TECHNICAL REPORT

Sea ice reports for the Antarctic shipping season 2016 - 2017

Prepared by Dr Jan L Lieser

Antarctic Climate & Ecosystems Cooperative Research Centre 2017

ACE CRC

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Sea ice reports for the Antarctic shipping season 2016–2017

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Cover photo: RS49978 - *Aurora Australis* aerial, 20 November 2016
Doug Thost/Australian Antarctic Division

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This research was also supported under Australian Research Council's Special Research Initiative for Antarctic Gateway Partnership (Project ID SR140300001).

Executive summary

The sea-ice reports compiled in this document are weekly reports on sea-ice conditions for East Antarctica, including sub-weekly updates. They were prepared to support ship operations in East Antarctica during the 2016/2017 shipping season. These reports were primarily used to inform the Australian Antarctic program, but were partly provided to other Antarctic operators as well. In particular, we assisted the Chinese National Antarctic Research Expeditions (RSV *Xue Long*), the Australian Marine National Facility (RV *Investigator*) and a commercial fishing operator.

Throughout the season, the focus of individual reports shifts with the main purpose of specific voyages of the Australian Antarctic research and supply vessel *Aurora Australis* and other customer requirements. The Antarctic voyages of RSV *Aurora Australis* in the 2016/2017 season were:

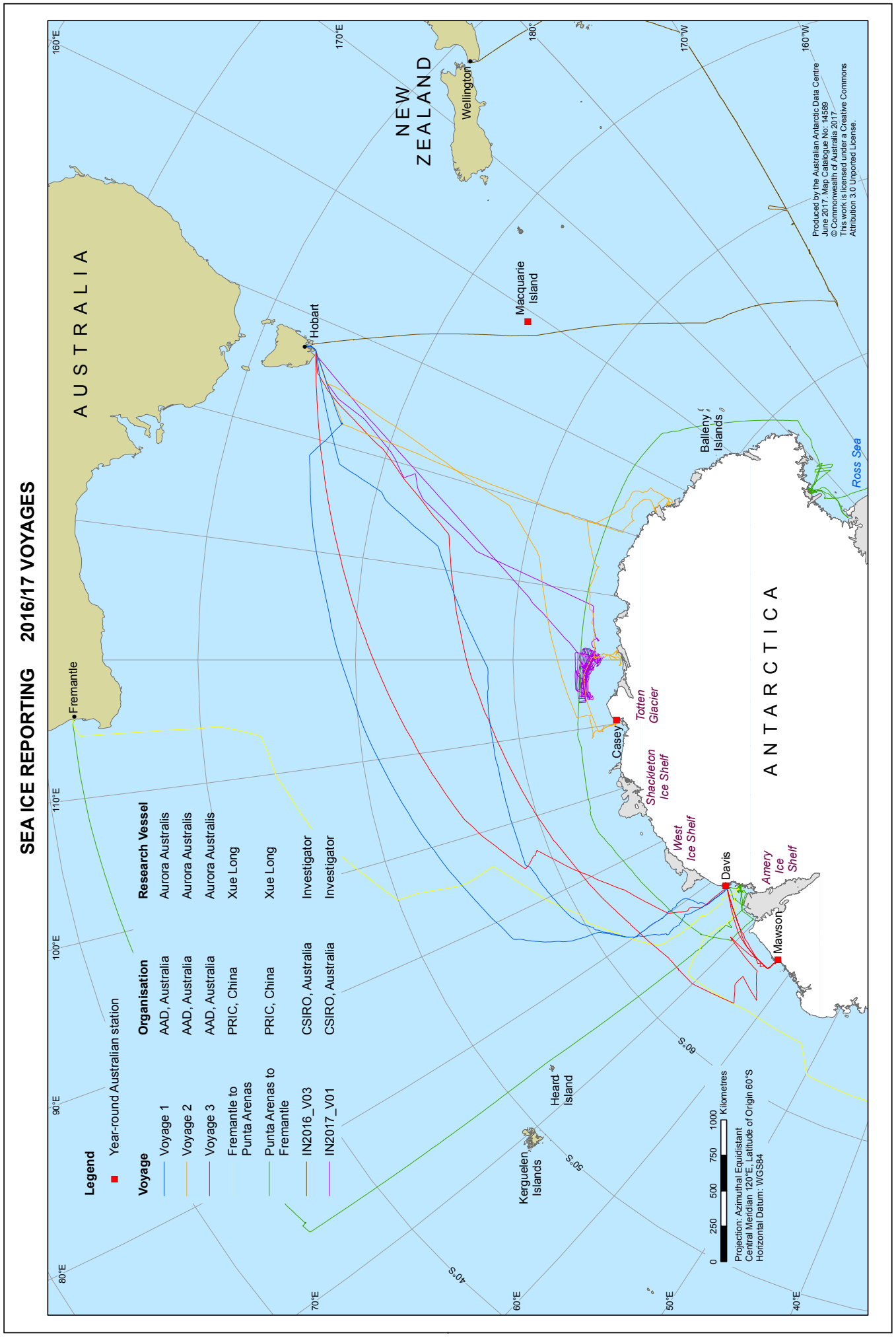
No.	Leave port	Main Purpose	Return
V1	27/10/2016	Davis Station resupply	03/12/2016
V2	08/12/2016	Casey Station resupply; Marine science	21/01/2017
V3	25/01/2017	Mawson Station resupply	11/03/2017

From January to August of 2016, pan-Antarctic sea-ice extent and area followed closely the long-term average. On 17/02/2016, sea-ice extent reached its annual minimum at 2.6×10^6 km^2. But on 28/08/2016, sea-ice extent peaked at 18.5×10^6 km^2 — roughly four weeks early, the earliest occurrence of a sea-ice extent maximum on record. Thereafter, the rate of sea-ice decline was largely average, but due to the early timing new record monthly lows of sea-ice extent and area were observed throughout spring and early summer of 2016. However, these overall figures do not reflect regional variability and local features like the occurrence of the Maud Rise polynya, which was relatively short-lived (two days) in 2016 but followed by a much larger Cosmonaut Sea polynya that lasted almost three weeks, in August. Also, after the 2015 El Niño event, Antarctic climate anomalies showed a strongly positive Southern Annular Mode (SAM) index, which was reversed to a strongly negative index, by austral spring. The detection and attribution of cause and effect of this complex variability is subject of ongoing research.

About this report

This compilation report is the sixth volume of sea-ice reports prepared by the Sea Ice Service of the Australian Research Council's Special Research Initiative for Antarctic Gateway Partnership and is supported by the sea-ice group of the Antarctic Climate & Ecosystems Cooperative Research Centre and the Australian Antarctic Division. The first report of this compilation was issued in calendar week 15 of 2016, after the 2015/2016 shipping season ended in March 2016.

Previous reports are available from the Manager Communications, Antarctic Climate & Ecosystems Cooperative Research Centre (see inside cover for details).


SEA ICE REPORTING 2016/17 VOYAGES
Legend
Year-round Australian station
Voyage
Organisation
Research Vessel
Voyage 1 AAD, Australia Aurora Australis
Voyage 2 AAD, Australia Aurora Australis
Voyage 3 AAD, Australia Aurora Australis
Fremantle to Punta Arenas PRIC, China Xue Long
Punta Arenas to Fremantle PRIC, China Xue Long
IN2016_V03 CSIRO, Australia Investigator
IN2017_V01 CSIRO, Australia Investigator
AUSTRALIA
NEW ZEALAND
ANTARCTICA
Fremantle
Hobart
Wellington
Macquarie Island
Balleny Islands
Ross Sea
Casey
Totten Glacier
Shackleton Ice Shelf
West Ice Shelf
Davis
Amery Ice Shelf
Mawson
Heard Island
Kerguelen Islands
Projection: Azimuthal Equidistant
Central Meridian 120°E, Latitude of Origin 60°S
Horizontal Datum: WGS84
0 250 500 750 1000 Kilometres
Produced by the Australian Antarctic Data Centre
June 2017. Map Catalogue No: 14589
© Commonwealth of Australia 2017
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Contents

Frequently used acronyms

AMSR-2	Advanced Microwave Scanning Radiometer 2
BoM	Bureau of Meteorology (AUS)
ESA	European Space Agency
GMRT	Global Multi-Resolution Topography
IBCSO	International Bathymetric Chart of the Southern Ocean
ICDC	Integrated Climate Data Centre, University of Hamburg
JAXA	Japan Aerospace Exploration Agency
MODIS	Moderate Resolution Imaging Spectroradiometer
NASA	National Aeronautics and Space Administration (USA)
NSIDC	National Snow and Ice Data Center (USA)
OLI	Operational Land Imager (scientific payload on Landsat-8 satellite)
SAR	Synthetic Aperture RADAR
Suomi NPP	Suomi National Polar-orbiting Partnership
TIR	Thermal Infrared spectrum
USGS	United States Geological Survey (USA)
VIIRS	Visible Infrared Imaging Radionmeter Suite

Sea Ice Report #15.1/2016

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

08/04/2016

Lützow-Holm Bay

A high resolution SAR scene of the region is shown in Figure 1. A gradual southward retreat of the fast-ice edge was observed throughout March. The red scribble line marks the fast-ice edge on 14/03/2016. However, on 02 April large areas of fast ice broke away (since 14/03/2016 roughly 800 km^2) exposing the front of Shirase Glacier to the open ocean.

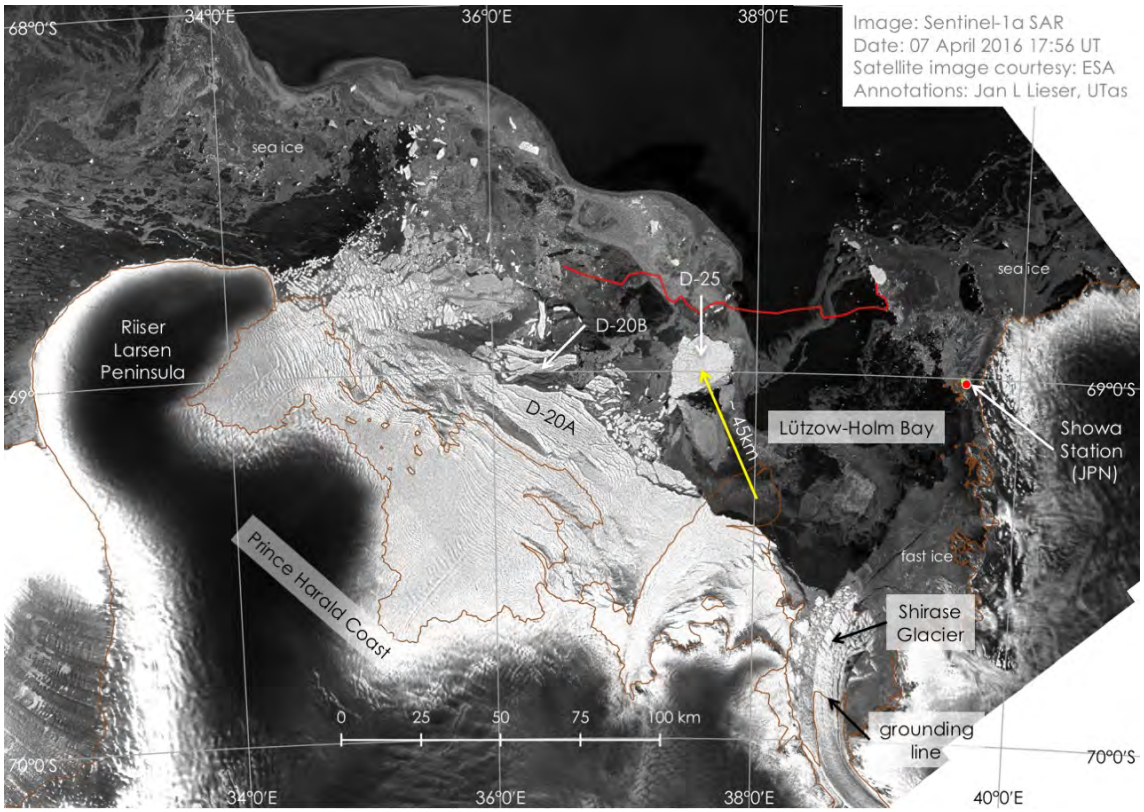

Figure 1: Sentinel-1a SAR scene, acquired 07/04/2016 and provided by PolarView.

A day earlier (01/04/2016), iceberg D-25 calved from its parent glacier and has since travelled about 45 km in northwestward direction (yellow arrow in Figure 1). During the same time (the last week), the northern part of Shirase Glacier (north of the grounding line) has progressed 200 m to 250 m northward. This could be regarded as significant considering flow velocities downstream (north) of the grounding line have previously been reported as high as 45 m to 55 m per week.

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Prydz Bay

A high-resolution SAR scene of northeastern Prydz Bay is shown in Figure 2. Yellow arrows indicate net displacement of large tabular icebergs since 02/03/2016 (120 h).

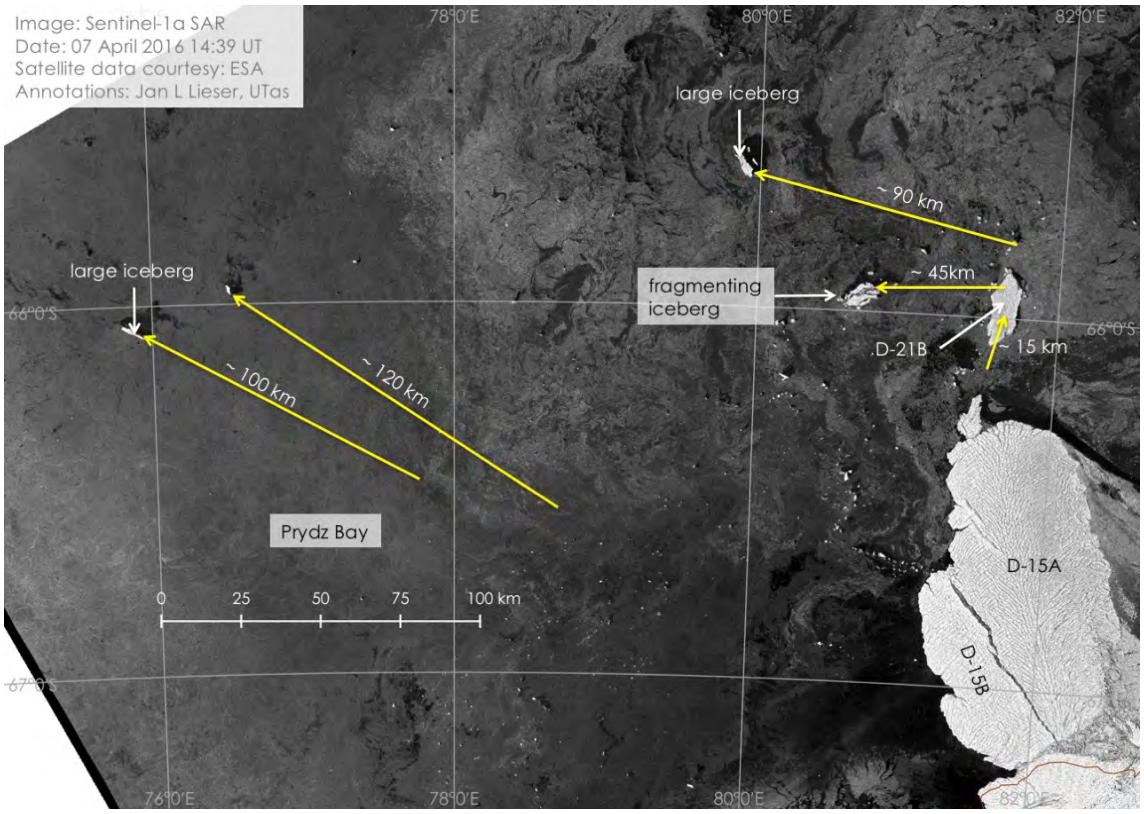

Figure 2: Sentinel-1a SAR scene, acquired 07/04/2016 and provided by PolarView.

Three of the four icebergs of the row of icebergs that used to sit north of D-15A appear dislodged, with D-21B moving northward and the other two drifting west with the prevailing currents. It is interesting to note that the former middle iceberg of the troika is disintegrating into smaller bergs.

Sea Ice Report #19.1/2016

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

02/05/2016

170° E

Figure 1 shows a sea-ice concentration map with an overlay of a high-resolution SAR scene, for the region of the sea-ice edge around 170° E.

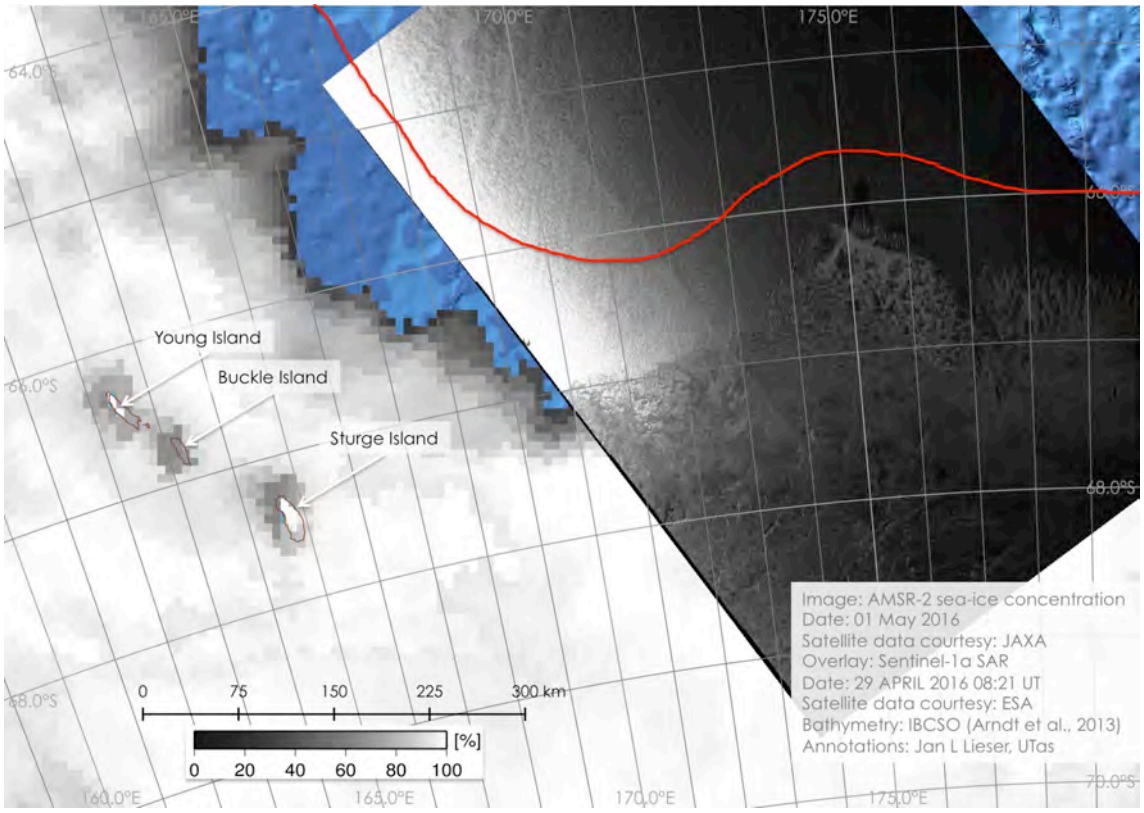

Figure 1: AMSR-2 sea-ice concentration, acquired 01/05/2016 and provided by Drift & Noise Polar Services; and Sentinel-1a SAR scene, acquired 29/04/2016 and provided by PolarView.

In the figure, the red scribble line indicates a boundary south of which some sea ice can reasonably be expected. Based on daily microwave (AMSR-2) derived sea-ice concentration charts, the sea-ice edge has advanced roughly 50 nautical miles northward, during the last week.

While the sea-ice edge appears well defined in the figure, prevailing southerly winds expected during the coming few days will aid the further northward spreading of sea ice, likely in the form of strips and patches.

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Sea Ice Report #19.2/2016

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

02/05/2016

170° W

Figure 1 shows a sea-ice concentration map with an overlay of a high-resolution SAR scene, for the region of the sea-ice edge around 170° W.

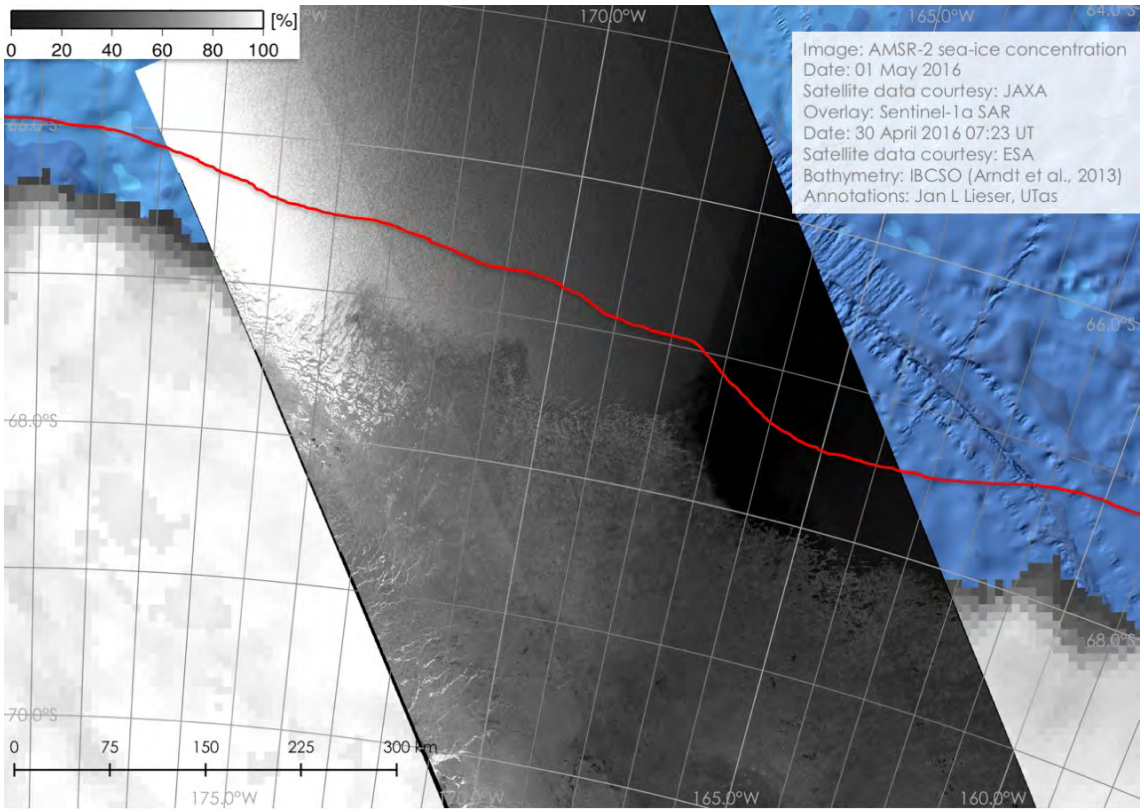

Figure 1: AMSR-2 sea-ice concentration, acquired 01/05/2016 and provided by Drift & Noise Polar Services; and Sentinel-1a SAR scene, acquired 30/04/2016 and provided by PolarView.

In the figure, the red scribble line indicates a boundary south of which some sea ice can reasonably be expected. Based on daily microwave (AMSR-2) derived sea-ice concentration charts, the sea-ice edge has advanced roughly 30 nautical miles northward, during the last week.

The sea-ice edge appears slightly diffuse in the figure and steady southerly winds expected during the coming few days will assist with the further northward spreading of sea ice, likely in the form of strips and patches.

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Sea Ice Report #19.3/2016

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

04/05/2016

170° W

Figure 1 shows a sea-ice concentration map with an overlay of a high-resolution SAR scene, for the region of the sea-ice edge around 170° W.

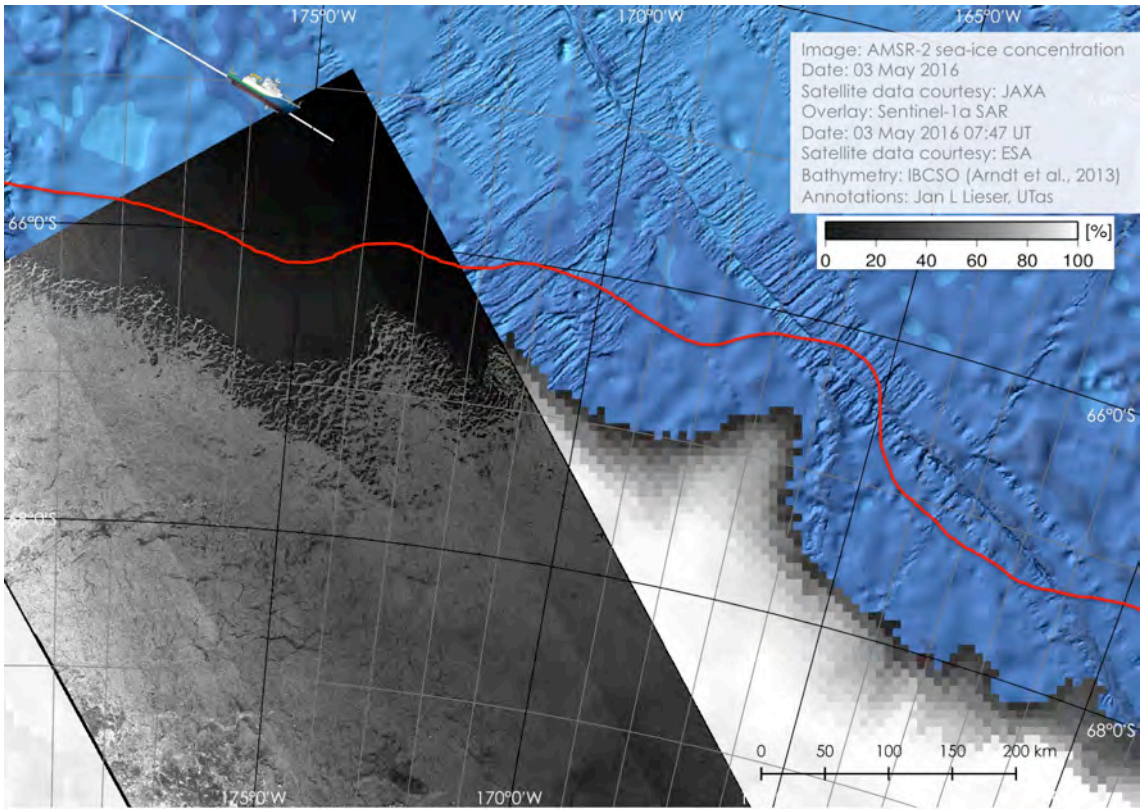

Figure 1: AMSR-2 sea-ice concentration, acquired 03/05/2016 and provided by Drift & Noise Polar Services; and Sentinel-1a SAR scene, acquired 03/05/2016 and provided by PolarView.

In the figure, the white line shows the cruise track of RV *Investigator* (until 03/05/16 22:00 UT) and the red scribble line indicates a boundary south of which some sea ice can reasonably be expected.
The sea-ice edge appears slightly diffuse in the figure, spanning up to 30 nautical miles in north-south direction (at 174° W) before some higher sea-ice concentration (> 80%) occurs.
Continuing southerly winds will assist with spreading the sea-ice edge further northward, before a change to southerly and easterly winds might compact the edge southward again.

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Sea Ice Report #19.4/2016

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

06/05/2016

170° W

Figure 1 shows a sea-ice concentration map, for the region of the sea-ice edge around 170° W.

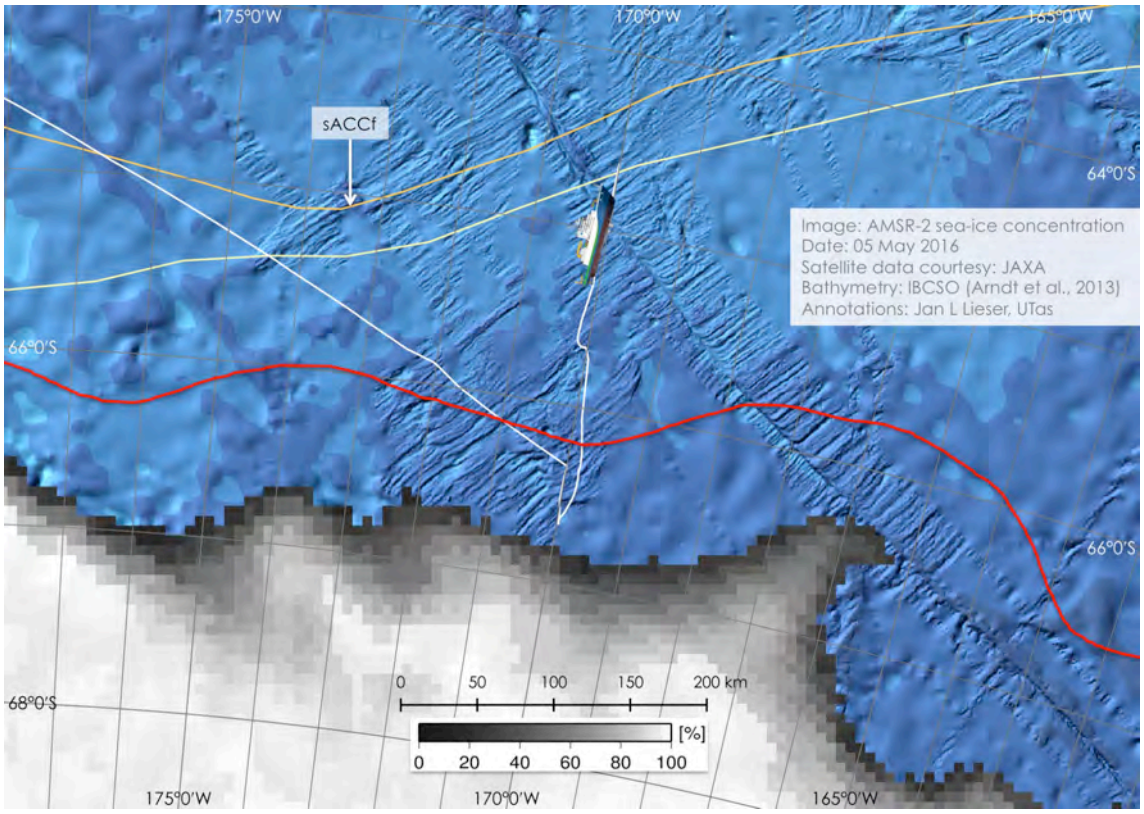

Figure 1: AMSR-2 sea-ice concentration, acquired 05/05/2016 and provided by Drift & Noise Polar Services;

In the figure, the white line shows the cruise track of RV *Investigator* (until 05/05/16 20:00 UT) and the red scribble line indicates a boundary south of which some sea ice can reasonably be expected. The yellow line indicates the southern boundary of the Antarctic Circumpolar Current (ACC) and the orange line the southern ACC front (sACCf).
After a brief northward excursion of the sea-ice edge on 04/05/16 under low southerly winds, the edge appears now pushed southward again with a low pressure system approaching from the west. However, the marginal ice zone (sea-ice concentration < 50%) is still up to 30 nautical miles (north-south direction) wide.

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Sea Ice Report #23.1/2016

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

03/06/2016

Prydz Bay

Figure 1 shows a high-resolution SAR scene of Prydz Bay. The eastern half is mainly occupied by first year sea ice as growing floes. Off the Amery Ice Shelf, a large polynya can be seen and further west fast ice is growing, around Cape Darnley. Fast ice is also present offshore the Vestfold Hills (Davis Station), with a flaw lead between the fast ice and the pack ice.

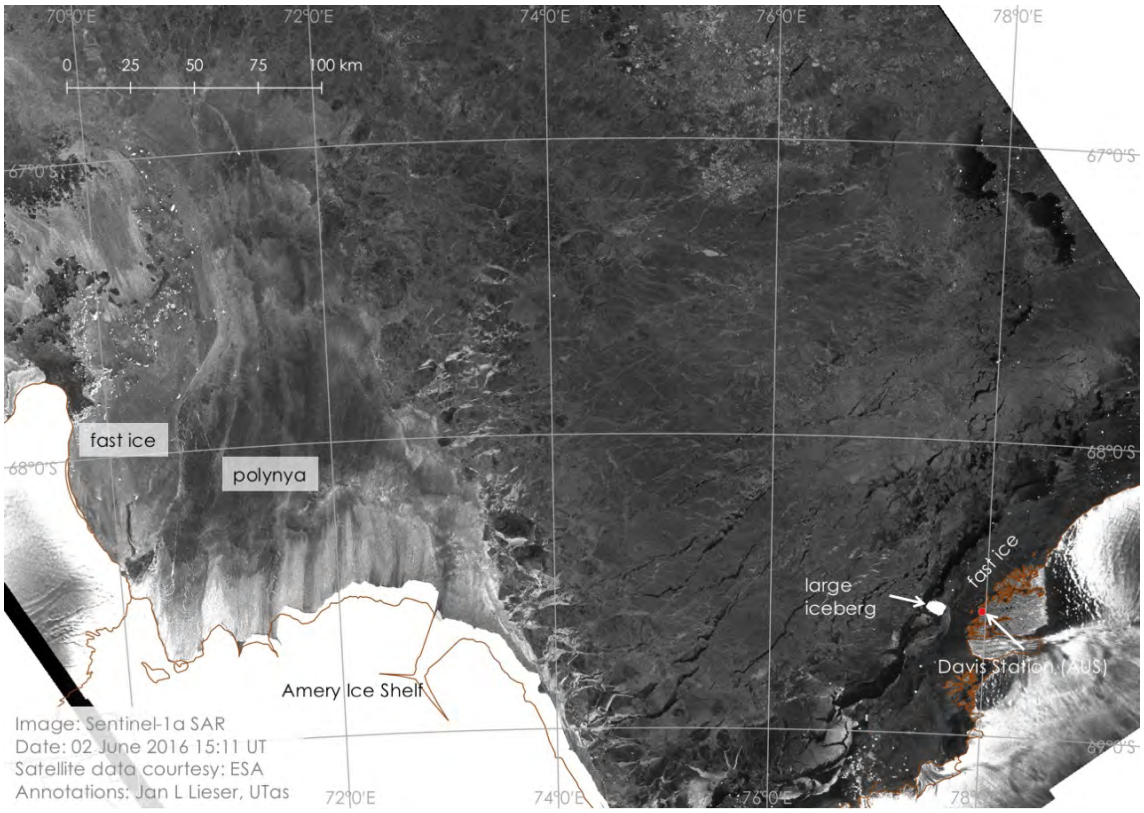

Figure 1: Sentinel-1a SAR, acquired 02/06/2016 and provided by PolarView.

North of 67° S and around 76° E, second-year sea-ice floes can be seen as brighter spots. It is a southward loop of a band of old sea ice moving into Prydz Bay from the east, around icebergs D-15A & B (outside Figure 1), and continuing northwestward (also outside the figure).

A large iceberg, which is grounded off Davis Station, has moved very slightly during the previous four weeks, roughly 10° in clockwise direction.

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D-15

Of curious note is the break-up of an iceberg, which is grounded immediately north of D-15A (Figure 2). The shape of the berg on 24/04/16 is given by the red outline in the figure. It appears to be a continuation of local iceberg movements, as reported in Sea Ice Report #15.1.

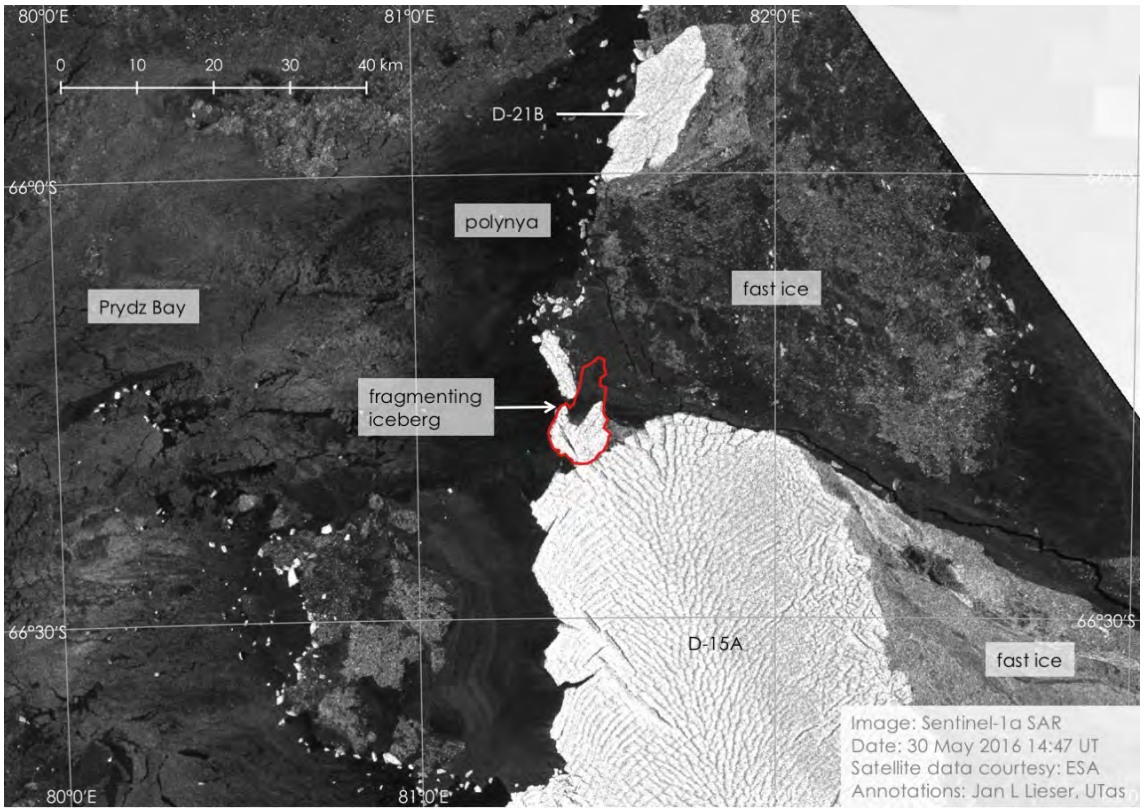

Figure 2: Sentinel-1a SAR, acquired 30/05/2016 and provided by PolarView.

Sabrina Coast

A SAR scene of the sea-ice zone off Sabrina Coast is provided with Figure 3. The yellow scribble line indicates the median sea-ice extent for May, in the region. The current sea-ice extent is below (south of) this median. West of the Dalton Iceberg Tongue, a polynya can be identified as very active, with new sea ice accumulating east of the perennial fast ice attached to the north-eastern flank of Law Dome.

In Figure 3, the black/white frame shows the rough location of the scene of Figure 4. The location of Henry and Chick islands is given by the yellow and orange dot, respectively, in both figures. Near-shore fast ice appears attached to the northern side of Moscow University Ice Shelf. The fast-ice edge is approximated by the red scribble line (Figure 4).

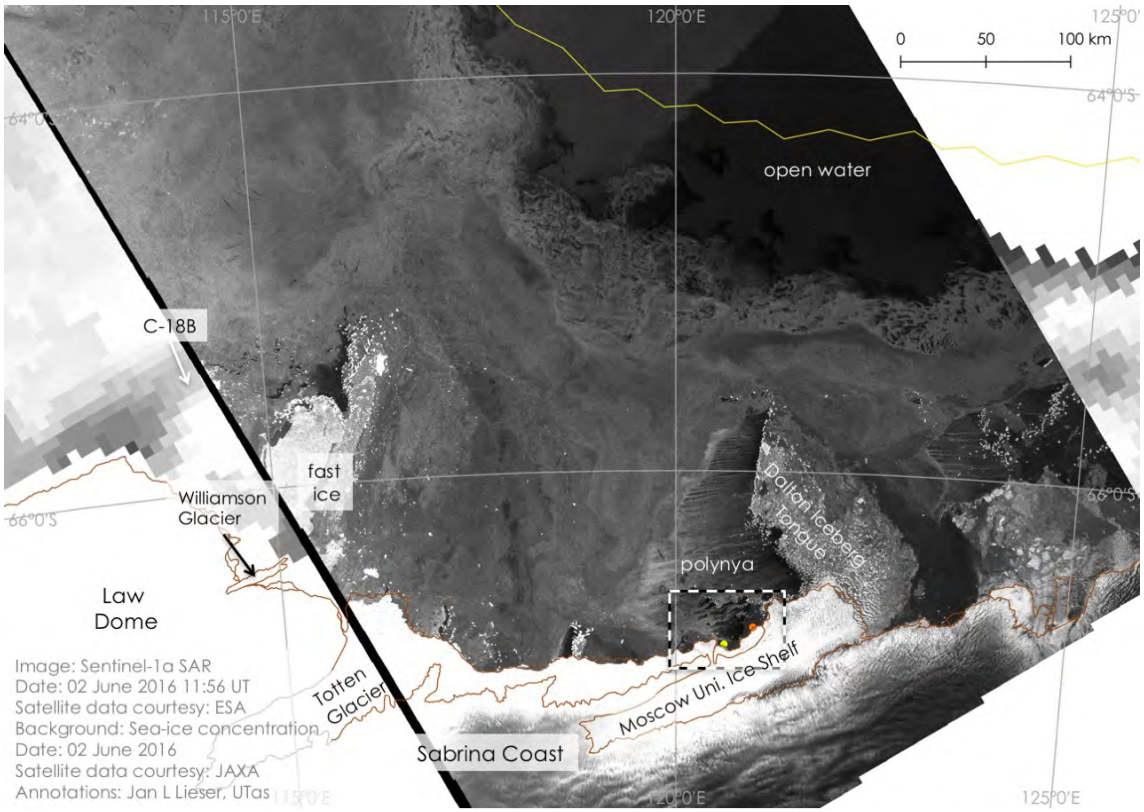

Figure 3: Sentinel-1a SAR, acquired 02/06/2016 and provided by PolarView.

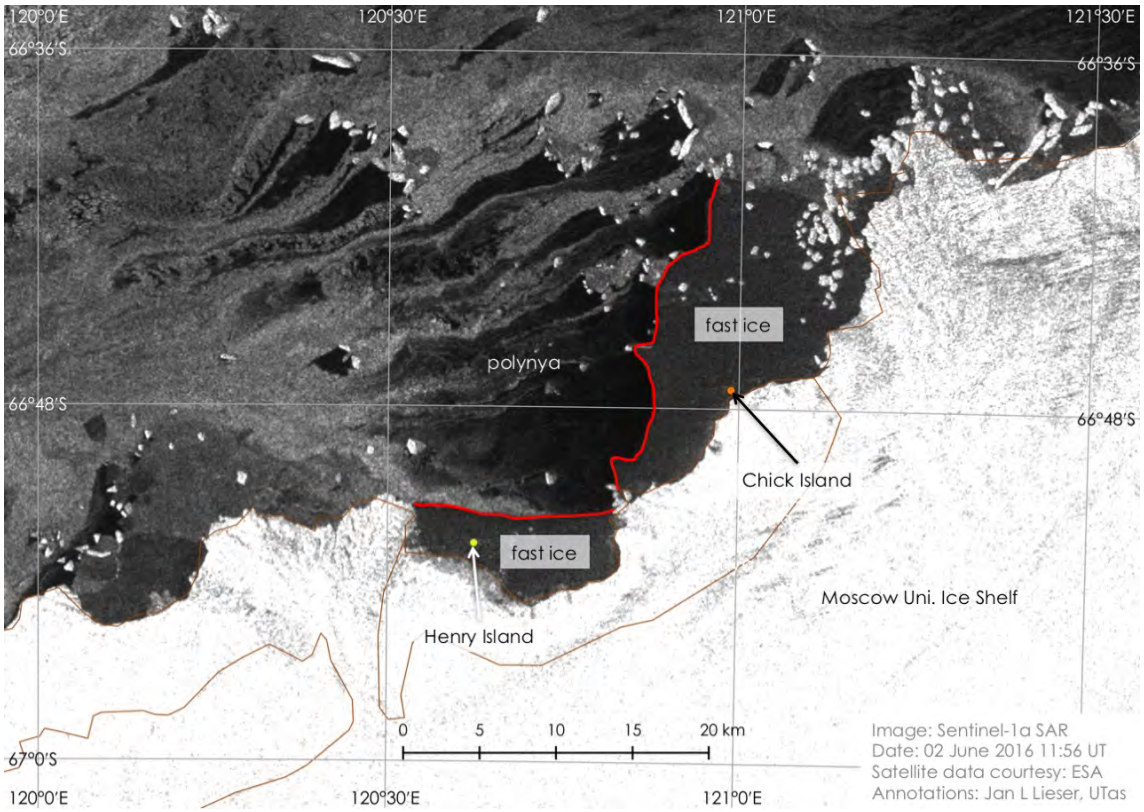

Figure 4: Sentinel-1a SAR, acquired 02/06/2016 and provided by PolarView.

Sea Ice Report #24.1/2016

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

06/06/2016

East Antarctica

Figure 1 shows RADAR backscatter (represented as grey scale) from the Advanced Scatterometer (ASCAT), a real aperture RADAR (in contrast to synthetic aperture RADAR, SAR) on-board the European METOP satellite, operated by EUMETSAT. It provides a daily, pan-Antarctic view irrespective of cloud cover and sunlight, with the caveat of rhombus-shaped areas over the ocean that are not covered by the instrument due to the nature of its operation. The data are typically used to determine the sea-ice edge and to locate large icebergs.

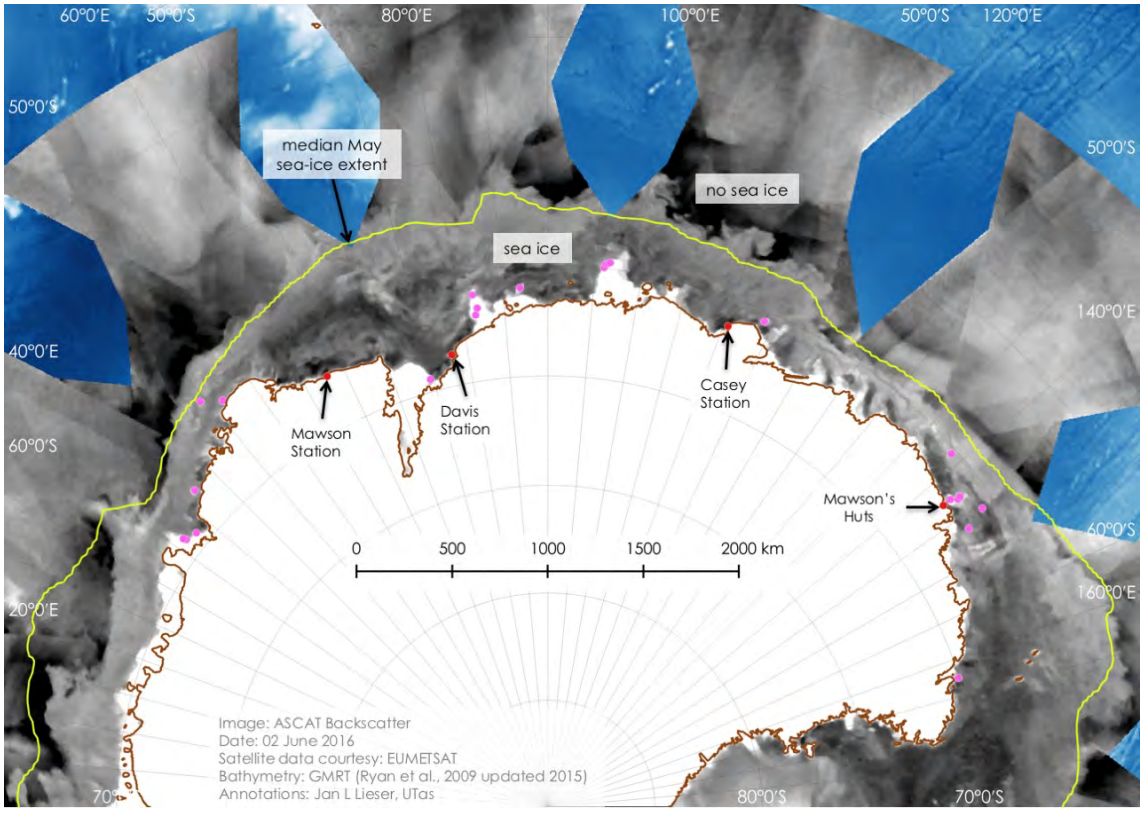

Figure 1: ASCAT backscatter, acquired 02/06/2016 and provided by Brigham Young University.

Also shown in the figure is the median sea-ice extent for May as a yellow scribble line, and the positions of large tabular icebergs (larger than 5 nautical miles across) as pink dots.

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While overall, the Antarctic sea-ice extent tracks slightly below the long-term mean, the figure highlights that this is not uniformly the case, around the continent. West of roughly 30° E, the current extent is far below (south of) the median, whereas for the rest of East Antarctica the sea-ice extent appears to meander around the median. But we note northward excursions of sea ice roughly between 80° E and 100° E and off the western Ross Sea.

Sea Ice Report #24.2/2016

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

09/06/2016

East Antarctica

Figure 1 shows a high-resolution (3.125 km) sea-ice concentration chart, for East Antarctica, together with the median sea-ice extent for June, as a yellow scribble line, and the positions of large tabular icebergs (larger than 5 nautical miles across) as pink dots.

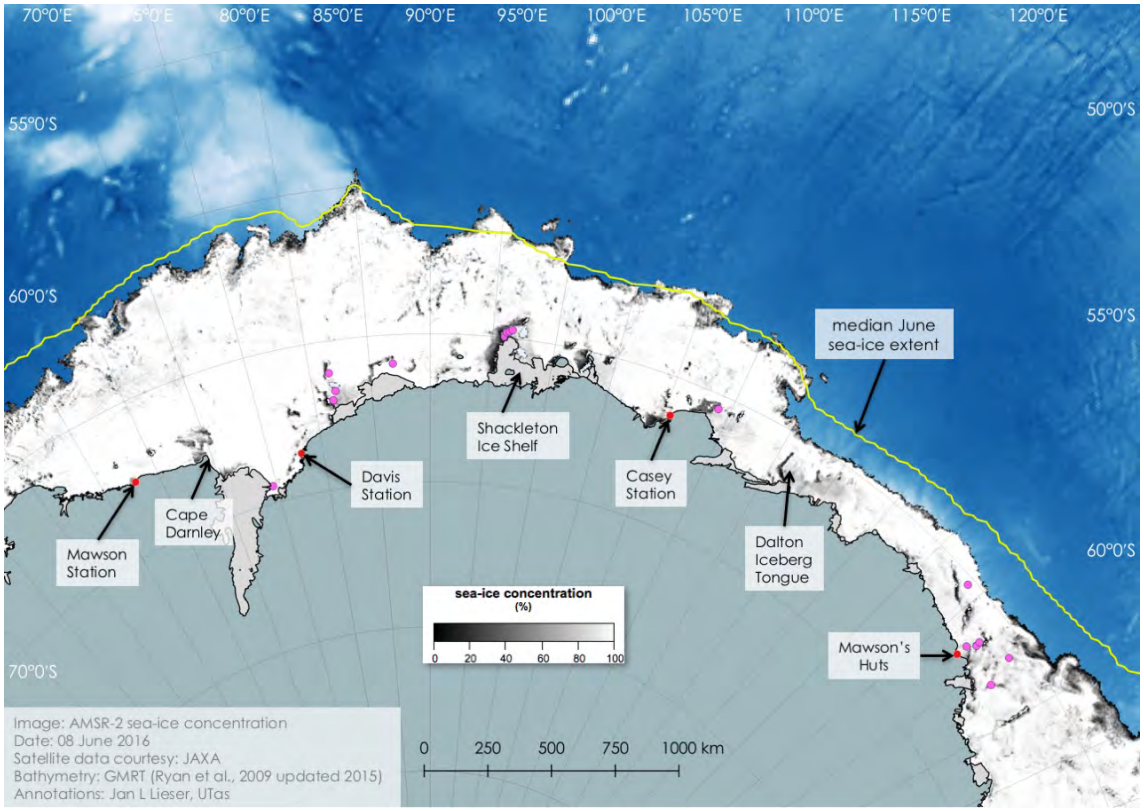

Figure 1: AMSR-2 sea-ice concentration, acquired 08/06/2016 and provided by Universität Hamburg.

Overall, the pan-Antarctic sea-ice extent remains slightly below the long-term average, but is still showing increasing trend.
The high resolution of the data presented in Figure 1 brings out some low sea-ice concentration areas that are typically west of prominent, permanent ice features such as fast ice off Cape Darnley, or the Shackleton Ice Shelf, including the group of large iceberg grounded north of it, or the distinctive hook shape west of the Dalton Iceberg Tongue.

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Sea Ice Report #25.1/2016

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

15/06/2016

East Antarctica

Figure 1 shows a high-resolution (3.125 km) sea-ice concentration chart, for East Antarctica, together with the median sea-ice extent for June, as a yellow scribble line, and the positions of large tabular icebergs (larger than 5 nautical miles across) as pink dots.

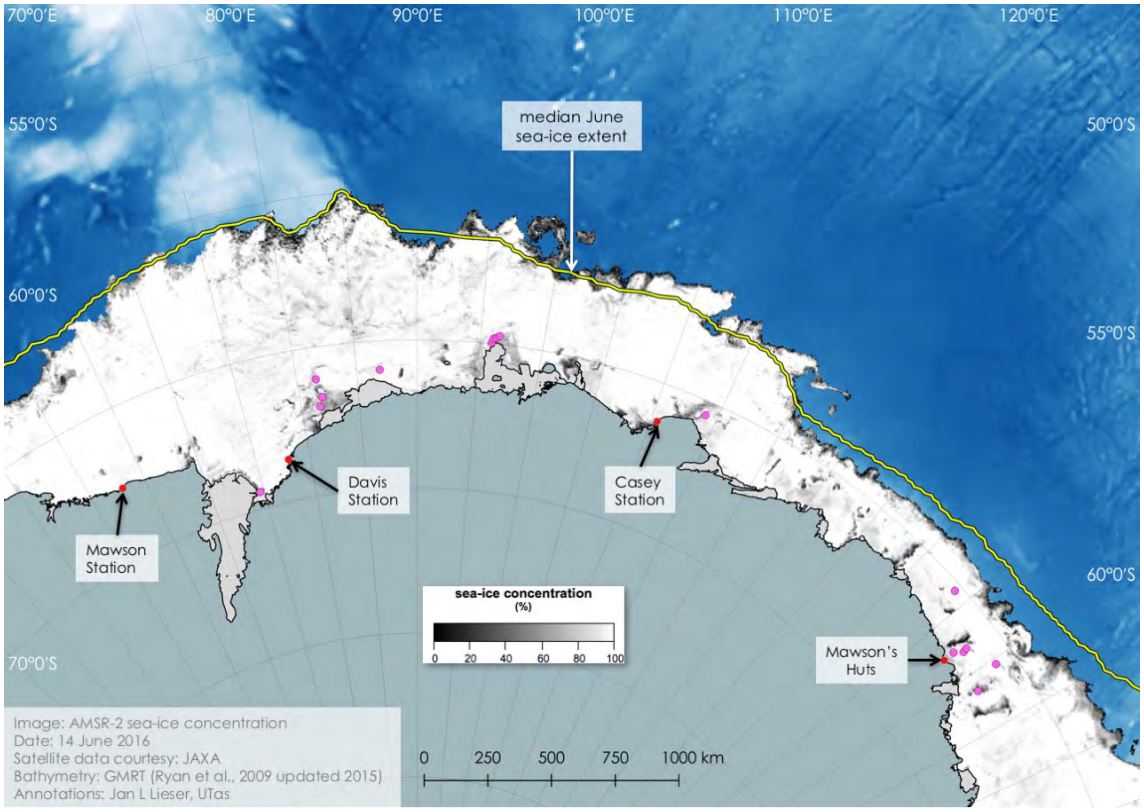

Figure 1: AMSR-2 sea-ice concentration, acquired 14/06/2016 and provided by Universität Hamburg.

The pan-Antarctic sea-ice extent is still growing, but remains slightly below the long-term average.

In east Antarctica, most of the coastal polynyas are increasingly frozen over, even though the differing ice types can still be distinguished in the RADAR data (see Figures 2 and 3).

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Davis Station

Off Davis Station, a large iceberg can still be clearly identified in the RADAR image (Figure 2) as a white spot.

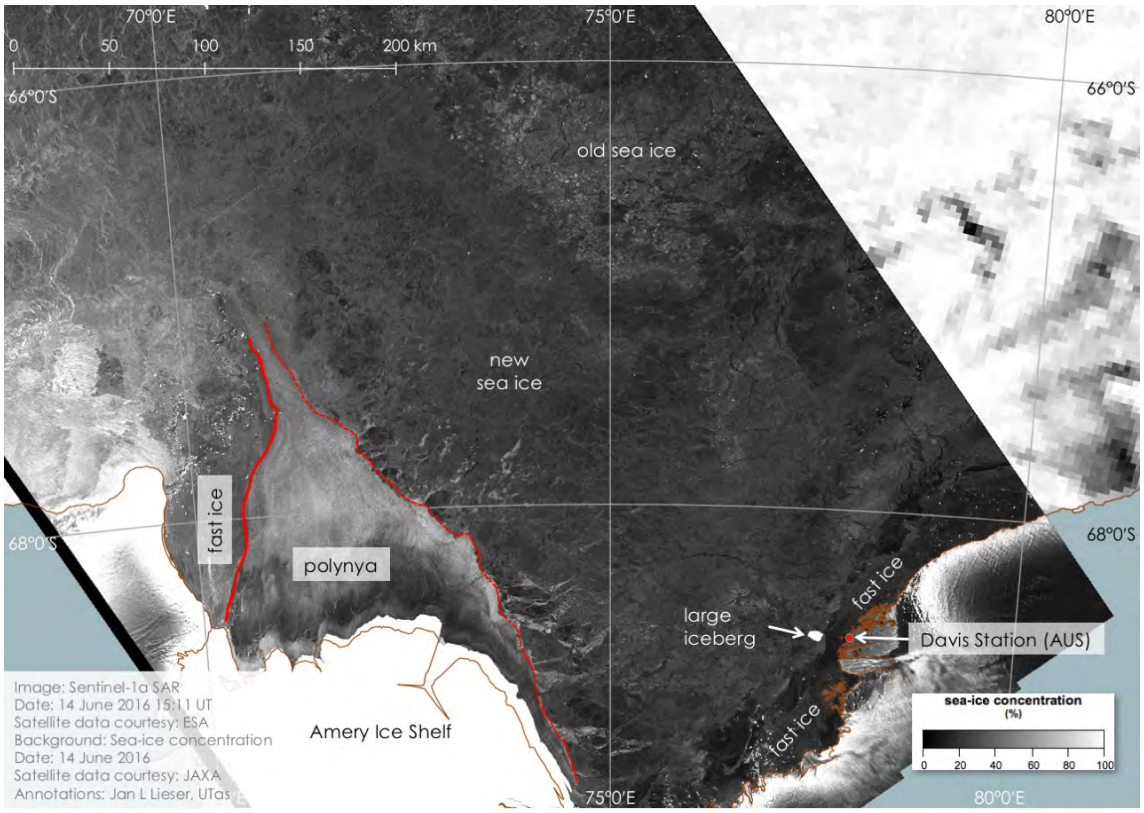

Figure 2: Sentinel-1a SAR, acquired 14/06/2016 and provided by PolarView. Complemented by AMSR-2 sea-ice concentration, acquired 14/06/2016 and provided by Universität Hamburg.

Prydz Bay is covered by a mixture of different sea-ice types. Old and new sea ice is present in the central part. The polynya off Amery Ice Shelf is now completely covered by sea ice, but its distinctive structure is still clearly distinguishable. The upside-down funnel shape is marked in Figure 2 with red scribble lines, a solid line at the western edge towards fast ice, a dashed line at the eastern edge towards pack ice.

Sabrina Coast

West of the Dalton Iceberg Tongue, the open water fraction of the polynya is reduced to a very narrow stretch showing up as a dark, north-south oriented patch (Figure 3).

North of the tongue, a band of high-concentration sea ice is only roughly 30 nautical miles wide (north-south), while the marginal ice zone is roughly 50 nautical miles wide (north-south). The boundary between these two ice regimes is approximated by the dashed, orange scribble line in Figure 3.

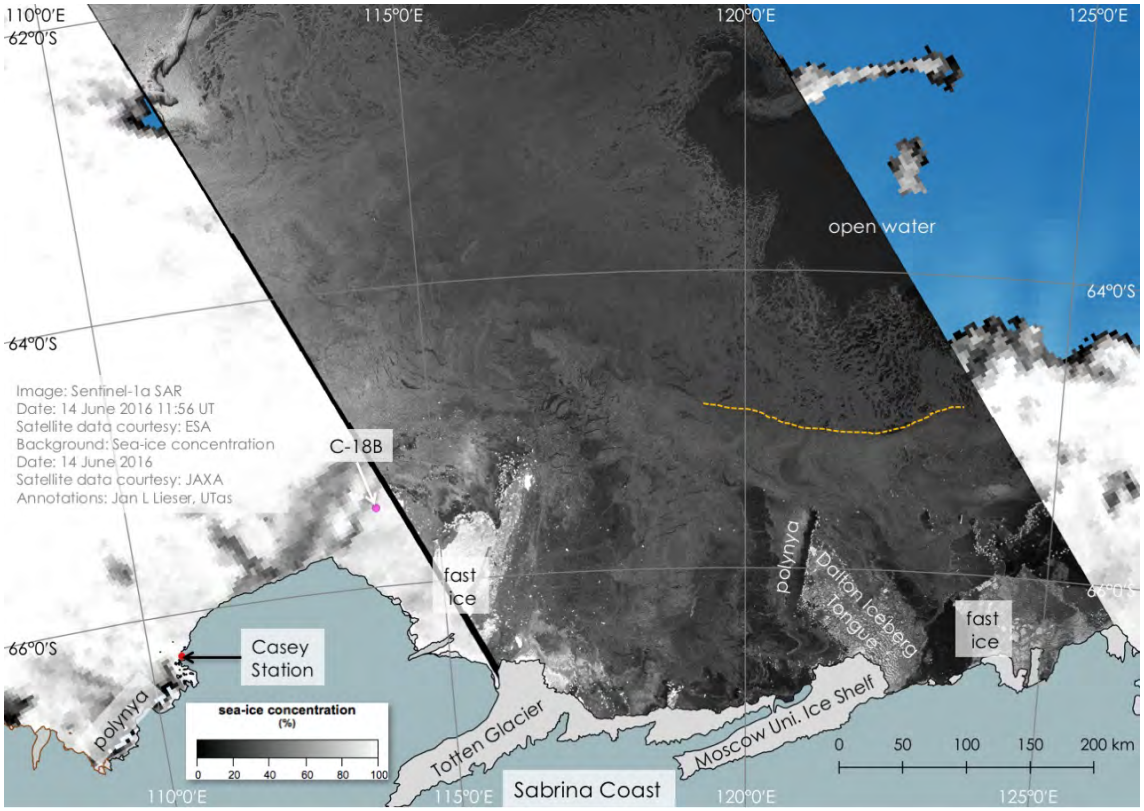

Figure 3: Sentinel-1a SAR, acquired 14/06/2016 and provided by PolarView. Complemented by AMSR-2 sea-ice concentration, acquired 14/06/2016 and provided by Universität Hamburg.

Sea Ice Report #27.1/2016

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

01/07/2016

East Antarctica

Figure 1 shows a high-resolution (3.125 km) sea-ice concentration chart, for East Antarctica, together with the median sea-ice extent for June and July, as a thin and a thick orange scribble line, respectively. The positions of large tabular icebergs (larger than 5 nautical miles across) are marked with pink dots.

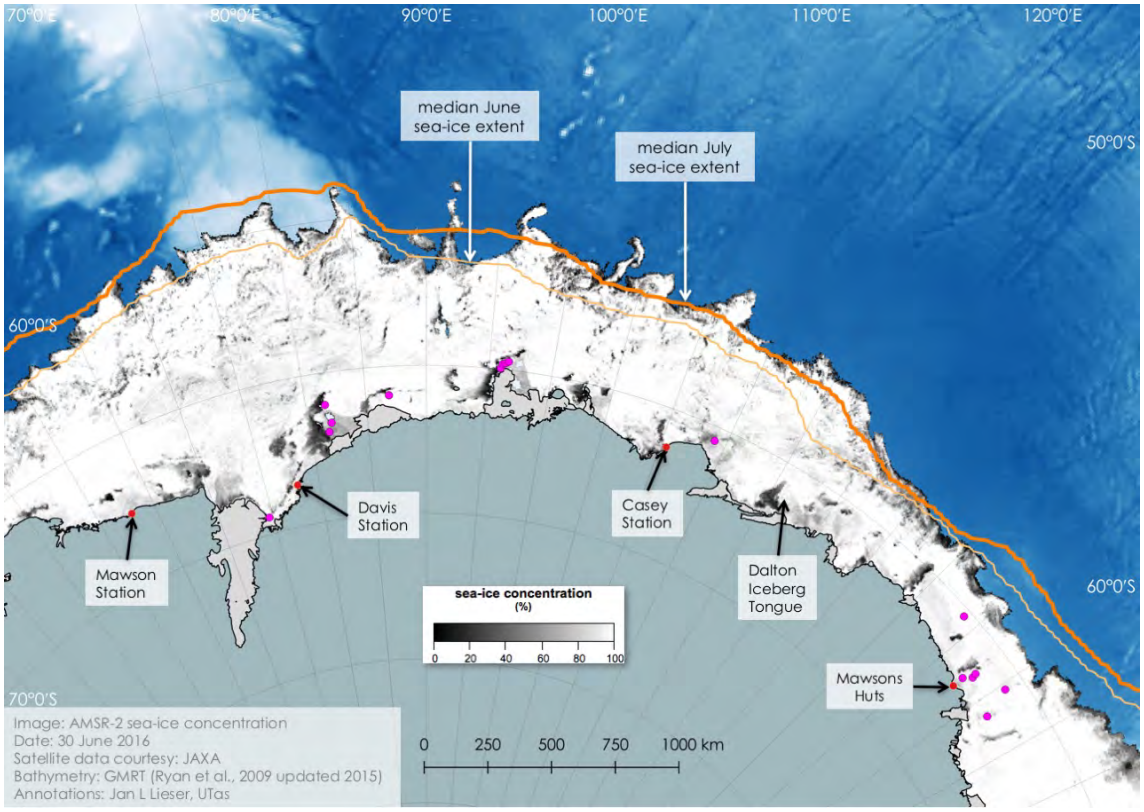

Figure 1: AMSR-2 sea-ice concentration, acquired 30/06/2016 and provided by Universität Hamburg.

Overall, the pan-Antarctic sea-ice extent is still growing, but on a daily basis, remains just below the long-term average.

Some recurring polynyas can be seen as low sea-ice concentration areas for example, off Mawson Station with open water roughly 45 nautical miles northwest of the station, the Dalton Iceberg Tongue polynya and a

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polynya west of the group of icebergs off Mawsons Huts, which appears like a displaced Mertz Glacier polynya. There are also a number of other recurring polynyas along the East Antarctic coast and elsewhere.

Davis Station

Off Davis Station, a large iceberg can still be clearly identified in the RADAR image (Figure 2) as a white spot.

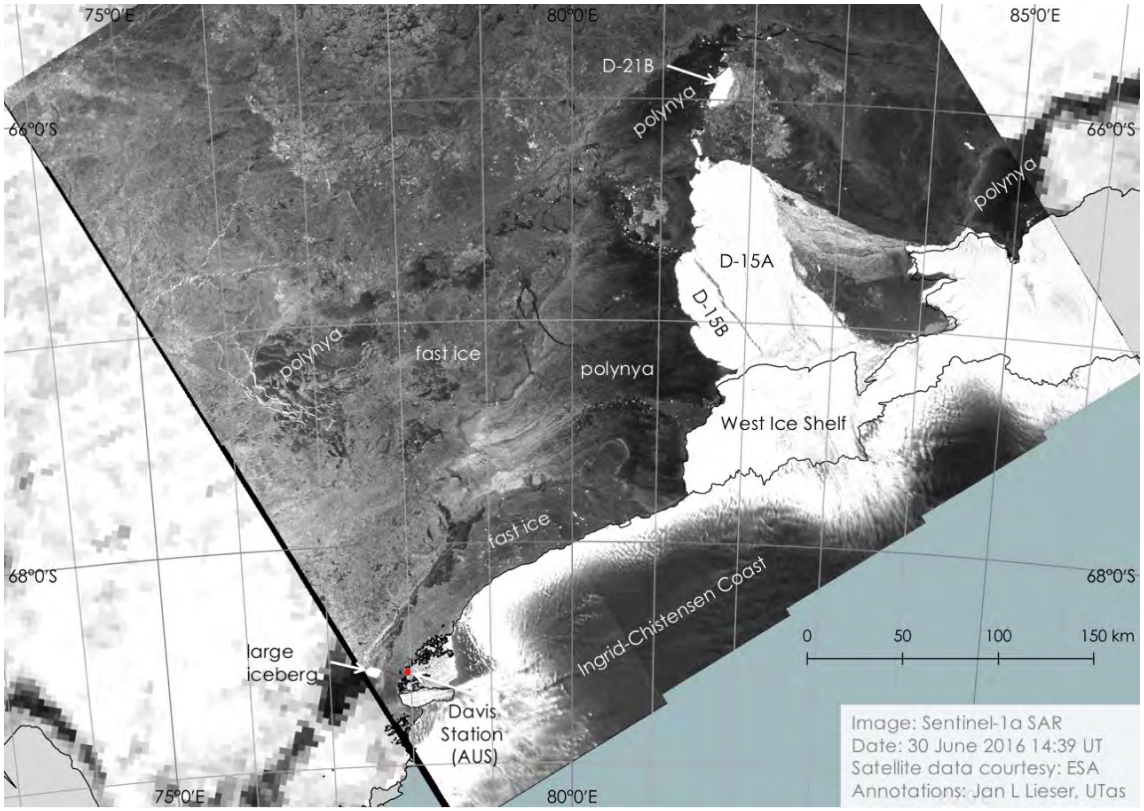

Figure 2: Sentinel-1a SAR, acquired 30/06/2016 and provided by PolarView. Complemented by AMSR-2 sea-ice concentration, acquired 30/06/2016 and provided by Universität Hamburg (see Figure 1).

Off the West Ice Shelf, a large region of open water west of icebergs D-15A and D-15B abounds and a smaller polynya west of iceberg D-21B, a bit further north. Along Ingrid-Christensen Coast (Davis Station), a flaw lead following the fast-ice edge is apparent, all the way to the Amery Ice Shelf (in the southwest corner of Figure 2). There is also an area of reduced sea-ice concentration within the pack ice at roughly 77° E and 67° S. (Compare Figure 1 for all the above mentioned reduced sea-ice concentration features.)

Sea Ice Report #28.1/2016

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

08/07/2016

Antarctica

Figure 1 illustrates the June sea-ice concentration anomaly, that is the difference between the averaged sea-ice concentration for June 2016 and the long-term mean for June. Also shown is the median sea-ice extent for June as an orange scribble line. The positions of large tabular icebergs (larger than 5 nautical miles across) are marked with pink dots.

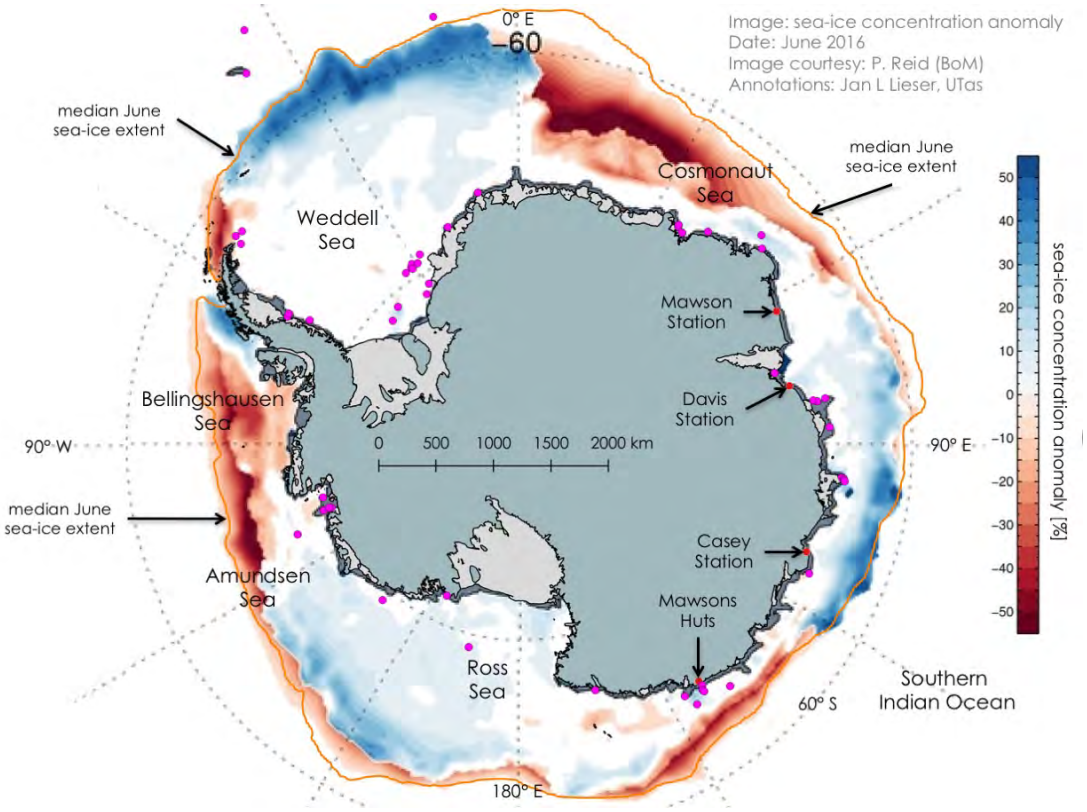

Figure 1: June sea-ice concentration anomaly, provided by P. Reid (Bureau of Meteorology).

While the pan-Antarctic sea-ice extent is still only very slightly below the long-term average (and growing), the concentration anomaly shows distinct regions of less than average sea-ice concentration (red) and more than average sea-ice concentration (blue). The pattern appears to be consistent with expected post-El Niño conditions.

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Sea Ice Report #29.1/2016

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

15/07/2016

This report covers a special interest in sea-ice conditions at the Bunger Hills.

Bunger Hills

Figure 1 shows an overview of typical late-spring/early-summer sea-ice conditions associated with the Shackleton Ice Shelf. Offshore winds have pushed the pack ice northward and a flaw lead has opened between the ice shelf and attached fast ice.

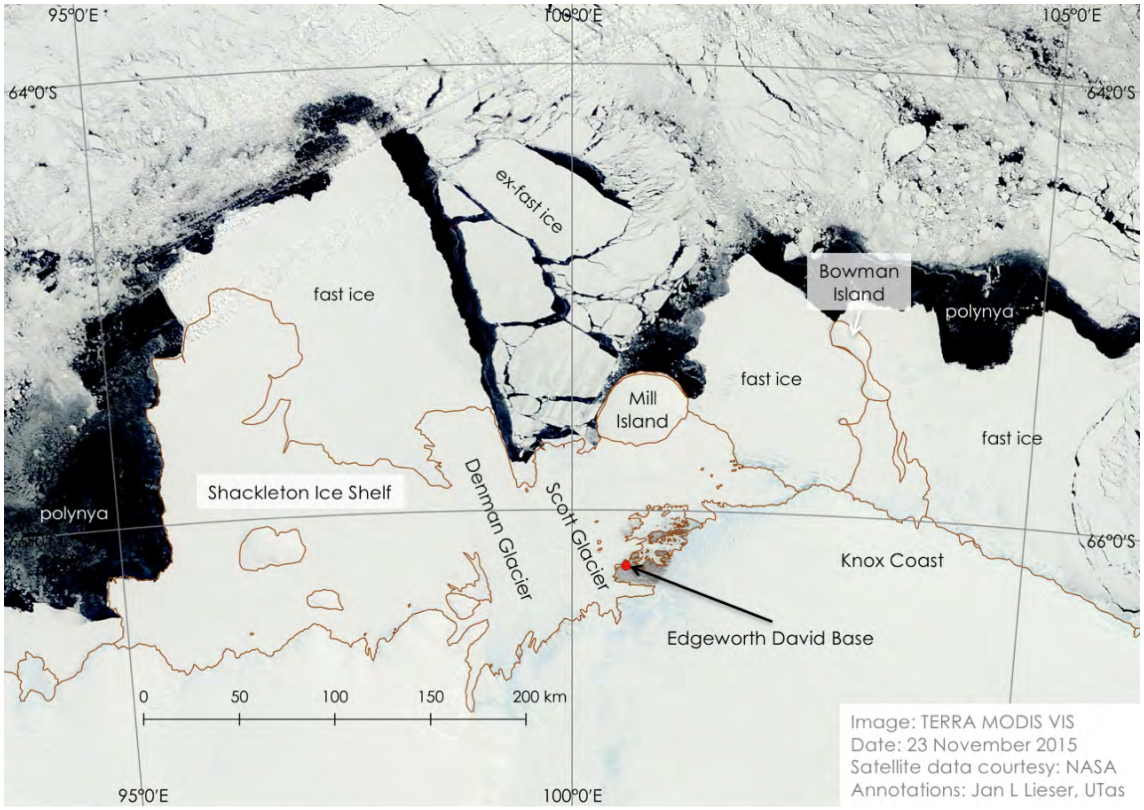

Figure 1: MODIS VIS scene, acquired 23/11/2015 and provided by NASA.

The following figures show detailed snapshots of ice around the Bunger Hllls, for late November 2015, mid January 2016 and end of June 2016. The Bunger Hills are a group of exposed rocks between the Antarctic ice cap of Knox Coast (seen as blue ice in the southeastern corner of Figures 2 and 4) and glaciers feeding the Shackleton Ice Shelf (Denman Glacier

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and Scott Glacier as main contributors). The Australian Edgeworth David Base is located in the southern part of the hills, on the shores of Transkriptsii Gulf.

Transkriptsii Gulf appears covered by fast ice year-round, as well as other areas around the Bunger Hills. The northern basin, Edisto Channel, displays a mixture of fast ice with some glacial ice fragments scattered in it, most likely from the Edisto Ice Tongue. This basin can sometimes have an open water surface during summer.

The fast ice of Transkriptsii Gulf appears with a flat surface, in the visible summer imagery. In late November, however, a cover of blown snow is present at the northern edge of the gulf, towards Krajnij Peninsula and further west against the side of Edisto Ice Tongue (Figure 3). In mid January, this snow cover is reduced and the majority of the gulf appears with a fast ice surface (Figure 5).

On the Edisto Ice Tongue, some puddles of surface melt water can be seen as blueish patches, north and west of Krajnij Peninsula and west of the rocks at 100° 28' 30" E and 66° 15' 30" S. A reduced snow cover of the Bunger Hills is seen in January when most of the snow on the surface of the rock has melted.

In winter, SAR data (Figures 6 and 7) provide a mixed signature, which indicates some surface roughness. A snow cover with varying surface topography is expected at this time of year.

The setting of Transkriptsii Gulf makes it difficult to judge the type of ice found in-situ, at the surface. While it is surrounded by rocks and an ice tongue, it is obvious to be landfast, but the surface of the gulf could be an accumulation of meltwater run-off from the hills in the southeast and/or glacial surface runoff from the ice tongue. Such phenomenon has been observed elsewhere in Antarctica, for example at Beaver Lake in the northern Prince Charles Mountains, west of the Amery Ice Shelf.

In summer, tide cracks have been observed on the shore of the gulf, which indicates some sub-surface connection with the ocean in the north. During winter, temperatures will be sufficient for sea ice to form underneath the surface (up until an equilibrium ice thickness is reached). It is not possible to judge the thickness of the ice of Transkriptsii Gulf from remote sensing data, nor the composition of the ice (that is to say, which proportion of the ice consists of fresh water ice and which proportion is made up from sea water).

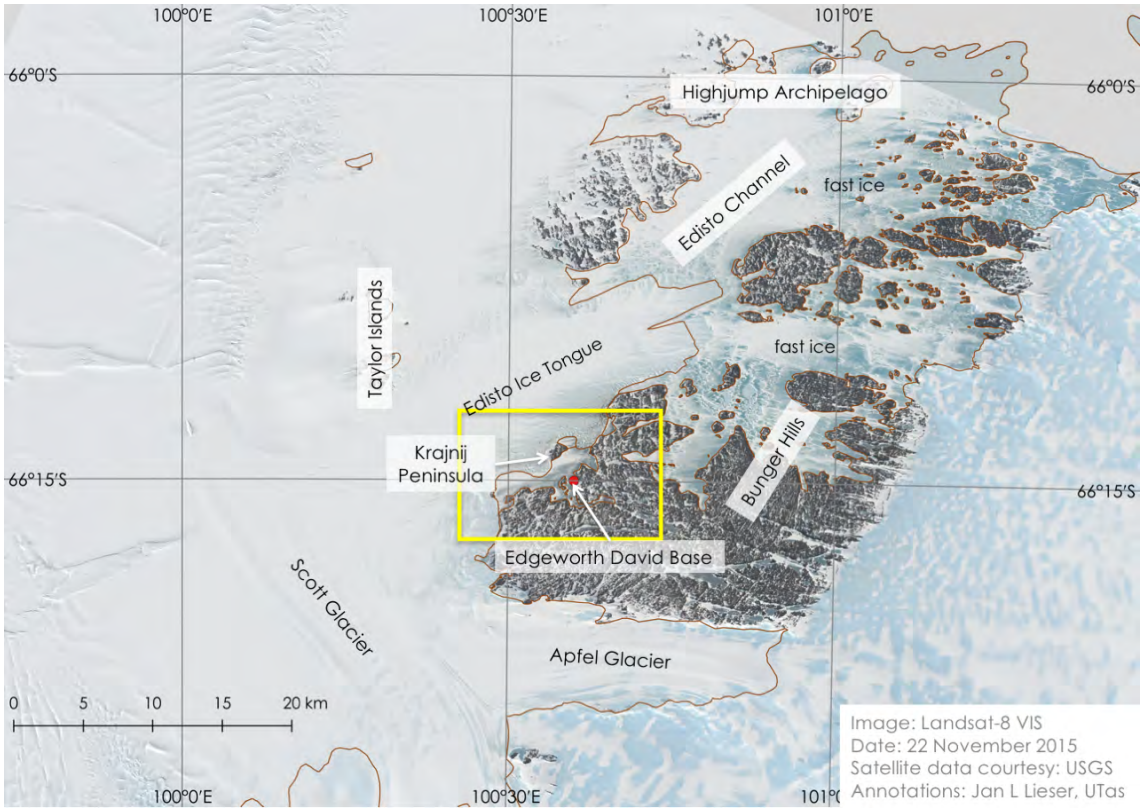

Figure 2: Landsat-8 VIS scene, acquired 22/11/2015 and provided by USGS. The yellow frame marks the rough position of Figure 3.

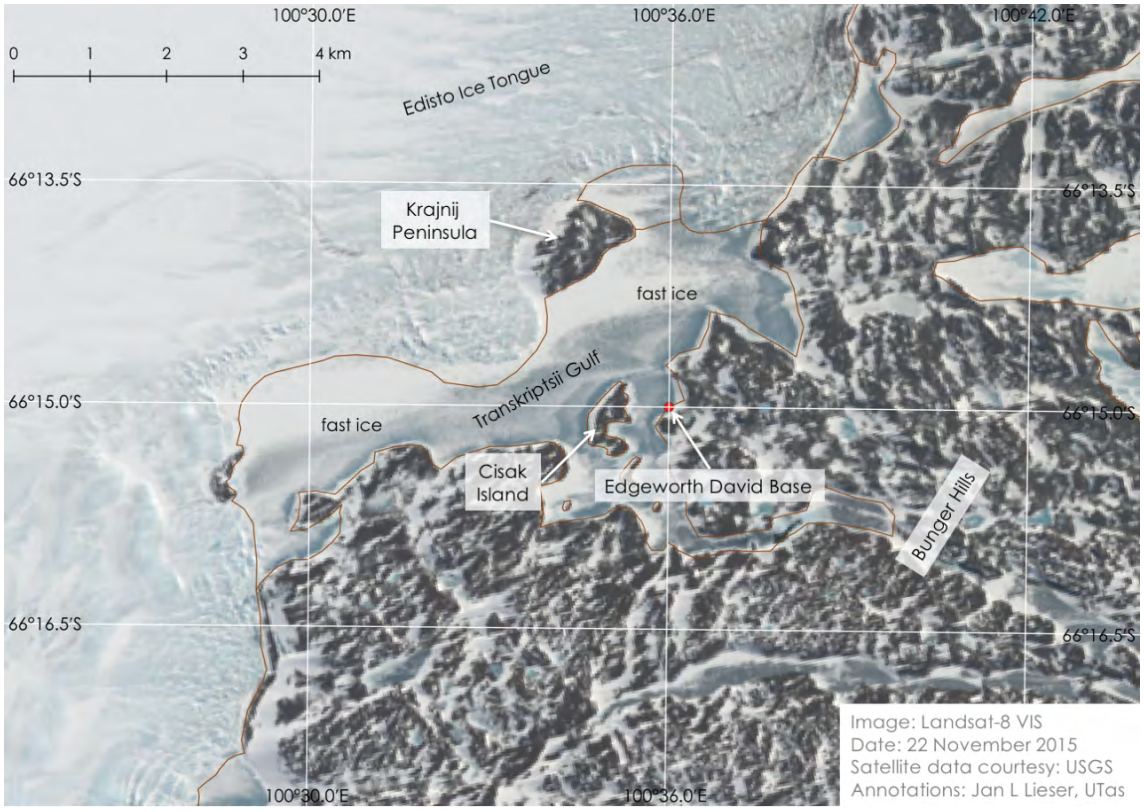

Figure 3: Detail of Transkriptsii Gulf, as seen in Figure 2.

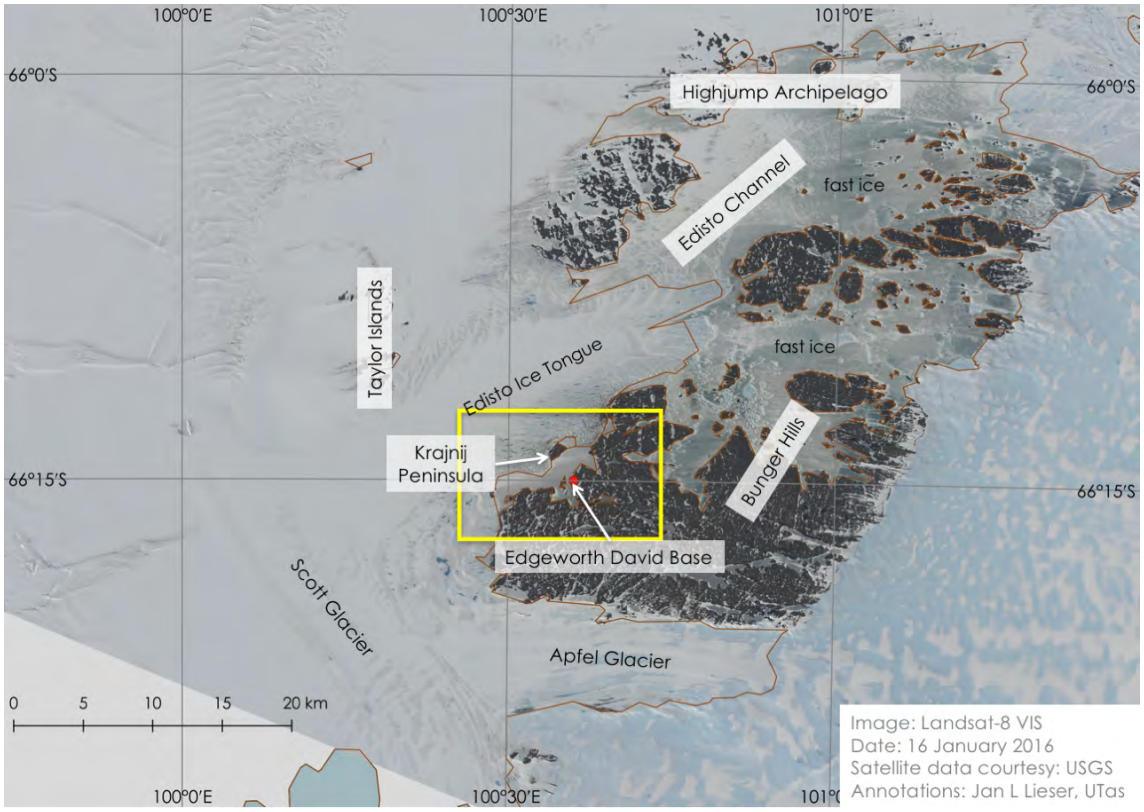

Figure 4: Landsat-8 VIS scene, acquired 16/01/2016 and provided by USGS. The yellow frame marks the rough position of Figure 5.

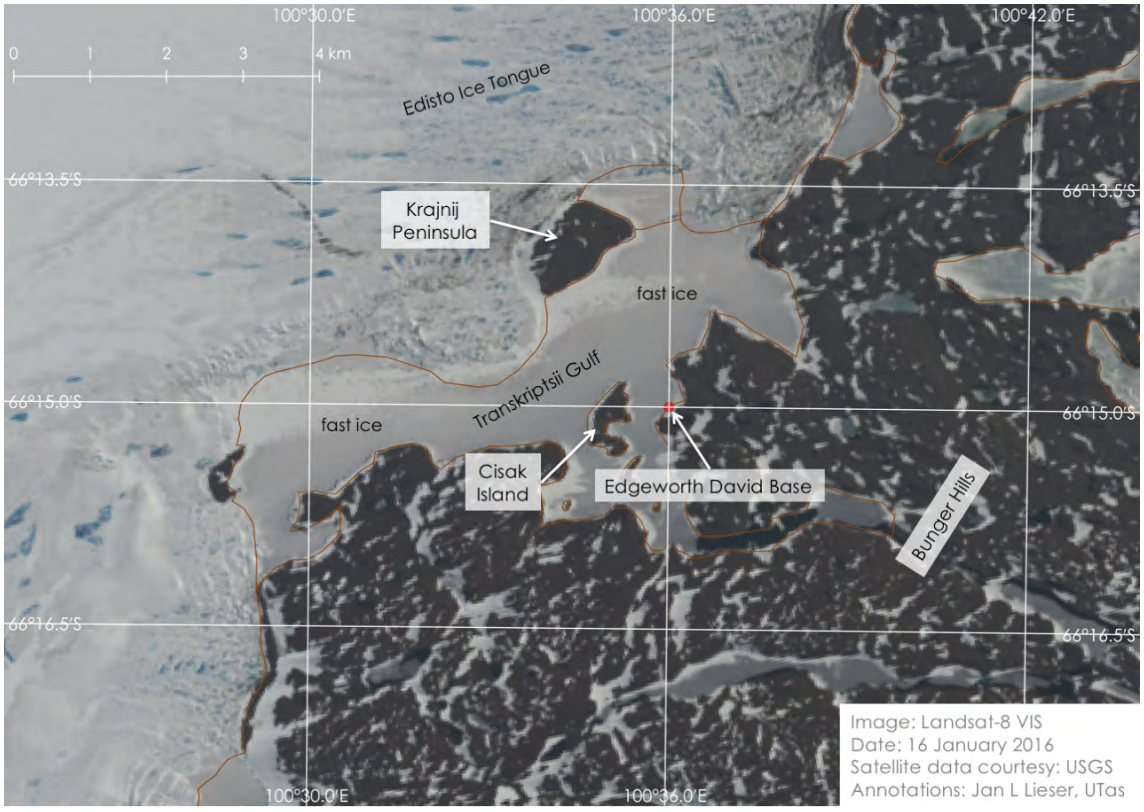

Figure 5: Detail of Transkriptsii Gulf, as seen in Figure 4.

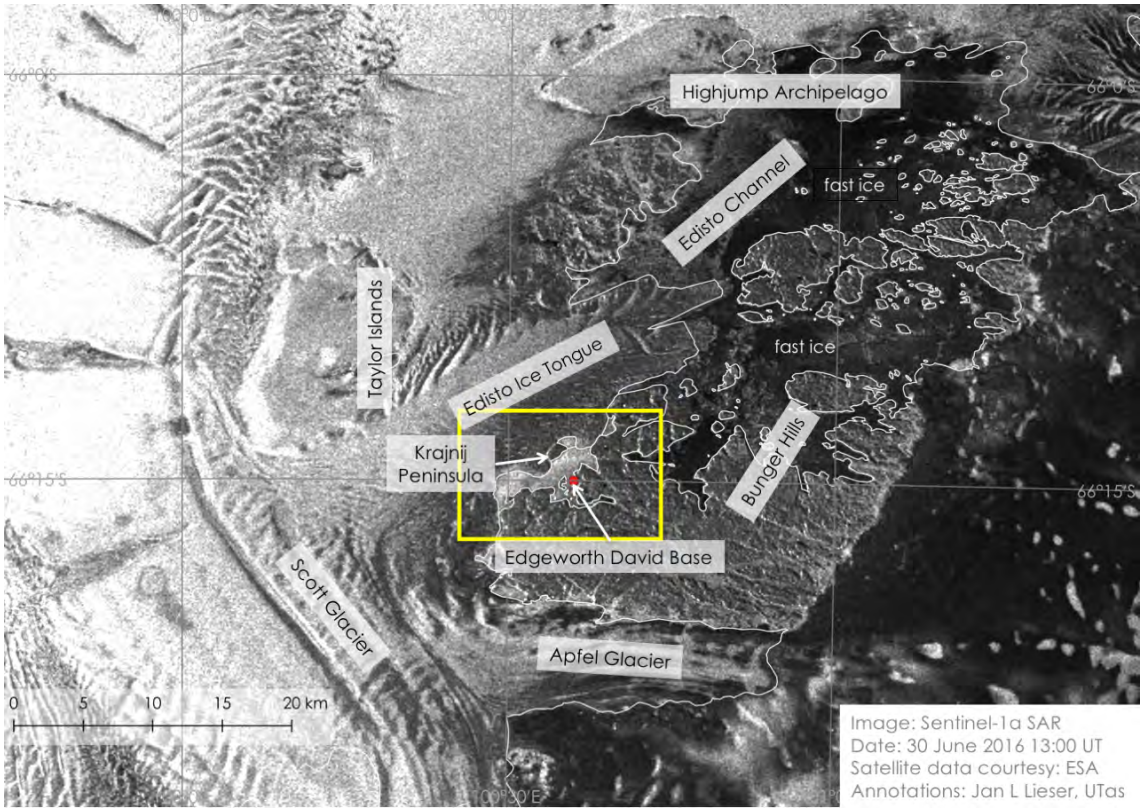

Figure 6: Sentinel-1a SAR scene, acquired 30/06/2016 and provided by PolarView. The yellow frame marks the rough position of Figure 7.

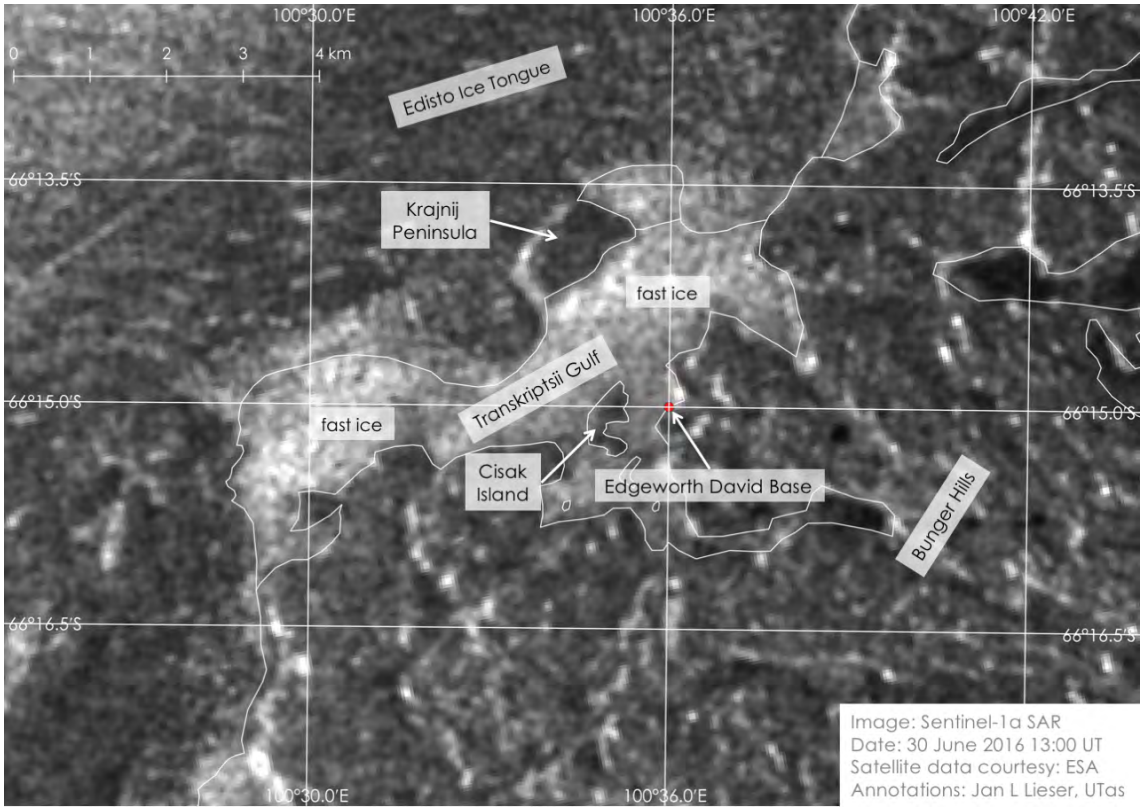

Figure 7: Detail of Transkriptsii Gulf, as seen in Figure 6.

Sea Ice Report #30.1/2016

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

21/07/2016

Commonwealth Bay

Figure 1 shows ice conditions north of Cape Denison. The troika of three large tabular icebergs remains local. C-29, the northernmost iceberg of the three, is surrounded by many smaller bergs, all of which appear enclosed by fast ice. The location of an oceanographic mooring ('Polynya-West') is given by the yellow dot, currently occupied by iceberg C-29.

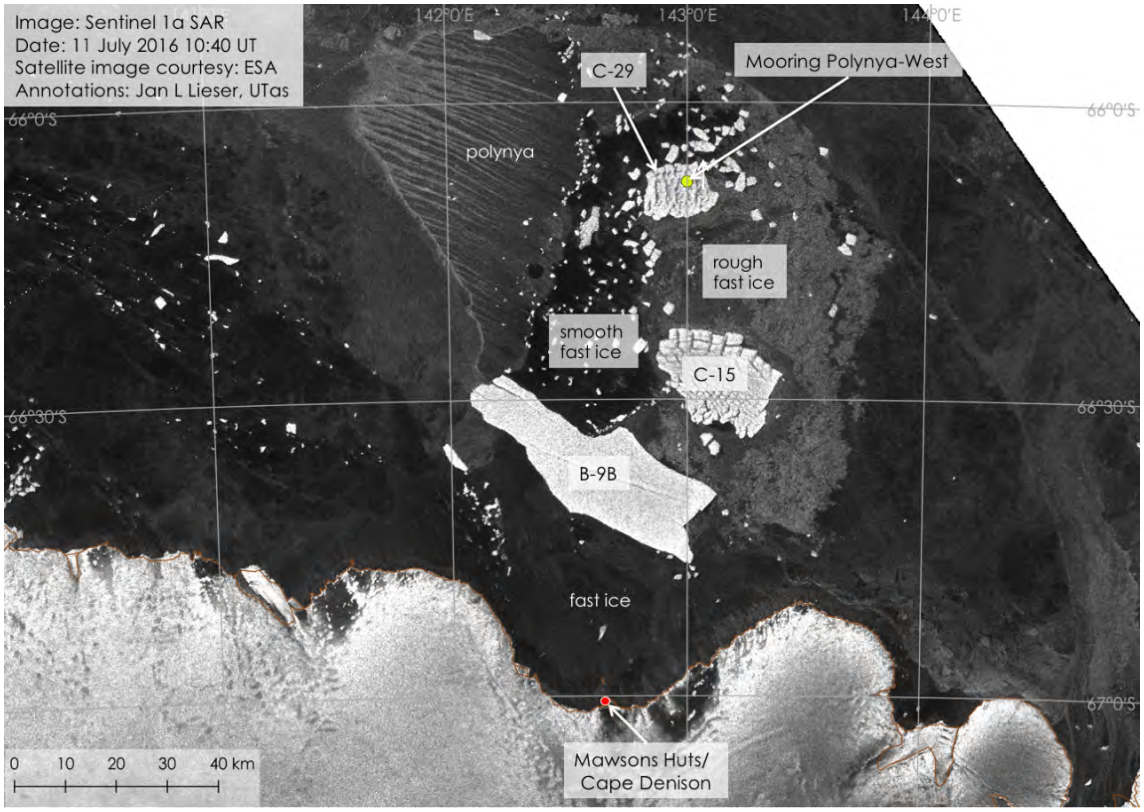

Figure 1: Sentinel-1a SAR scene, acquired 11/07/2016 and provided by PolarView.

Off Cape Denison, Commonwealth Bay is covered by fast ice. This ice appears to have grown towards the southern side of iceberg B-9B. Northwest of the icebergs and the fast ice between them, some polynya activity can be seen that is producing new sea ice, which accumulates further west against more fast ice enclosing icebergs along 138° E and pack ice further north from there.

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Sea Ice Report #32.1/2016

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

02/08/2016

Sabrina Coast

Figure **??** shows a high-resolution SAR scene, off Sabrina Coast. The yellow and orange dots mark the locations of Henry Island and Chick Island, respectively, both still enclosed by fast ice.

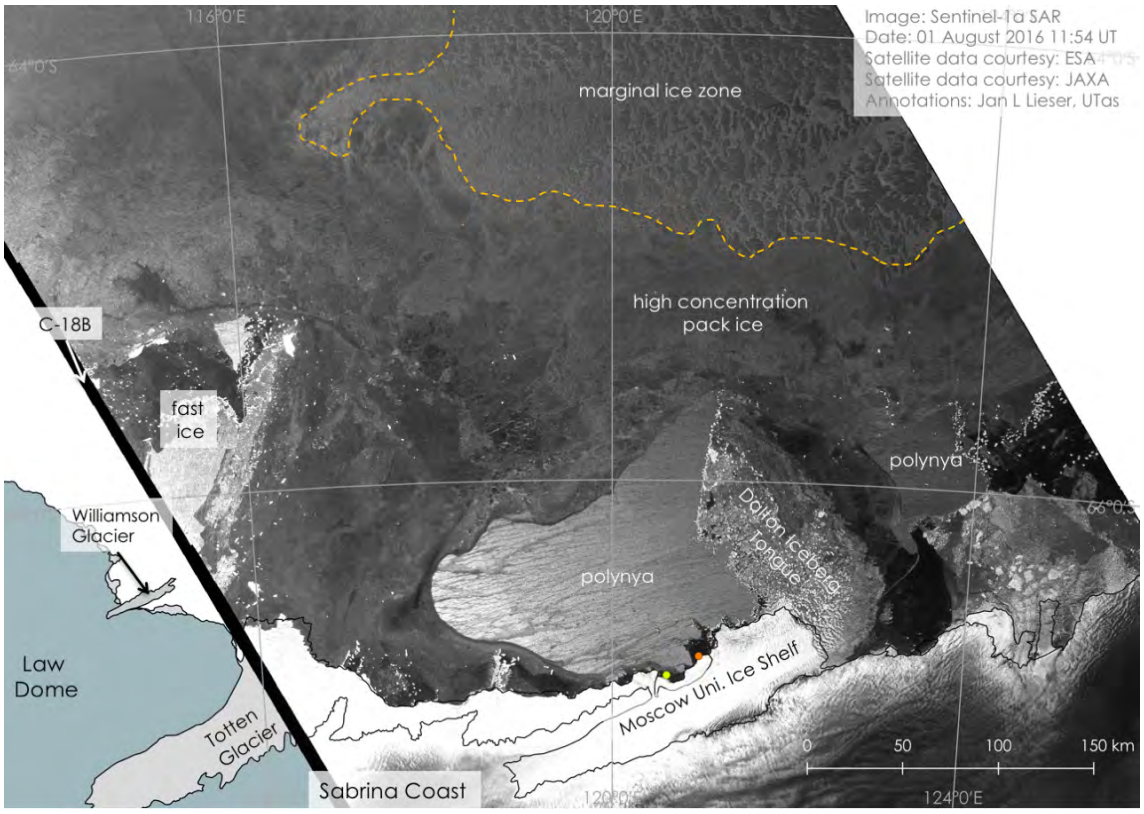

Figure 1: Sentinel-1a SAR scene, acquired 01/08/2016 and provided by PolarView.

West of the Dalton Iceberg Tongue, a large polynya of roughly 12 360 570 km^2 (approximately 1.3 times the area of Kati Thanda–Lake Eyre, SA) is present. This polynya is separated from the marginal ice zone by only 45.5 nautical miles of high-concentration sea ice, in north-south direction. A second, smaller polynya east of the Dalton Iceberg Tongue is roughly 2 128 530 km^2. The size of these polynyas is likely a consequence of a large low pressure system, which had its centre roughly at 59° 30' S and 111° 0' E, at the time of SAR acquisition.

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Sea Ice Report #33.1/2016

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

09/08/2016

With the return of sunlight to the Antarctic coast, more and more visible data are available.

Sabrina Coast

The scene shown in Figure 1 is largely affected by clouds, but some general features of the sea-ice zone off Sabrina Coast are still recognisable. The sea-ice edge is indicated by the dashed orange line. The distance between the polynya west of the Dalton Iceberg Tongue and the open water in the north is less than 30 nautical miles (red double-arrow). A polynya can also be seen offshore Casey Station.

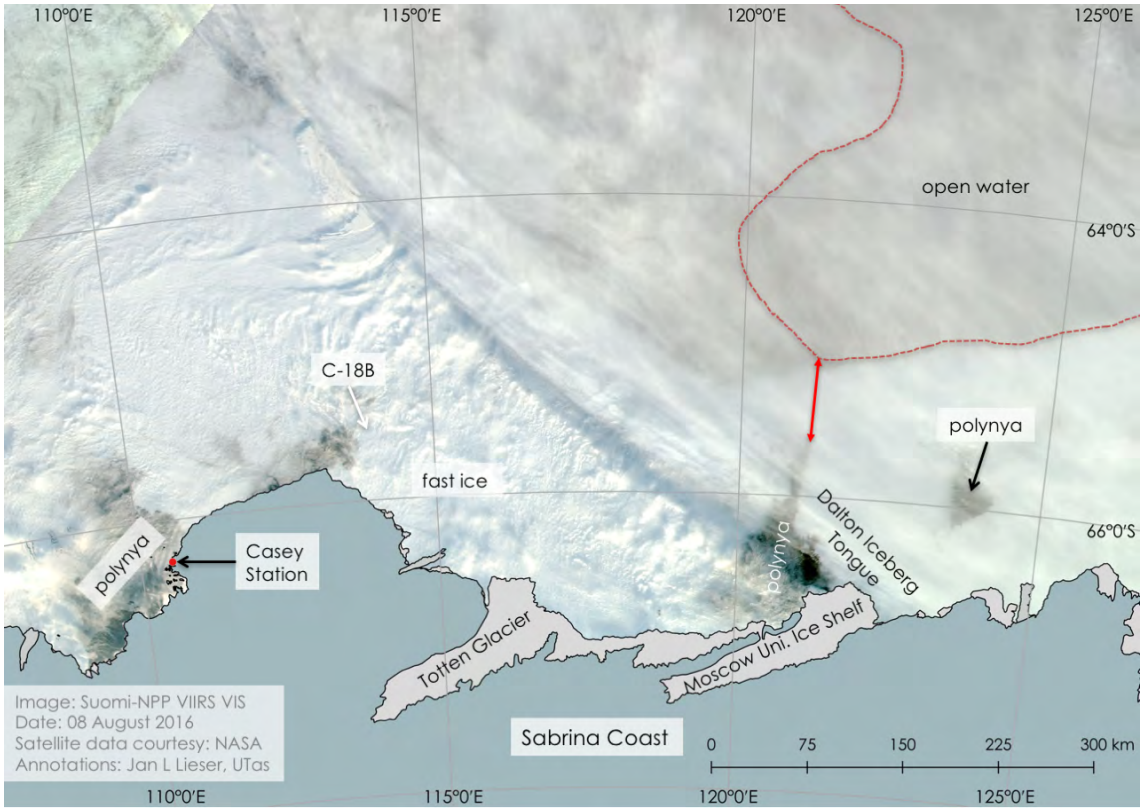

Figure 1: Suomi-NPP VIIRS visible scene, acquired 08/08/2016 and provided by NASA.

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Commonwealth Bay

Figure 2 shows a mostly cloud-free scene of East Antarctica, between Dumont D'Urville Station and the Mertz Glacier. Three large tabular icebergs are still lined up, north of Commonwealth Bay. The red scribble line indicates the current fast-ice edge between iceberg C-29 and the Mertz Glacier. Orange lines show boundaries of distinctively different zones within this fast ice, most likely formed at different times (eastern fast ice more recently).

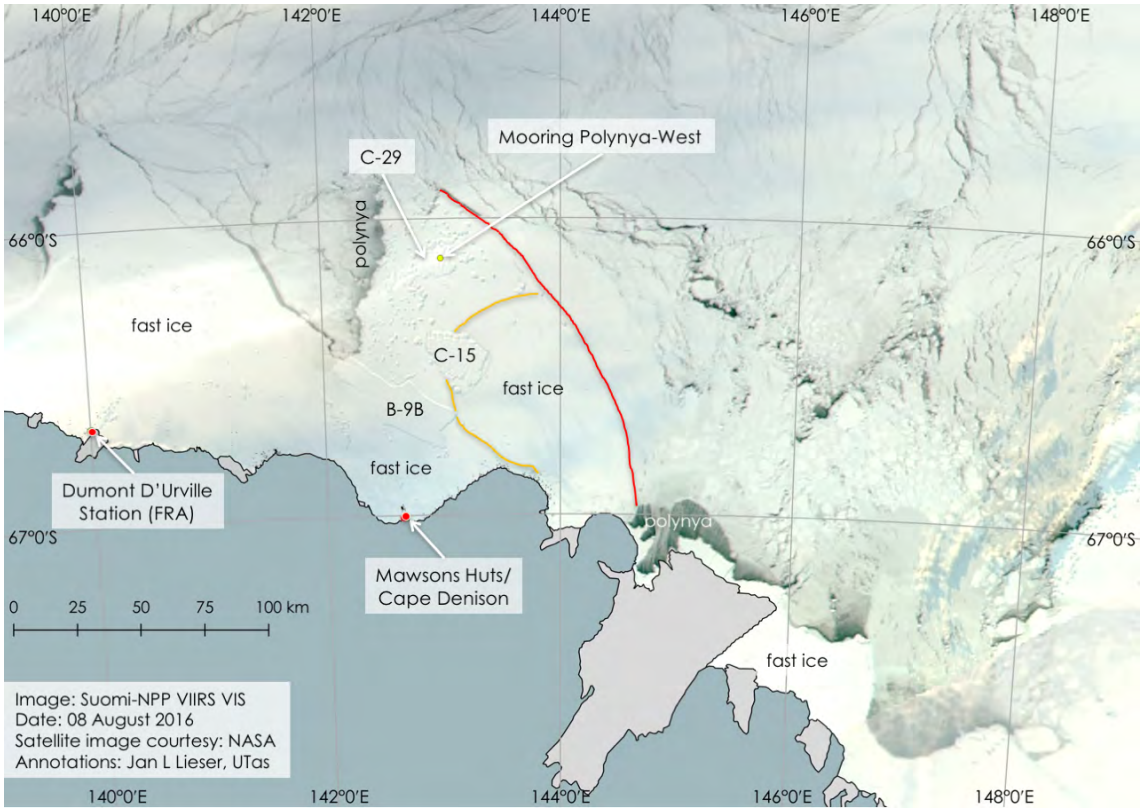

Figure 2: Suomi-NPP VIIRS visible scene, acquired 08/08/2016 and provided by NASA.

The position of an oceanographic mooring (Polynya-West) is given by the yellow dot. It remains under iceberg C-29.

Sea Ice Report #33.2/2016

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

11/08/2016

Prydz Bay

Figure 1 shows a visible scene of Prydz Bay only partly covered by clouds but affected by some glare at the boundary of separate swaths, in the western part. The current extent of fast ice in the region is marked by red scribble lines.

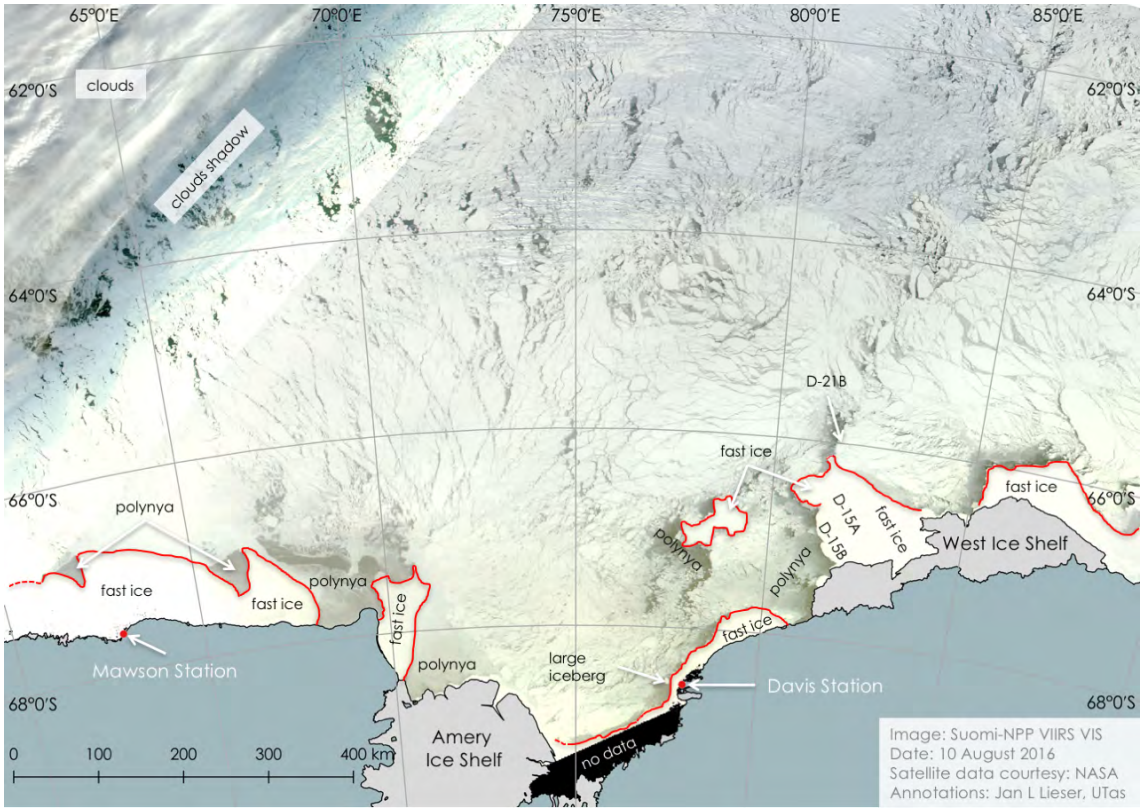

Figure 1: Suomi-NPP VIIRS visible scene, acquired 10/08/2016 and provided by NASA.

In central Prydz Bay (north of the Amery Ice Shelf), a change in the orientation of dominant cracks is apparent. South of 64° S, these linear kinematic features are oriented mostly in north-south direction, west of 74° E, whereas to the east of 76° E such features are predominantly east-west oriented.
Offshore fast-ice areas, all polynyas are covered by at least some sea ice, which indicates ongoing sea-ice production.

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Sea Ice Report #34.1/2016

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

17/08/2016

Figure 1 shows the difference between the mean sea-ice concentration for July 2016 and the average July sea-ice concentration, for the satellite era, the so-called monthly anomaly. The black line in the figure represents the mean sea-ice extent, for July, while the red line gives the median (most frequent) monthly sea-ice extent. Pink dots indicate the position of large tabular icebergs.

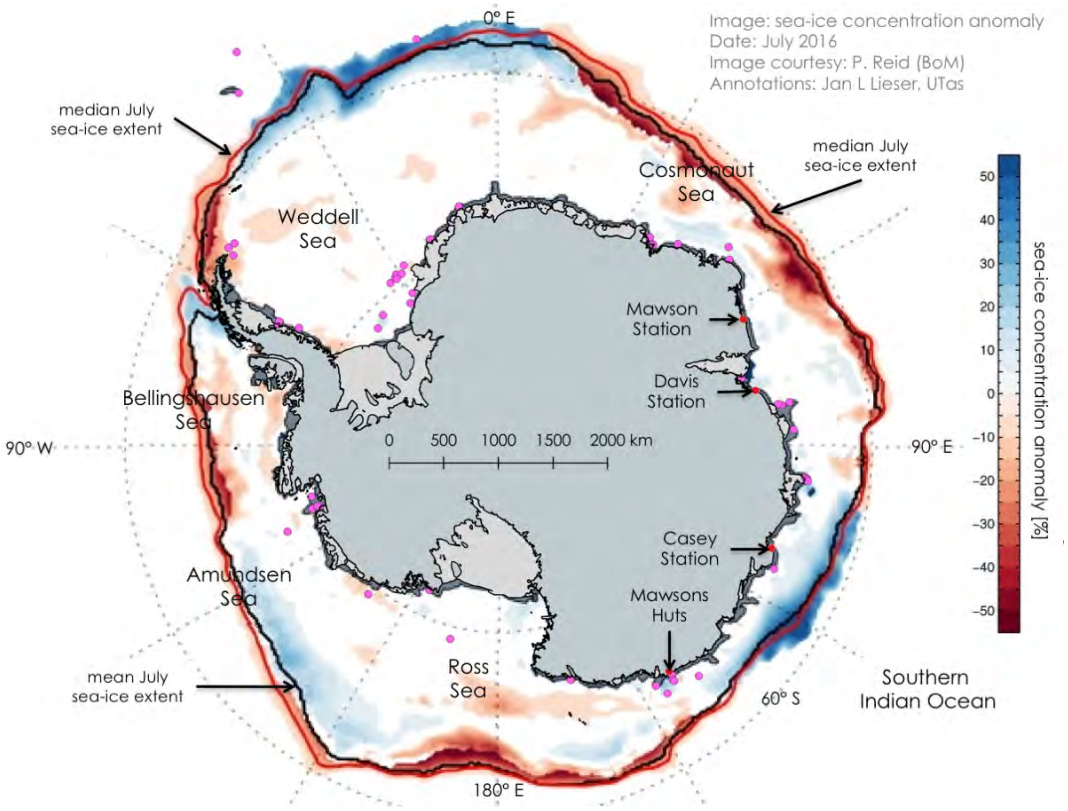

Figure 1: Sea-ice concentration anomaly, provided by P. Reid (Bureau of Meteorology).

The Southern Hemisphere sea-ice extent was only about 0.2% above the long-term average, but regional differences are not represented in one hemispheric number (see Figure 1). Cosmonaut Sea and Ross Sea have experienced largely lower than average sea-ice extent, as well as Bellingshausen Sea and the western Weddell Sea, even though the latter two to a lesser degree. Above average sea-ice extent in the central and eastern Weddell Sea and the southern Indian Ocean, between 100° E and 140° E, are counterbalancing the pan-Antarctic picture.

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Sea Ice Report #35.1/2016

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

22/08/2016

Mawson Station

Figure 1 displays a high-resolution SAR scene on top of a visible image of the Antarctic coast, between Mawson Station and Cape Darnley. Fast ice areas are indicated by red scribble lines. The distance between the station and the nearest open water, a polynya to the northwest, is roughly 40 nautical miles (yellow double arrow).

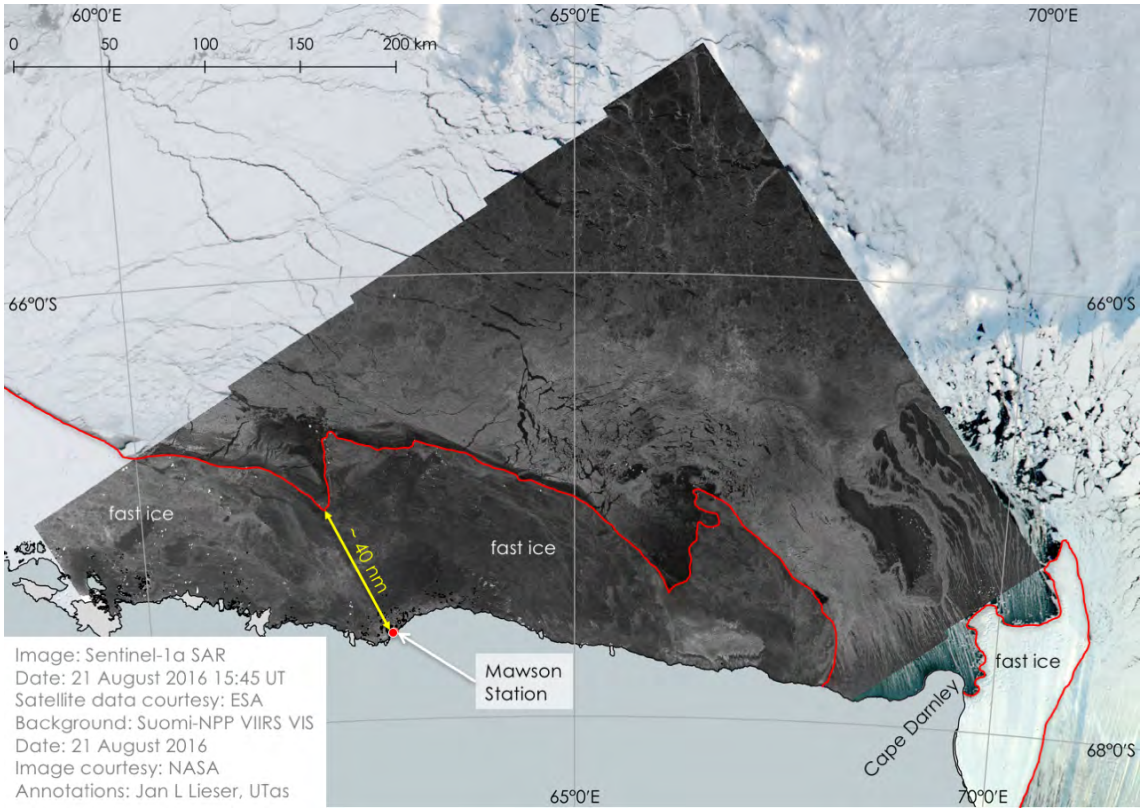

Figure 1: Sentinel-1a SAR scene, acquired 21/08/2016 and provided by PolarView; Background: Suomi-NPP VIIRS VIS image, acquired 21/08/2016 and provided by NASA.

North of Cape Darnley, the polynya shows signs of active sea-ice production even though the polynya area is relatively small. On the other hand, further to the west, a large polynya is persistent within the sea-ice zone, offshore Enderby Land, in Cosmonaut Sea at 65° 30' S.

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Commonwealth Bay

One of the first Landsat-8 visible images of the Antarctic sea-ice zone since last midwinter is provided in Figure 2. The corresponding thermal infrared (TIR) image is given in Figure 3. This TIR figure shows the colour-coded at-satellite temperature. In the presence of thin clouds and the absence of atmospheric correction a corresponding ground surface temperature is not calculated. Leads and cracks within the sea ice and the thin ice cover of the polynya are clearly seen in brighter red due to the warmer ocean temperature compared to the ice and snow surfaces, in Figure 3.

In both figures, the outlines of three, large tabular icebergs are given by pink scribble lines. Even though iceberg C-15 was surrounded by fast ice, it is still shifting position and a large area (roughly 4800 km^2) of fast ice has been dislodged. The position of an oceanographic mooring is given by a yellow dot. This location is occupied by iceberg C-29.

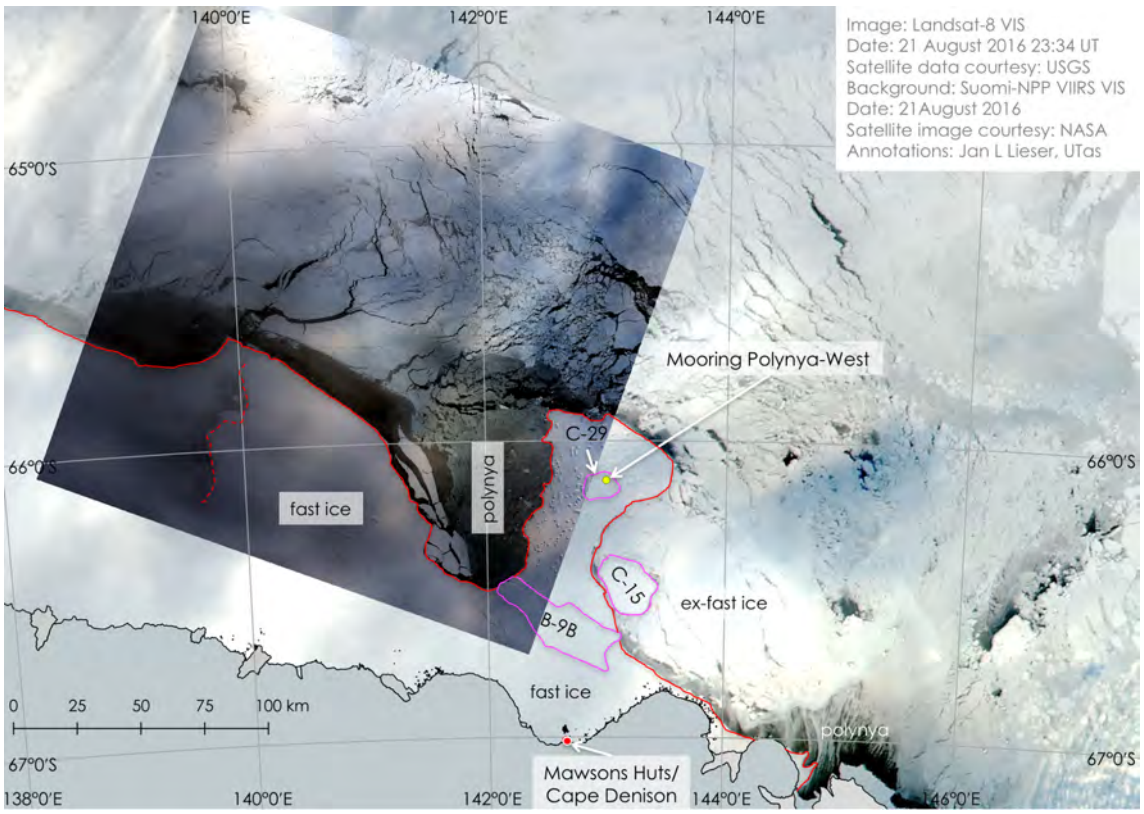

Figure 2: Landsat-8 visible image, acquired 21/08/2016 and provided by USGS; Background: Suomi-NPP VIIRS visible image, acquired 21/08/2016 and provided by NASA.

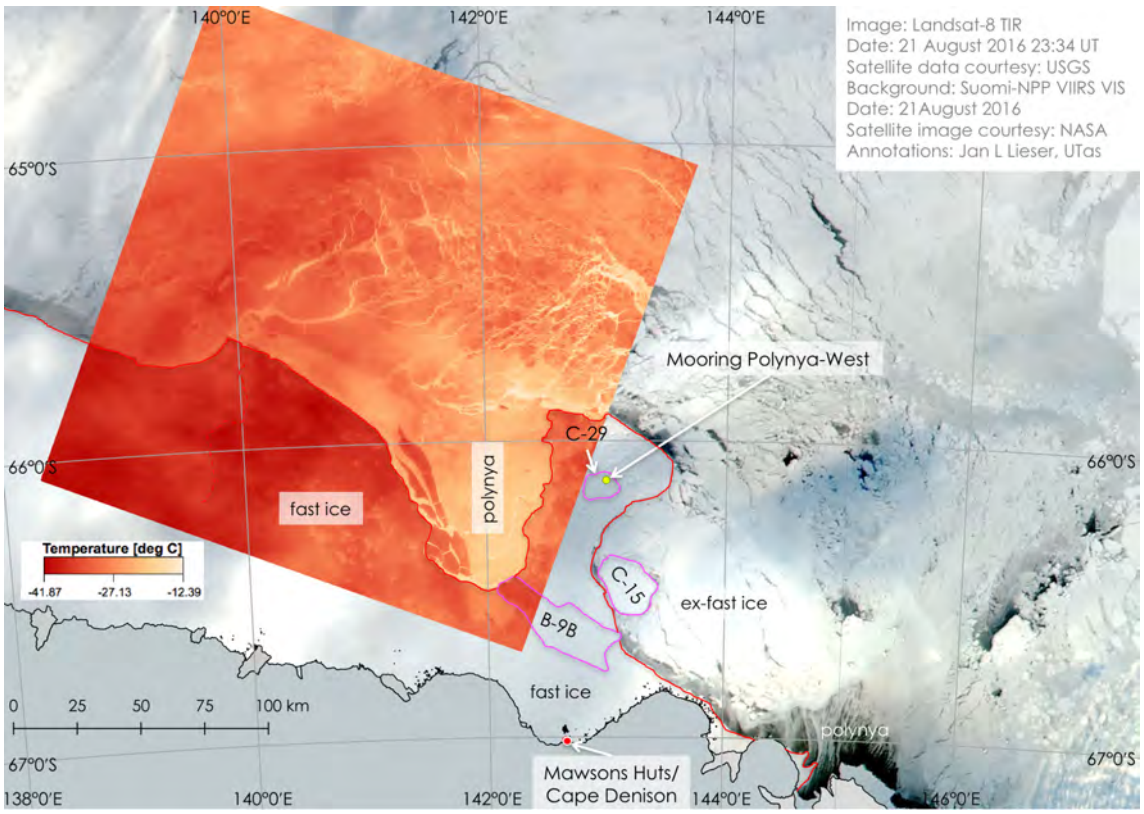

Figure 3: Landsat-8 Thermal Infrared (TIR) image, acquired 21/08/2016 and provided by USGS; Background: Suomi-NPP VIIRS visible image, acquired 21/08/2016 and provided by NASA.

Sea Ice Report #35.2/2016

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

23/08/2016

East Antarctica

Figure 1 shows yesterday's sea-ice concentration chart for East Antarctica. The locations of three whale-recorder moorings are indicated by green dots.

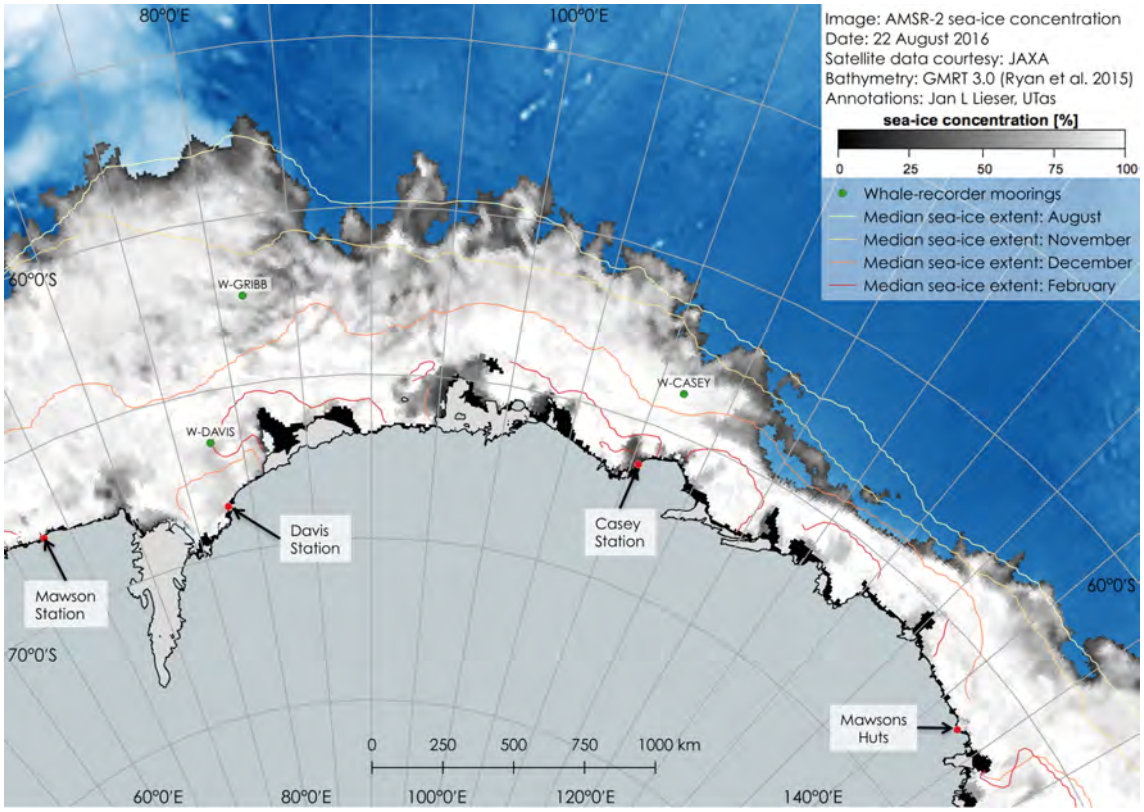

Figure 1: AMSR-2 sea-ice concentration, acquired 22/08/2016 and provided by Drift & Noise Polar Service.

The pan-Antarctic sea-ice extent hovers around the long-term mean, still. Two of the above mentioned whale moorings can be expected to be free of sea ice when it retreats sufficiently southward in December. However, the 'W-Davis' mooring might only edge onto the sea-ice free zone in February.

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Sea Ice Report #36.1/2016

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

30/08/2016

Davis Station

Figure 1 shows a very high-resolution (30 m) visible image of the Vestfold Hills and Davis Station. The scene is entirely cloud-free. The open water surfaces of Deep Lake and Club Lake (immediately to the east of Deep Lake) can be seen as dark patches in the central hills.

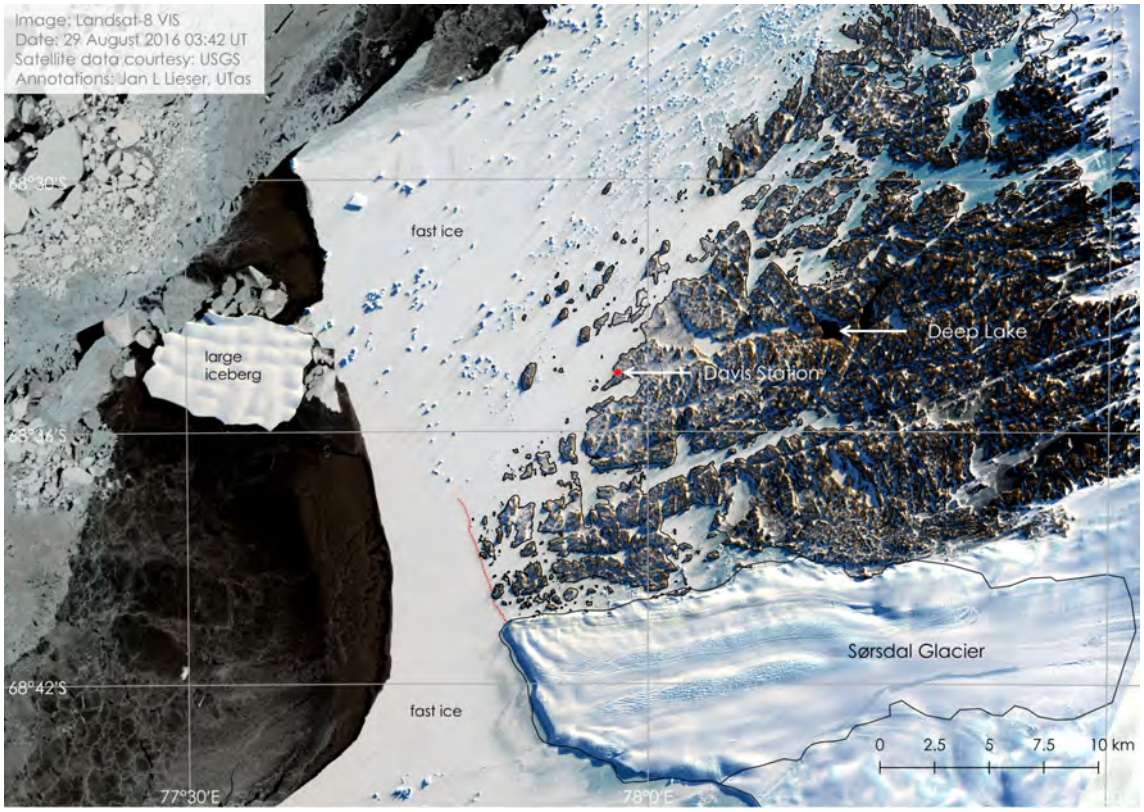

Figure 1: Landsat-8 visible image, acquired 29/08/2016 and provided by USGS.

Offshore the Vestfold Hills, the large iceberg remains grounded but is not enclosed by fast ice. Many smaller icebergs can be seen trapped in the fast ice. Some tide cracks (marked by dotted red lines in Figure 1) can be detected at the southern part of the hills, extending roughly northward from the face of Sørsdal Glacier.

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Commonwealth Bay

Figure 2 shows a visible image of the Commonwealth Bay. Some clouds can be seen north of Mertz Glacier. The location of an oceanographic mooring is indicated by a yellow dot.

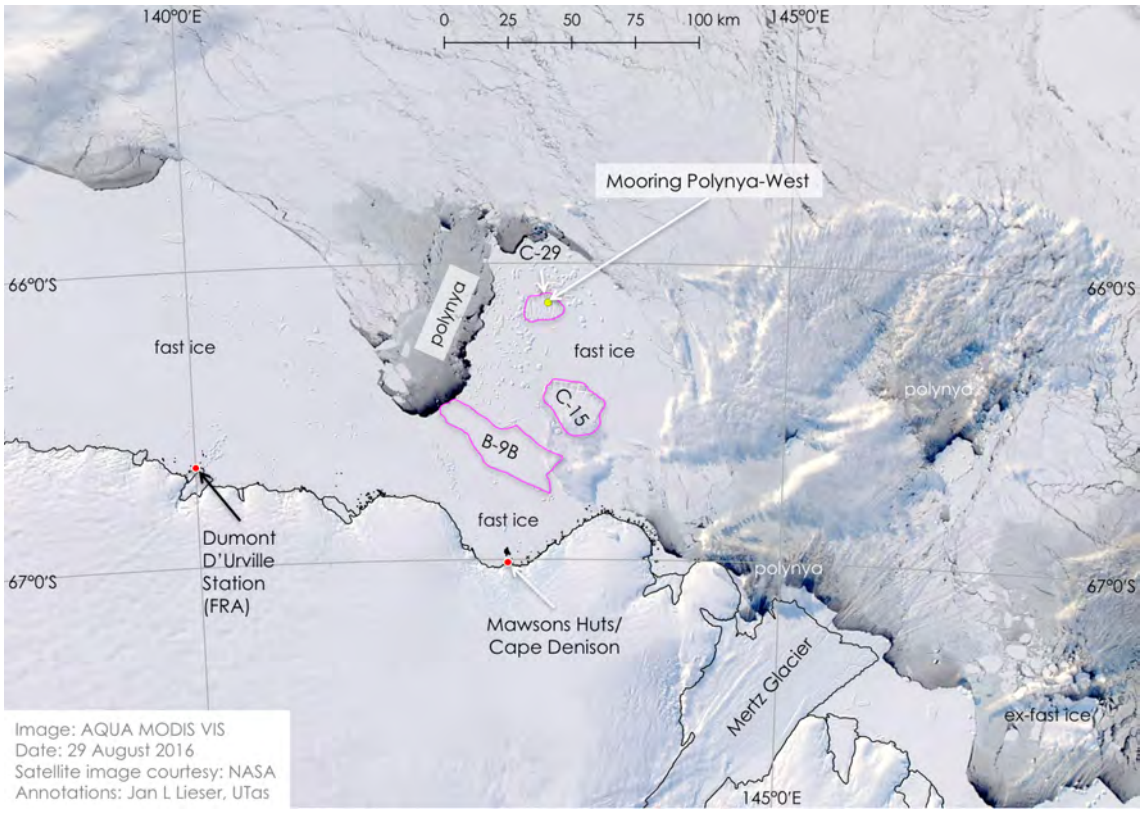

Figure 2: Aqua MODIS visible image, acquired 29/08/2016 and provided by NASA.

The area of ex-fast ice as marked in Sea Ice Report #35.1 appears re-attached to the fast ice between icebergs C-29 and B-9B. This highlights that fast ice, even though it is stationary sea ice (fastened between anchor points) for certain periods, can exhibit dynamic behaviour.

Sea Ice Report #36.2/2016

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

02/09/2016

Sabrina Coast

Figures 1 and 2 show the long-term average sea-ice concentration charts for December and January, respectively, with the corresponding median sea-ice extent as a yellow/orange scribble line. The green dot gives the position of a whale-recorder mooring. The locations of Henry Islands and Chick Island are marked by blue dots. The light blue arc shows roughly a 150 km (roughly 75 nautical miles) radius off the islands towards the polynya area, west of the Dalton Iceberg Tongue. This is the approximate distance between the islands in the south and the northernmost iceberg of the Dalton Iceberg Tongue, which typically marks the northern edge of the polynya.

The general southward retreat of the sea-ice extent is obvious comparing the two figures. On average, the shape and size of the polynya varies only very little, in the summer months of December and January. Fast ice remains generally attached to the northeastern flank of Law Dome and off Totten Glacier.

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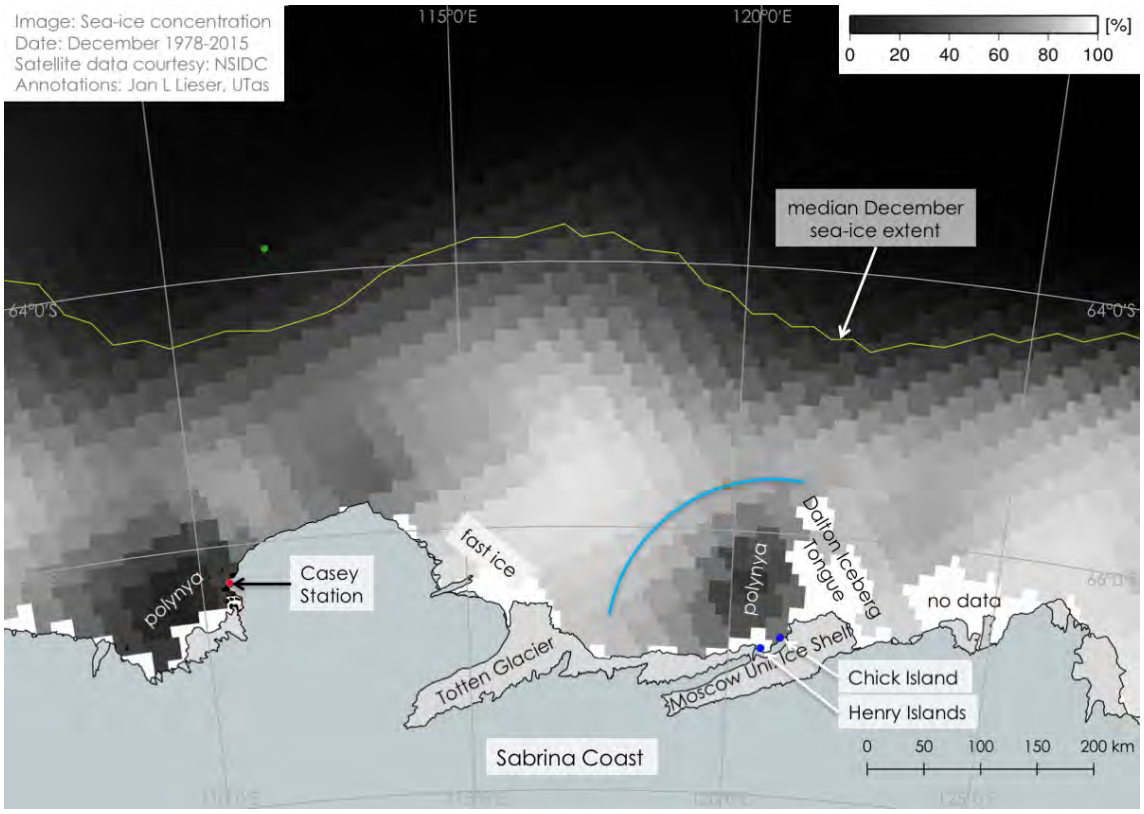

Figure 1: December average sea-ice concentration, computed from data provided by NSIDC.

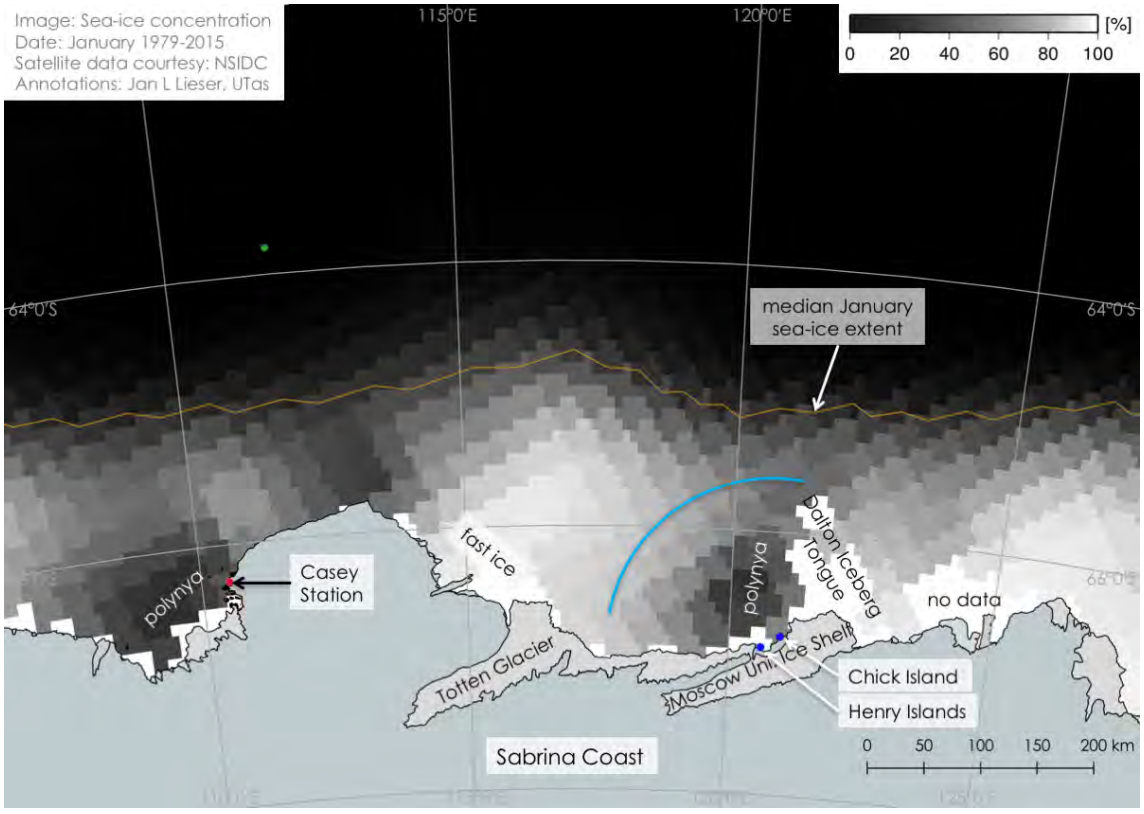

Figure 2: January average sea-ice concentration, computed from data provided by NSIDC.

Sea Ice Report #37.1/2016

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

05/09/2016

Mawson Station

Off Mawson Station, the overall distribution of fast ice has not changed significantly (see Figure 1). In early September, the distance to the nearest open water was roughly 40 nautical miles.

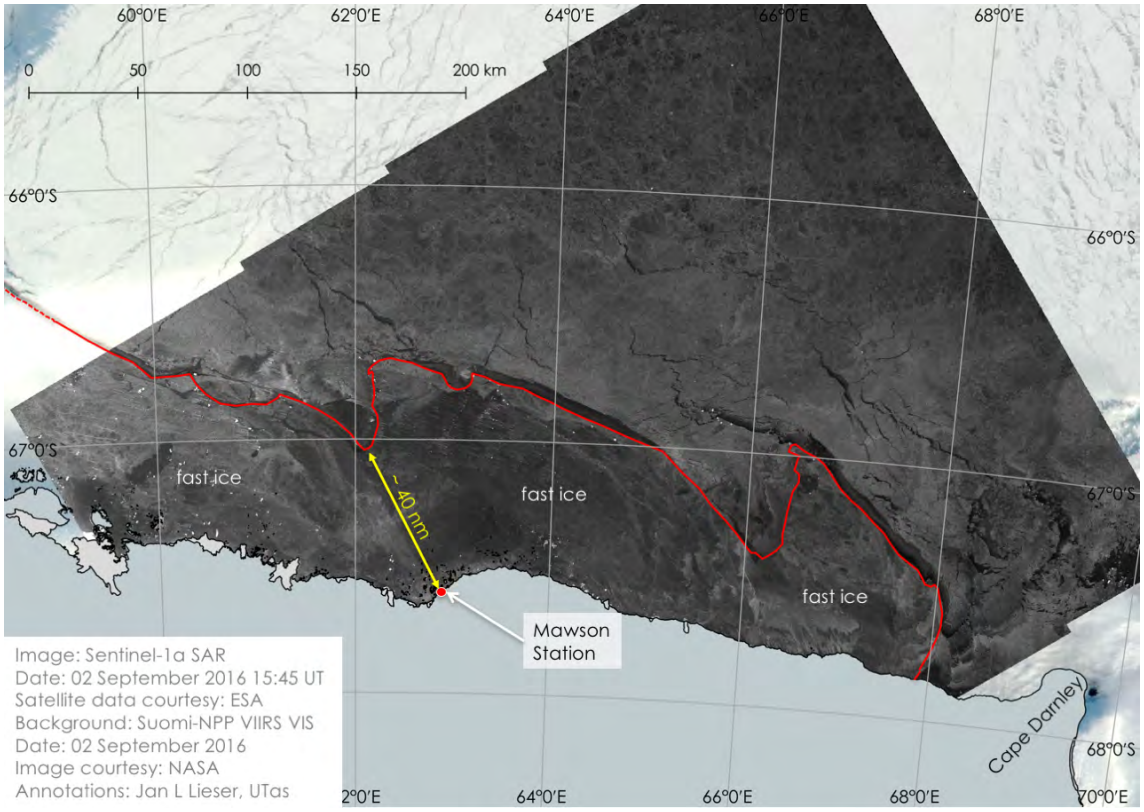

Figure 1: Sentinel-1a SAR scene, acquired 02/09/2016 and provided by PolarView.

Commonwealth Bay

Figure 2 shows a thermal infrared image of the coastal region between Cape Denison and the Mertz Glacier. Cold surfaces appear dark blue, not-so-cold surfaces (open water) appear dark red (note: the colour-coding is artificial and relates only to at-satellite temperature values).

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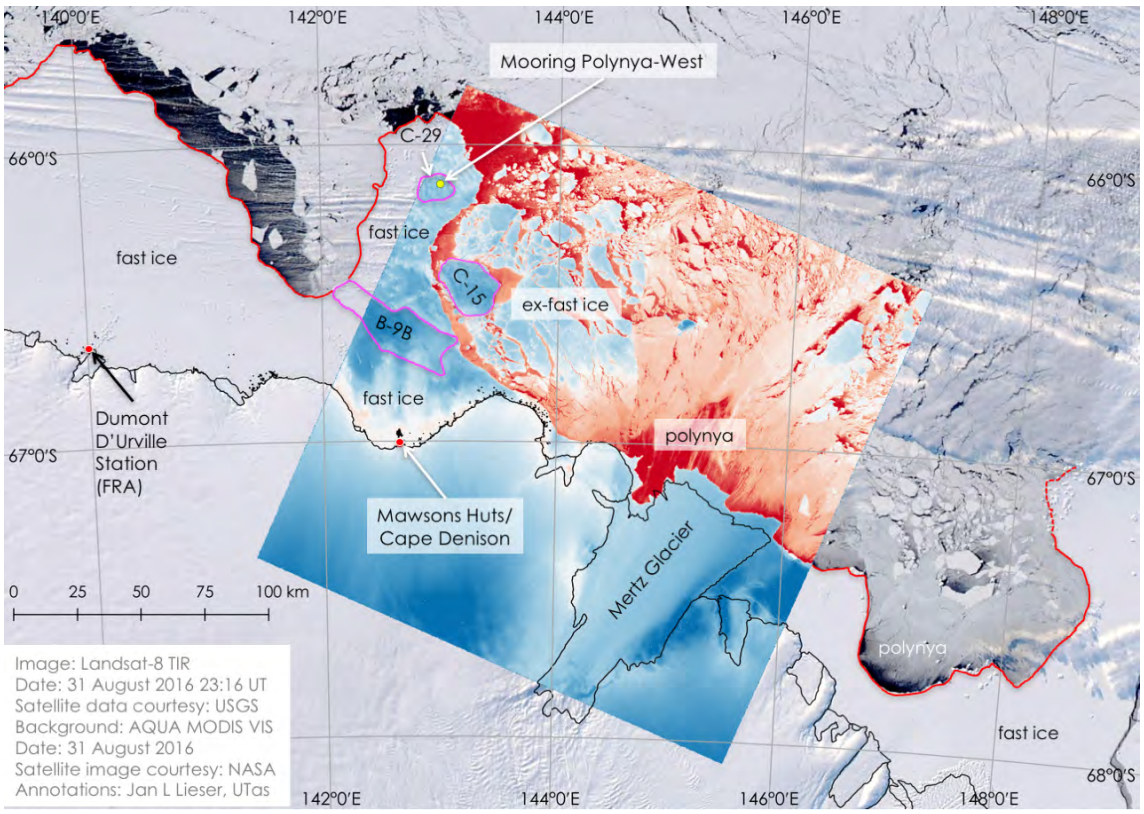

Figure 2: Landsat-8 TIR scene, acquired 31/08/2016 and provided by USGS.

Since 29/08/2016 (see Sea Ice Report #36.1/2016), fast ice surrounding iceberg C-15 has broken off again (at least 4125 km^2). On 31/08/2016, the iceberg moved roughly 3 km eastward, between the acquisitions of the AQUA MODIS and Landsat-8 TIR scenes (Figure 2). This exposed some open water between the fast ice remaining between icebergs C-29 and B-9B and the iceberg C-15, which can be seen as dark red colouring in the figure. As long as iceberg C-15 is not entrapped by fast ice it appears to move rather feely, locally.

Sea Ice Report #37.2/2016

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

07/09/2016

Davis Station

Prydz Bay is largely covered by various types of sea ice. Mackenzie Bay, northwest of Amery Ice Shelf, is fully covered by new ice as well as Cape Darnley Polynya. Along Ingrid Christensen Coast, fast ice has grown from Amery Ice Shelf in the west to West Ice Shelf in the east (just outside the frame of Figure 1). Off Davis Station, a large iceberg remains grounded, but is not enclosed by fast ice.

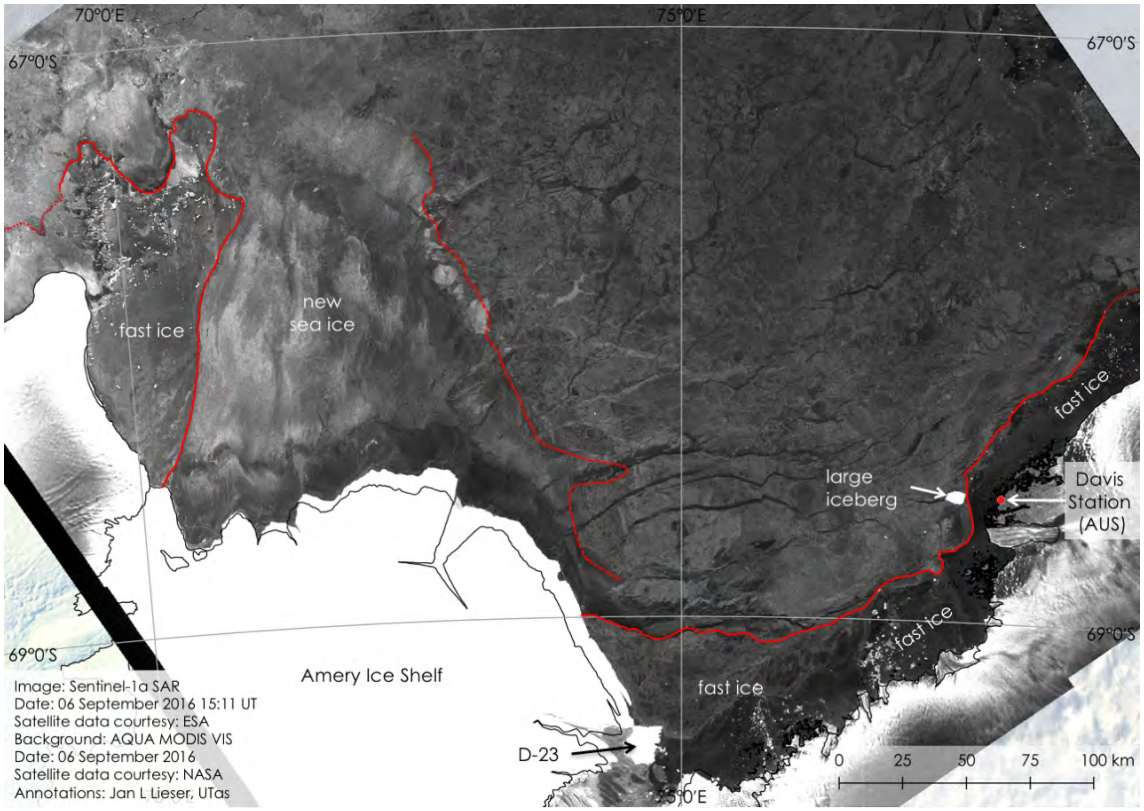

Figure 1: Sentinel-1a SAR scene, acquired 06/09/2016 and provided by PolarView.

The pack-ice edge is roughly 650 nautical miles north of Davis Station, as the season approaches maximum sea-ice extent. This is about 60 nautical miles short of the median ice extent for September.

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Sabrina Coast

Off Sabrina Coast, fast ice extends from Totten Glacier to Dalton Iceberg Tongue (see Figure 2). The polynya to the west of the iceberg tongue is covered by new ice. This new ice accumulates against fast ice attached to Law Dome, north of Totten Glacier. Henry Islands and Chick Island are enclosed by fast ice.

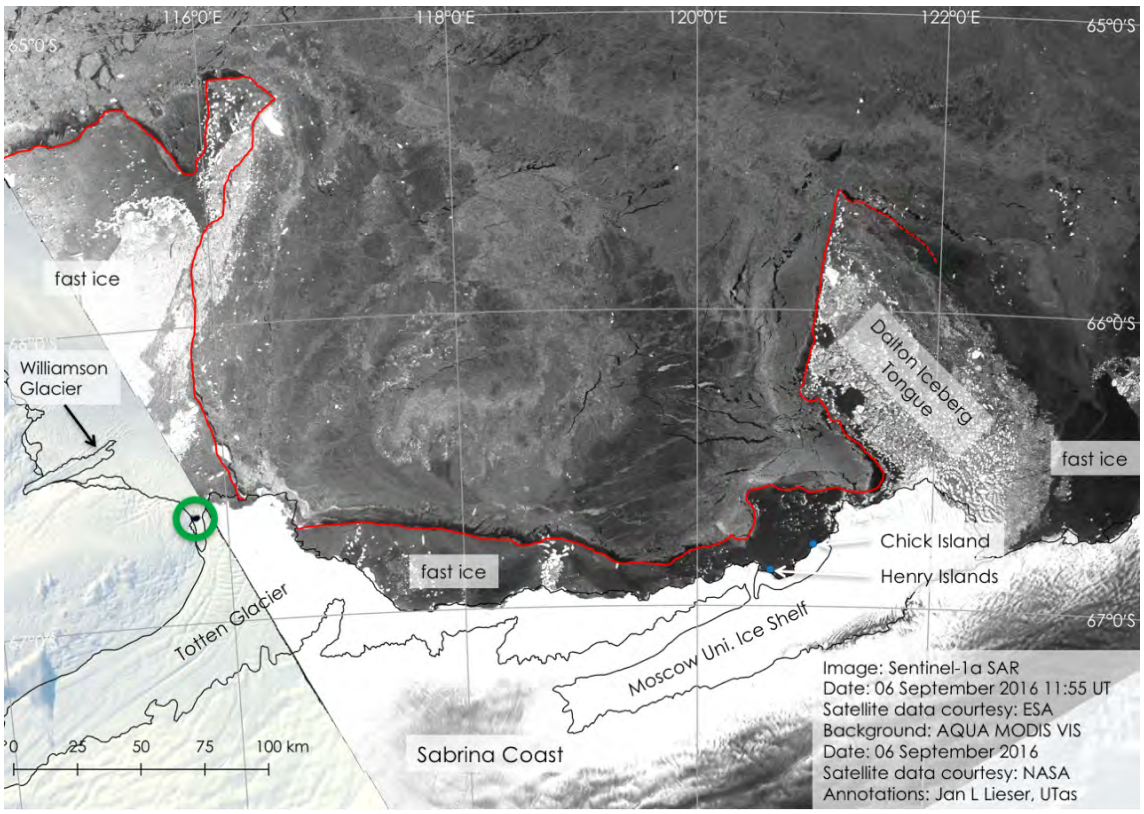

Figure 2: Sentinel-1a SAR scene, acquired 06/09/2016 and provided by PolarView.

Of curious note is a small patch of open water, north of Totten Glacier (see green circle in Figure 2). It is located between the coast of Law Dome in the west, the glacier in the east and fast ice in the north. On 06/09/2016, the size of this patch is estimated to be 7 km^2, but a week earlier it was roughly 17.5 km^2 (on 30/08/2016).

Sea Ice Report #38.1/2016

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

13/09/2016

As the Antarctic sea-ice season is heading into spring, it appears quite likely that this year saw an early sea-ice extent maximum, which may have occurred in late August (28/08) already. At the same time, sea-ice area (the actual surface of the ocean covered by sea ice, south of the extent) is showing record low values (information by courtesy of Dr. Phillip Reid, BoM).

Curiously, Arctic sea-ice extent is showing anomalously low summer (minimum) values, this September, even though it may not reach the absolute record low sea-ice extent values registered in 2012.

During last week, a number of locations experienced striking fast-ice retreat, in East Antarctica. Figures of this report show recent conditions with red lines indicating previous local fast ice extent.

Mawson Station

Off Mawson Coast, roughly 500 km^2 of fast ice broke away as one large floe, west of Mawson Station. East of the station, roughly 650 km^2 of fast ice broke off, between 08/09/2016 and 12/09/120126 (see Figure 1).

The distance between the station and the nearest open water (the so-called Northwest Polynya) is roughly 42 nautical miles.

Casey Station

Off Know Coast (west of Casey Station), the passage of a large low pressure system in the north has shattered roughly 14 200 km^2 of fast ice, between 04/09/2016 and 10/09/2016 (see Figure 2). Offshore Casey Station, the polynya is filled with young sea ice.

Sabrina Coast

Off Totten Glacier, roughly 1500 km^2 of fast ice broke away (see Figure 3), between 10/09/2016 and 12/09/2016. During the same time, at least 2500 km^2 of fast ice broke away east of the Dalton Iceberg Tongue.

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Commonwealth Bay

Between Dumont D'Urville Station and Mertz Glacier, fast ice is also breaking up (see Figure 4). North of iceberg C-29, roughly 600 km^2 of fast ice broke away, between 06/09/2016 and 12/09/2016. During the same time, roughly 2800 km^2 of fast ice broke away north of Dumont D'Urville Station. Further west, fast ice is retreating too, as indicated by the dashed red line (Figure 4). Along 139° 10' E, the north-south extent of fast ice is reduced from 34 km to 17 km.

Iceberg C-15 has rotated and travelled at its centre roughly 12 km northeastward. Its previous position and orientation is given by the dotted pink line, in Figure 4.

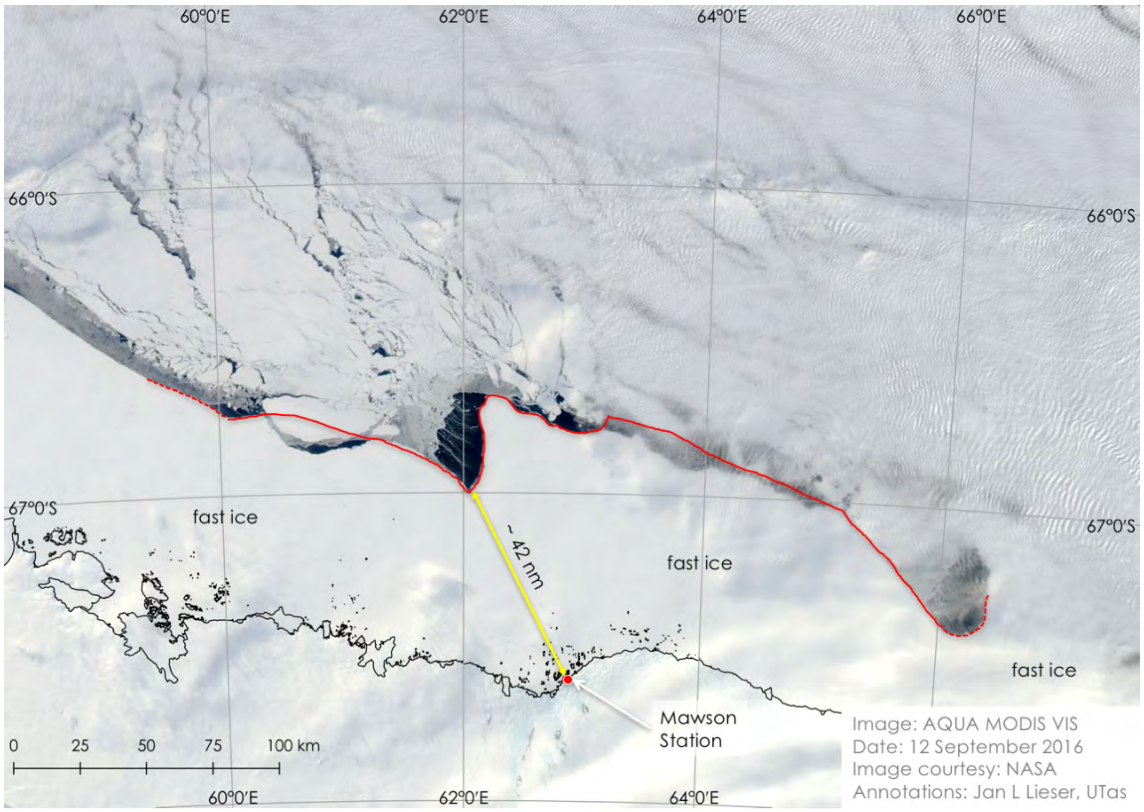

Figure 1: MODIS VIS scene, acquired 12/09/2016 and provided by NASA.

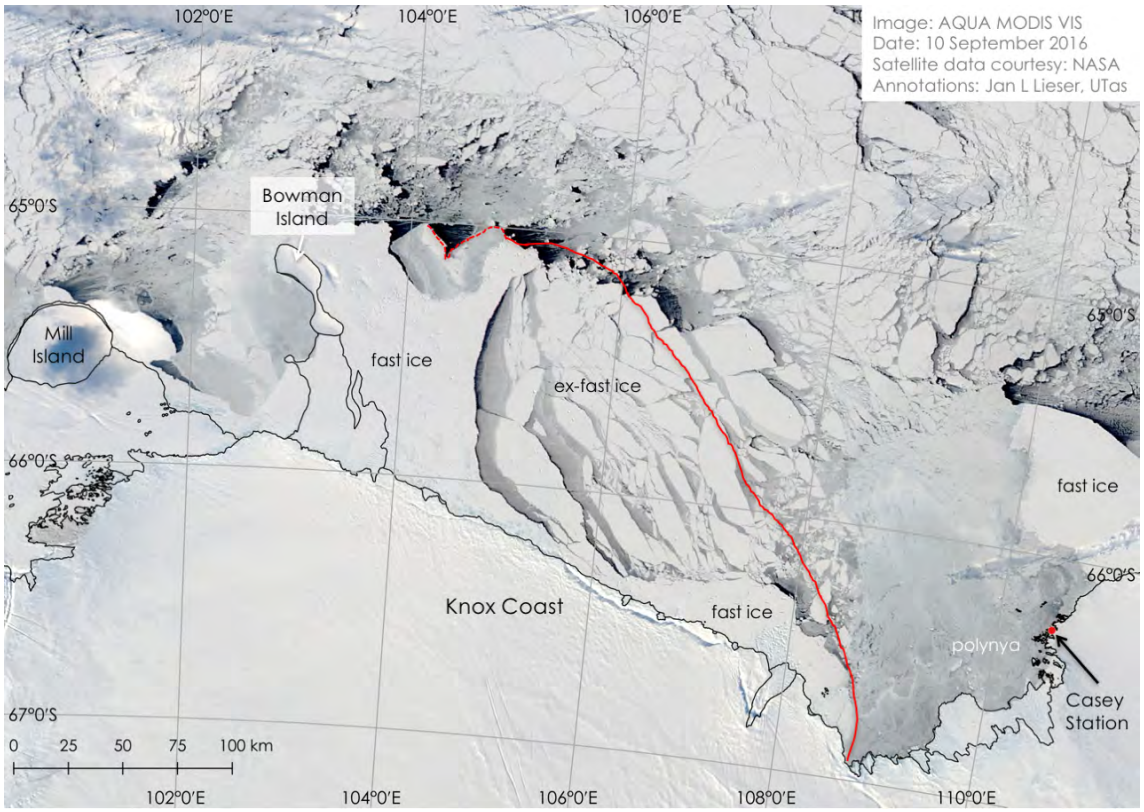

Figure 2: MODIS VIS scene, acquired 10/09/2016 and provided by NASA.

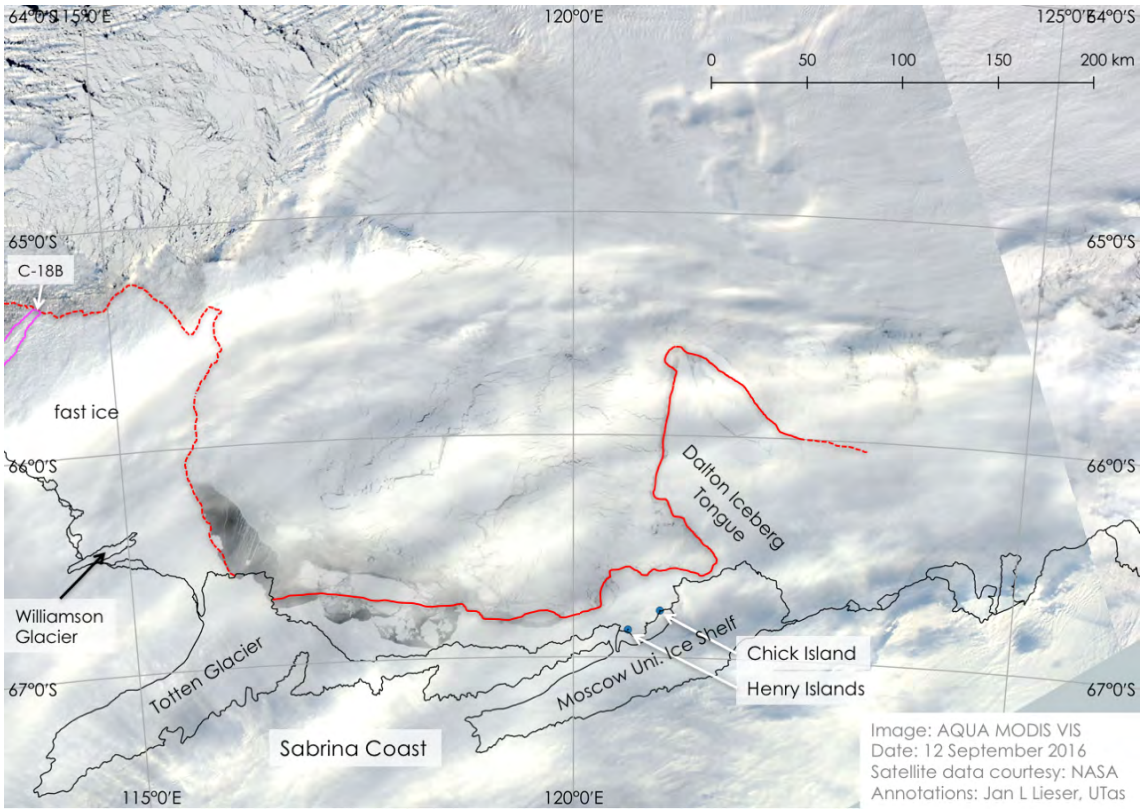

Figure 3: MODIS VIS scene, acquired 12/09/2016 and provided by NASA.

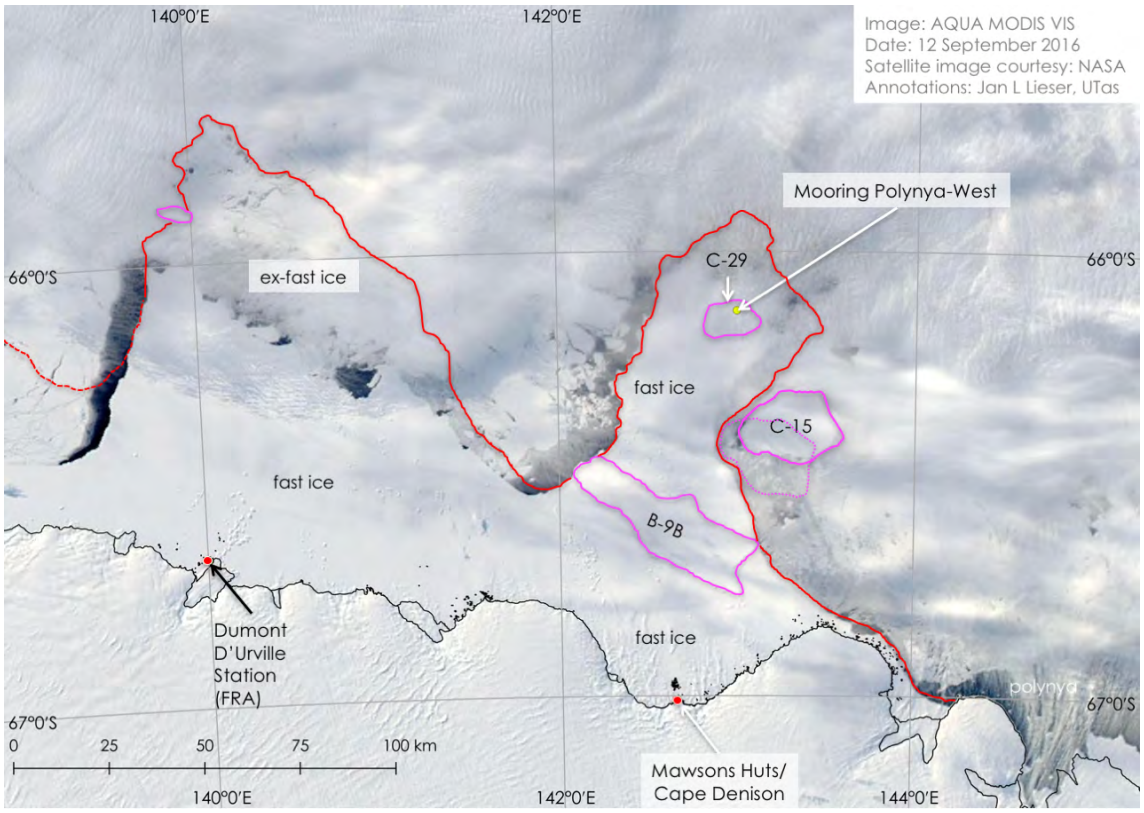

Figure 4: MODIS VIS scene, acquired 12/09/2016 and provided by NASA.

Sea Ice Report #38.2/2016

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

16/09/2016

Antarctica

Figure 1 shows the difference between the August 2016 average sea-ice concentration relative to the long-term August average: the sea-ice concentration anomaly.

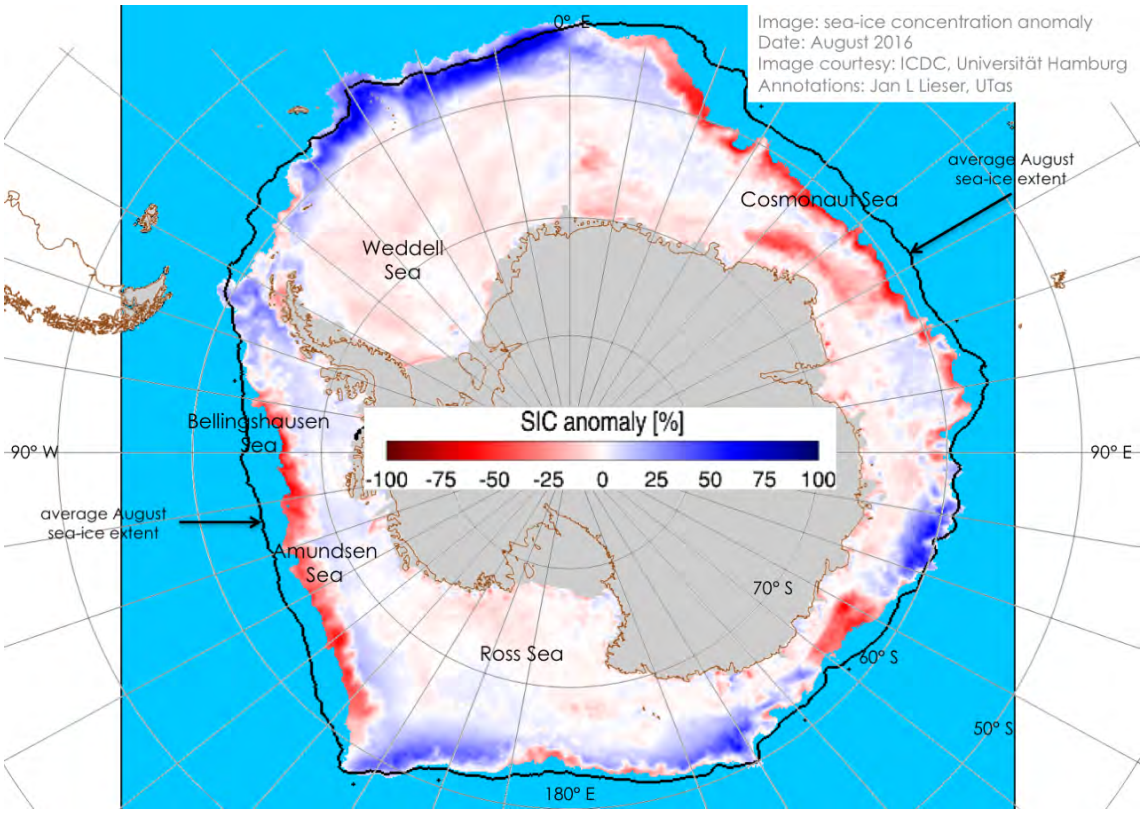

Figure 1: Sea-ice concentration anomaly for August 2016, provided by ICDC, Universität Hamburg.

The large negative sea-ice concentration anomaly in Cosmonaut Sea, between 5° E and 95° E, can be seen very clearly. The prolonged presence of the Cosmonaut Sea polynya is also seen as a red patch within the sea-ice zone, between 40° E and 60° E. Two more pronounced negative anomalies are north of Sabrina Coast, between 115° E and 130° E, and in the Amundsen Sea and western Bellingshausen Sea. The Ross Sea exhibits a mixed sea-ice concentration signal, but a slightly negative extent. Only in the eastern Weddell Sea, a strong positive sea-ice concentration anomaly signal is present and a slightly larger than average sea-ice extent.

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Davis Station

Figure 2 shows a visible scene of the Ingrid-Christensen Coast, between Amery Ice Shelf and West Ice Shelf.

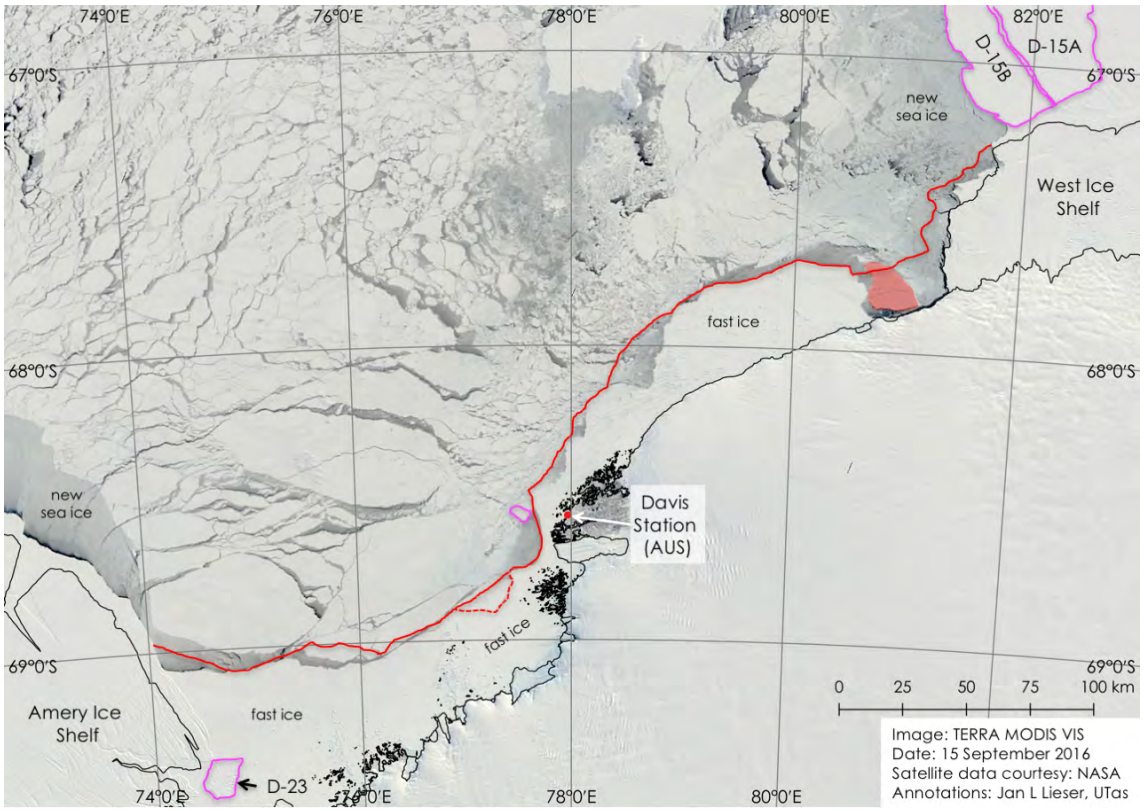

Figure 2: MODIS VIS scene, acquired 15/09/2016 and provided by NASA.

As noted in Sea Ice Report #38.1/2016, fast ice is breaking up. The red line in the figure gives the fast-ice edge on 07/09/2016 (dashed line indicates imminent break-out). West of the West Ice Shelf, the red shaded shape of ex-fast ice has an area of roughly 275 km^2 and broke away over night, from 14/09/2016 to 15/09/2016.

The general tendency for fast ice break up in East Antarctica appears to also continue elsewhere around Antarctica. For example, north of the Japanese Syowa Station (not shown in Figure 2), an area of roughly 1435 km^2 is broken up since 02/09/2016.

Sea Ice Report #39.1/2016

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

20/09/2016

East Antarctica

Figure 1 shows the sea-ice concentration chart for East Antarctica, on 19/09/2016. Acoustic whale recorder moorings are given by green dots, large tabular icebergs by pink dots. The median sea-ice extent for September is represented by the black-white line.

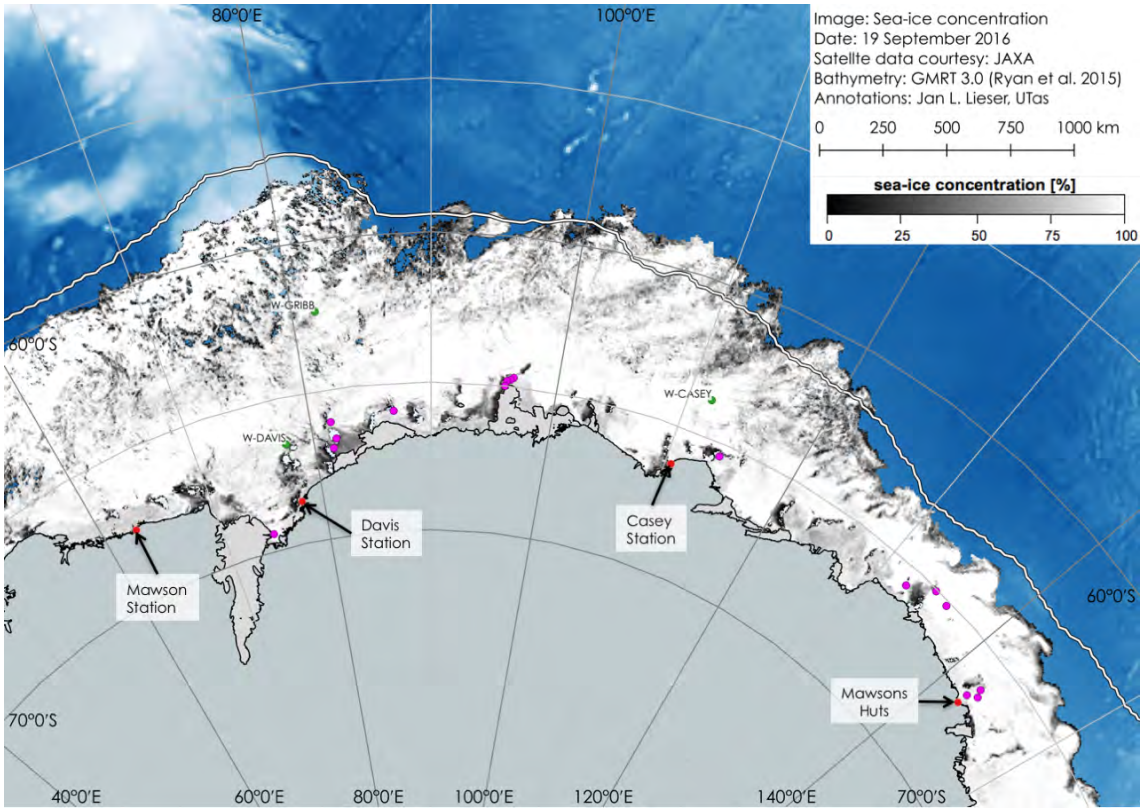

Figure 1: Sea-ice concentration, acquired 19/09/2016 provided by Universität Hamburg.

Sea-ice extent is largely below (south of) the median extent for this time of year. Sea-ice cover in Cooperation Sea (north of Davis Station) is rather broken, and considerable open water patches can be found as far south as 63° S.
Further west, the Cosmonaut Sea polynya is detectable as a low sea-ice concentration area with its centre roughly at 54° 38' E and 64° 15' S (just outside Figure 1).

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Sabrina Coast

Figure 2 shows a SAR scene, offshore Sabrina Coast. Red scribble lines indicate the current fast-ice edge. North of the Totten Glacier, the boundary between fast ice and pack ice is indiscernible after a change in wind direction pushed pack ice against the fast ice barrier, northeast of Law Dome.

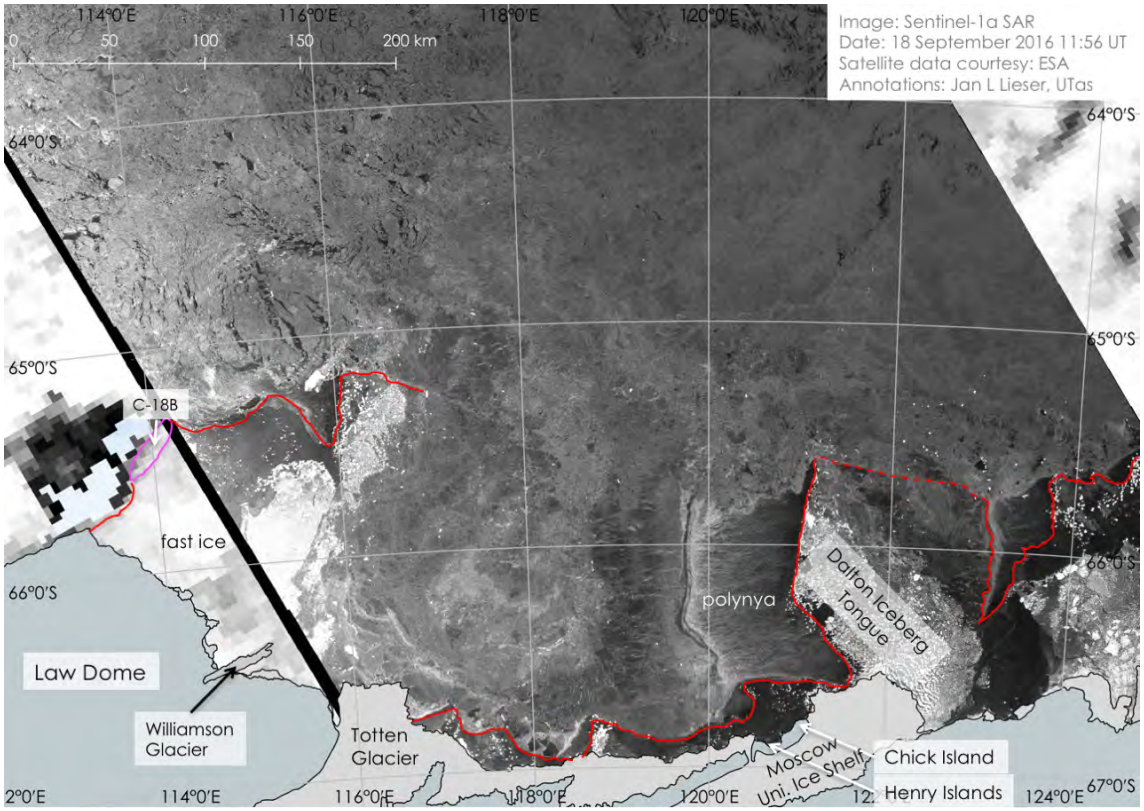

Figure 2: Sentinel-1a SAR scene, acquired 18/09/2016 and provided by PolarView.

Sea Ice Report #39.2/2016

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

22/09/2016

Davis Station

Figure 1 shows a visible scene, offshore Davis Station. The pink shape gives the position of the large tabular iceberg on 16/09/2016.

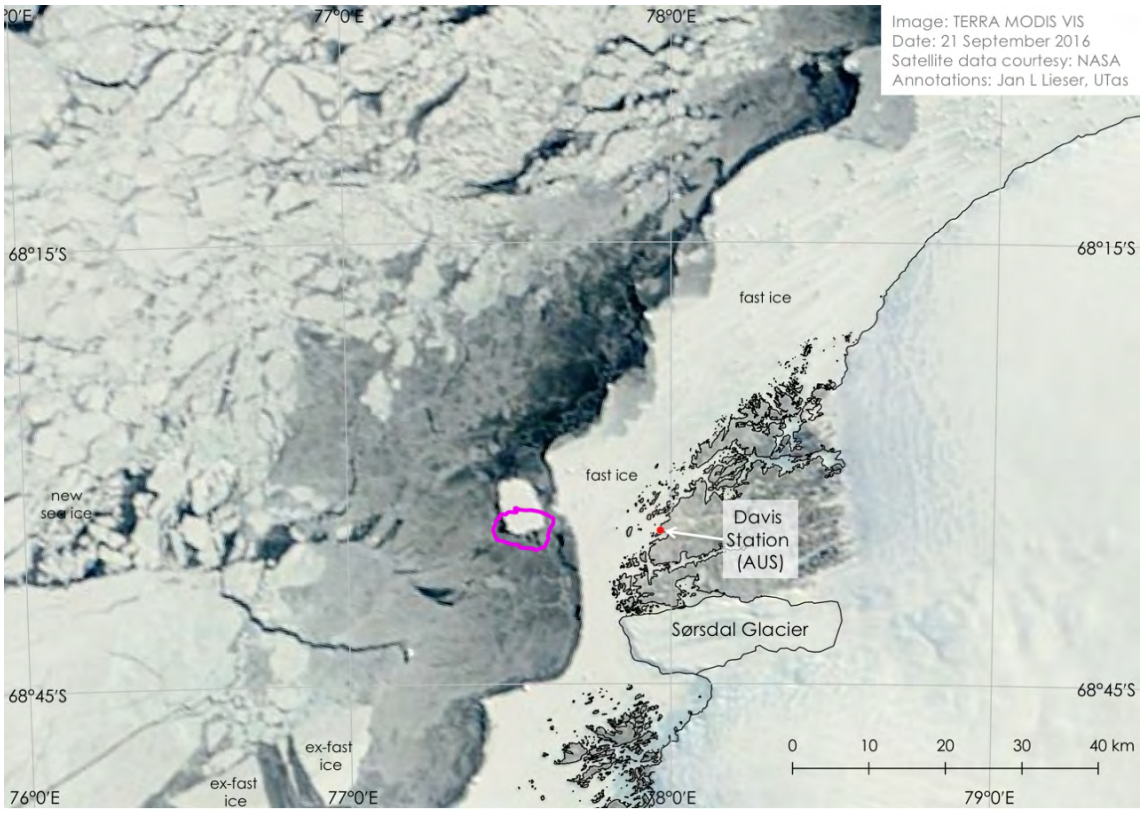

Figure 1: MODIS VIS scene, acquired 21/09/2016 provided by NASA.

Since 17/09/2016, this iceberg has started moving and is pivoting around its easternmost edge. When the iceberg gets unstuck, the fast-ice edge will be exposed to wind and wave action. Today, the fast-ice edge is roughly 3.5 nautical miles west of Gardner Island.

Sabrina Coast

Figure 2 shows a visible scene offshore Sabrina Coast. The ex-fast ice off Totten Glacier appears mobile and near-shore fast ice continues to break

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up. Fast ice offshore Henry Islands and Chick Island remains still local.

East of the Dalton Iceberg Tongue, ex-fast ice can be detected through the thin cloud cover and cracks of open water are visible right to the edge of the iceberg field.

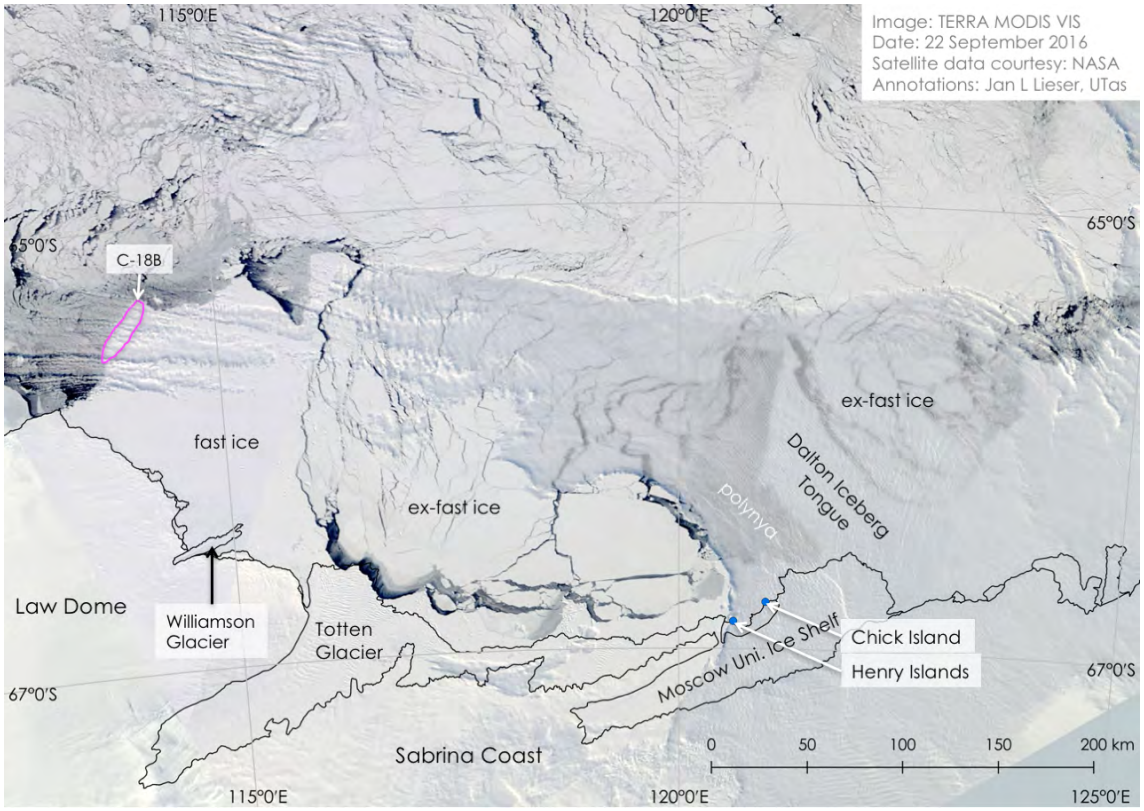

Figure 2: MODIS VIS scene, acquired 22/09/2016 and provided by NASA.

Commonwealth Bay

Figure 3 shows a high-resolution SAR scene on top of a sea-ice concentration chart. The black-white line shows the median sea-ice extent for September, in the region. The current sea-ice extent is well below (south of) the median, however the sea-ice cover shows high concentration after compaction by onshore wind, recently.

Figure 4 provides a detailed view of three, large tabular icebergs, offshore Commonwealth Bay/Cape Denison. The dotted pink shape indicates the position of iceberg C-15 on 12/09/2016. This iceberg appears mobile within the pack ice and has moved northward, during the last week.

The SAR scene shows clearly that iceberg C-29 is surrounded by many smaller bergs in the north and west, which are enclosed by fast ice, and smaller bergs in the east, which are surrounded by pack ice.

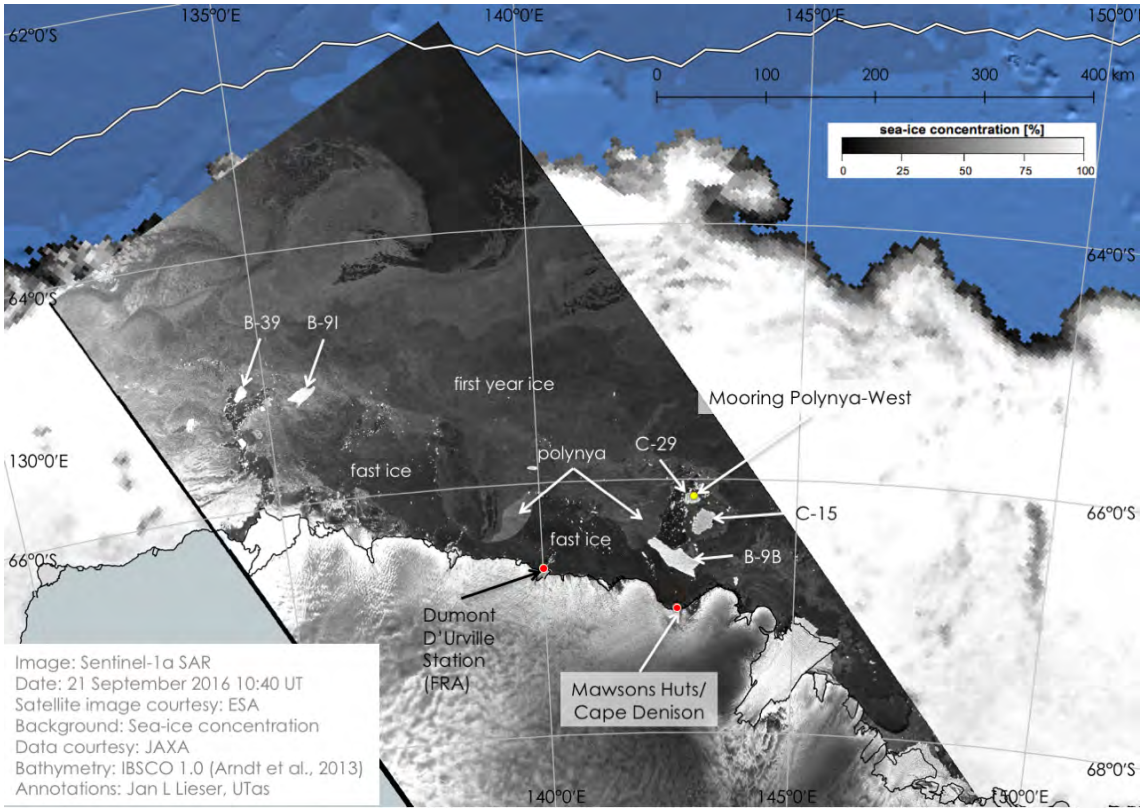

Figure 3: Sentinel-1a SAR scene, acquired 21/09/2016 and provided by PolarView. Sea-ice concentration data acquired 21/09/2016 and provided by Universität Hamburg.

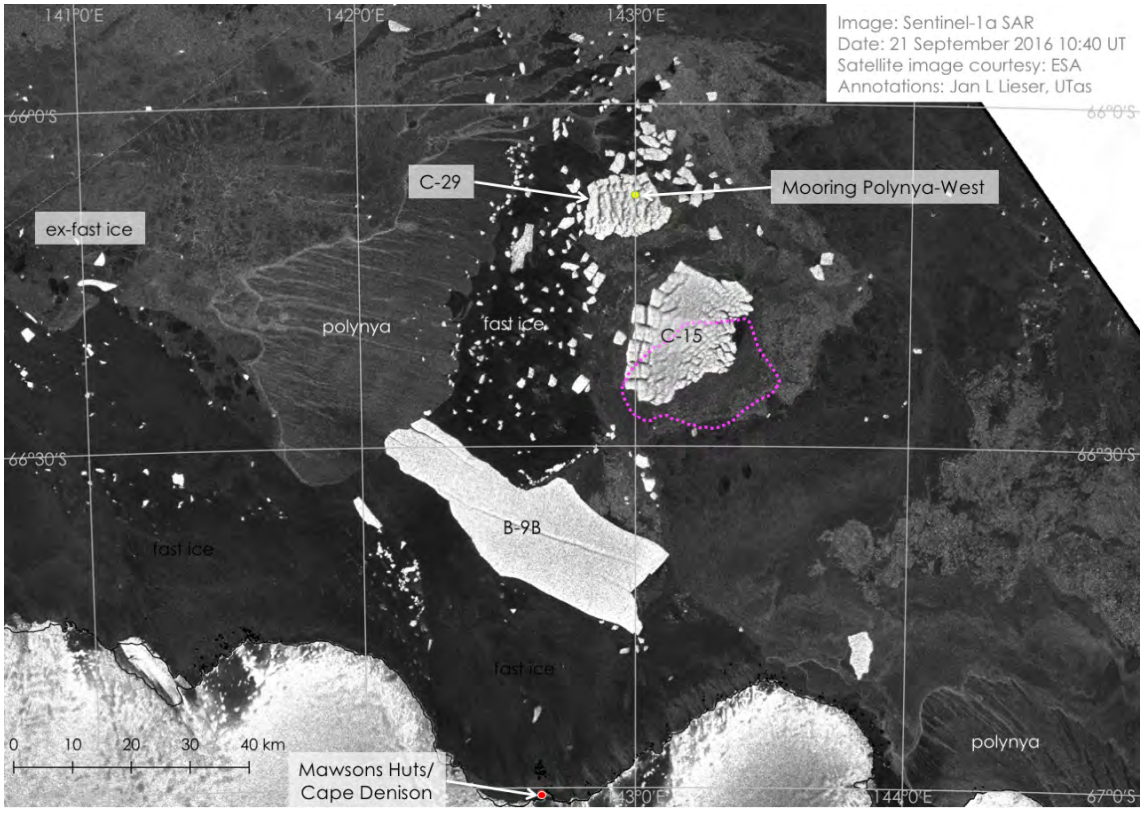

Figure 4: Sentinel-1a SAR scene, acquired 21/09/2016 and provided by PolarView.

Sea Ice Report #39.3/2016

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

23/09/2016

Commonwealth Bay

We observe further fast-ice break-up, in East Antarctica, reporting here on an event east of Commonwealth Bay. Figure 1 shows a visible scene of the Mertz Glacier region. Between yesterday's two overpasses of the TERRA and AQUA satellites, roughly 240 km^2 of fast ice (marked by the red shape) broke away from the eastern side of the glacier.

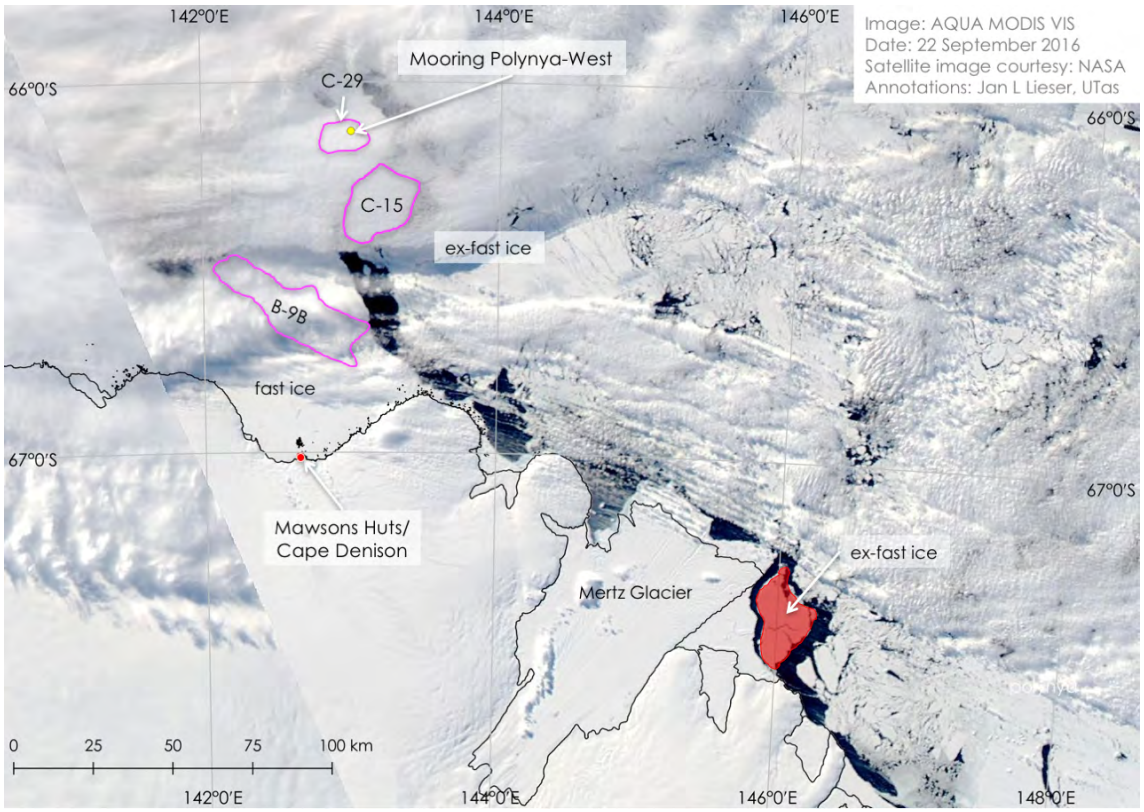

Figure 1: MODIS VIS scene, acquired 22/09/2016 and provided by NASA.

This is a region that typically held multi-year fast ice before the glacier tongue was knocked off. Since then, at least two large tabular icebergs, which were entrapped in the fast ice, have departed the region. The fast ice that has broken off over night had formed locally since February 2016, when also Commonwealth Bay was ice free.

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Sea Ice Report #42.1/2016

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

11/10/2016

After the early maximum in sea-ice extent this season, the pan-Antarctic extent decreased markedly, but appears to have plateaued for a couple of weeks, when it approached almost average conditions again. However, since the beginning of October, sea-ice extent is on the decline and clearly below average.

East Antarctica

Comparing the median sea-ice extent for September and October with current sea-ice concentrations shows that, in East Antarctica, extent is largely below the long-term average (Figure 1; pink dots mark large tabular icebergs). In eastern Cooperation Sea (north of Davis Station), sea-ice concentration is rather low, as far south as roughly 65° S.

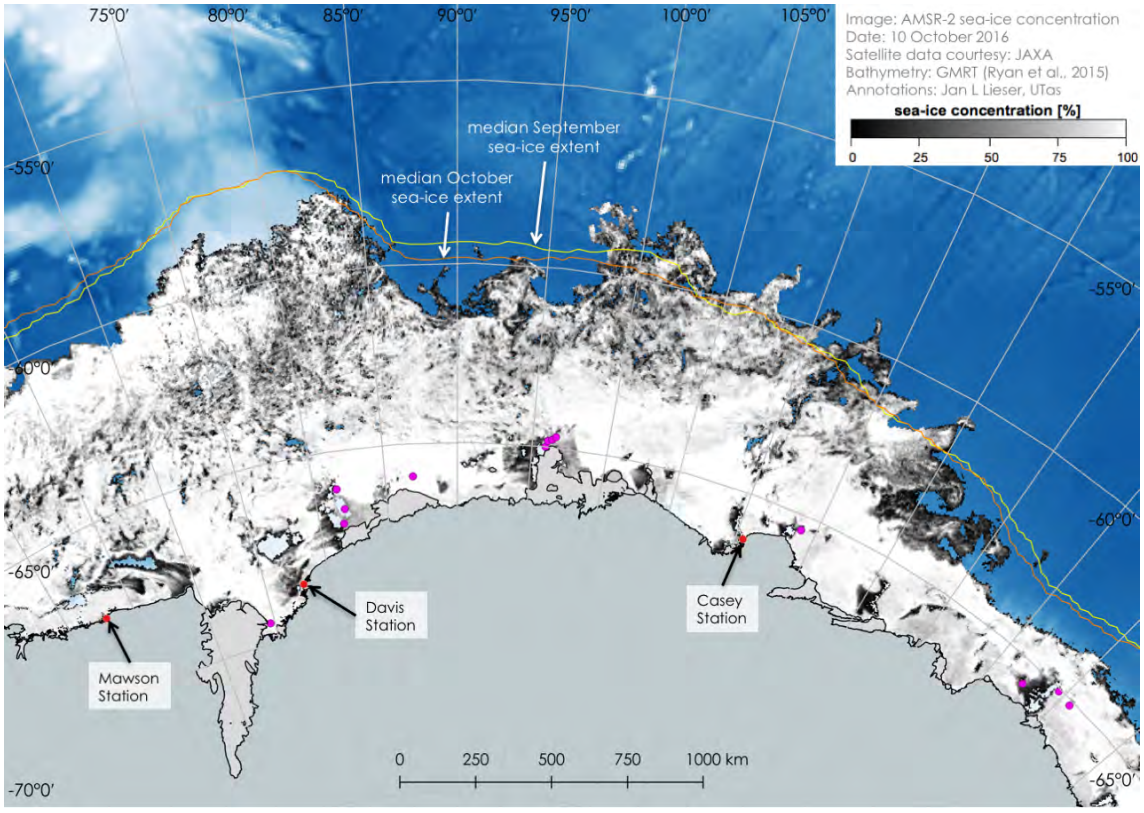

Figure 1: Sea-ice concentration, acquired 10/10/2016 and provided by Universität Hamburg.

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Davis Station

Figure 2 shows a high-resolution visible image of the fast ice, off Davis Station. Offshore, the large iceberg is still unsettled but not able to leave the area. Some new sea ice has built recently, which can be seen as grey shades, off the fast-ice edge, which is less than 6.5 nautical miles west of the station.

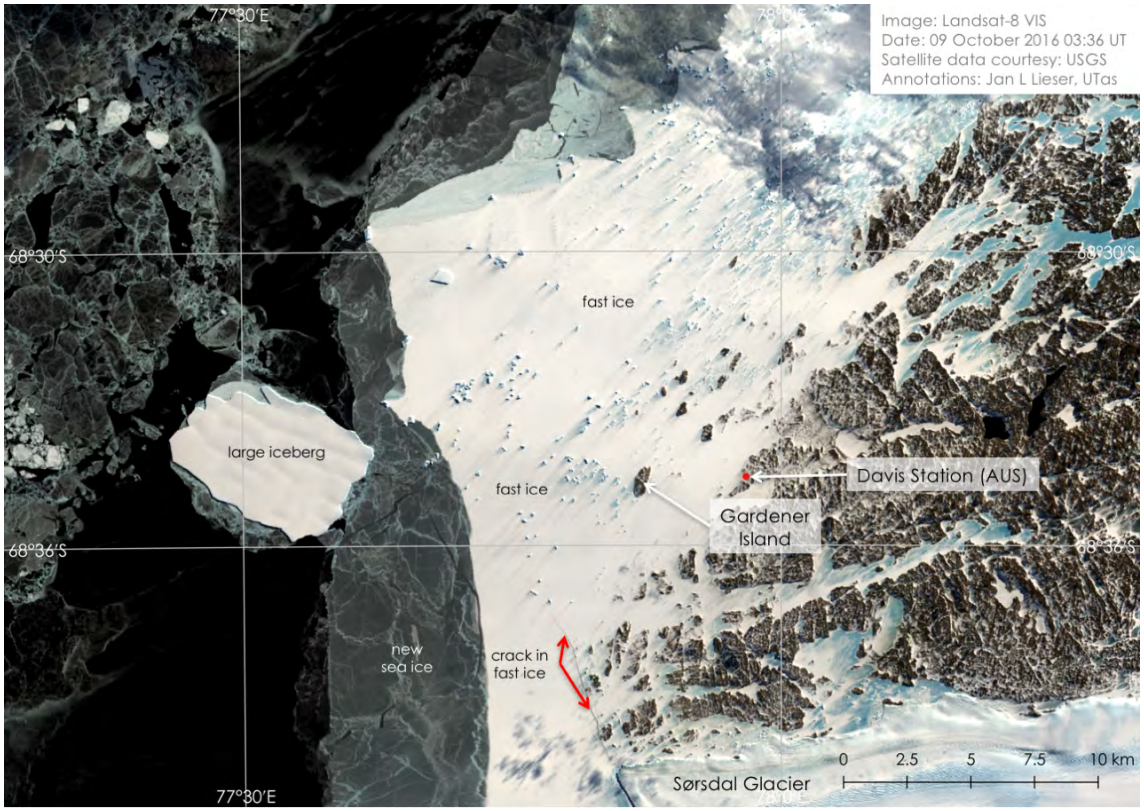

Figure 2: Landsat-8 VIS scene, acquired 09/10/2016 and provided by USGS.

The high-resolution scene also reveals many icebergs enclosed by fast ice, west of Gardener Island, and a crack in the fast ice at the southern end of the Vestfold Hill (red arrows in the figure).

Casey Station

While there is still fast ice attached to the northwestern and northeastern flanks of Law Dome, the pack ice north of it is rather dynamic. Large patches of open drift ice can be seen almost reaching the fast-ice edge, north of Casey Station. Off the station, a polynya can be seen in the RADAR scene (Figure 3).

West of the Dalton Iceberg Tongue, the polynya appears active and accumulated new ice mixed with ex-fast ice fills the area, in front of Totten Glacier.

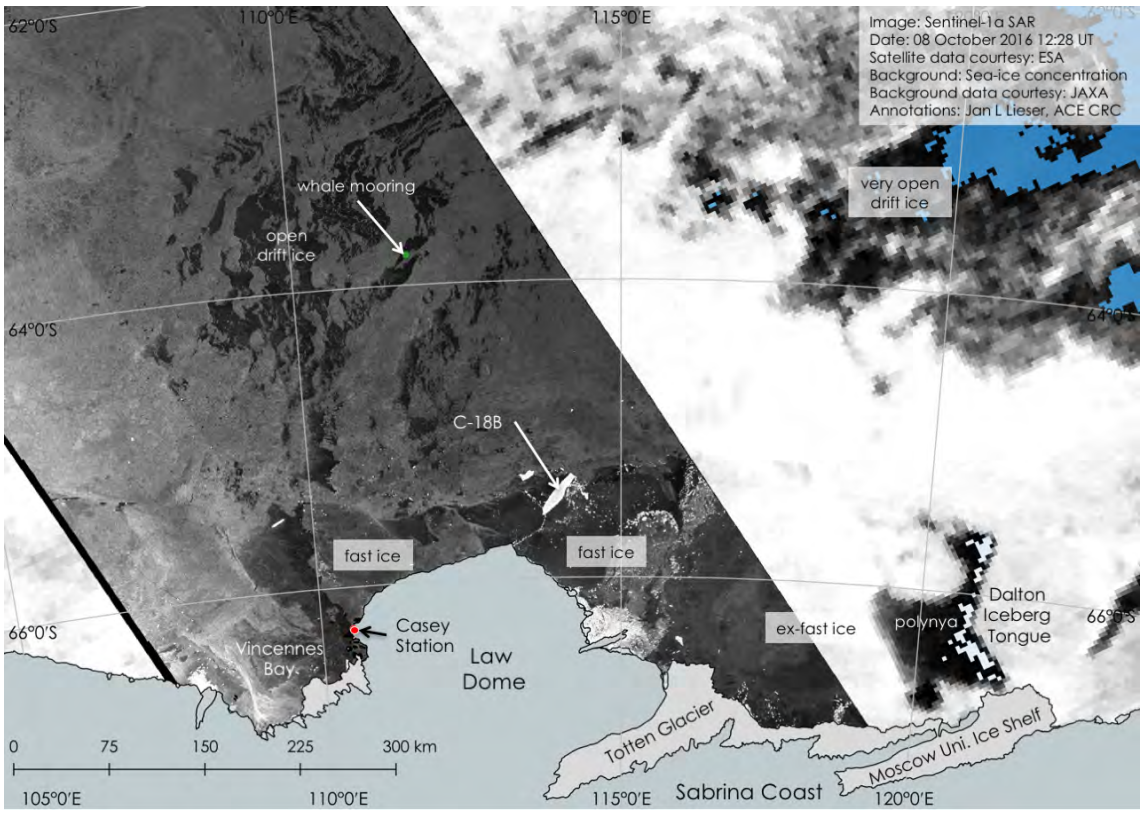

Figure 3: Sentinel-1a SAR scene, acquired 08/10/2016 and provided by PolarView; Background: sea-ice concentration, acquired 10/10/2016 and provided by Universität Hamburg.

Commonwealth Bay

Offshore Cape Denison, fast-ice conditions have not changed significantly (see Figure 4). New sea ice is attaching itself to the fast ice between iceberg C-29 and B-9B and trapping iceberg C-15, momentarily.

Mooring Polynya-West remains underneath iceberg C-29.

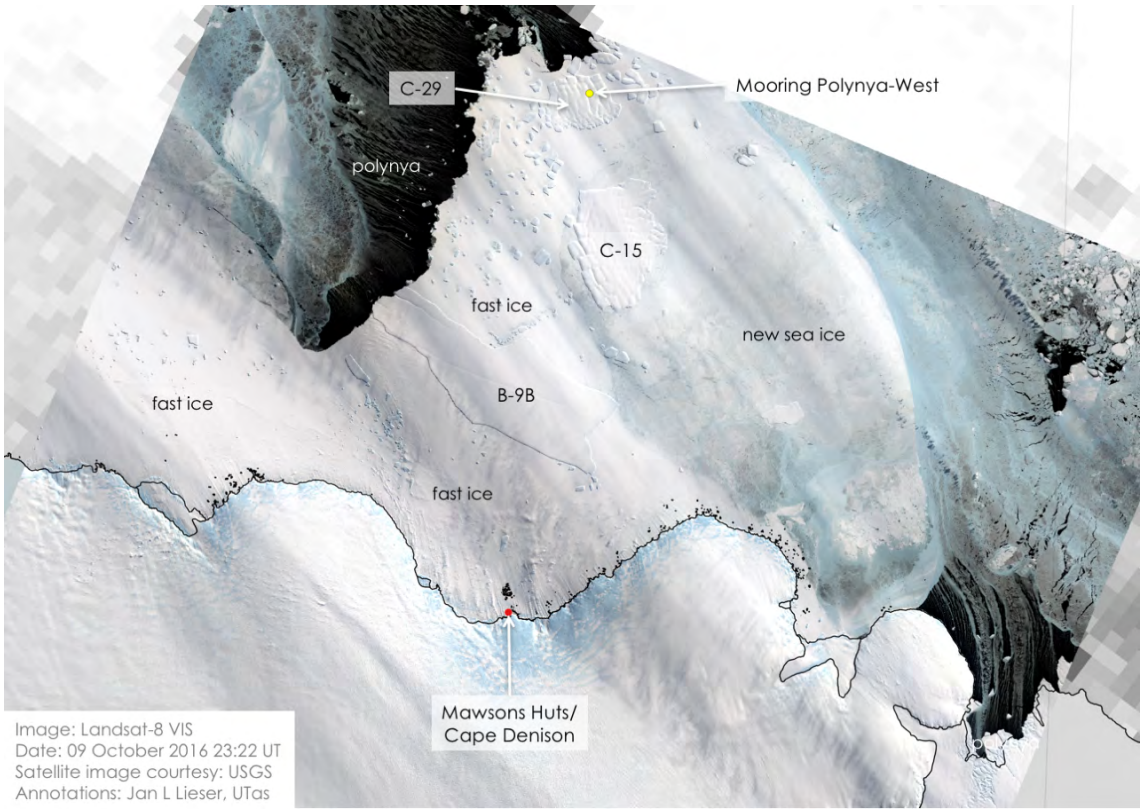

Figure 4: Landsat-8 VIS scene, acquired 09/10/2016 and provided by USGS.

Sea Ice Report #42.2/2016

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

12/10/2016

Davis Station

Figure 1 shows a visible image of the fast ice off Davis Station. The large iceberg offshore has swivelled around a bit during the past two days (see Sea Ice Report #42.1). Its position on 09/10/2016 is indicated by the red outline in the figure. New sea ice has been blown away from the fast-ice edge, which remains less than 6.5 nautical miles west of the station.

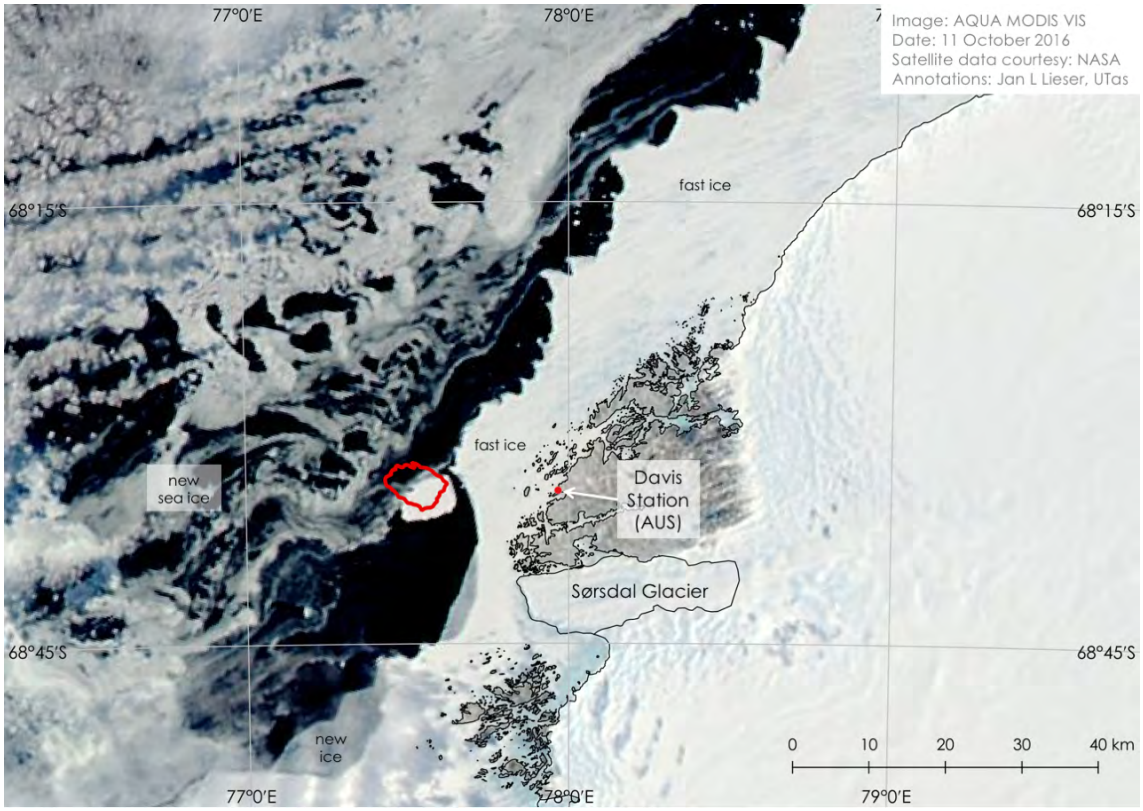

Figure 1: MODIS VIS scene, acquired 11/10/2016 and provided by NASA.

Sabrina Coast

Figure 2 gives a visible impression of the sea ice, between Law Dome and the Dalton Iceberg Tongue. The area is filled by various types of sea ice. The solid red line in the figure separates two distinctively different zones of

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fast ice; to the west is stable fast ice that remained in-situ for many months, to the east is only temporary fast ice that is subject to frequent break offs. Red dashed lines indicate the northern and southern boundaries of this (not so) land-fast sea ice area. A band of high concentration drifting pack ice is north of the fast ice regions and spans roughly 65 nautical miles in north-south direction.

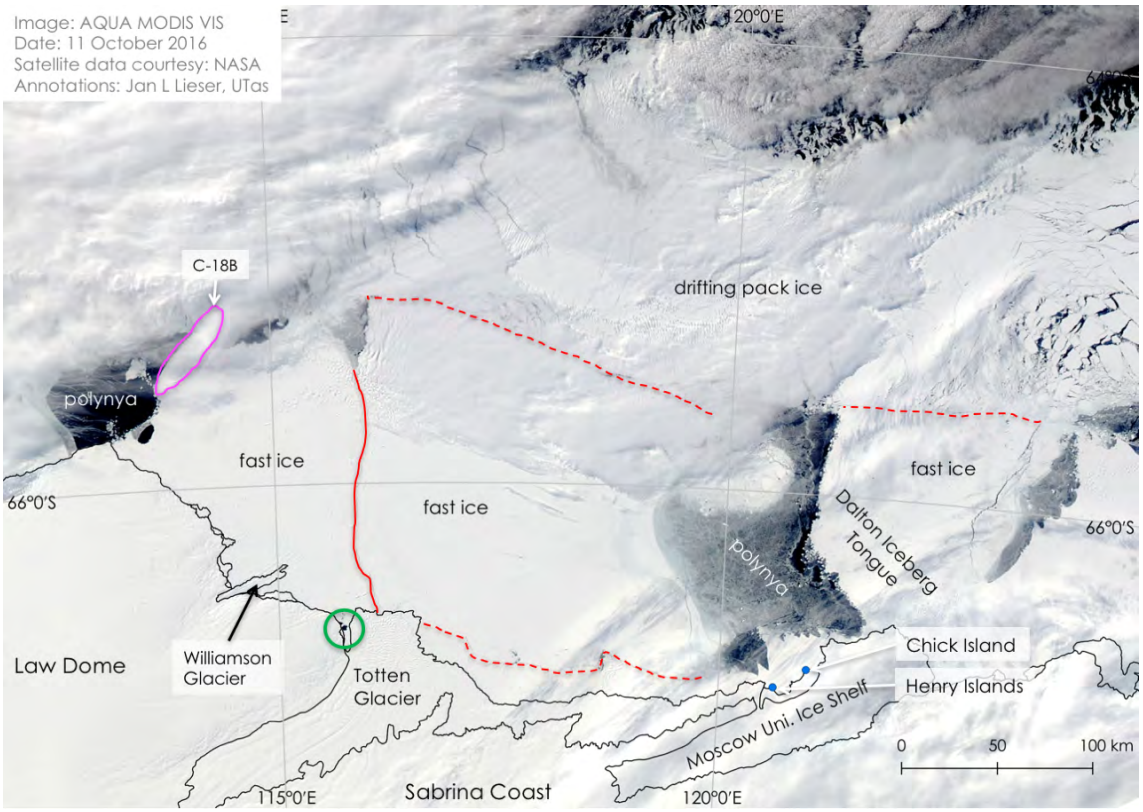

Figure 2: MODIS VIS scene, acquired 11/10/2016 and provided by NASA.

Of curious note is a small area at the northwestern edge of Totten Glacier (see green circle in Figure 2). It is an area of open water of various size (currently approximately 3 km^2), which was monitored during the last winter season. It is located between the Law Dome ice cap in the west, the floating Totten Glacier in the east and old fast ice in the north, right at the edge of the continental margin. The cause for this feature is currently under investigation, but oceanic and atmospheric factors appear to be responsible.

Sea Ice Report #42.3/2016

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

13/10/2016

Antarctica

Figure 1 shows the colour-coded sea-ice concentration anomaly for September 2016, with the long-term average sea-ice extent as a black line.

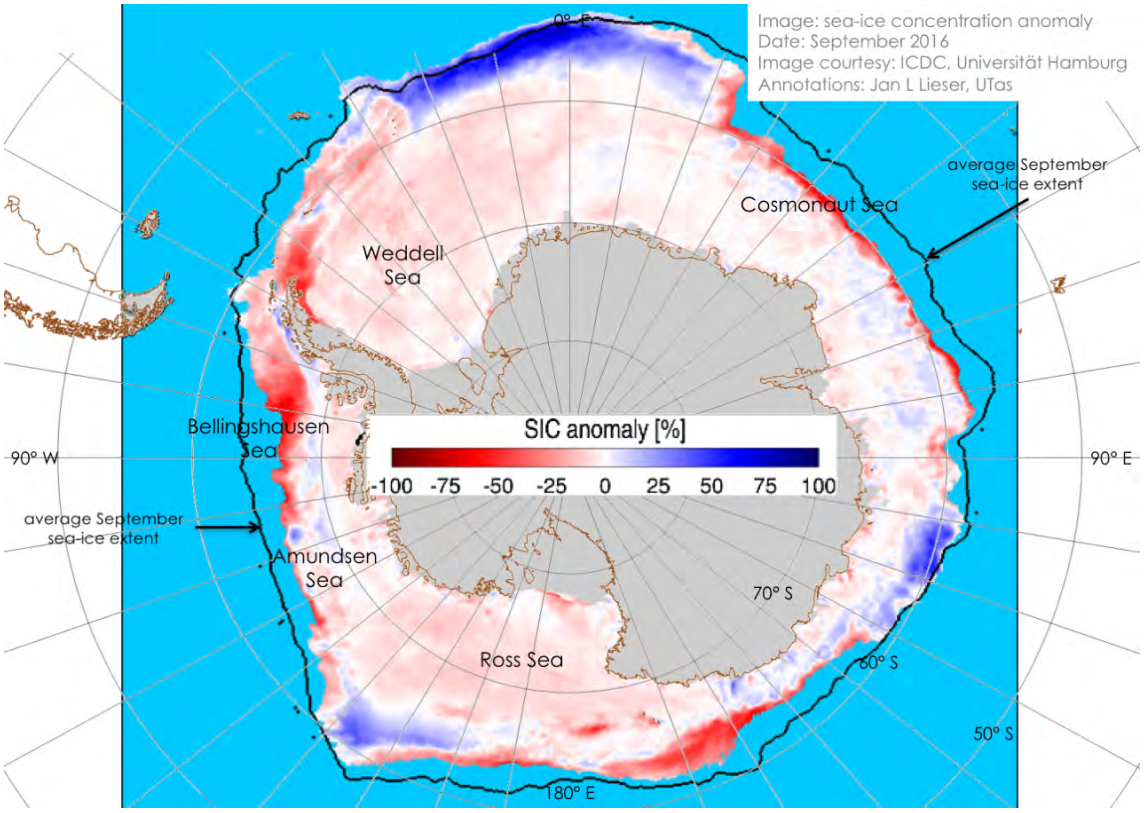

Figure 1: Sea-ice concentration anomaly, provided by ICDC.

The trend of the previous months is continued with pan-Antarctic lower than average sea-ice extent – except for the eastern Weddell Sea – and largely lower than average sea-ice concentration within the lower extent (shown as red patches). Sea-ice concentration is only above average in three locations: a small part of the southern Indian Ocean (between 100° E and 120° E), a patch in the eastern Ross Sea and, again, the eastern Weddell Sea. Only in these regions, the sea-ice extent reaches the average sea-ice extent, this September.

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Sabrina Coast

Figure 2 shows a very high-resolution visible image of the fast ice attached to the northern end of the Moscow University Ice Shelf, off Sabina Coast. Henry Islands and Chick Island can be clearly seen enclosed by fast ice.

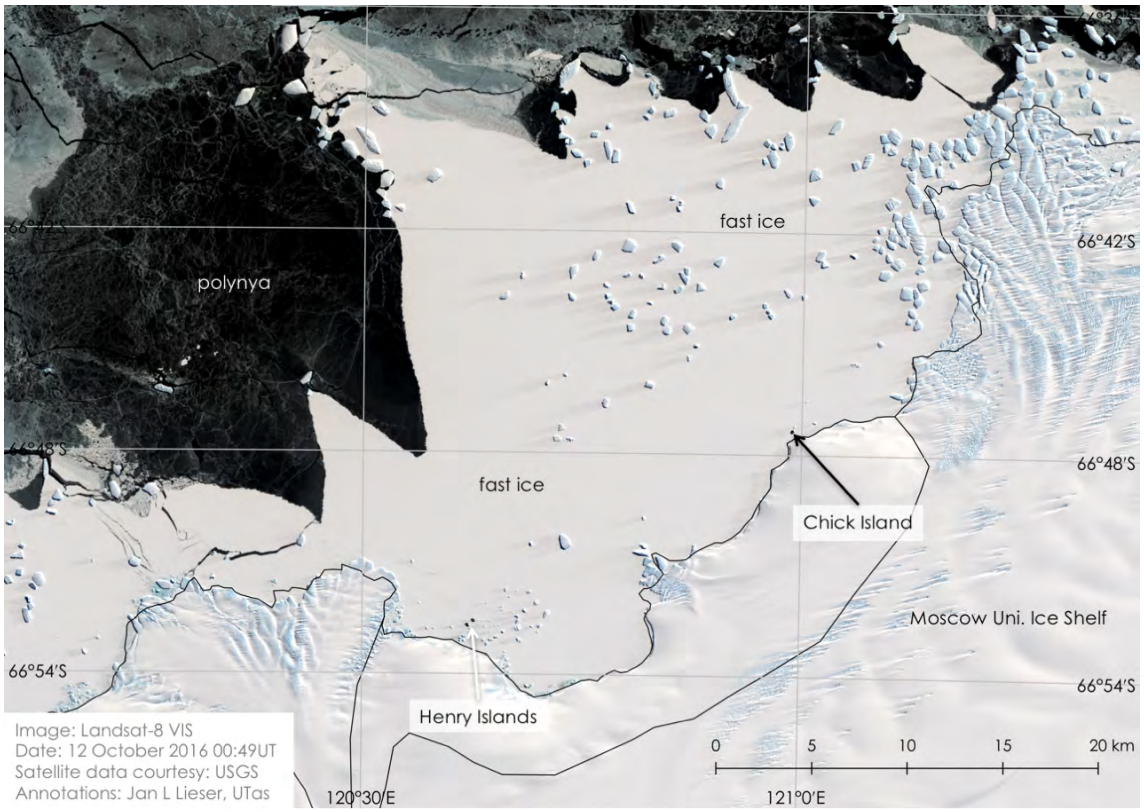

Figure 2: Landsat-8 VIS scene, acquired 12/10/2016 and provided by USGS.

Some fast ice is breaking off at the northern edge of the fast ice, where it meets the polynya, resulting in a zigzag shape of the fast ice edge.

Sea Ice Report #42.4/2016

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

14/10/2016

Davis Station

Figure 1 shows a SAR scene of central Prydz Bay, off Amery Ice Shelf.

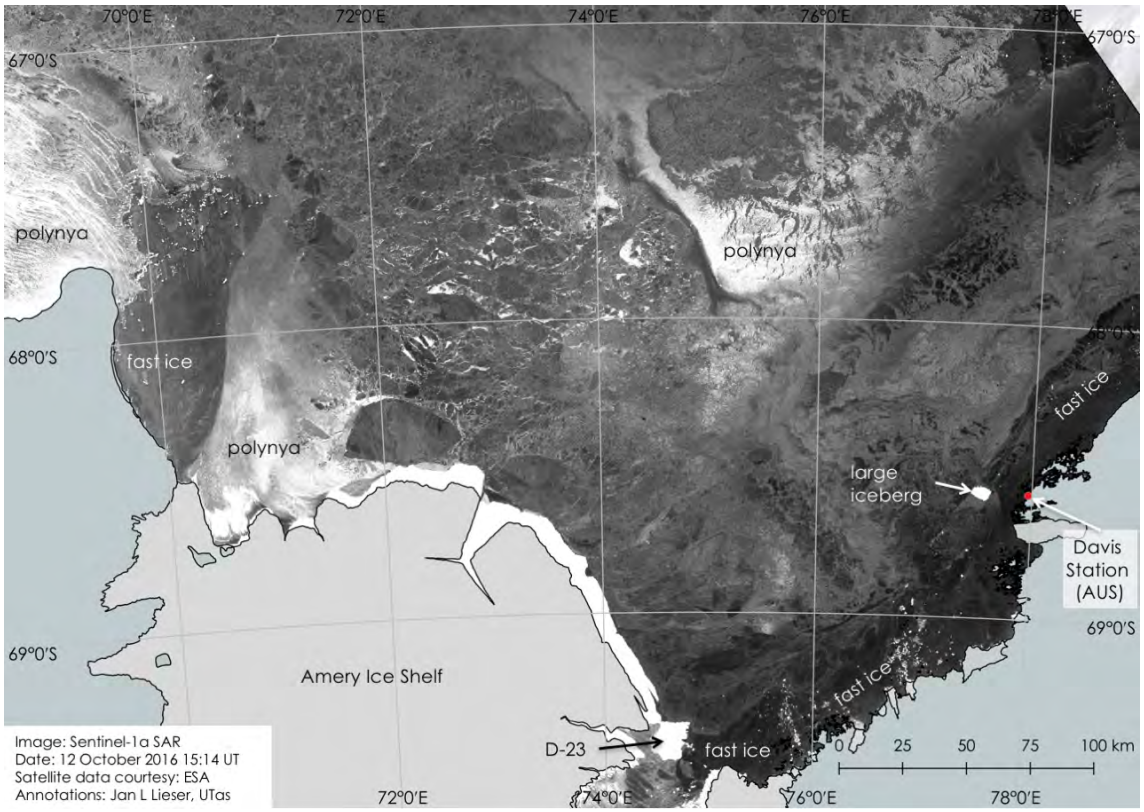

Figure 1: Sentinel-1a SAR scene, acquired 12/10/2016 and provided by PolarView.

The polynyas north of the western Amery Ice Shelf and around the corner from Cape Darnley can be identified, as well as a rather large open water/low sea-ice concentration patch in the central part of Prydz Bay.

Off Davis Station, the large iceberg is still unsettled but the fast ice edge remains stable since last report (Sea Ice Report #41.2/2016).

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Casey Station

Figure 3 shows a very high-resolution visible image of the vicinity of Casey Station.

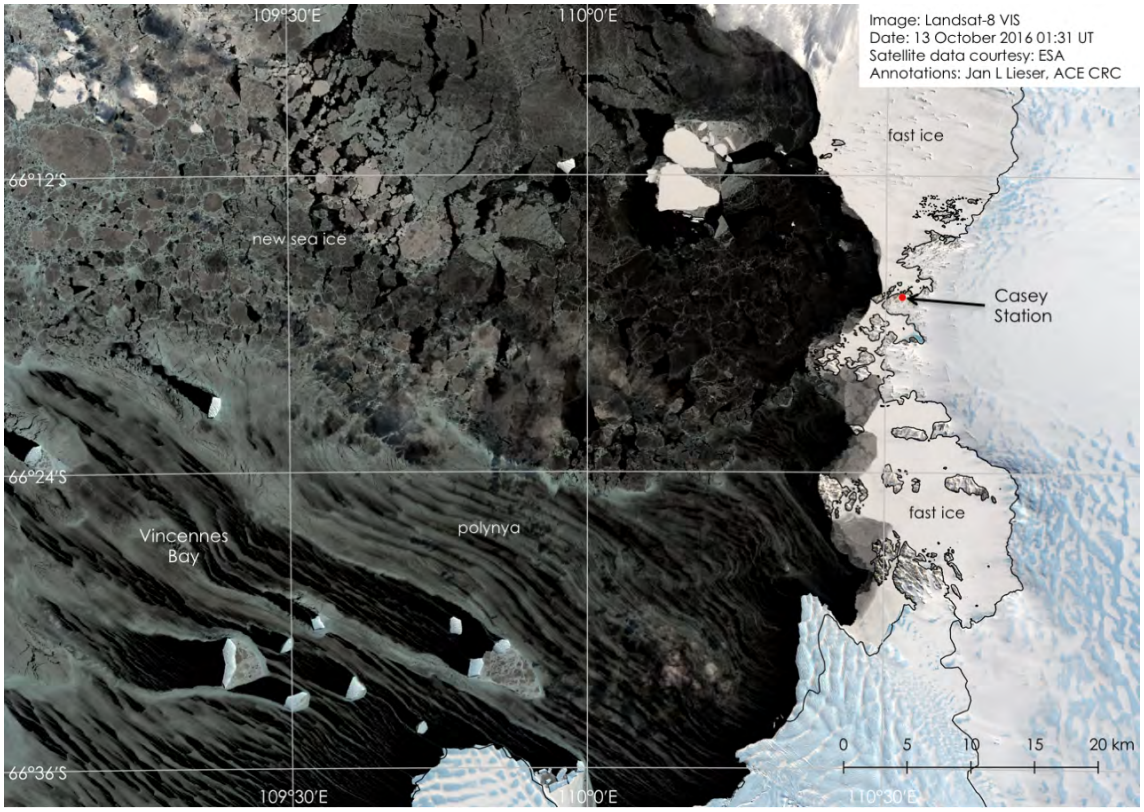

Figure 2: Landsat-8 VIS scene, acquired 13/10/2016 and provided by USGS.

The polynya of Vincennes Bay is covered by new ice, with only isolated floes and bergy bits drifting freely. North and south of the station, some old fast ice is still in sheltered bays at the continental margin.

Sabrina Coast

A high-resolution SAR scene is shown in Figure 3. The boundary between very open drift and high-concentration sea ice is approximated by the orange line.

A large polynya is the prominent feature, west of the Dalton Iceberg Tongue, with smaller polynyas present west of iceberg C-18 and east of the Dalton Iceberg Tongue. North of the ex-fast ice between the ice tongue and the fast ice attached to the eastern flank of Law Dome, the band of high concentration sea ice is roughly only 65 nautical miles wide (north-south).

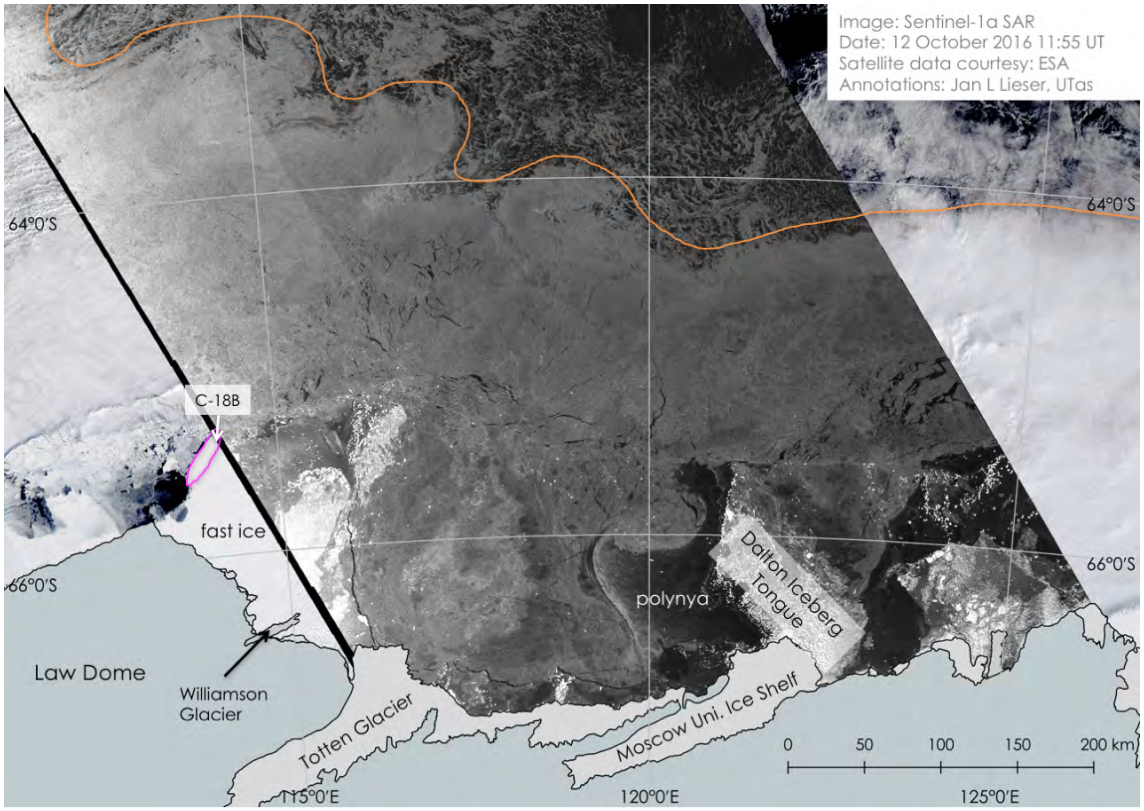

Figure 3: Sentinel-1a SAR scene, acquired 12/10/2016 and provided by PolarView. Background: AQUA MODIS VIS image, acquired 12/10/2016 and provided by NASA.

Sea Ice Report #43.1/2016

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

17/10/2016

We note further break-up of fast ice, along the coast of East Antarctica.

Mawson Station

Figure 1 shows a visible scene of the fast ice off Mawson Station. The position of the fast-ice edge on 12/10/2016 is indicated by the dashed yellow line.

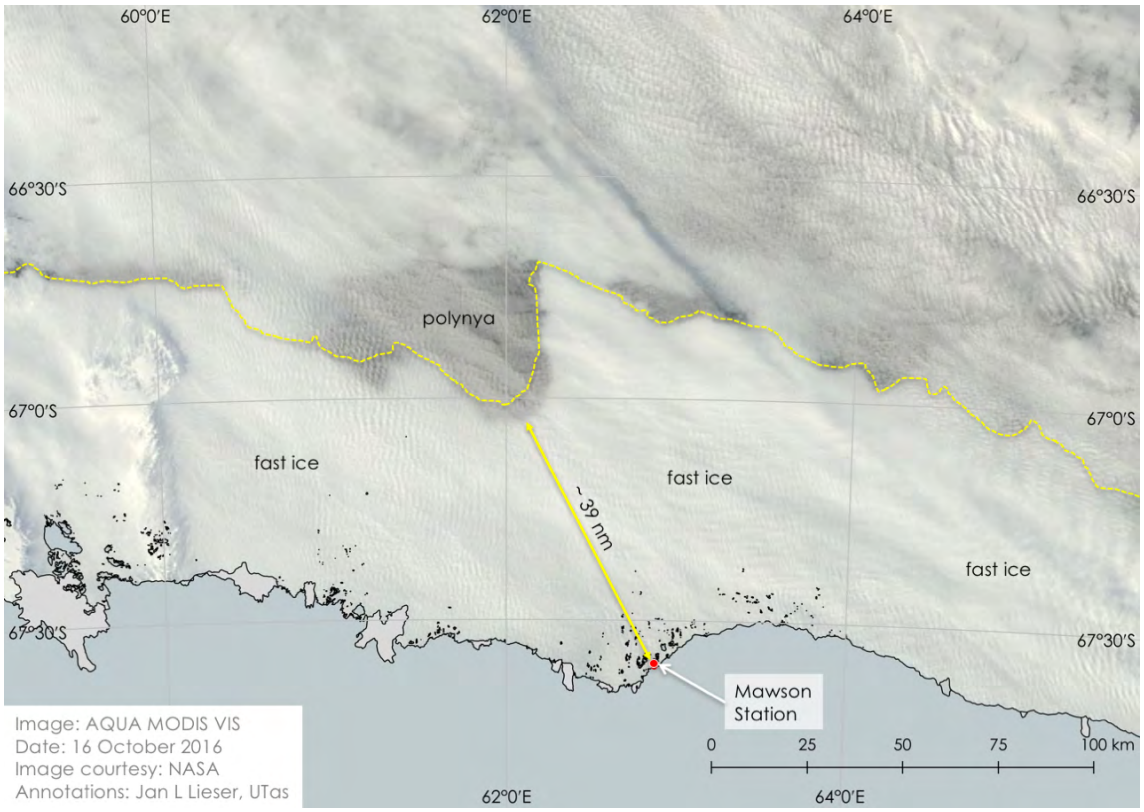

Figure 1: AQUA MODIS VIS scene, acquired 16/10/2016 and provided by NASA.

Northwest of the station, the edge of the polynya has retreated southward by about 3 nautical miles, during the past five days. Further west, some more fast ice break-up is detected.

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Davis Station

Figure 2 shows a very high-resolution visible image of the vicinity of Davis Station (largely affected by broken clouds). The yellow dashed line indicates the position of the fast-ice edge, on 12/10/2016. The red lines show yesterday's location, where positive identification is possible.

The pink shape gives the position of the large tabular iceberg, off Davis Station, five days ago.

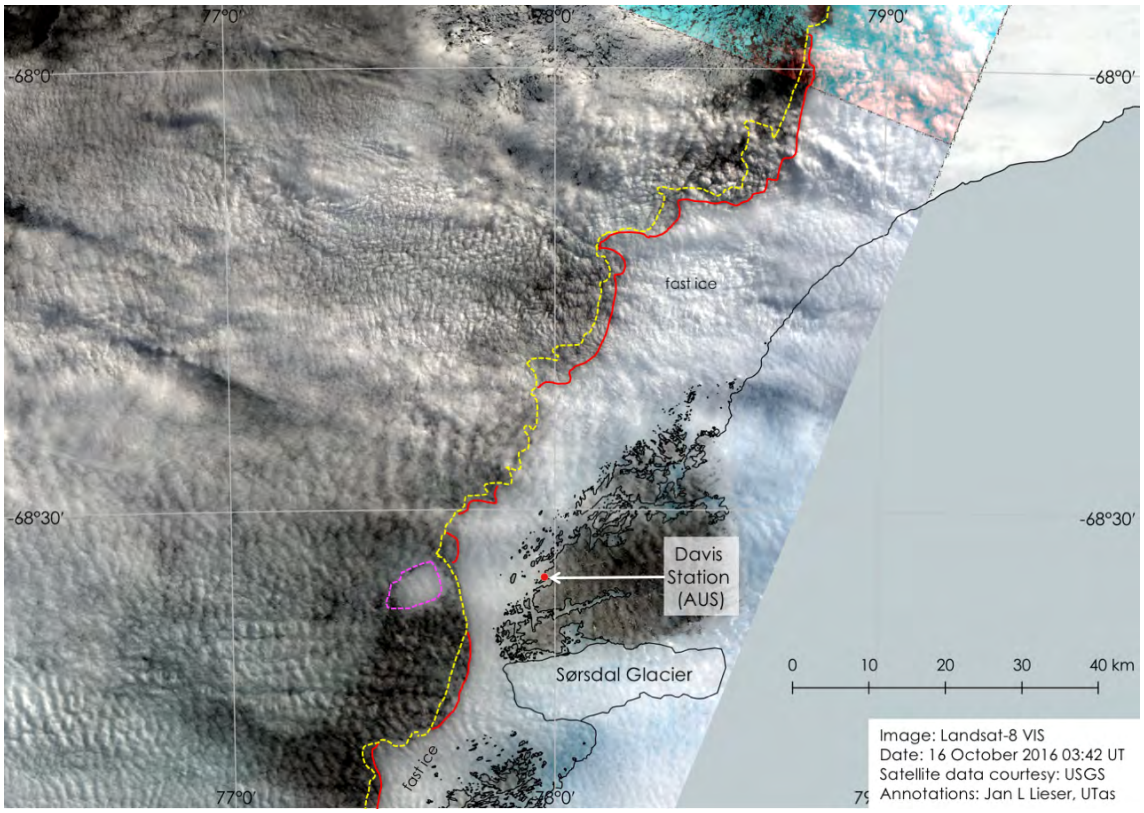

Figure 2: Landsat-8 VIS scene, acquired 16/10/2016 and provided by USGS.

The retreat of the fast-ice edge towards the coast is obvious in various locations. The large iceberg has moved anti-clockwise a little bit closer to the coast.

Further north, west of icebergs D-15A and D-15B, remains a large area of fast ice (not shown in the frame of Figure 2), which is not connected to land or promontories. During the weekend, more than 3000 km^2 of this patch of fast ice have broken away and are now drifting freely as ex-fast-ice floes.

Sea Ice Report #43.2/2016

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

18/10/2016

Ross Sea

Figure 1 shows a high-resolution (3.25 km/pixel) sea-ice concentration chart for the Ross Sea. Additionally, the long-term median sea-ice extent for October, November and December are given by the yellow, orange and red lines, respectively.

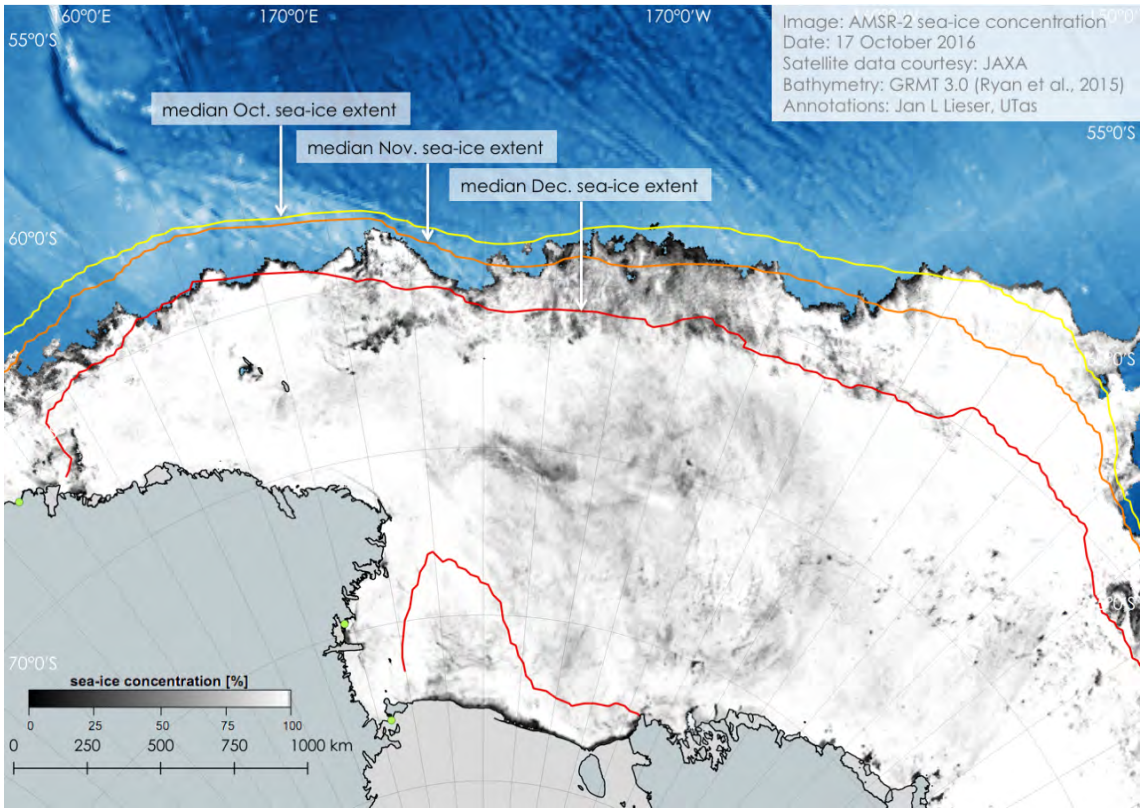

Figure 1: Sea-ice concentration, acquired 17/10/2016 and provided by Universität Hamburg.

Overall, the sea-ice extent is largely below (south of) the median October extent, except for a small region between 150° W and 130° W.
Between 160° E and 170° E, today's sea-ice concentration is almost below (south of) the median December extent. At the same time, in the central Ross Sea (between 180° E and 150° W), the current boundary between the marginal ice zone and the dense pack is roughly at the median December extent.

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Sea Ice Report #43.3/2016

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

19/10/2016

Davis Station

Figure 1 shows a visible image of eastern Prydz Bay and off Davis Station. Off the station, a thin red line indicates the location of the fast ice edge, on 12/10/2016.

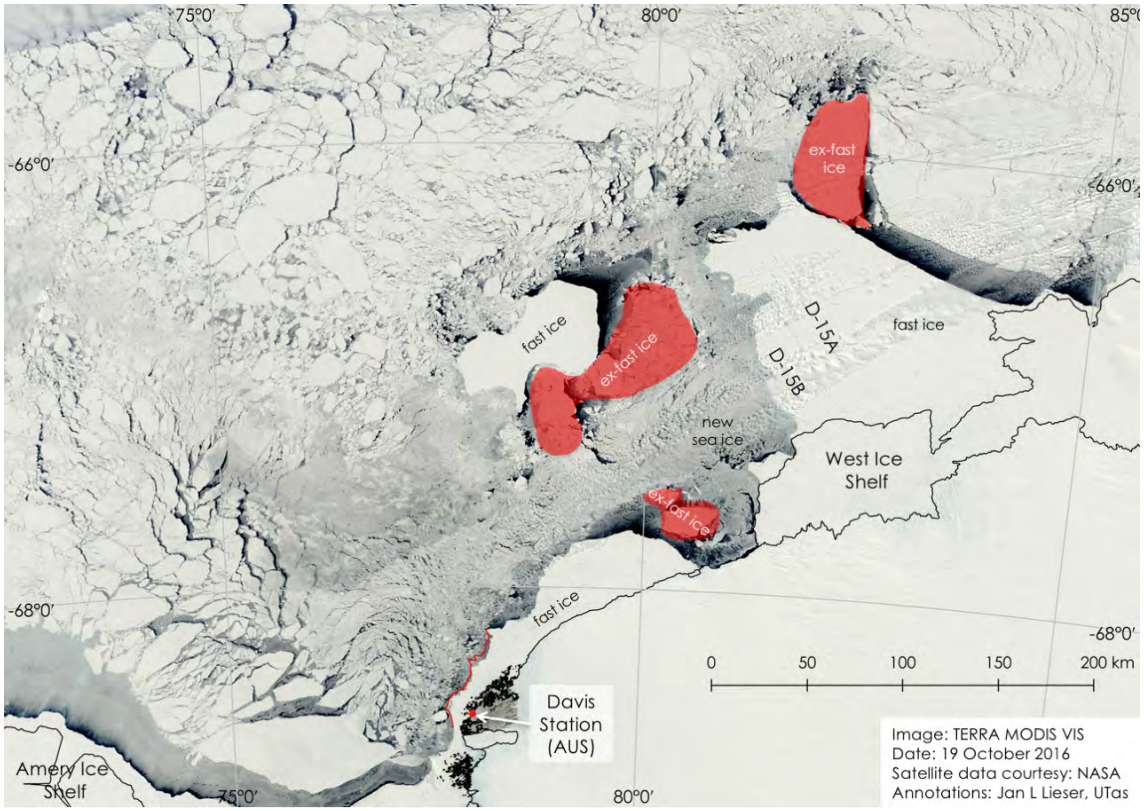

Figure 1: TERRA MODIS VIS scene, acquired 19/10/2016 and provided by NASA.

The figure highlights areas of fast ice break up, in the vicinity of the West Ice Shelf. Overnight, an area of almost 2000 km^2 of fast ice broke off, north of iceberg D-15A. The region of ex-fast ice in the central part of the image was reported earlier (see Sea Ice Report #43.1/2016).

Offshore Davis Station, the fast-ice edge has retreated towards the coast by about 1.3 nautical miles.

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Sea Ice Report #44.1/2016

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

24/10/2016

Davis Station

Figure 1 shows a visible image of the Davis Station region. Offshore, the red line approximates the location of the fast ice edge.

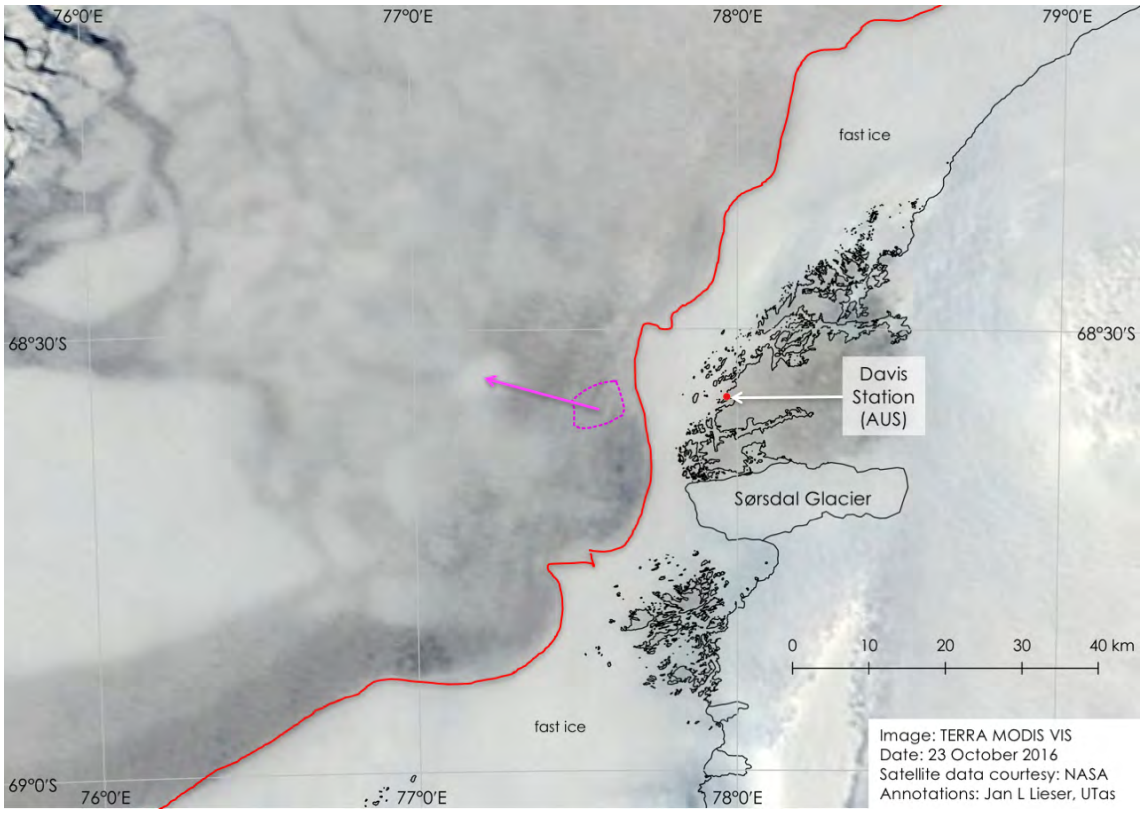

Figure 1: TERRA MODIS VIS scene, acquired 23/10/2016 and provided by NASA.

Off Davis Station, the large iceberg that was grounded there for about a year became unstuck on 20/10/2016, and has since moved roughly 8 nautical miles northwestward. The pink dashed shape indicates its position on 19/10/2016. Even though the region is under thin clouds since then, the location of the large berg can be tracked.

North of iceberg D-15A (not shown in the figure), a large piece of fast ice broke off on 18/10/2016 (see Sea Ice Report #43.3). During the weekend, this ex-fast ice has broken into smaller floes and is drifting with the pack ice.

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Sea Ice Report #44.2/2016

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

30/10/2016

East Antarctica

Figure 1 shows a sea-ice concentration chart of East Antarctica. The white line gives the median sea-ice extent for November, green dots show the locations of acoustic whale recorder buoys.

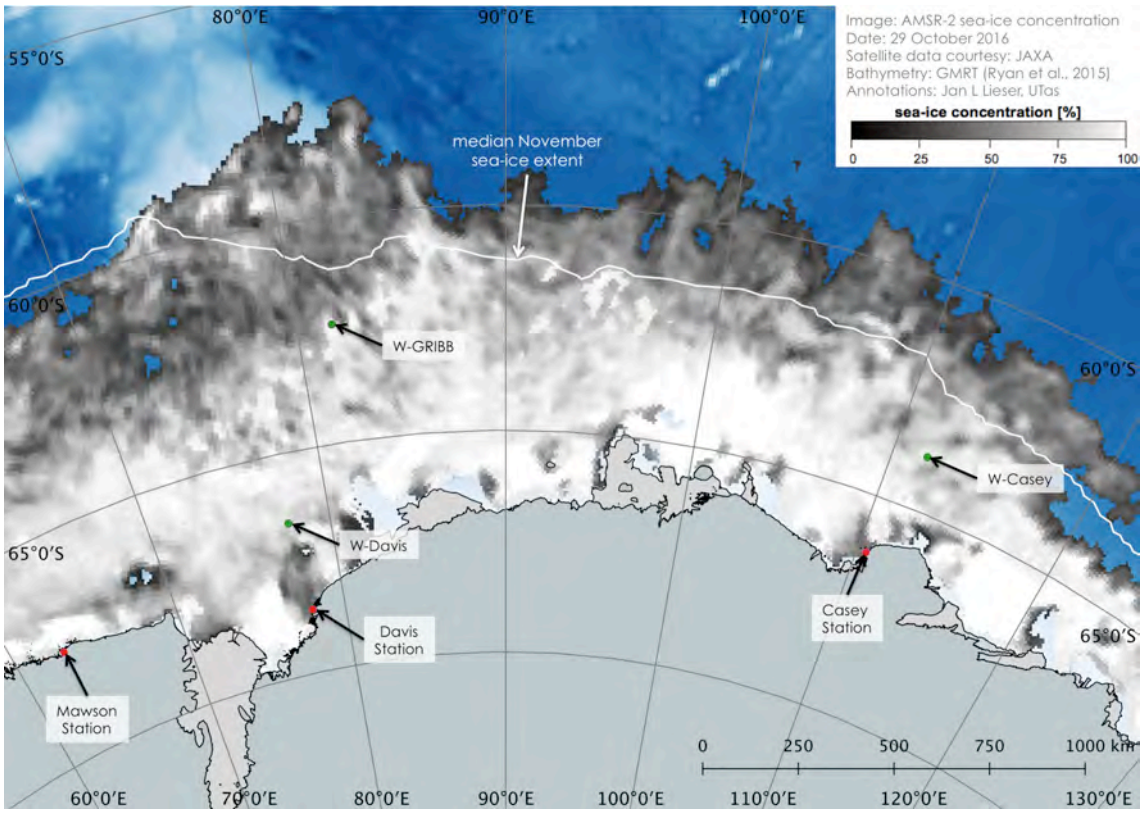

Figure 1: Sea-ice concentration, acquired 29/10/2016 and provided by Drift & Noise Polar Services.

The pan-Antarctic sea-ice extent remains largely below the average for late October, as it is in most places below (south of) the median extent for November already. Only three regions show sea-ice extent significantly above (north of) the November median, namely in the eastern Weddell Sea (between 20° W and 5° E), the western Ross Sea (between 125° W and 150° W) and some parts of East Antarctica (between 75° E and 120° E, see Figure 1).
In Prydz Bay, medium-high sea-ice concentration (50 % to 75 %) is found as far south as 65° S.

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Sea Ice Report #45.1/2016

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

31/10/2016

Davis Station

Figure 1 shows a visible scene of Prydz Bay, complemented by sea-ice concentration in the east. The yellow line roughly indicates the transition between the marginal ice zone in the north and more compact pack ice in the south. Red scribble lines show areas of fast ice.

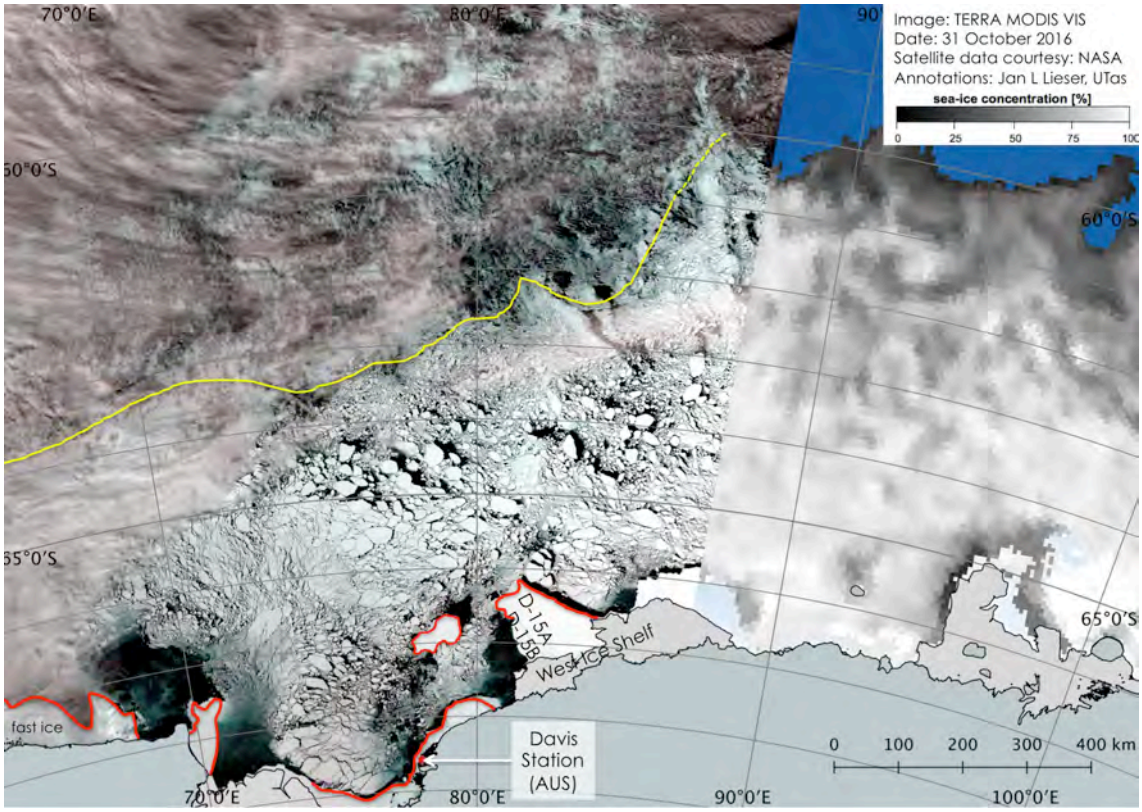

Figure 1: TERRA MODIS VIS scene, acquired 31/10/2016 and provided by NASA; complemented by sea-ice concentration, acquired 30/10/2016 and provided by Drift & Noise Polar Services.

South of 64° S, some large floes of first year sea ice are clearly visible (Figure 1). Currently, the general northerly drift of the floes results in a divergent pattern and most very large floes show some openings and cracks around them.

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Figure 2 shows a detail of Figure 1 around Davis Station. The fast-ice edge is about 5.5 nautical miles west of the station. The large iceberg, which was previously grounded off the station, can be seen further south now, off the Rauer Group (south of Sørsdal Glacier).

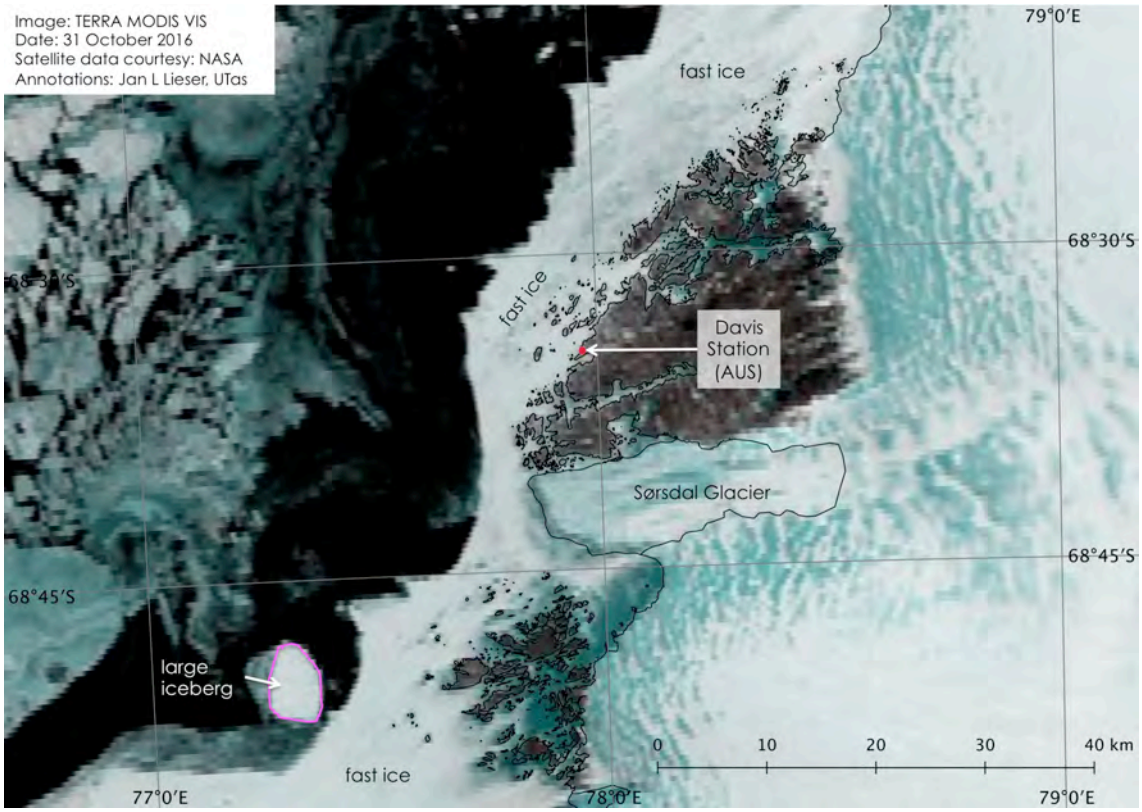

Figure 2: TERRA MODIS VIS scene, acquired 31/10/2016 and provided by NASA.

Sea Ice Report #45.2/2016

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

02/11/2016

East Antarctica

Figure 1 shows a sea-ice concentration chart of East Antarctica. The white line gives the median sea-ice extent for November. The track of RSV *Aurora Australis* is given by the red line (up to 02/11/2016 00:00 UT).

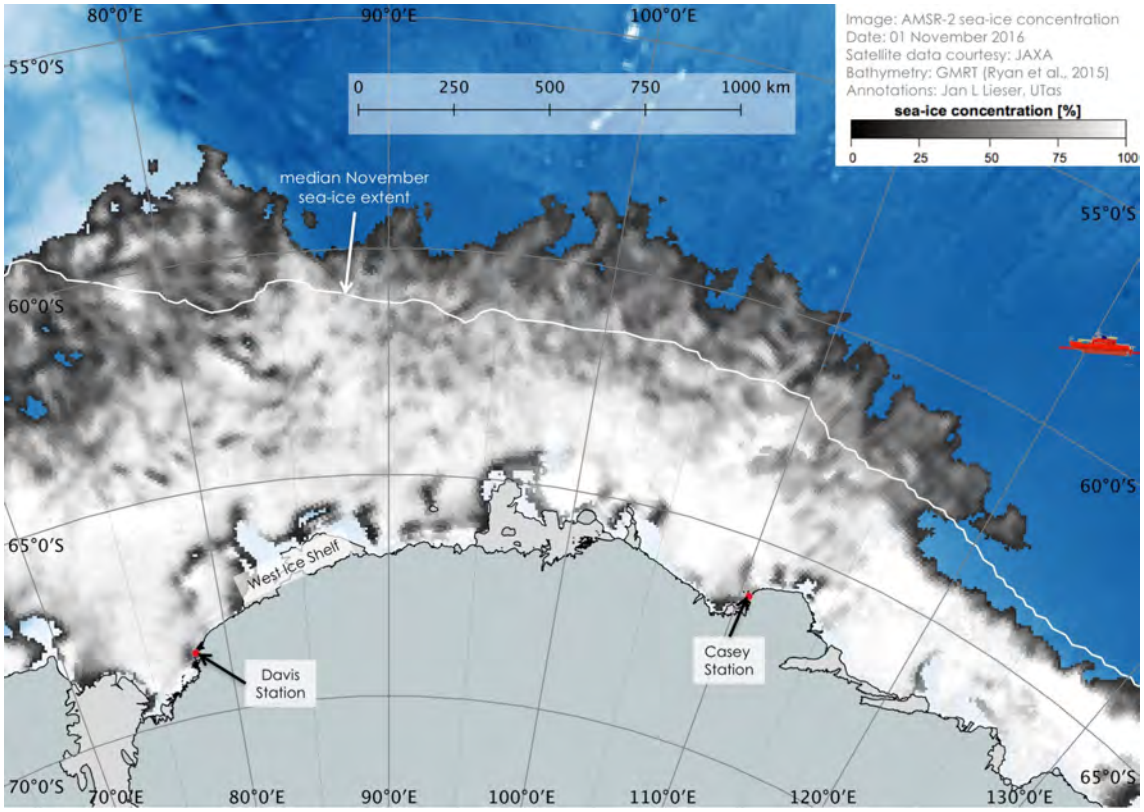

Figure 1: Sea-ice concentration, acquired 01/11/2016 and provided by Drift & Noise Polar Services.

Between 70° E and 120° E, some sea ice is north of the November median extent, while east and west of this region, sea-ice extent is below (south of) the median, in East Antarctica.

In Prydz Bay, medium-high sea-ice concentration reaches as far south as 65° S.

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Davis Station

Figure 2 shows a largely cloud-free visible scene of Prydz Bay and adjacent regions. The white line gives the median sea-ice extent for November (see Figure 1). The yellow line roughly indicates the transition between the marginal ice zone in the north and more compact pack ice in the south.

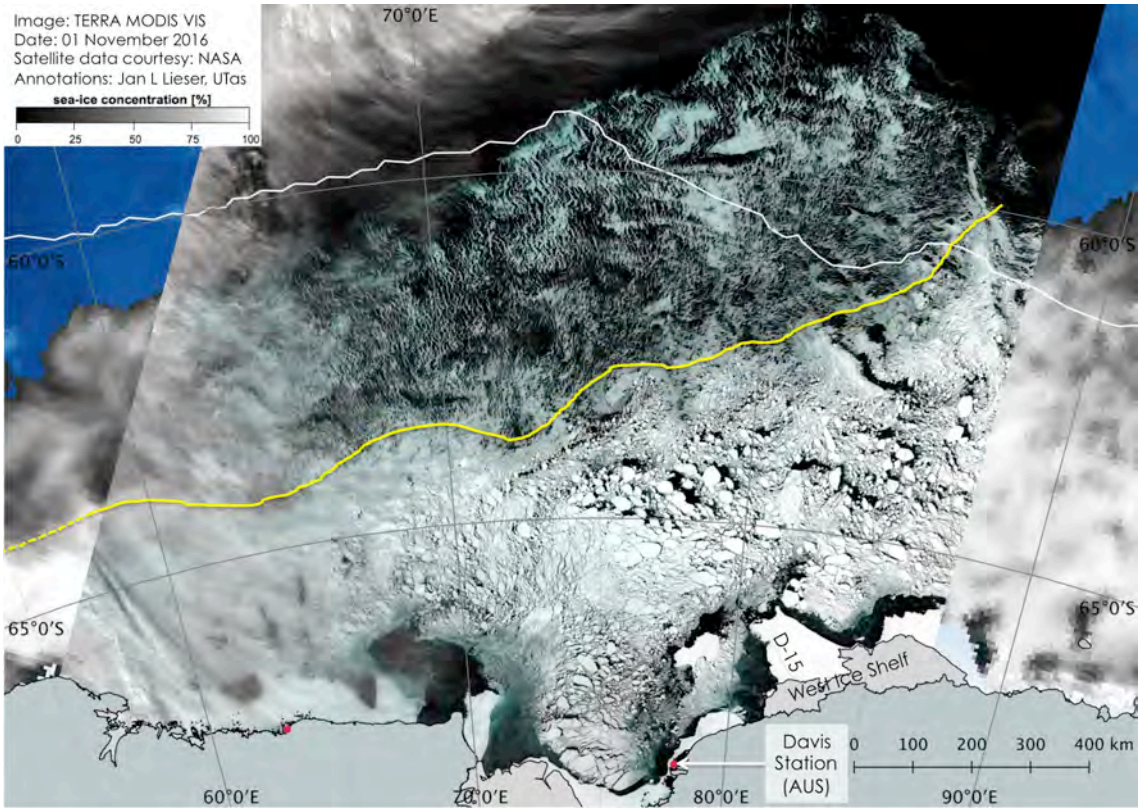

Figure 2: TERRA MODIS VIS scene, acquired 01/11/2016 and provided by NASA; complemented by sea-ice concentration, acquired 01/11/2016 and provided by Drift & Noise Polar Services.

In northern Prydz Bay, the marginal ice zone is between 250 nautical miles and 300 nautical miles wide (north-south extent).

Between 64° S and 66° S, large sea-ice floes have been tracked at speeds of roughly 0.5 knots in northerly directions.

Sea Ice Report #45.3/2016

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

03/11/2016

Davis Station

Figure 1 shows a high-resolution SAR scene of northern Prydz Bay on top of a MODIS VIS scene. The location is roughly north of the West Ice Shelf, in the transition zone between the marginal ice zone and more compact sea ice (see Sea Ice Report #45.2).

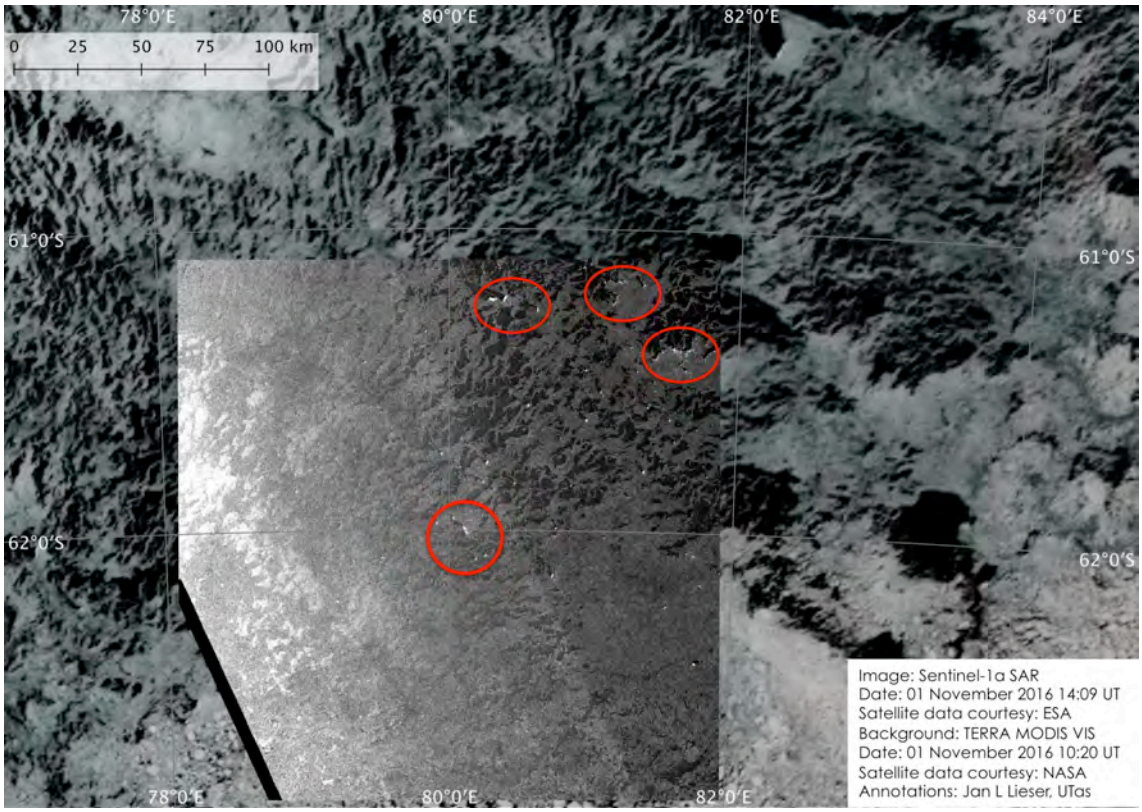

Figure 1: Sentinel-1a SAR scene, acquired 01/11/2016 and provided by Drift & Noise Polar Services; complemented by TERRA MODIS VIS scene, acquired 01/11/2016 and provided by NASA.

The SAR scene allows for identification of floating icebergs. Some clusters of bergs are indicated by red circles in the figure, while many more bergs are scattered around. Individual bergs have been tracked drifting in northerly directions at speeds of up to 0.5 knots.

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Sea Ice Report #45.4/2016

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

05/11/2016

Prydz Bay

Figure 1 shows two SAR scenes of northeastern Prydz Bay on top of a sea-ice concentration chart. The white line denotes the median sea-ice extent for November. The red line shows the cruise track of RSV *Aurora Australis* (up until 05/11/2016 07:00 UT). The location of an acoustic whale recorder mooring is given by a green dot.

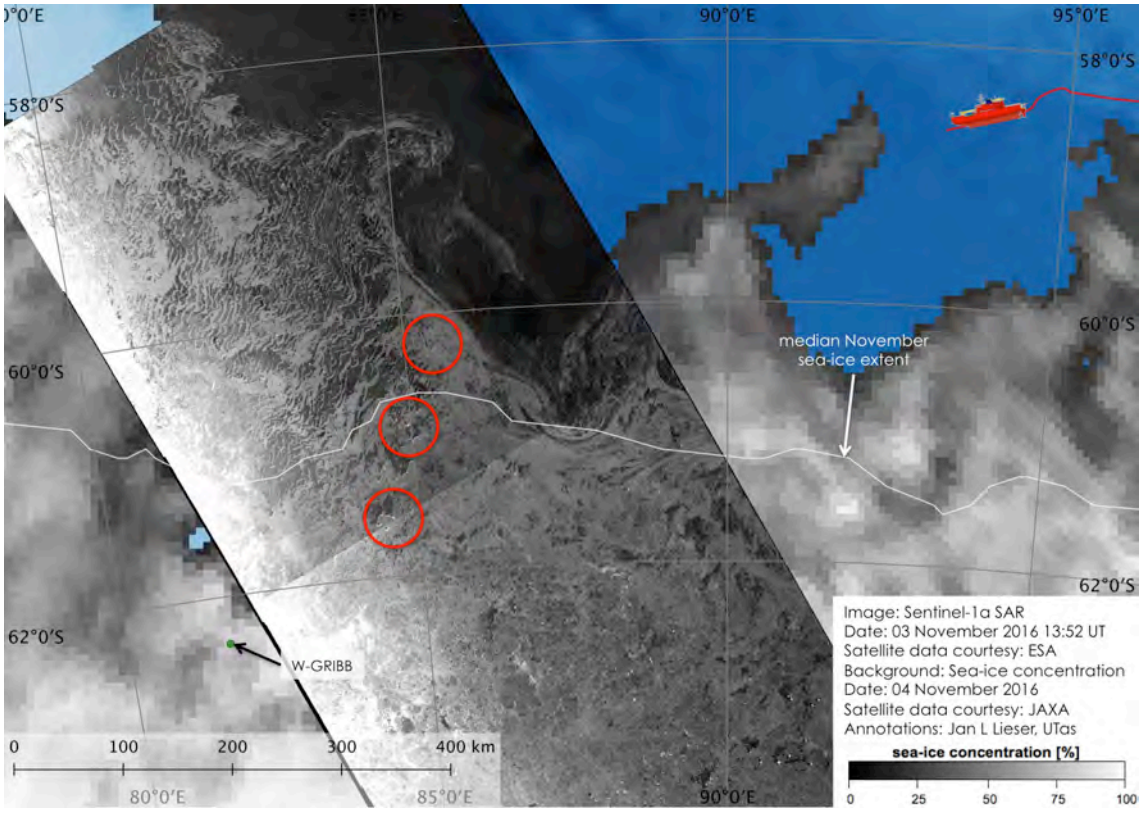

Figure 1: Sentinel-1a SAR scene, acquired 03/11/2016, complemented by sea-ice concentration, acquired 04/11/2016, both provided by Drift & Noise Polar Services.

The fine, filament-like structure of the marginal ice zone can clearly be seen, in the SAR scene.

Many icebergs are present in the marginal ice zone, only some clusters of bergs are indicated by red circles.

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Sea Ice Report #46.1/2016

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

08/11/2016

Davis Station

Figure 1 shows a sea-ice concentration chart of northeastern Prydz Bay. The orange line shows the cruise track of RSV *Aurora Australis* (up until 08/11/2016 00:00 UT). The location of an acoustic whale recorder mooring is given by a green dot.

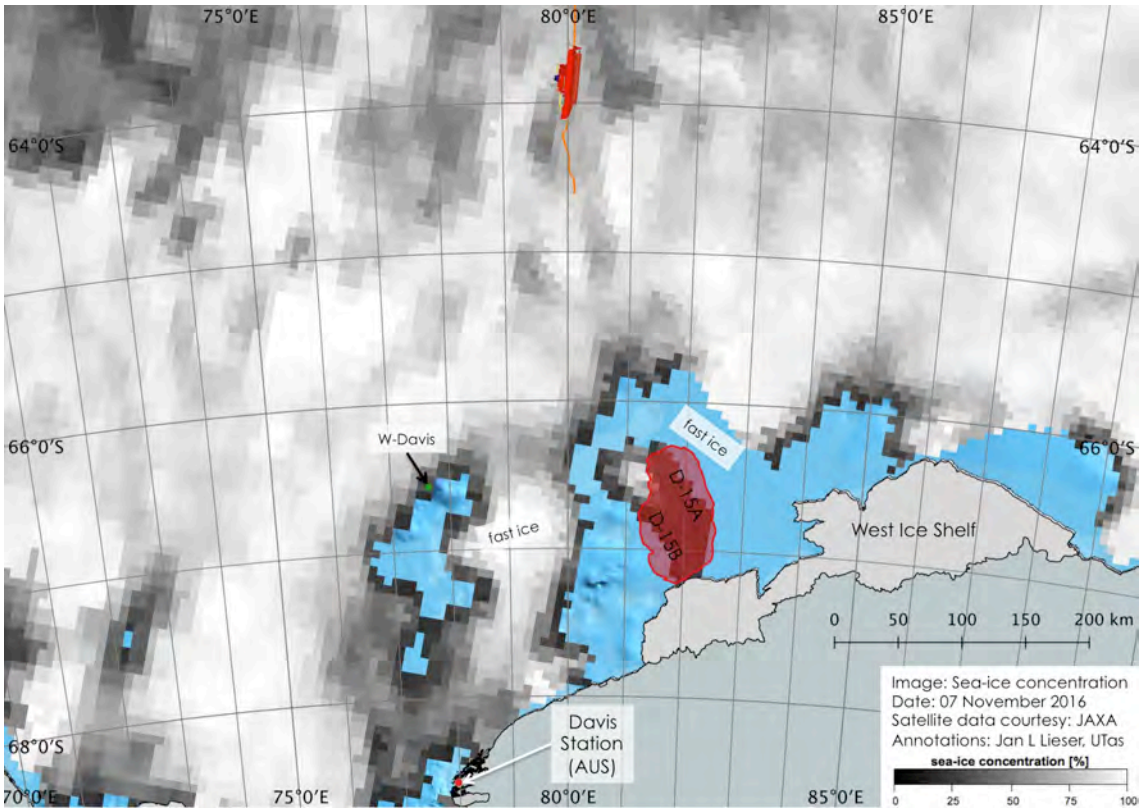

Figure 1: Sea-ice concentration, acquired 07/11/2016 and provided by Drift & Noise Polar Services.

The ship is operating in an area of higher sea-ice concentration, between 64° S and 66° S. South of 66° S, lighter sea-ice conditions are expected to allow for good progress towards Davis Station. Offshore Davis Station, the fast-ice edge appears to be still roughly 5 nautical miles west of the station.

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Sea Ice Report #46.2/2016

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

08/11/2016

Davis Station

Figure 1 shows a visible scene of northeastern Prydz Bay (update to Sea Ice Report #46.1/2016). The orange line shows the cruise track of RSV *Aurora Australis* (up until 08/11/2016 08:00 UT). Fast ice areas are marked by red scribble lines. The location of an acoustic whale recorder mooring is given by a green dot.

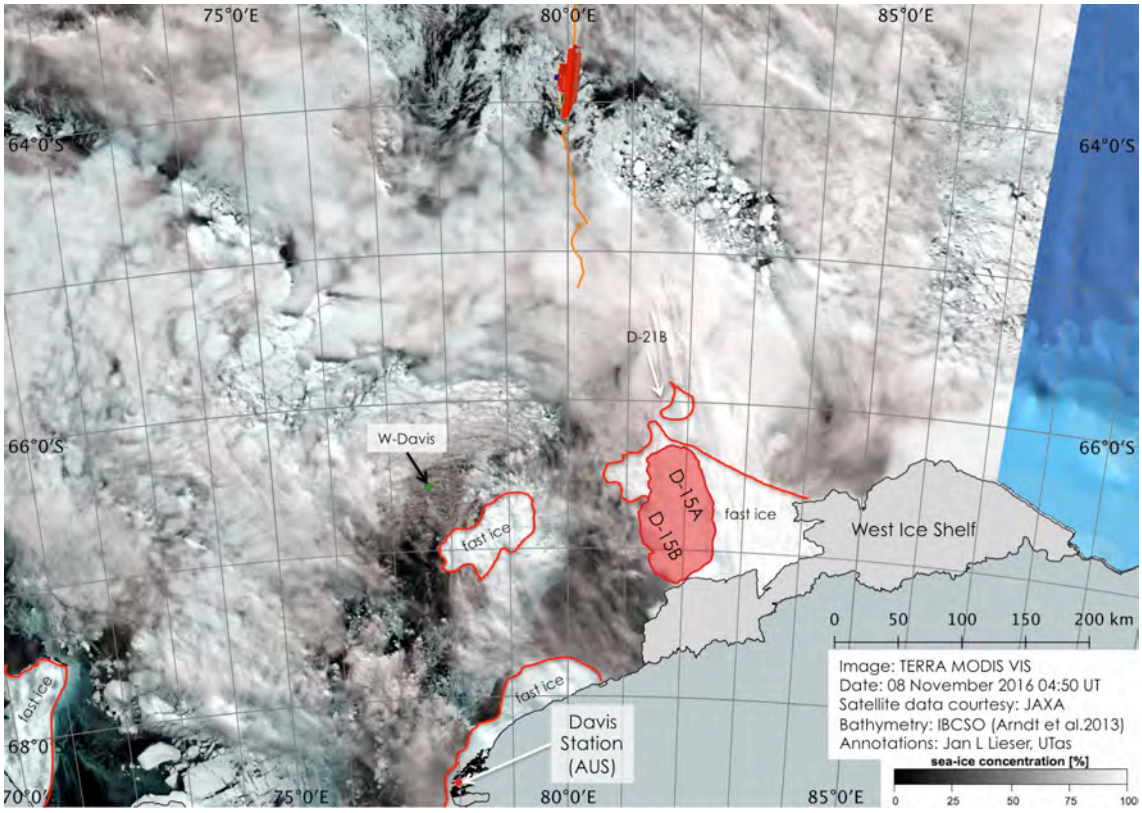

Figure 1: MODIS VIS scene, acquired 08/11/2016 and provided by NASA.

The ship is operating in an area of higher sea-ice concentration, between 64° S and 66° S. South of 66° S, lighter sea-ice conditions are expected to allow for good progress towards Davis Station. Offshore Davis Station, the fast-ice edge appears to be still roughly 5 nautical miles west of the station.

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Sea Ice Report #46.3/2016

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

09/11/2016

Antarctica

Figure 1 shows the difference between the mean sea-ice concentration for October 2016 and the average October sea-ice concentration, for the satellite era, the so-called monthly anomaly. The black line in the figure represents the average sea-ice extent, for October.

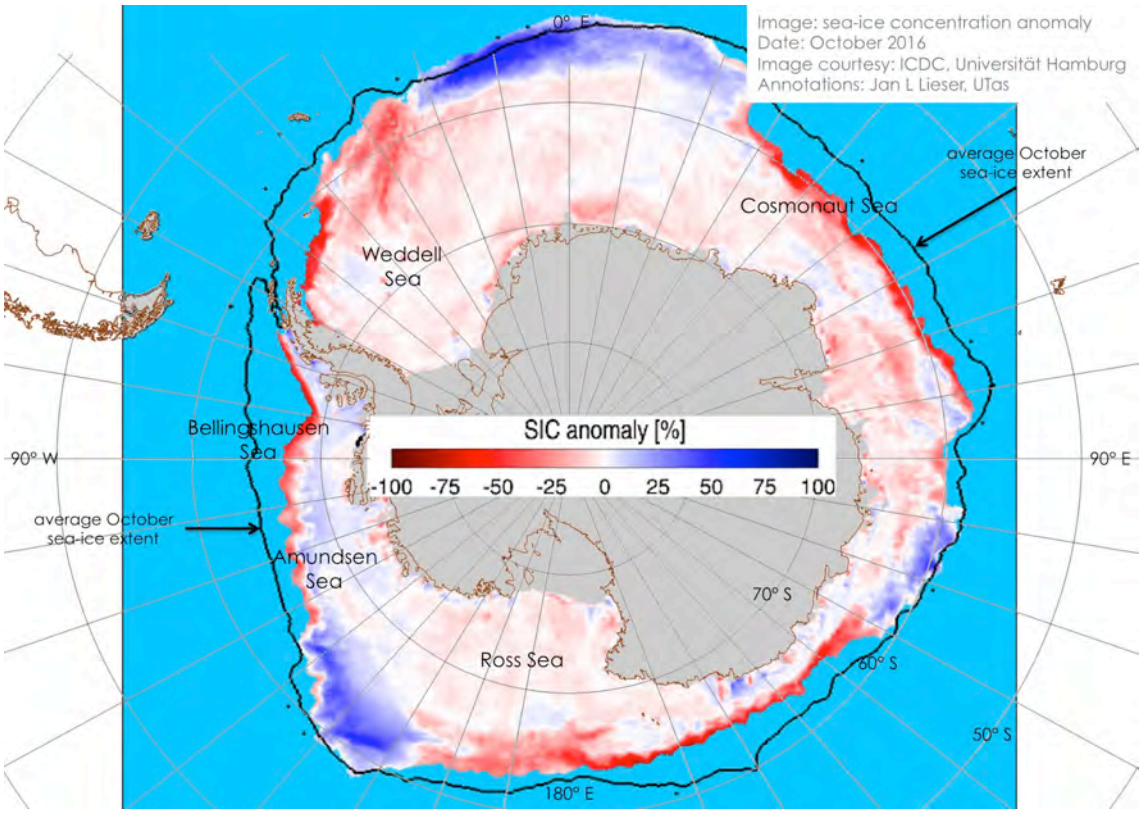

Figure 1: Sea-ice concentration anomaly for October 2016, provided by ICDC, Universität Hamburg.

While the pan-Antarctic sea-ice extent is below the range of ±2 standard deviations of the mean and therefore anomalously low, the regional pattern of sea-ice concentration anomaly around Antarctica remains largely unchanged compared to previous months (since July 2016). The only regions of slightly above average sea-ice concentration (and only marginally above average sea-ice extent; blue shaded areas in Figure 1) are found in eastern Weddell Sea and eastern Ross Sea and between 100° E and 120° E, in East Antarctica.

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Sea Ice Report #46.4/2016

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

10/11/2016

Davis Station

Figure 1 shows Sentinel-1a SAR scene of the Vestfold Hills and offshore. The orange line gives the cruise track of RSV *Aurora Australis* (up to 10/11/2016 00:00 UT). The vessel is currently breaking into fast ice.

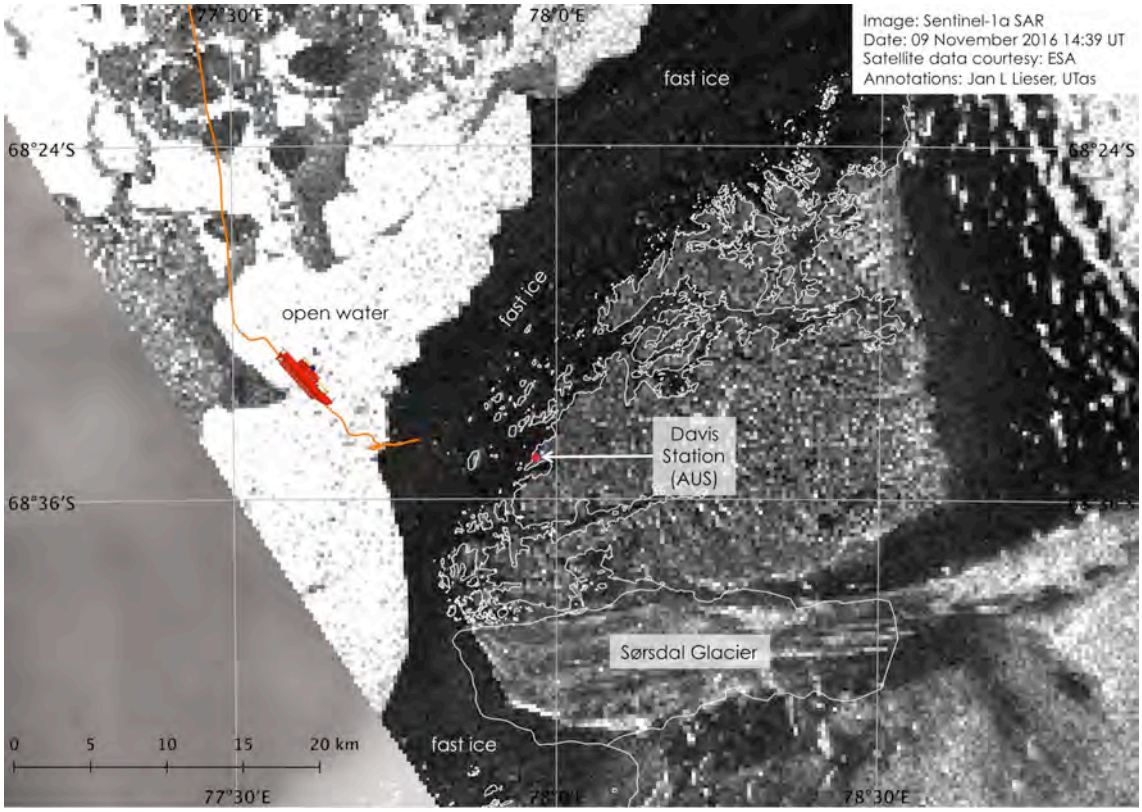

Figure 1: Sentinel-1a SAR scene, acquired 09/11?2016, provided by Drift & Noise Polar Services.

West of the fast-ice edge, open water appears white due to the small scale roughness caused by the wind blowing offshore (average 30 knots at the time of data acquisition). Further out, a mixture of of isolated old floes, grease ice and brash ice is being pushed west.

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Sea Ice Report #46.5/2016

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

10/11/2016

Prydz Bay

Figure 1 shows the difference in sea-ice concentration on 04/11/2016 compared to 09/11/2016, for the wider Prydz Bay region. Fast ice areas are marked by red lines, where positive identification was possible (west of 87.5° E) and by dashed red lines where approximated. The locations of acoustic whale recorder moorings are given by white dots. The grey line shows the cruise track of RSV *Aurora Australis* (up to 10/11/2016 00:00 UT).

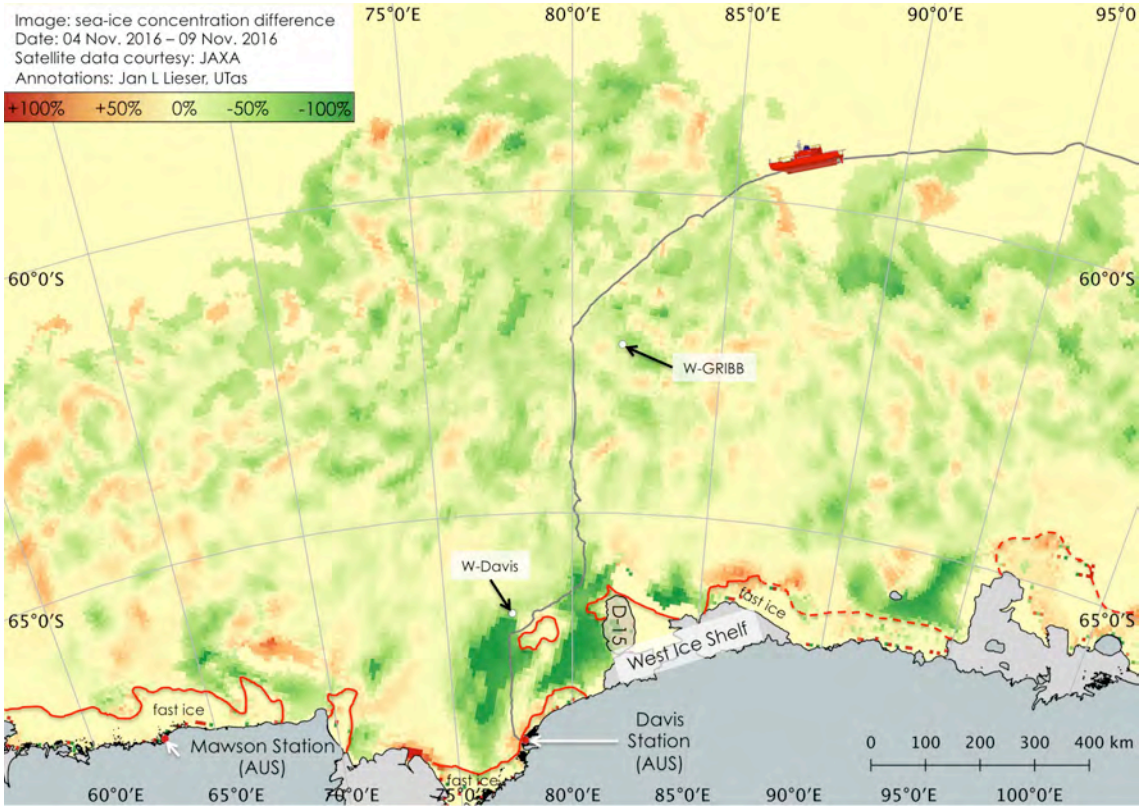

Figure 1: Sea-ice concentration difference, based on data provided by Drift & Noise Polar Services.

The colourisation presents the difference in sea-ice concentration since the vessel started her sea-ice passage, on 04/11/2016. A general reduction in sea-ice concentration (indicated by green shading) is prominent in the figure.

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Sea Ice Report #46.6/2016

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

12/11/2016

Davis Station

Figure 1 shows a visible scene of the vicinity of the Vestfold Hills. The view is partly obscured by clouds. The red scribble line indicates the fast-ice edge on 05/11/2016. The orange line shows the cruise track of RSV *Aurora Australis* (up to 12/11/2016 00:00 UT). The iceberg that was grounded offshore Davis Station for more than a year is marked by a pink shape.

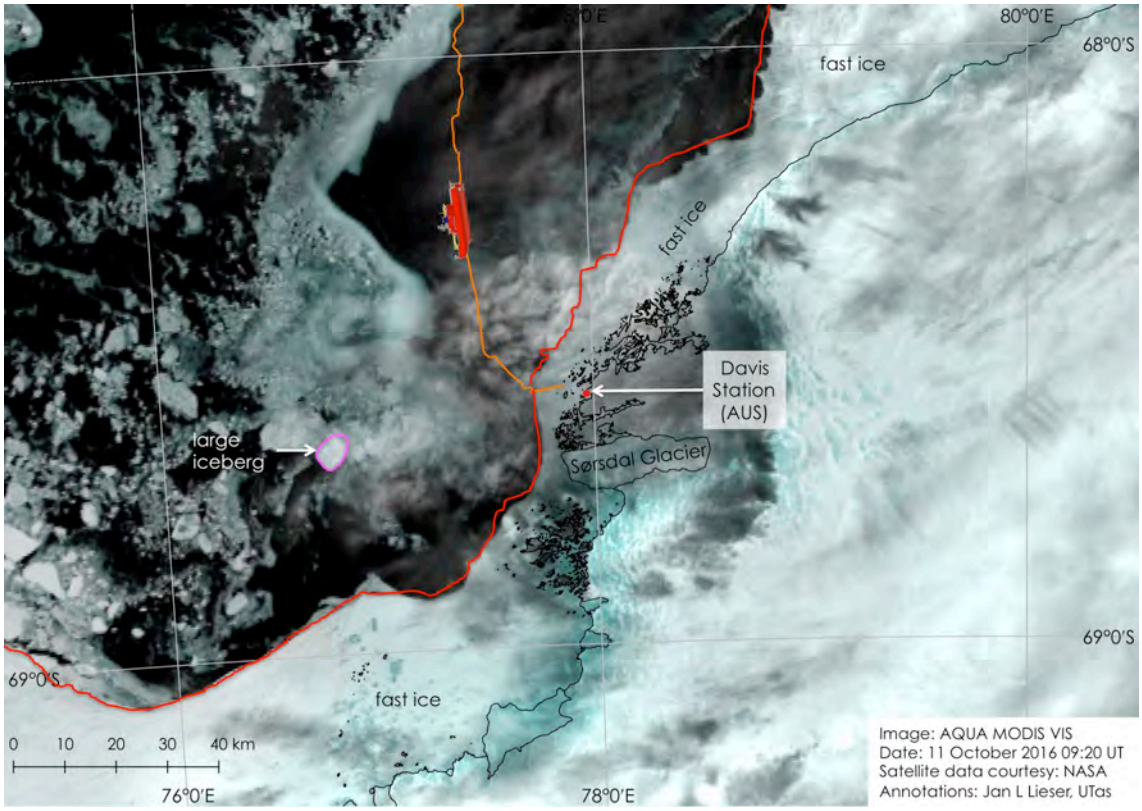

Figure 1: AQUA MODIS VIS scene, acquired on 11/11/2016 and provided by NASA.

Since 05/11/2016, the fast-ice edge retreated slightly towards the continent. South of Davis Station, roughly 35 km^2 of fast ice have broken off, offshore Rauer Group. North of Davis Station, about 105 km^2 of fast ice have broken off and nearly 180 km^2 further north, towards the West Ice Shelf (outside the frame of Figure 1). The fast-ice area attached to the northwest of icebergs D-15A and D-15B (also outside the frame of Figure 1) was reduced by approximately 300 km^2, since 05/11/2016.

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Sea Ice Report #46.7/2016

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

13/11/2016

Mawson Station

Figure 1 shows a visible scene of Mawson Coast. The view is partly obscured by clouds. The red scribble line indicates the fast-ice edge on 04/11/2016.

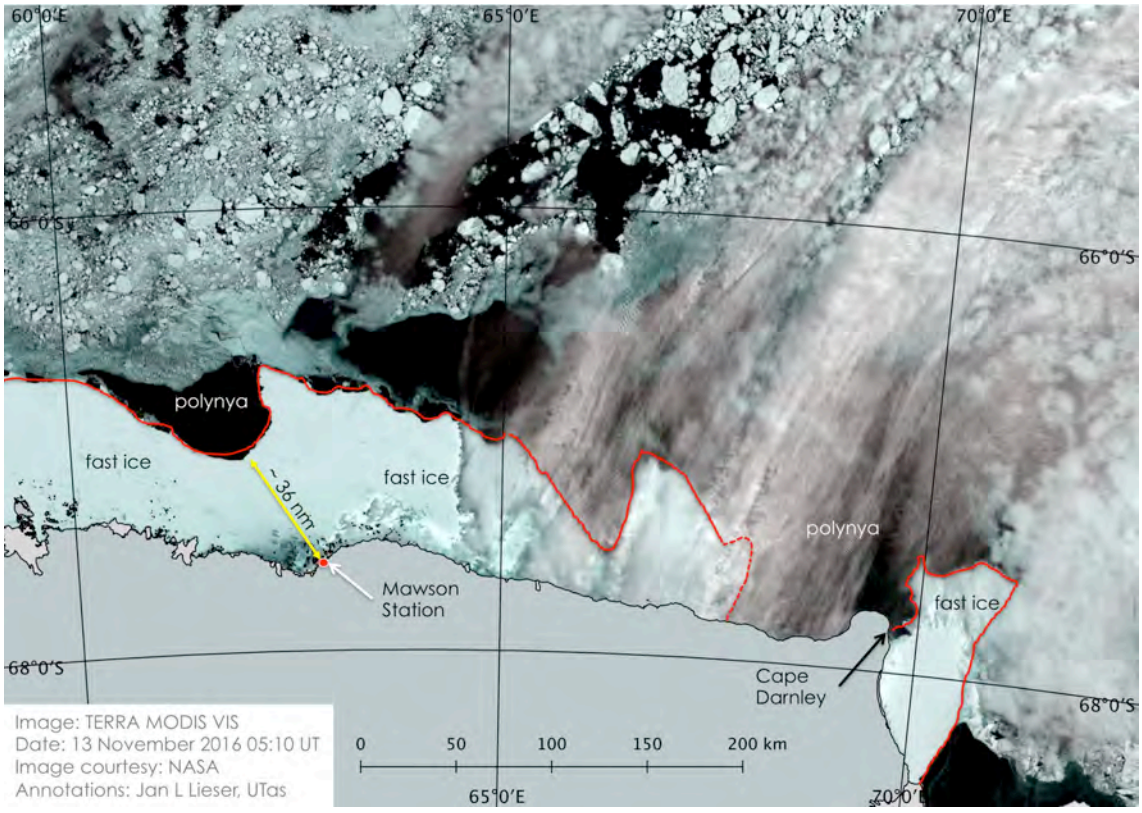

Figure 1: TERRA MODIS VIS scene, acquired on 13/11/2016 and provided by NASA.

Since 04/11/2016, the fast-ice edge retreated slightly towards the continent. The closest distance to the polynya northwest of Mawson Station is 36 nautical miles. At Cape Darnley, fast ice is starting to break up as well.
North of Mawson Station, the sea-ice edge is between 120 nautical miles and 200 nautical miles south of the median extent for November. Additionally, the marginal ice zone is between 50 nautical miles and 80 nautical miles wide, which highlights that not only the extent of sea ice is below average, between 60° E and 80° E, but also the sea-ice concentration within the low extent.

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Sea Ice Report #47.1/2016

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

14/11/2016

Davis Station

Figure 1 shows a visible scene of Prydz Bay The view is partly obscured by clouds. The position of an acoustic whale recorder mooring is given by the green dot. A pink circle surrounds a large tabular iceberg, off Davis Station.

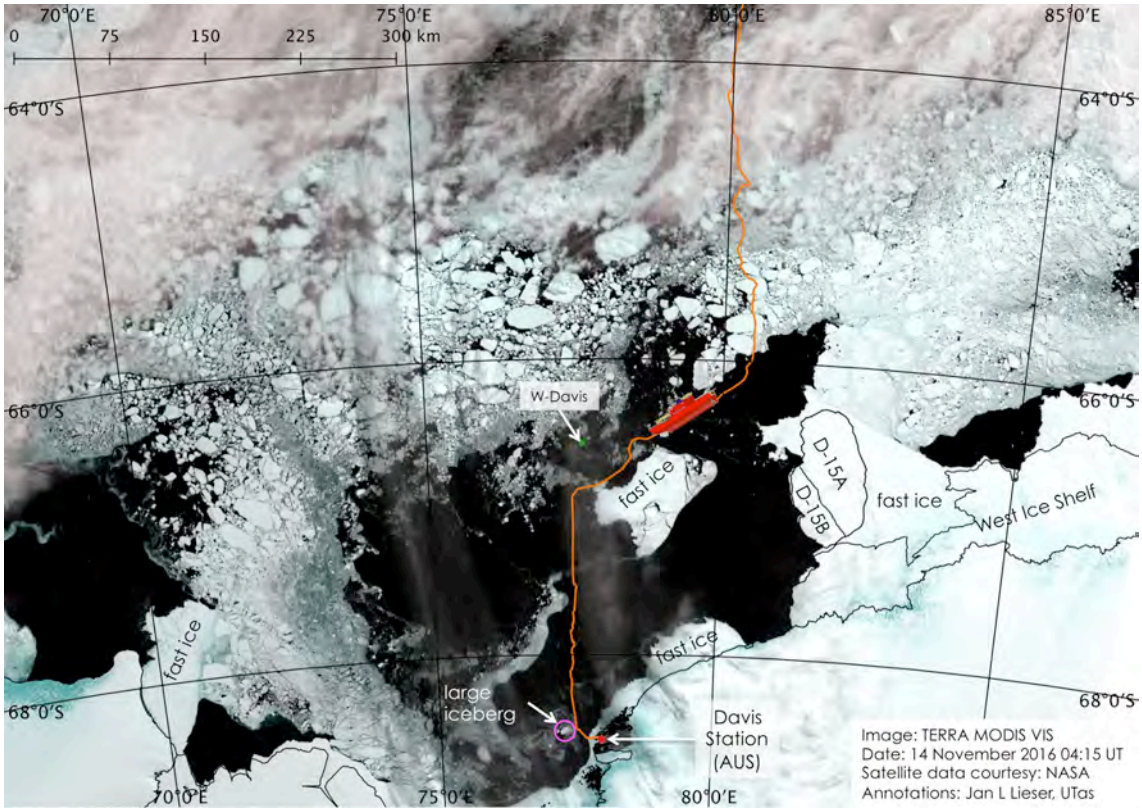

Figure 1: TERRA MODIS VIS scene, acquired on 14/11/2016 and provided by NASA.

Higher sea-ice concentration (more than 75%) is only found south of 63° S and the sea-ice edge is at about 62° S while the median sea-ice extent for November in the region is roughly at 59° 30' S. This means that the sea-ice edge is approximately 160 nautical miles further south than the median extent.

Fast ice continues to break up at Cape Darnley, northeast of iceberg D-15A and from the patch of fast ice not attached to land, at Four-Ladies-Bank north of Davis Station.

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Sea Ice Report #47.2/2016

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

14/11/2016

Sabrina Coast

Figure 1 shows a visible scene of Sabrina Coast. The view is partly obscured by clouds. The position of an acoustic whale recorder mooring is given by the green dot. A pink shape indicates the location of iceberg C-18B.

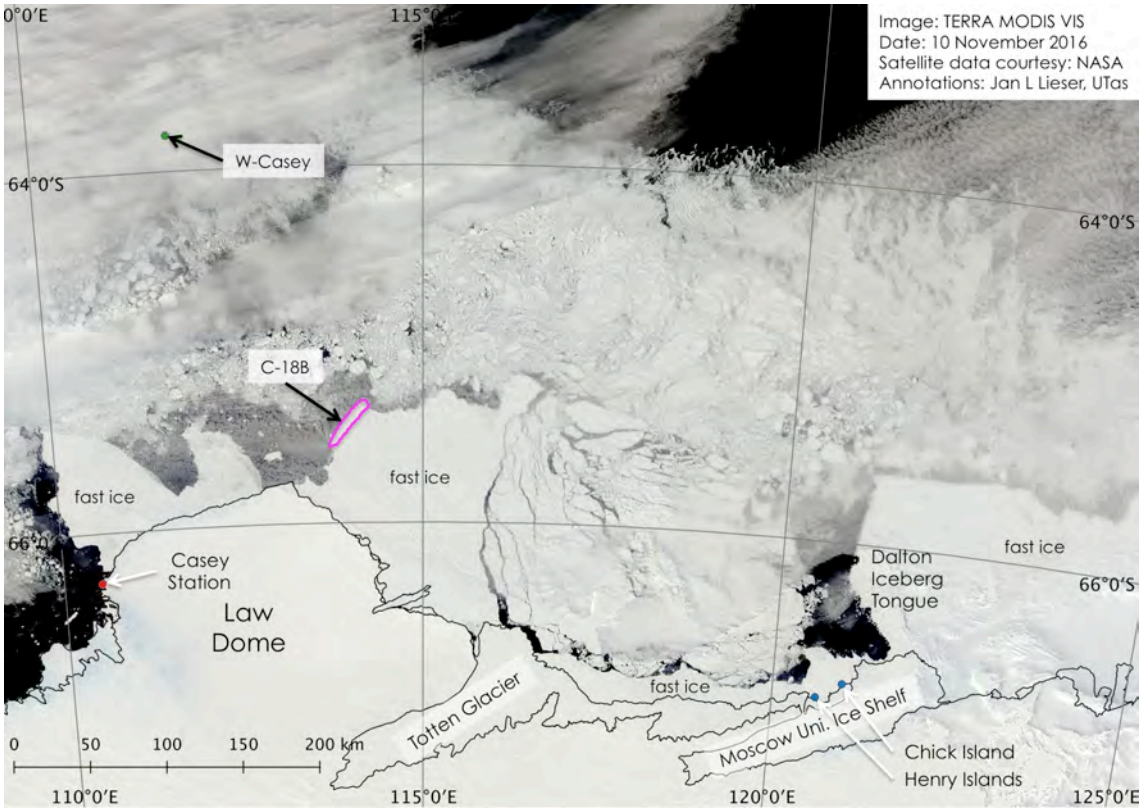

Figure 1: TERRA MODIS VIS scene, acquired on 10/11/2016 and provided by NASA.

The natural bay between fast ice attached to the northeast of Law Dome and the Dalton Iceberg Tongue is occupied by broken ex-fast ice. North of it is a band of pack ice now spanning about 75 nautical miles in north-south direction after it was compressed by southerly winds, since 10/11/2016.

Offshore Henry Islands and Chick Island, fast ice is still attached to the Moscow University Ice Shelf, but its northern edge has retreated since 10/11/2016 and lost approximately 130 km^2 of fast-ice area.

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Commonwealth Bay

Figure 2 shows a visible scene of Commonwealth Bay and its vicinity. The view is partly obscured by clouds. The position of an oceanographic mooring is given by the yellow dot. Pink shapes indicate the location of various iceberg (dotted shape: uncertain location).

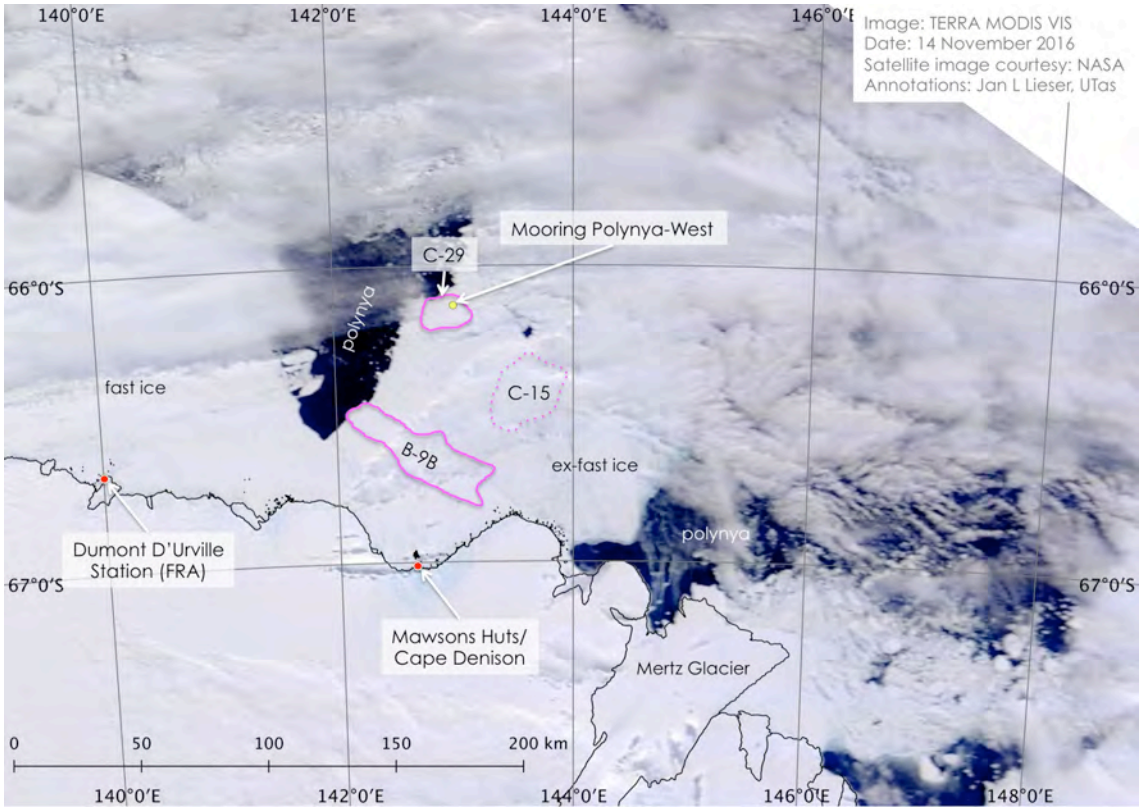

Figure 2: TERRA MODIS VIS scene, acquired on 14/11/2016 and provided by NASA.

Off Dumont D'Urville Station and Commonwealth Bay is still extensive fast ice. The location of the 'Polynya West' mooring is still covered by iceberg C-29.

Sea Ice Report #47.3/2016

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

15/11/2016

Davis Station

Figure 1 shows a visible scene of southern Prydz Bay. It is almost entirely cloud-free. The grey line is the cruse track of RSV *Aurora Australis*, currently located in the fast ice of Davis Station. A pink scribble line indicates the track of a large iceberg (surface of approximately 29 km^2), since the vessel arrived in the area on 08/11/2016. Colour-coded contour lines mark bathymetry (where known).

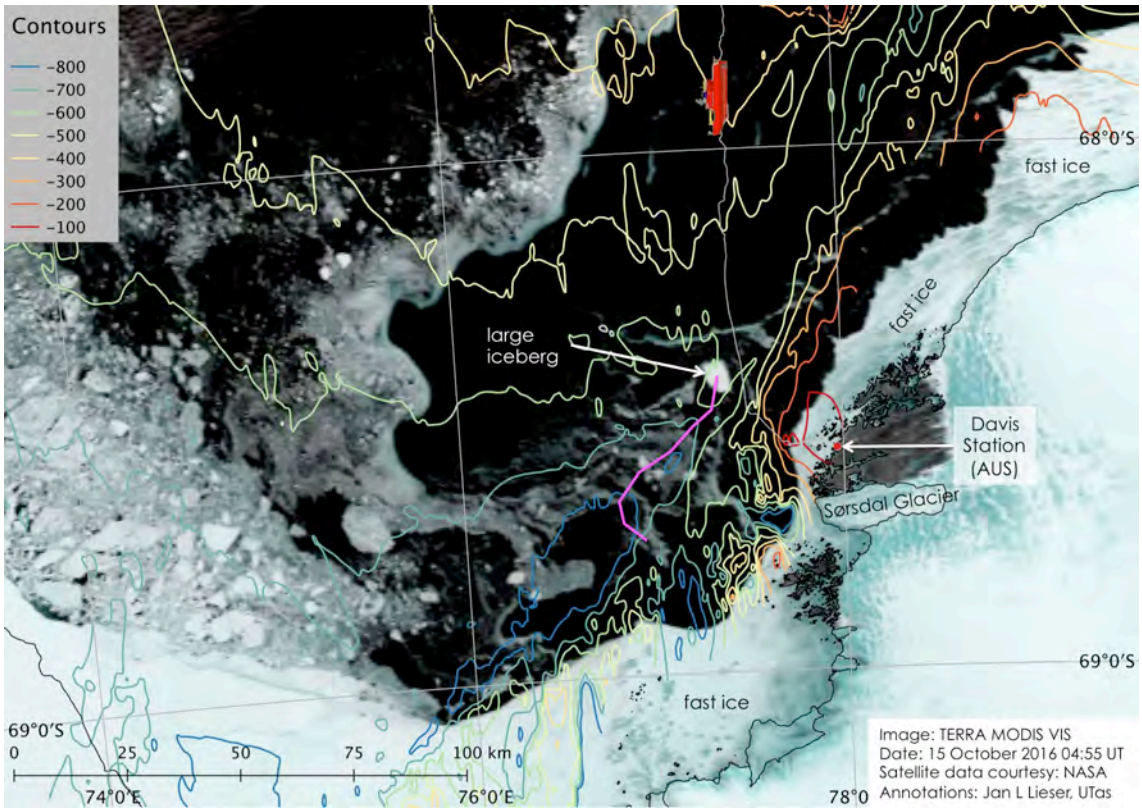

Figure 1: TERRA MODIS VIS scene, acquired on 15/11/2016 and provided by NASA.

Since 08/11/2016, the large iceberg, which was grounded off Davis Station in about 200 m water depth for more than a year, has travelled between 2.5 nautical miles and 4.5 nautical miles per day resulting in an overall drift of roughly 36 nautical miles and about 22 nautical miles further north. The berg drifts currently in about 600 m water depth.

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Sea Ice Report #47.4/2016

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

16/11/2016

Davis Station

Figure 1 shows a sea-ice concentration chart of Prydz Bay. The orange line is the cruse track of RSV *Aurora Australis*, currently located in the fast ice of Davis Station. A green and yellow lines indicate the median sea-ice extent for November and December, respectively. The locations of two acoustic whale recorder moorings are given by green dots.

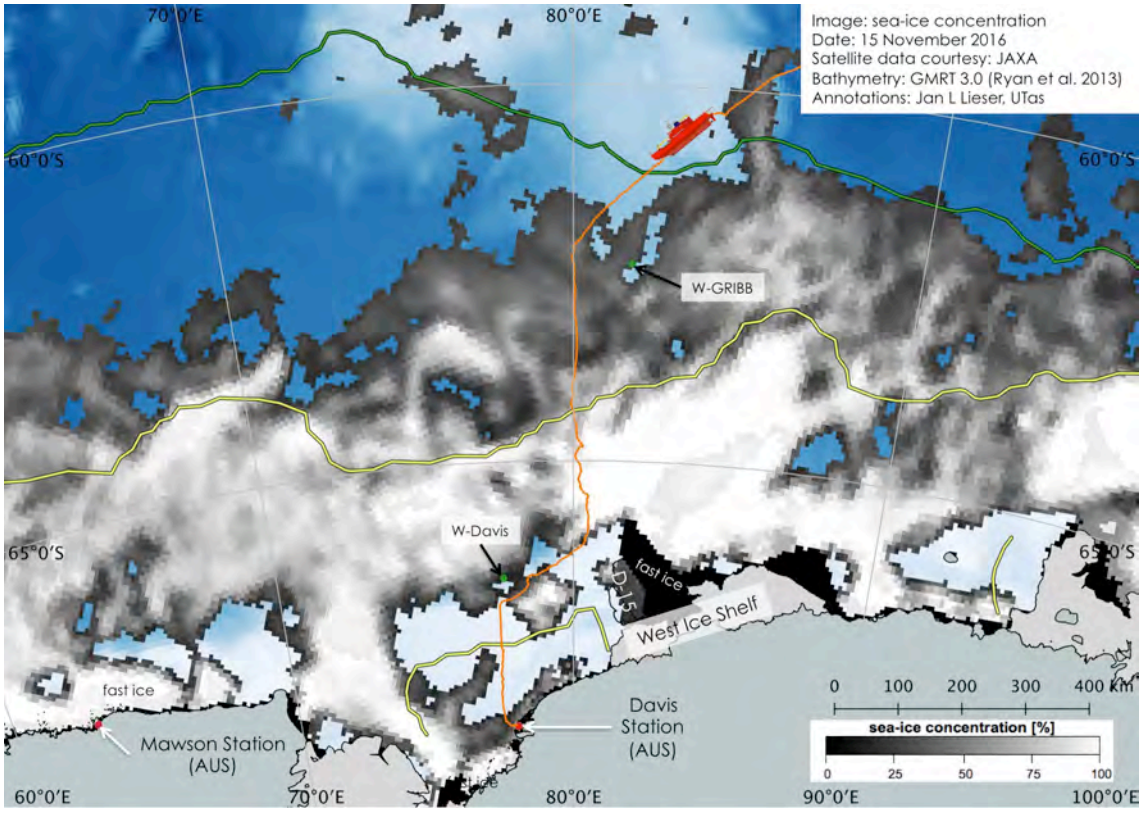

Figure 1: Sea-ice concentration chart, acquired on 15/11/2016 and provided by Drift & Noise Polar Services.

The zone of higher concentration, compact first-year sea ice already appears to be confined to the boundary of the median December extent. North of the December median, only isolated pockets of medium high sea-ice concentration remain in a matrix of otherwise low sea-ice concentration. Coastal polynyas off Mawson Coast and north of Davis Station, as well as west of the Shackleton Ice Shelf are found completely

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ice free.

Figure 2 shows a visible scene of southern Prydz Bay. The orange line is the cruse track of RSV *Aurora Australis*, currently located in the fast ice of Davis Station.

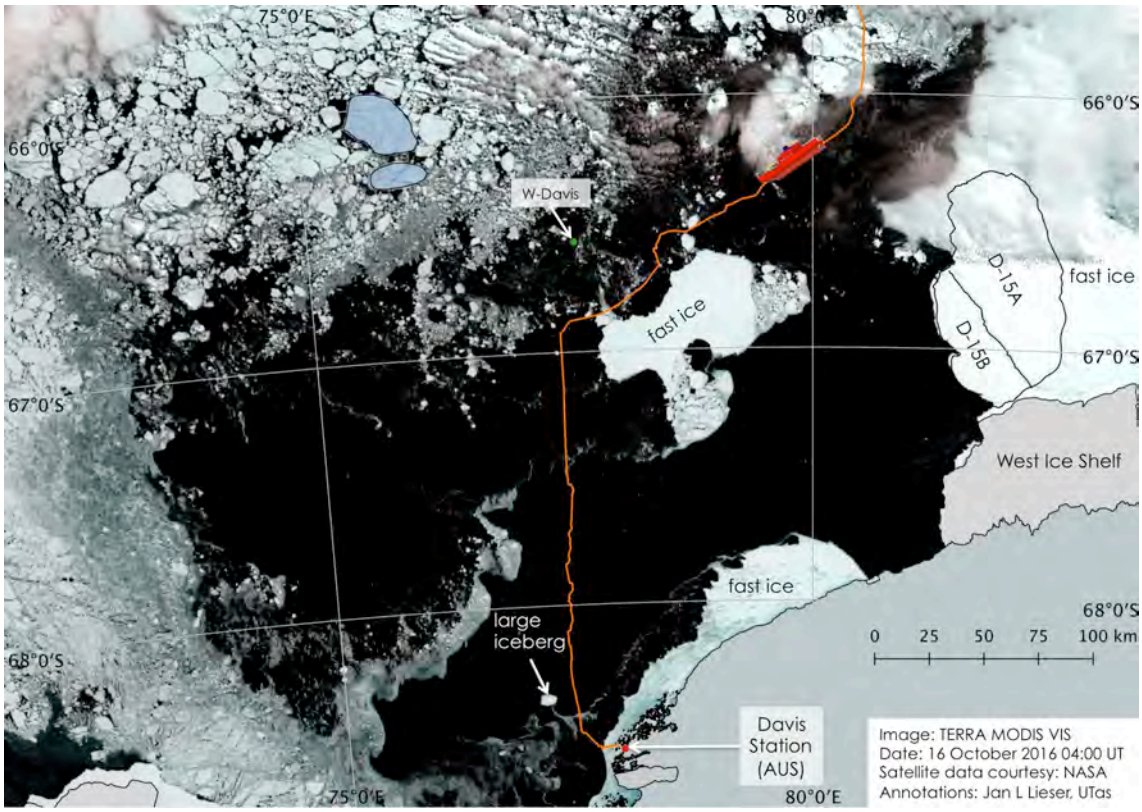

Figure 2: TERRA MODIS VIS, acquired on 16/11/2016 and provided NASA.

The location of the 'W-Davis' mooring can be seen as largely free of sea ice. Only smaller patches of sea ice are drifting freely in the area. Northwest of the mooring, large sea-ice floes are breaking up, as indicated by the blue shaded shapes. Also, the fast-ice area southeast of the mooring site continues to break up.

Off Davis Station, the large iceberg (see Sea Ice Report #47.3/2016) was sighted from the vessel offshore (approximately 19 nautical miles away), drifting slowly in northerly direction.

Sea Ice Report #47.5/2016

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

17/11/2016

Prydz Bay

Figure 1 shows the difference in sea-ice concentration on 10/11/2016 compared to 16/11/2016, for the wider Prydz Bay region. Fast ice areas are marked by red lines where positive identification was possible (west of 87.5° E) and by dashed red lines where approximated. The locations of acoustic whale recorder moorings are given by white dots. The grey line shows the cruise track of RSV *Aurora Australis* , currently off Davis Station.

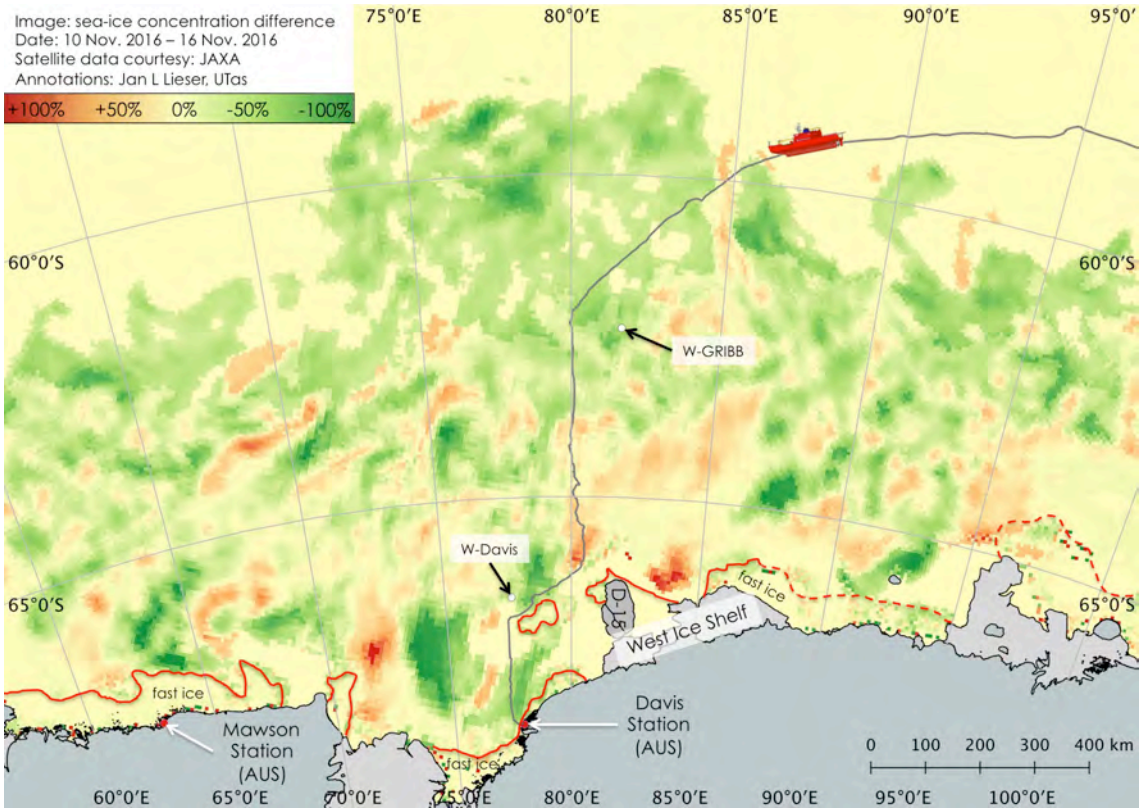

Figure 1: Sea-ice concentration difference, based on data provided by Drift & Noise Polar Services.

The colourisation presents the difference in sea-ice concentration since the vessel arrived at the fast-ice edge off Davis Station on 09/11/2016. A general reduction in sea-ice concentration (indicated by green shading) is prominent in the figure.

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Sea Ice Report #47.6/2016

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

18/11/2016

Davis Station

Figure 1 shows a high-resolution SAR scene of Davis Station vicinity. The station and RSV *Aurora Australis* can be seen as bright spots, due to their high reflectivity with respect to the satellite's RADAR frequency. The vessel's track through the fast ice can also be identified as a brighter trail, caused by the many broken and upturned pieces of fast ice left behind the ship. About 1 nautical mile of track towards the fast ice edge (marked by a red scribble line) does not show up in the RADAR due to different sea-ice properties, at the fast-ice margin. Where RSV *Aurora Australis* entered the fast ice and broke off a few pieces fast ice a little bight-like feature is visible.

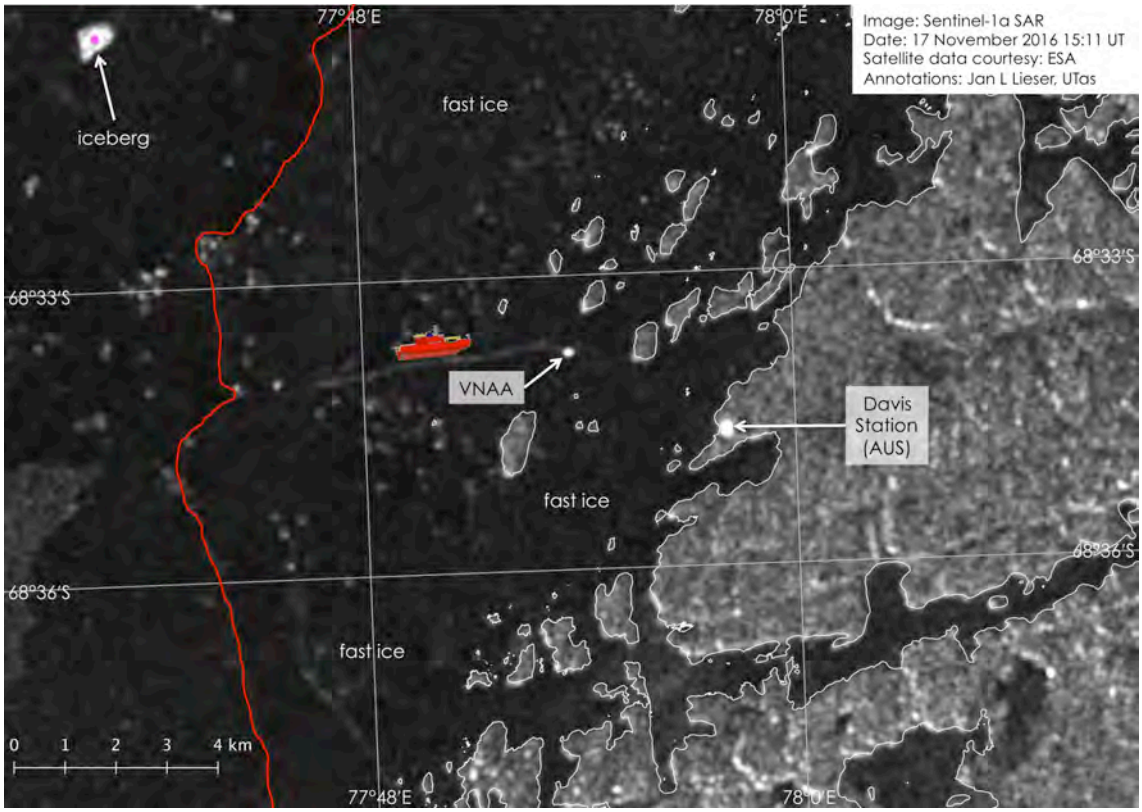

Figure 1: Sentinel-1a SAR scene, acquired on 17/11/2016 and provided by PolarView.

A large number of icebergs is found offshore the islands off Davis Station. One larger berg of nearly 0.3 km^2 surface area is marked by a pink dot.

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Figure 2 provides almost the entire scene of the part shown in Figure 1. The location of the iceberg mentioned in the previous section is again marked by a pink dot. The large (roughly 29 km^2 surface area) iceberg, which was the subject of Sea Ice Report #47.3/2016, has drifted almost 10 nautical miles westward and rotated 180°, since 15/11/2016.

The location of an acoustic whale recorder mooring is given by a green dot. Fast-ice areas are indicated by red scribble lines. The orange line shows the cruise track of RSV *Aurora Australis* , currently off Davis Station.

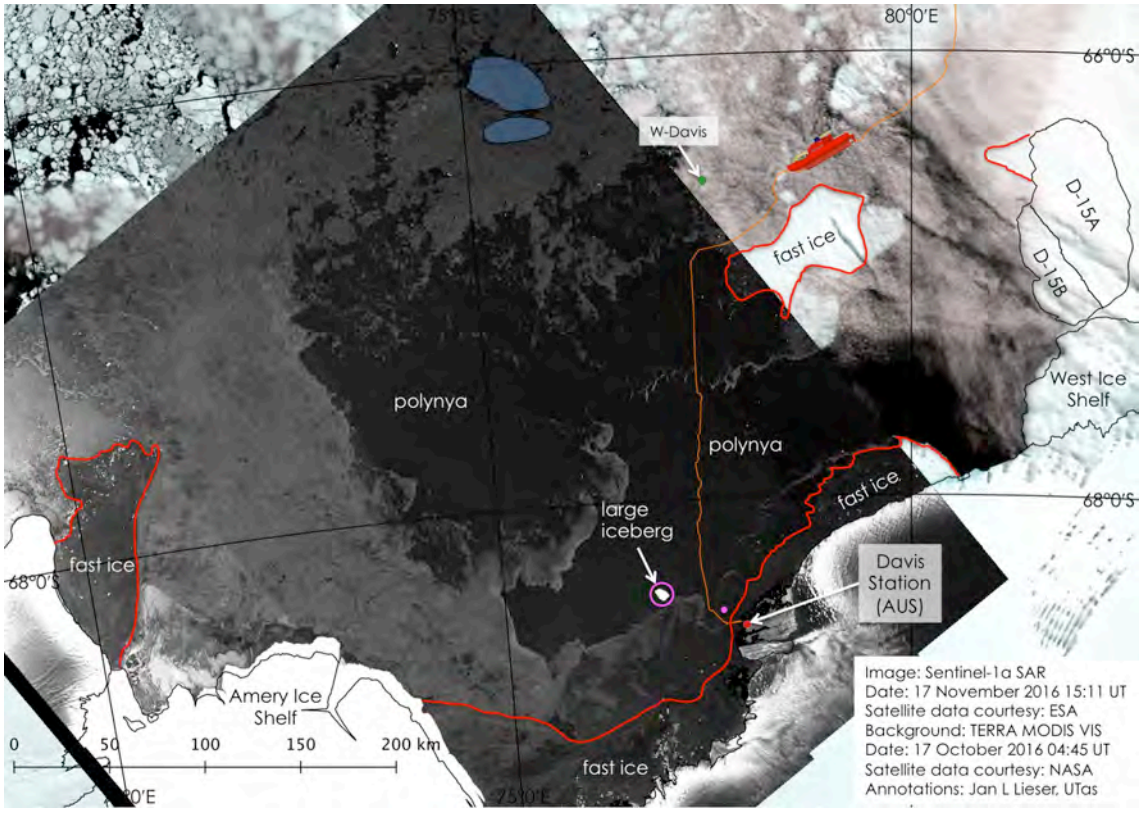

Figure 2: Sentinel-1a SAR scene, acquired on 17/11/2016 and provided by PolarView. Background: TERRA MODIS VIS scene, acquired on 17/11/2016 and provided by NASA.

The ice free areas of southeastern Prydz Bay can clearly be seen in Figure 2. The position of the 'W-Davis' mooring is in the marginal ice zone of only minimal sea-ice concentration. Two large sea-ice floes that were marked in Figure 2 of Sea Ice Report #47.4/2016 are again identified in the above figure and marked by blue shaded shapes.

Sea Ice Report #47.7/2016

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

18/11/2016

Sabrina Coast

Figure 1 shows a detailed, high-resolution SAR scene of the area of Henry Islands and Chick Island. The fast-ice edge is indicated by a red scribble line.

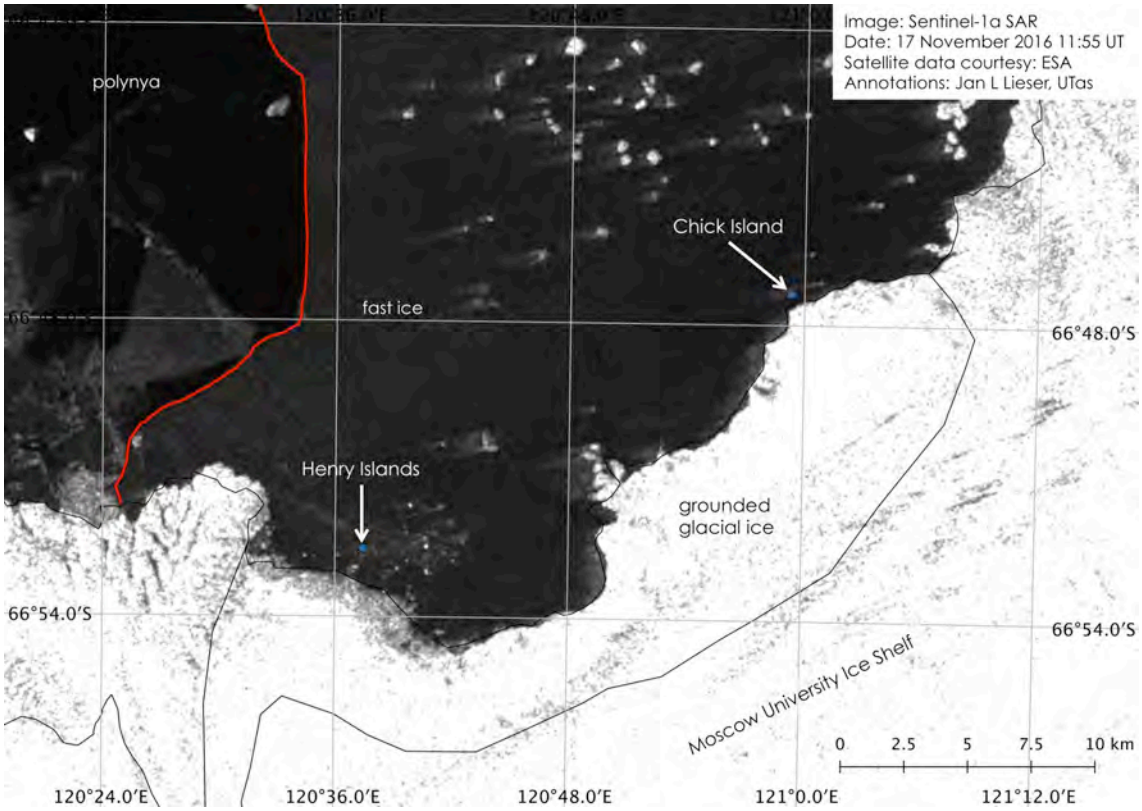

Figure 1: Sentinel-1a SAR scene, acquired on 17/11/2016 and provided by PolarView.

The homogeneous grey shading of the fast-ice surface suggests a smooth (homogeneous) surface offshore. However, a large number of icebergs is found offshore the islands. North of Chick Island, all icebergs show a typical lee wind signature, caused by the predominant easterly winds. The brighter RADAR signature indicates rougher surfaces in these areas.

In the vicinity of the Henry Islands, many smaller bergs create a rough surface, as evident in the bright spots and lighter grey shades, particularly

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to the east of the islands.

Figure 2 provides a larger view of the region of Figure 1 (indicated by the yellow-black frame). The Dalton Iceberg Tongue causes a large polynya, as it acts as an obstacle for the near-coastal, westward sea-ice drift. Newly formed sea ice that originates from the polynya is pushed by easterly winds and accumulates against the first-year sea ice, which itself is pushed against the northeastern flank of Law Dome (just outside the frame of Figure 2, in the west).

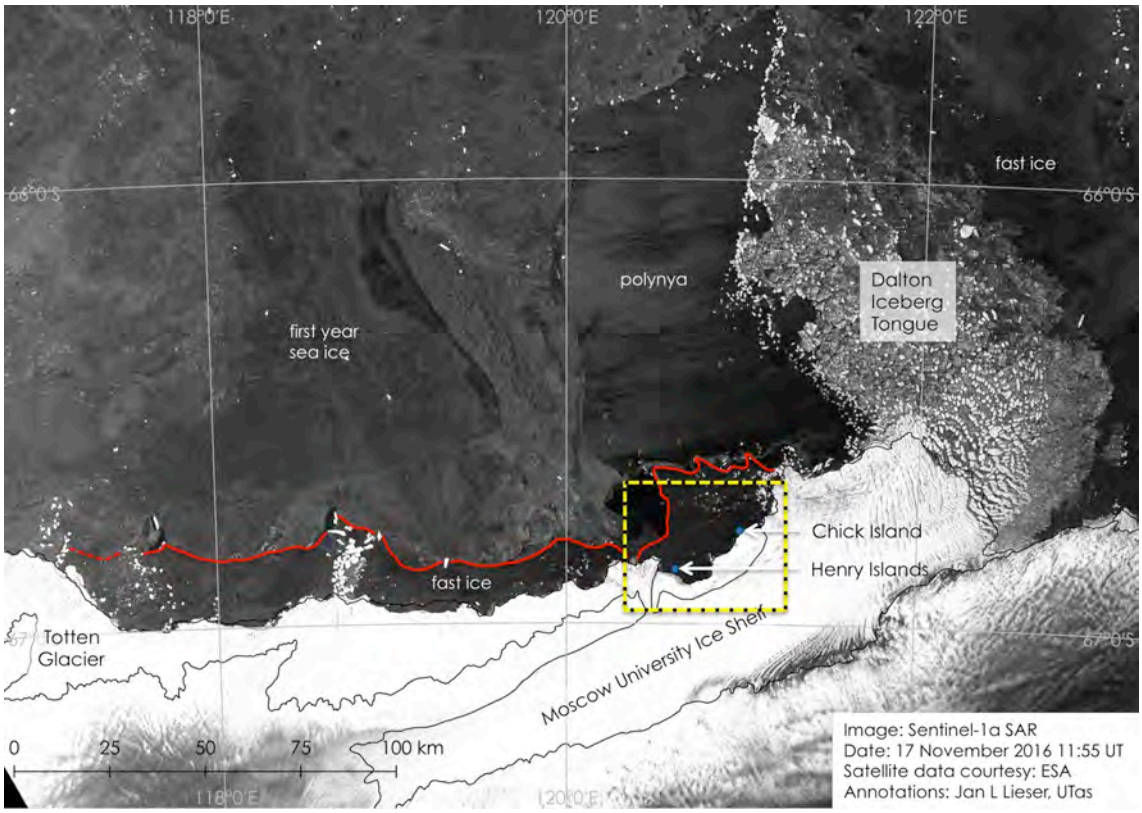

Figure 2: Sentinel-1a SAR scene, acquired on 17/11/2016 and provided by PolarView.

Sea Ice Report #47.8/2016

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

20/11/2016

Davis Station

Figure 1 shows a Sentinel-1 SAR scene on top a sea-ice concentration chart, for the larger Prydz Bay region. The median sea-ice extents for November and December are given by the light green and cyan line, respectively. The cruise track of RSV *Aurora Australis* is represented by the orange line (up to 20/11/2016 04:00 UT). The location of a whale acoustic recorder mooring is indicated by a green dot.

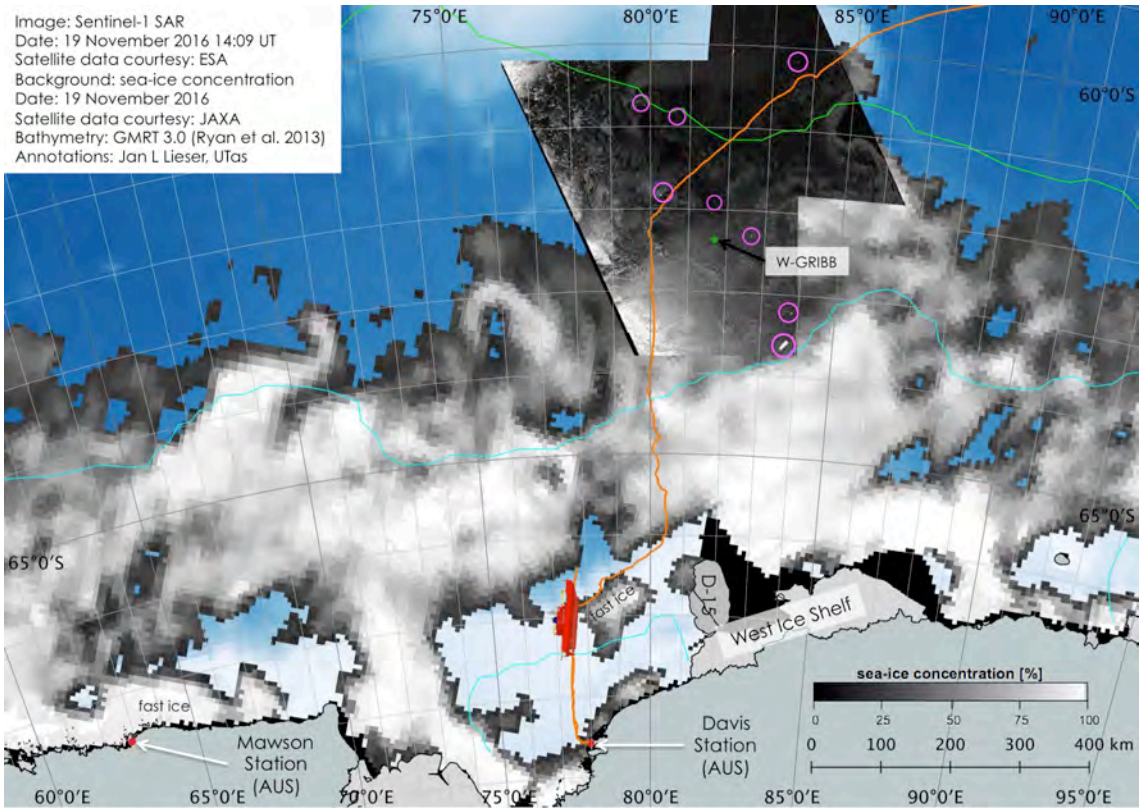

Figure 1: Sea-ice concentration chart and Sentinel-1 SAR scene, both acquired on 19/11/2016 and provided by Drift & Noise Polar Services.

The region of higher concentration sea ice is mostly confined to the December median extent, already. The SAR scene reveals that sea ice captured in this scene mostly consists of strips and patches of brash ice or very small floes. However, larger icebergs (some marked by pink circles) are also present in the region.

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Sabrina Coast

Figure 2 shows a sea-ice concentration chart off Law Dome and Sabrina Coast. The median sea-ice extents for November and December are given by the light green and cyan line, respectively. The location of a whale acoustic recorder mooring is indicated by a green dot.

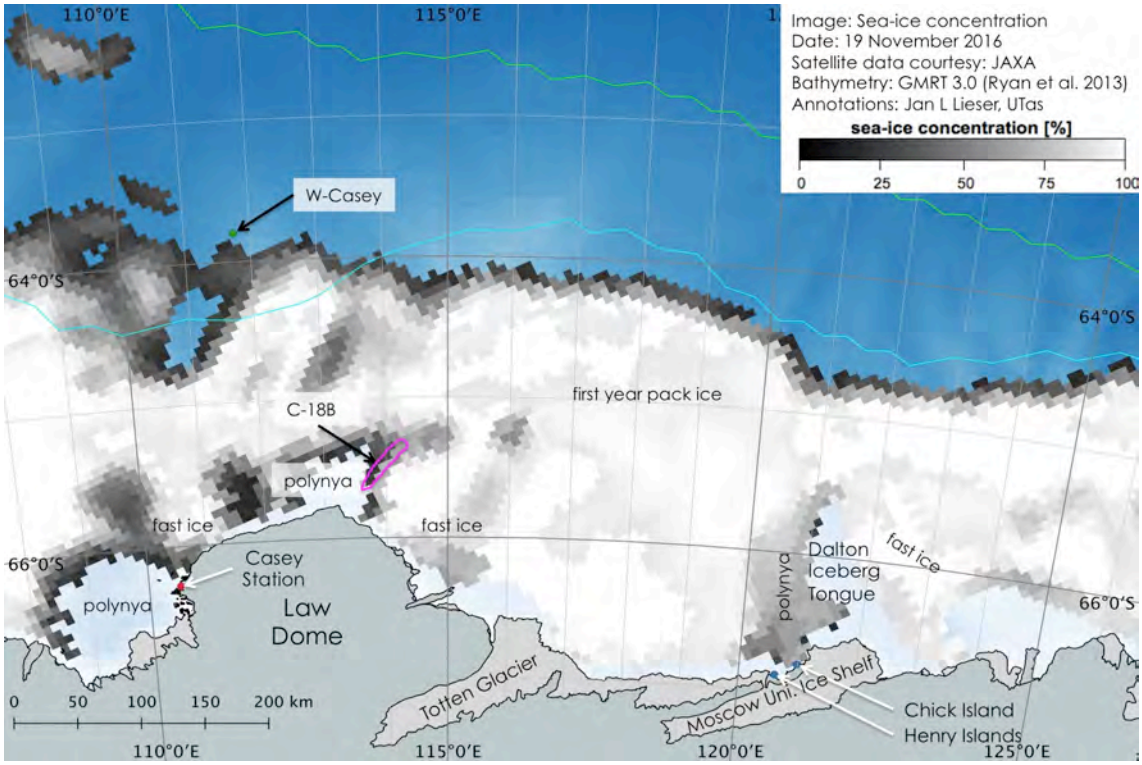

Figure 2: Sea-ice concentration chart, acquired on 19/11/2016 and provided by Drift & Noise Polar Services.

East of 114° E, sea-ice extent is already below (south of) the December median and west of 114° E the sea ice appears well advanced towards the December median extent. In Vincennes Bay (off Casey Station), the polynya is well established and the polynya west of the Dalton Iceberg Tongue slightly frozen over.

Sea Ice Report #48.1/2016

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

21/11/2016

Prydz Bay

Figure 1 shows a Sentinel-1 SAR scene on top a sea-ice concentration chart, for a region north of Prydz Bay. The cruise track of RSV *Aurora Australis* is represented by the orange line (up to 20/11/2016 22:00 UT).

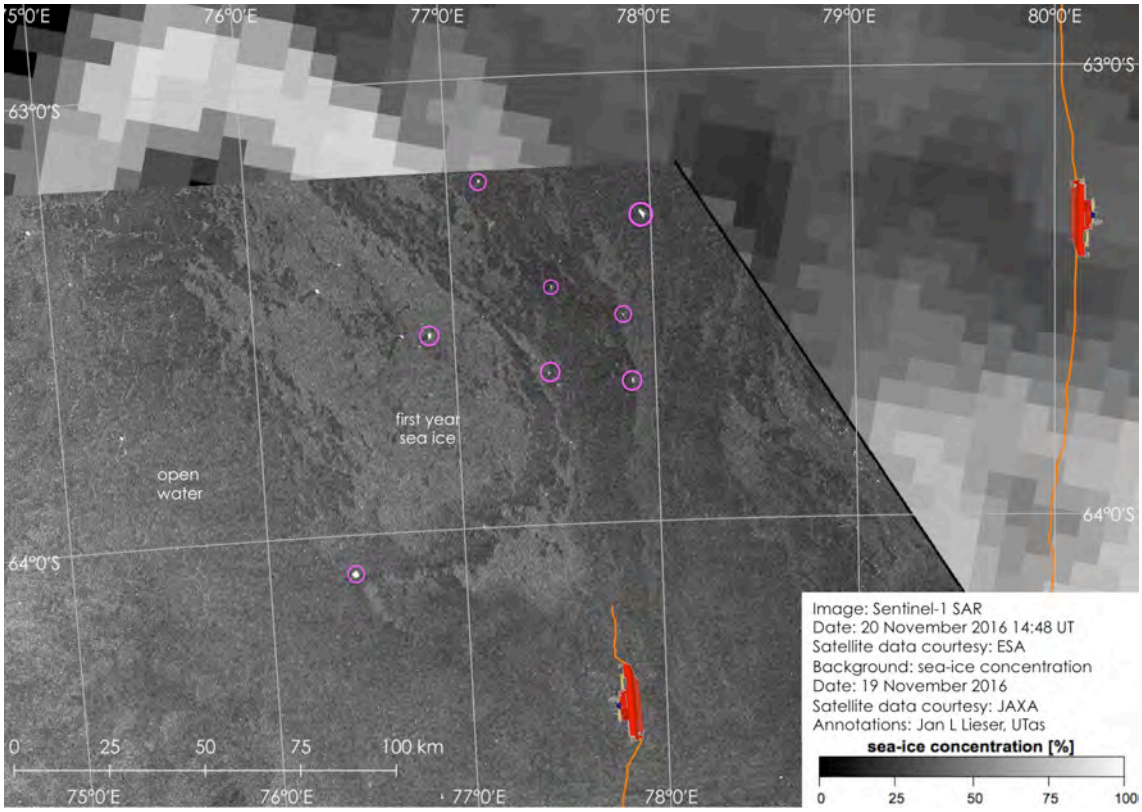

Figure 1: Sentinel-1 SAR scene, acquired on 20/11/2016 and provided by Drift & Noise Polar Services.

A patch of first year sea ice (annotated in the figure) is moving westward steadily. The rest of the scene is dominated by strips and patches of sea ice drifting freely as medium to low sea-ice concentration. Larger icebergs (some marked by pink circles) are also present in the region.

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Sea Ice Report #48.2/2016

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

22/11/2016

Prydz Bay

Figure 1 shows two Sentinel-1 SAR scenes (the eastern one from 13:51 UT, the western one from 14:41 UT) on top a sea-ice concentration chart, for a region north of Prydz Bay. The cruise track of RSV *Aurora Australis* is represented by the orange line (up to 22/11/2016 00:00 UT). The location of a whale acoustic mooring is given by the green dot.

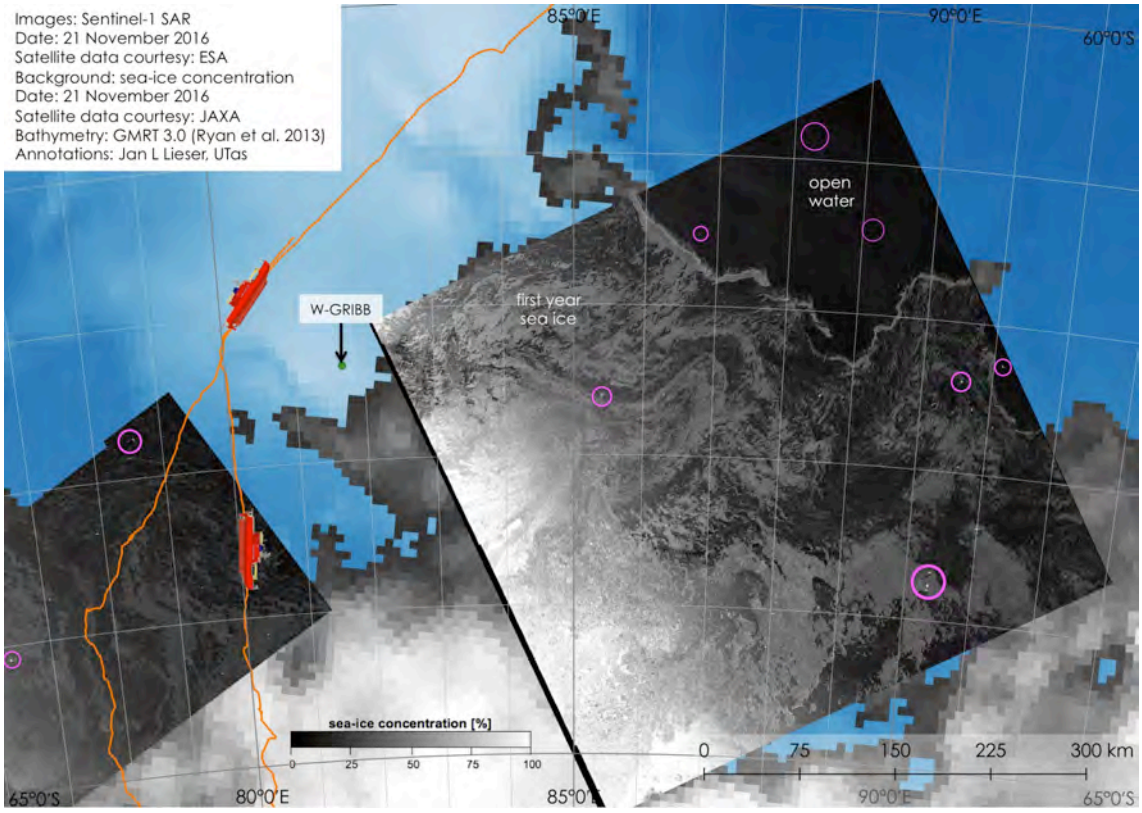

Figure 1: Sentinel-1 SAR scenes and sea-ice concentration chart acquired on 21/11/2016 and provided by Drift & Noise Polar Services.

The RADAR scenes are dominated by strips and patches of sea ice drifting freely as medium to low sea-ice concentration. The formations of these strips and patches appear to reflect oceanic surface eddies, while the wind is only very low. Larger icebergs (some marked by pink circles) are also present in the region.

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Sea Ice Report #48.3/2016

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

24/11/2016

Davis Station

Figure 1 shows a visible scene, off Davis Station. RSV *Aurora Australis* has recently visited the station and her cruise track is represented by the orange line.

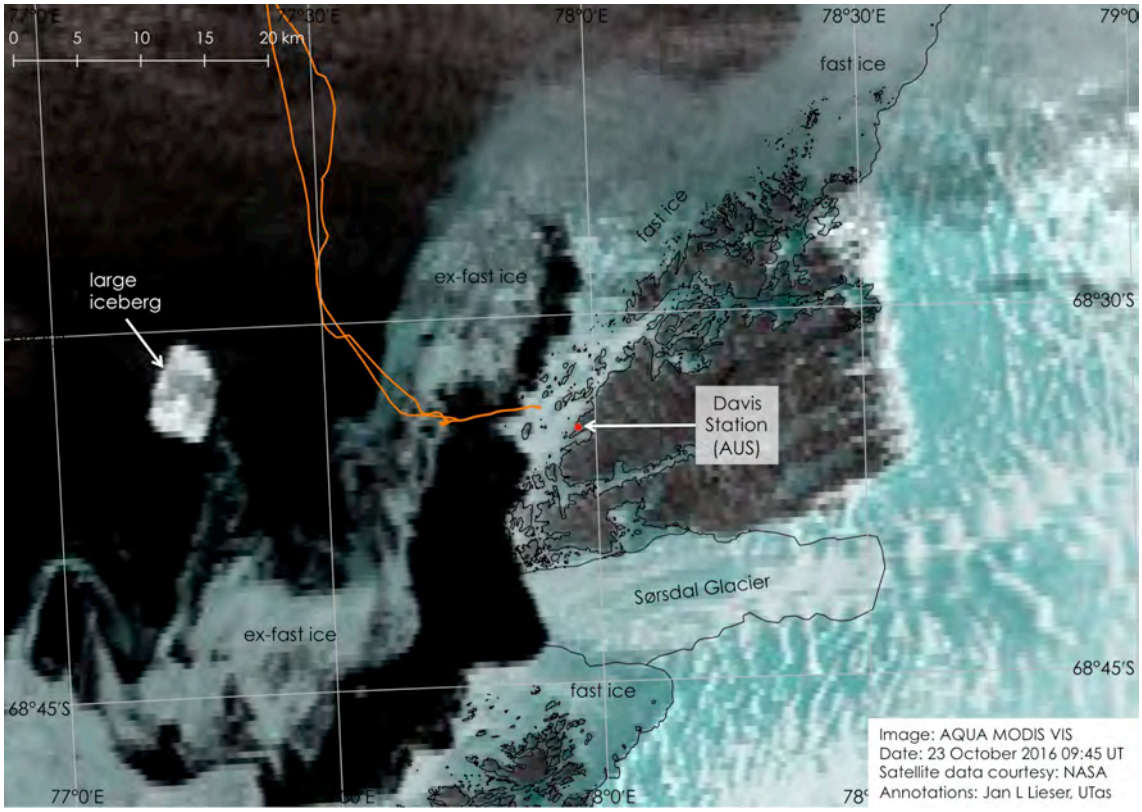

Figure 1: AQUA MODIS VIS scene, acquired on 23/11/2016 and provided by NASA.

Since RSV *Aurora Australis* departed the station (on 19 November 2016), fast ice has been breaking up, off the Vestfold Hills. The face of Sørsdal Glacier is now exposed to the ocean and more than 3 nautical miles of fast ice, which the vessel traversed to and from the parking spot for resupply, have shattered and are drifting offshore.

A large iceberg (about 27 km^2) remains approximately 16 nautical miles offshore, in roughly 600 m of water depth.

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Sabrina Coast

Figure 2 shows a sea-ice concentration chart, off Sabrina Coast and Law Dome. The location of a whale acoustic mooring is given by a green dot. The median sea-ice extent for November and December is indicated by the light blue and green lines, respectively.

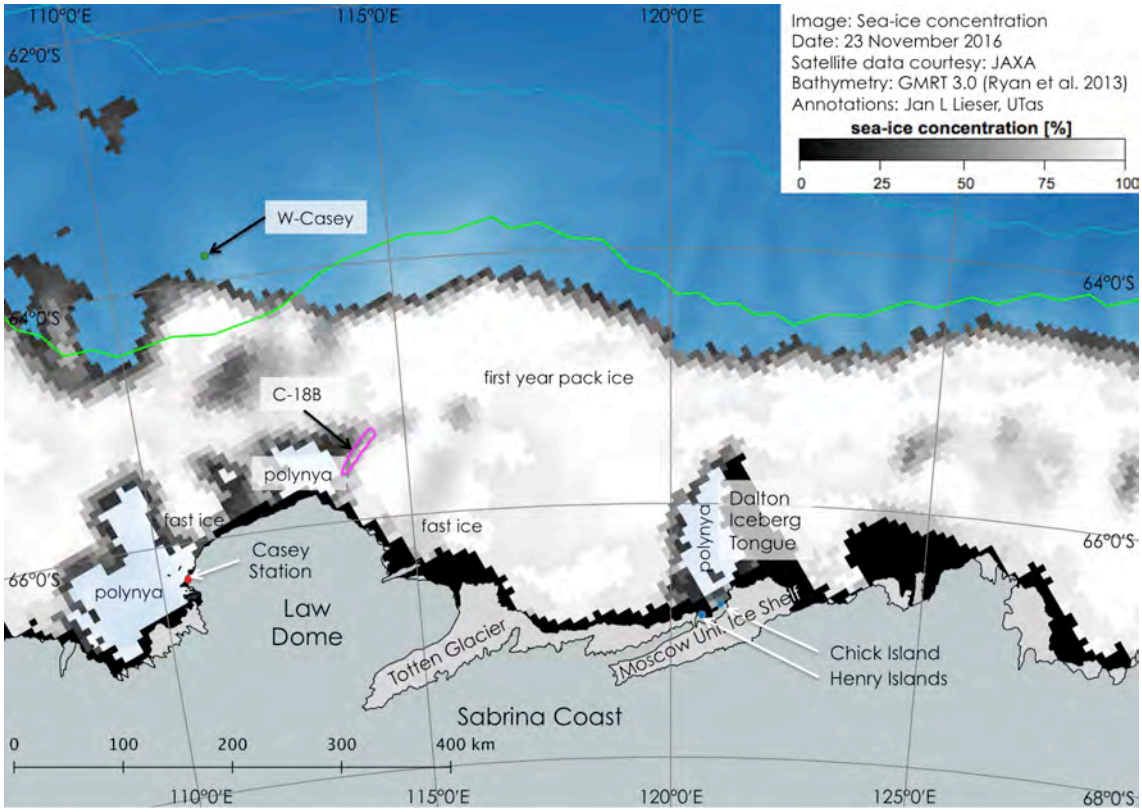

Figure 2: Sea-ice concentration chart, acquired on 23/11/2016 and provided by Drift & Noise Polar Services.

The sea-ice extent towards the end of November is in large parts of the frame below (south of) the median sea-ice extent for December already.

Offshore Casey Station, a large polynya is only separated from the open ocean by less than 60 nautical miles (north-south direction).

Sea Ice Report #49.1/2016

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

28/11/2016

East Antarctica

Figure 1 shows a sea-ice concentration chart, for East Antarctica between Mawson Station and Sabrina Coast. The locations of two whale acoustic moorings are given by green dots. The median sea-ice extent for November and December is indicated by the yellow and light green line, respectively. The recent cruise track of RSV *Aurora Australis* is shown by the thin orange line.

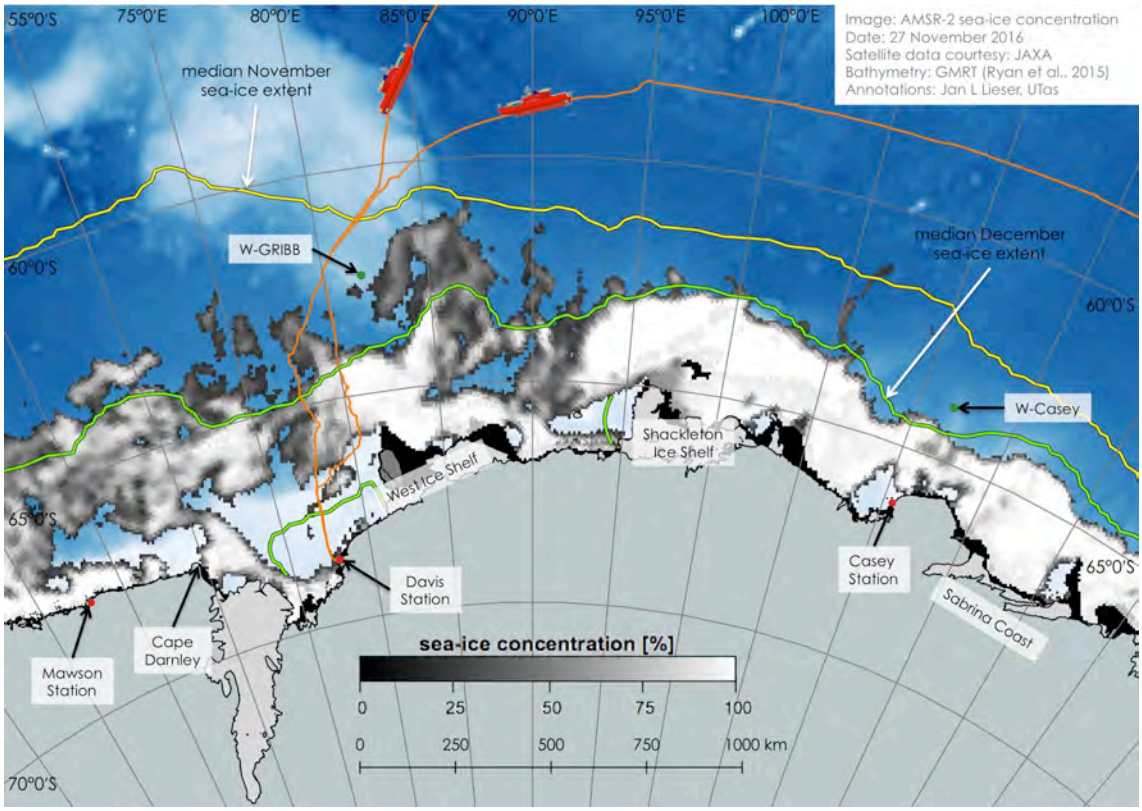

Figure 1: Sea-ice concentration chart, acquired on 27/11/2016 and provided by Drift & Noise Polar Services.

East of 92° E, the sea-ice extent is at the end of November already largely below (south of) the median sea-ice extent for December, but also west of 92° E, the northern sea-ice extent is fast approaching the December median. Additionally large areas of open water are west of Cape Darnley, in Prydz Bay (off Davis Station) and west of the Shackleton Ice Shelf.

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Offshore Casey Station, a large polynya is separated from the open ocean by less than 60 nautical miles (north-south direction).

Mawson Station

Figure 2 shows a visible scene, off Mawson Station. The red scribble line indicates the location of the fast-ice edge, on 16/11/2016.

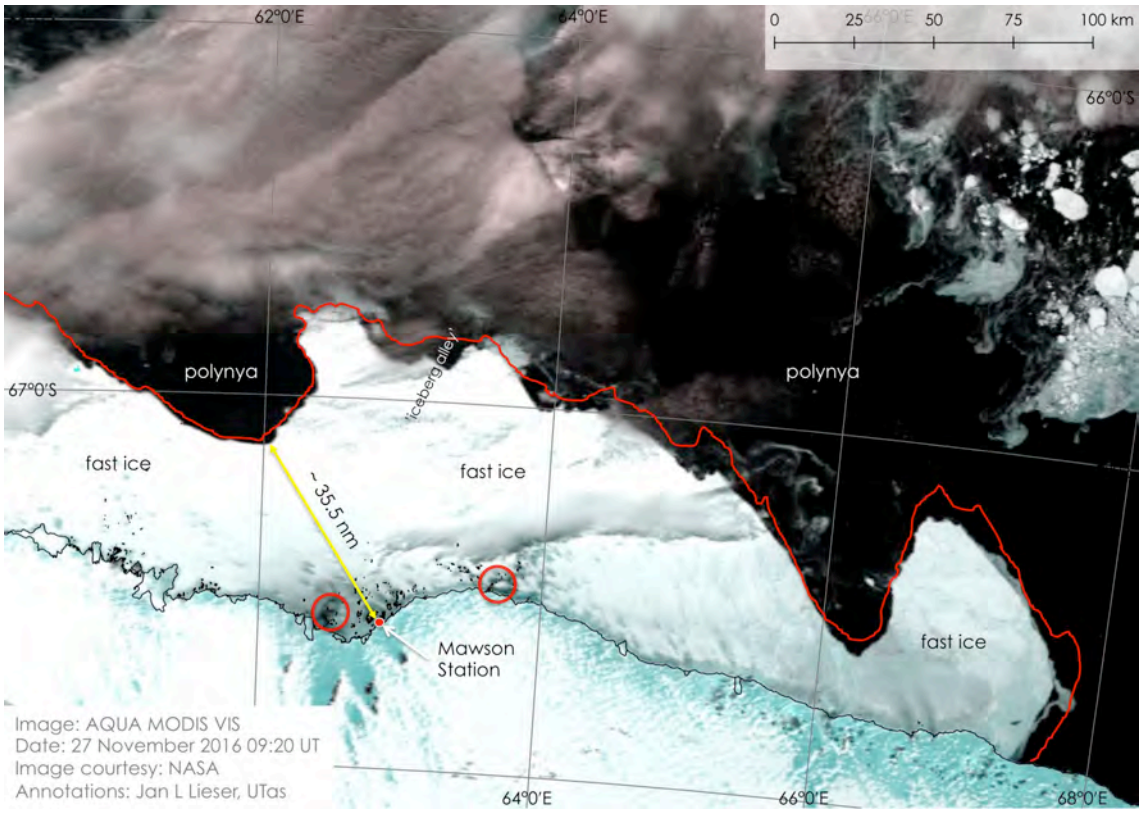

Figure 2: AQUA MODIS VIS scene, acquired on 27/11/2016 and provided by NASA.

The fast-ice edge has started to retreat towards the coast. Since 16/11/2016, roughly 1770 km^2 broke off. The northern part of 'iceberg alley' is already free of fast ice. West of Mawson Station, Figure 2 shows also a near-shore region of large patches of open water, at 67° 35' S and 62° 28' E (marked by a red circle). But also further east of the station, some areas of near-shore fast ice appear to be breaking up, around 67° 29' S and 63° 38' E (also marked by a red circle).

Davis Station

Figure 3 shows a visible scene, off Davis Station. RSV *Aurora Australis* has recently visited the station and her cruise track is represented by the orange line. The pink line shows the movement of a large iceberg, since 16/11/2016, as it is following roughly the 600 m bathymetry contour.

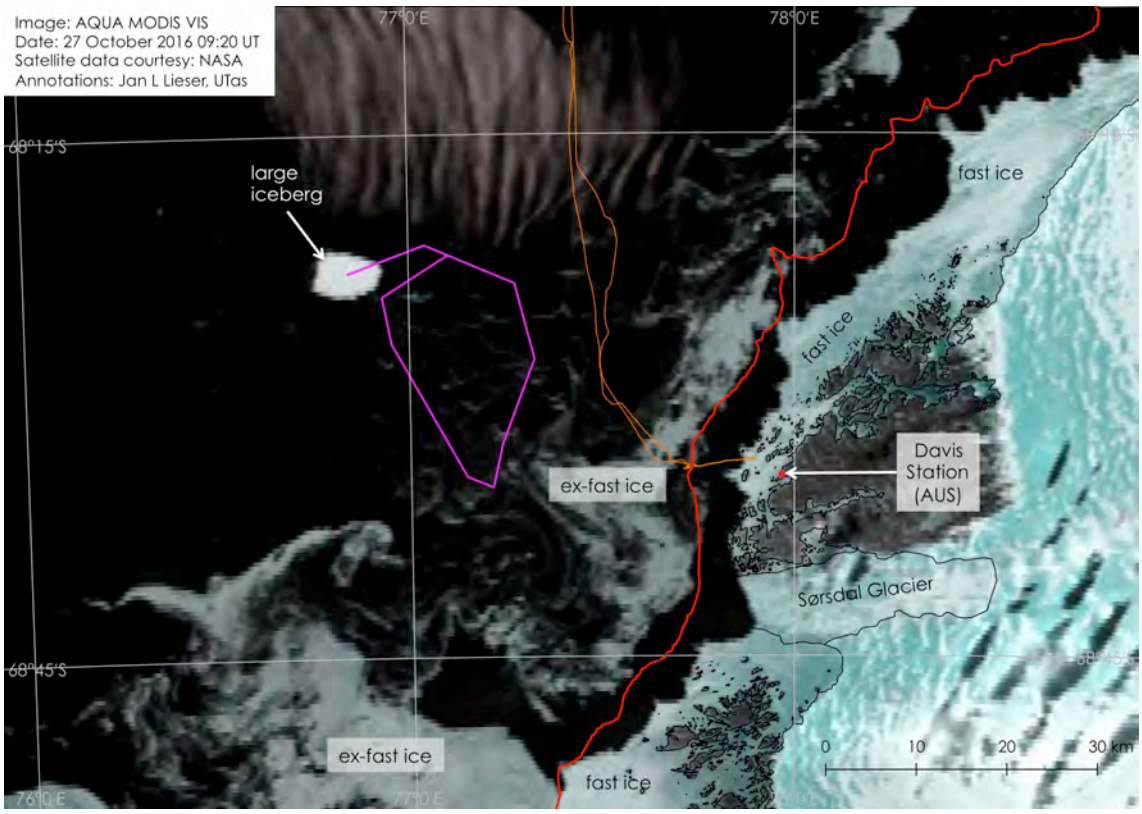

Figure 3: AQUA MODIS VIS scene, acquired on 27/11/2016 and provided by NASA.

The red scribble line indicates the location of the fast-ice edge, on 16/11/2016. Since then, close to 600 km^2 of fast ice of the region shown in Figure 3 have broken away, shattered and are drifting offshore. Towards the West Ice Shelf (northeast of the frame shown in the figure), another 530 km^2 of fast ice broke off and almost 400 km^2 of fast ice broke off, towards the Larsemann Hills (southwest of the frame shown in the figure).

Sea Ice Report #49.2/2016

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

28/11/2016

Prydz Bay

Figure 1 shows a visible scene of the Prydz Bay region. Red scribble lines indicate fast-ice areas. Dashed orange lines indicate pre-existing fault lines in the fast ice, north and west of the Larsemann Hills. The position of Research/Survey Vessel *Xue Long* (on 27/11/2016 02:50 UT) is given by a red dot (annotated 'BNSK').

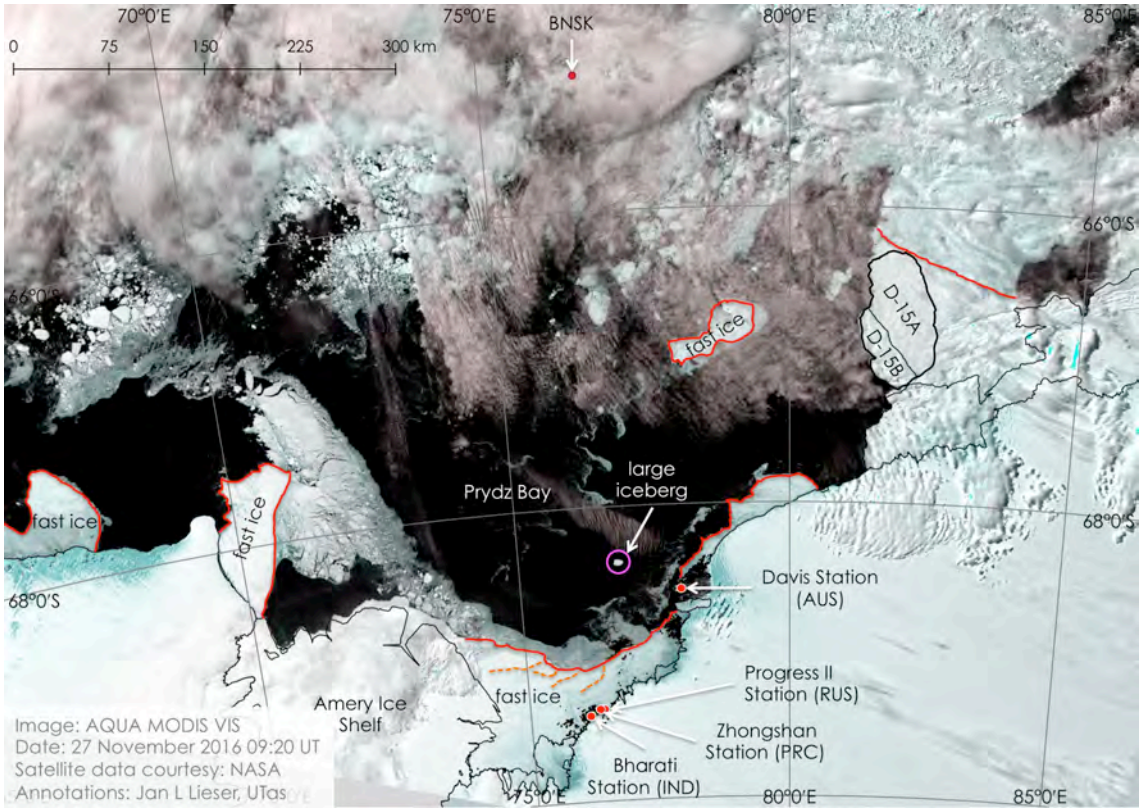

Figure 1: AQUA MODIS VIS scene, acquired on 27/11/2016 and provided by NASA.

The central part of Prydz Bay is largely free of sea ice, only small areas of strips and patches of mostly ex-fast ice are drifting freely. North of the Larsemann Hills, the fast-ice edge is roughly 18 nautical miles away.
A large tabular iceberg (about 29 km^2 surface area) is marked with a pink circle in the figure. This iceberg is also drifting freely and its movement followed roughly the 600 m bathymetry contour, recently.

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Sea Ice Report #49.3/2016

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

01/12/2016

Casey Station

Figure 1 shows a visible scene of Vincennes Bay and off Law Dome.

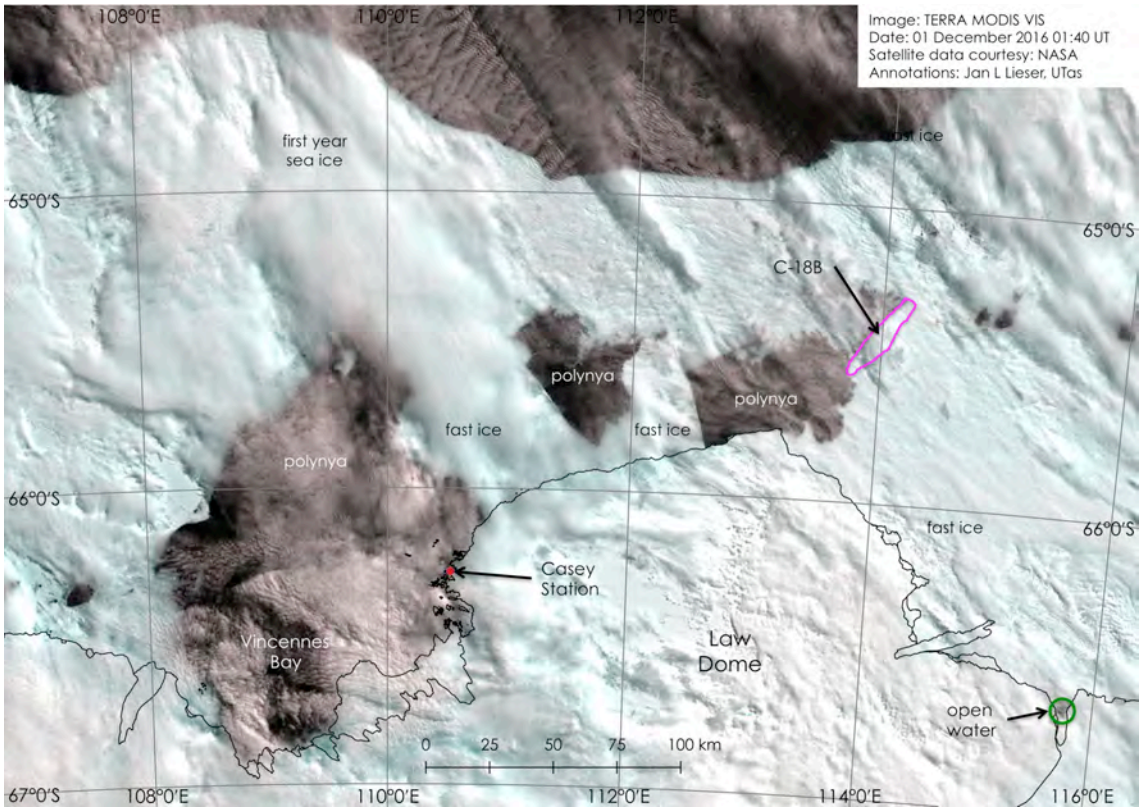

Figure 1: TERRA MODIS VIS scene, acquired on 01/12/2016 and provided by NASA.

Three polynya regions are prominent features of the region, the largest is Vincennes Bay. The sea-ice edge is well defined in the region and up to 40 nautical miles south of the median sea-ice extent for December, which highlights that the sea-ice melt season is roughly 3 weeks to 4 weeks advanced. The band of sea ice that separates Vincennes Bay from the open ocean is less than 60 nautical miles wide (north-south extent). Southeast of iceberg C-18B, fast ice remains attached to the eastern flank of Law Dome, even though we curiously note a patch of apparent open water at the northwestern edge of Totten Glacier (marked by a green circle; see also Sea Ice Reports #37.2/2016 and #42.2/2016).

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Sabrina Coast

Figure 2 shows a visible scene, off Moscow University Ice Shelf. The red scribble line indicates the location of the fast-ice edge, on 14/11/2016.

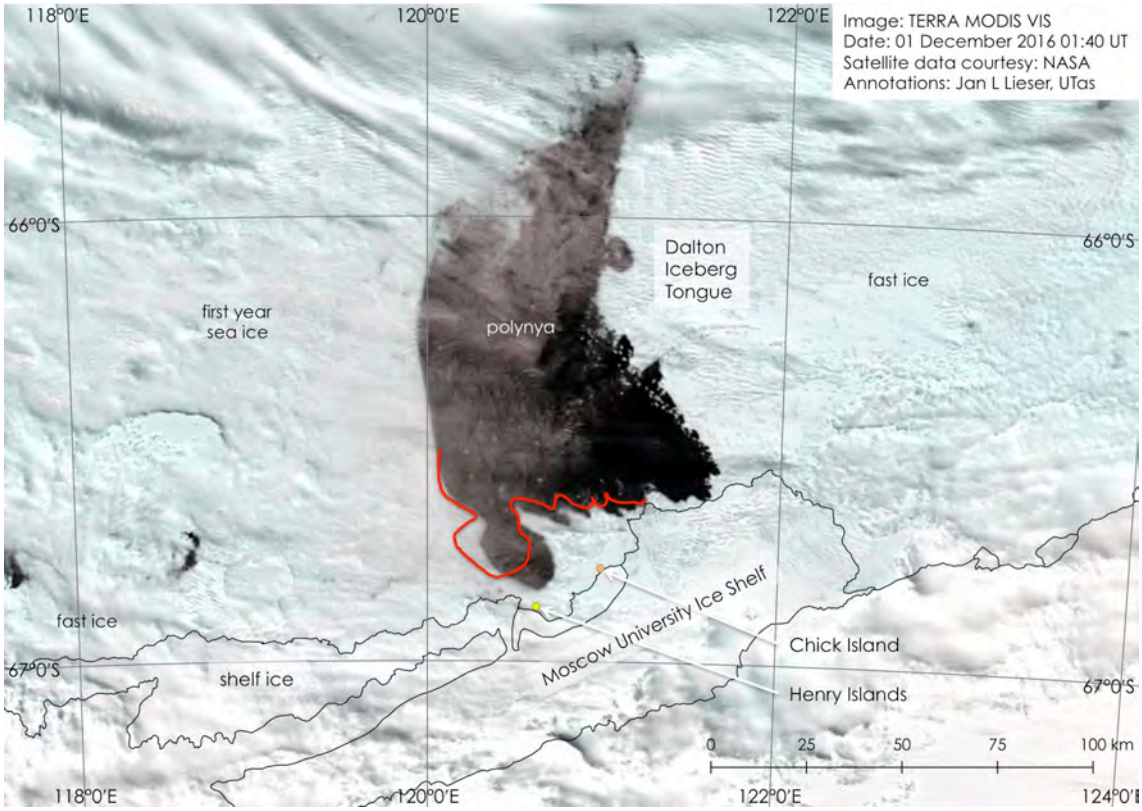

Figure 2: TERRA MODIS VIS scene, acquired on 01/12/2016 and provided by NASA.

Off Henry Islands, the fast-ice edge is retreating towards the coast and also further north, some fast ice is breaking away.

The polynya west of the Dalton Iceberg Tongue is separated from the open ocean by less than 40 nautical miles (north-south direction). Between 118° E and 124° E, the sea-ice extent is between 25 nautical miles and 50 nautical miles south of the December median extent, similar to the situation described above (off Casey Station).

Sea Ice Report #50.1/2016

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

08/12/2016

Mawson Station

Figure 1 shows a SAR scene off Mawson Coast on a background of visible imagery.

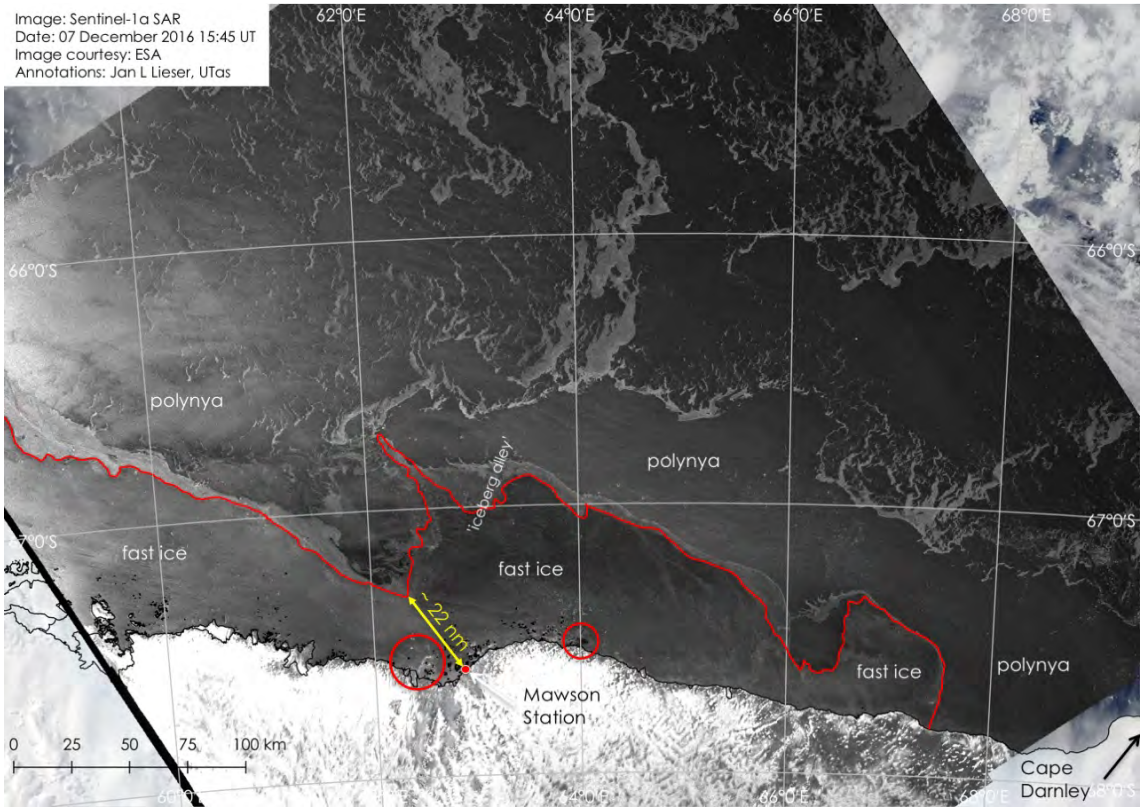

Figure 1: Sentinel-1a SAR scene, acquired on 07/12/2016 and provided by PolarView. Background: AQUA MODIS VIS scene, acquired on 07/12/2016 and provided by NASA.

During the past week, the fast-ice edge retreated rapidly southwards, off Mawson Station. West and east of the station, nearshore areas of open water are detectable (red circles in the figure). The largest open water patch east of Mawson Station is about 14 km^2.

North of Mawson Coast, sea ice consists largely of strips and patches of melting ice with large areas of open water, all well south of the median sea-ice extent for December.

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Casey Station

Figure 2 shows a SAR scene off Law Dome on a background of visible imagery, for the larger Knox Coast—Budd Coast—Sabrina Coast region. The yellow line indicates the median sea-ice extent for December. The location of a whale acoustic mooring is given by a green dot (W-Casey).

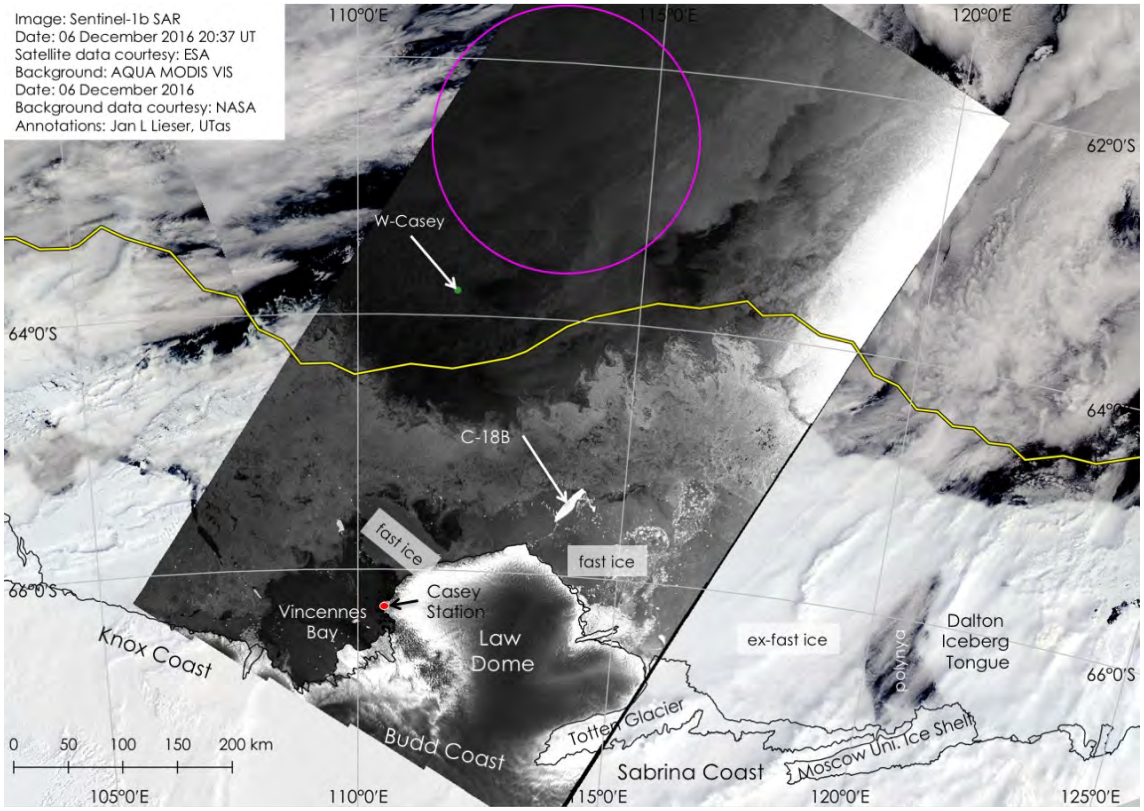

Figure 2: Sentinel-1b SAR scene, acquired on 06/12/2016 and provided by PolarView. Background: TERRA MODIS VIS scene, acquired on 07/12/2016 and provided by NASA.

North of the sea-ice edge, many small icebergs are detected in the SAR scene (approximated by – but not limited to – the purple circle). The current sea-ice edge is well south of the December median extent except for a small region, between 108° E and 110° 15' E. Northeast of Law Dome, the sea-ice edge appears a bit more fuzzy, after the passage of a low pressure system while the sea-ice edge remains rather well defined further east, off the Dalton Iceberg Tongue.

Figure 3 shows an enlarged part of Figure 2, northwest of Law Dome. The orange scribble line approximates a boundary between small decaying sea-ice floes to the north of it and a band of sea ice, which has some larger floes incorporated in the mix of various sea-ice types, north of fast ice areas. In this band, many larger icebergs are identified (high RADAR reflectivity resulting in bright white spots in the image), two of which are outlined by a purple shape (area roughly 12 km^2 and 40 km^2).

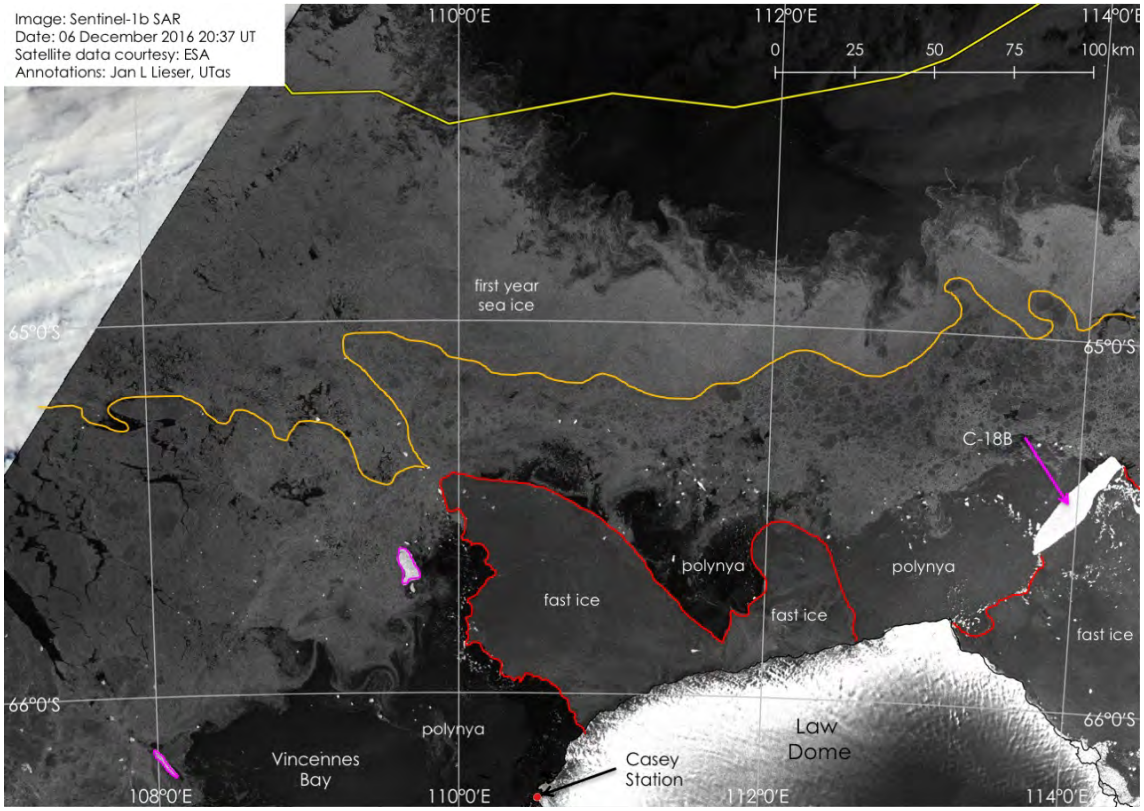

Figure 3: Sentinel-1b SAR scene, acquired on 06/12/2016 and provided by PolarView.

Sea Ice Report #50.2/2016

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

08/12/2016

Commonwealth Bay

Figure 1 shows a visible image, off Commonwealth Bay and Mertz Glacier. The position of an oceanographic mooring is given by a yellow dot. Red scribble lines approximate fast ice edges.

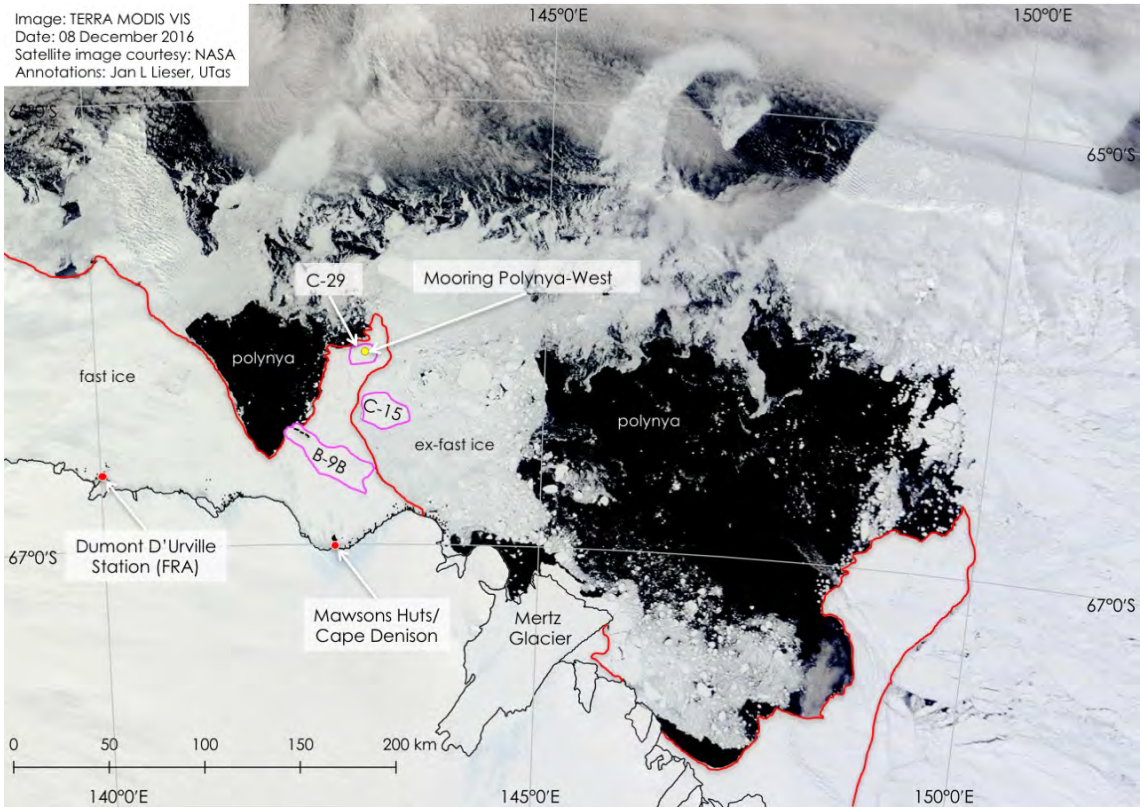

Figure 1: TERRA MODIS VIS scene, acquired on 08/12/2016 and provided by NASA.

Off Mertz Glacier, a large polynya is evident surrounded by ex-fast ice in the west, some fast ice in the southeast and pack ice trapped behind rows of grounded icebergs, in the east. West of the large iceberg troika (consisting of B-9B, C-15 and C-29), another polynya is found surrounded by fast ice in the south and separated from the open ocean in the north by decaying sea ice, partly as strips and patches.
Of curious note is a rift in the northwestern side of iceberg B-9B, which creates a wobbly tooth-like fragment (black dashed line), towards the polynya there.

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Sea Ice Report #50.3/2016

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

09/12/2016

Mawson Station

Figure 1 shows a visible image off Mawson Coast. Red scribble lines approximate fast ice edges.

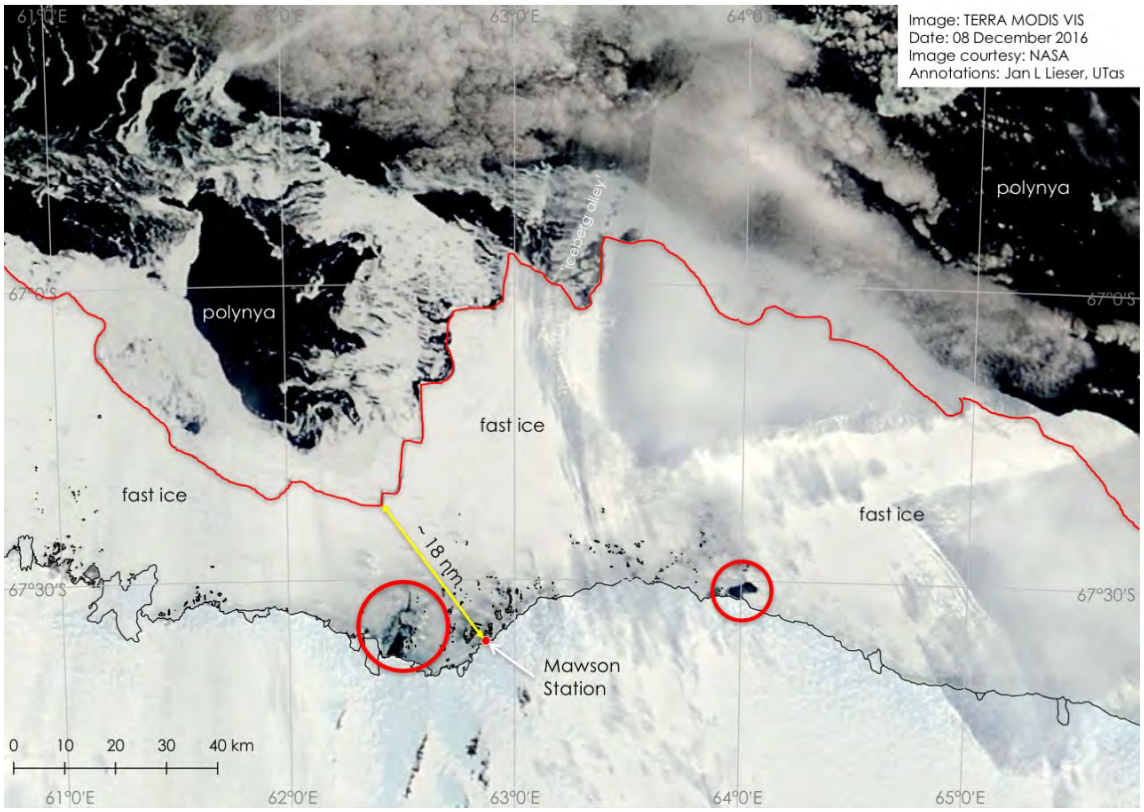

Figure 1: TERRA MODIS VIS scene, acquired on 08/12/2016 and provided by NASA.

Further to Sea Ice Report #50.1/2016, we note that the near-shore open water patches east and west of Mawson Station are growing rapidly. Also, the sea-ice edge continues to retreat towards the continent with the shortest distance between the station and the northward fast-ice edge now roughly 18 nautical miles.

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Sea Ice Report #51.1/2016

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

12/12/2016

Zhongshan Station

Figure 1 shows a SAR scene of Prydz Bay. The cruise track of RSV *Xue Long* is given as a red line (up to 12/12/2016 00:00 UT).

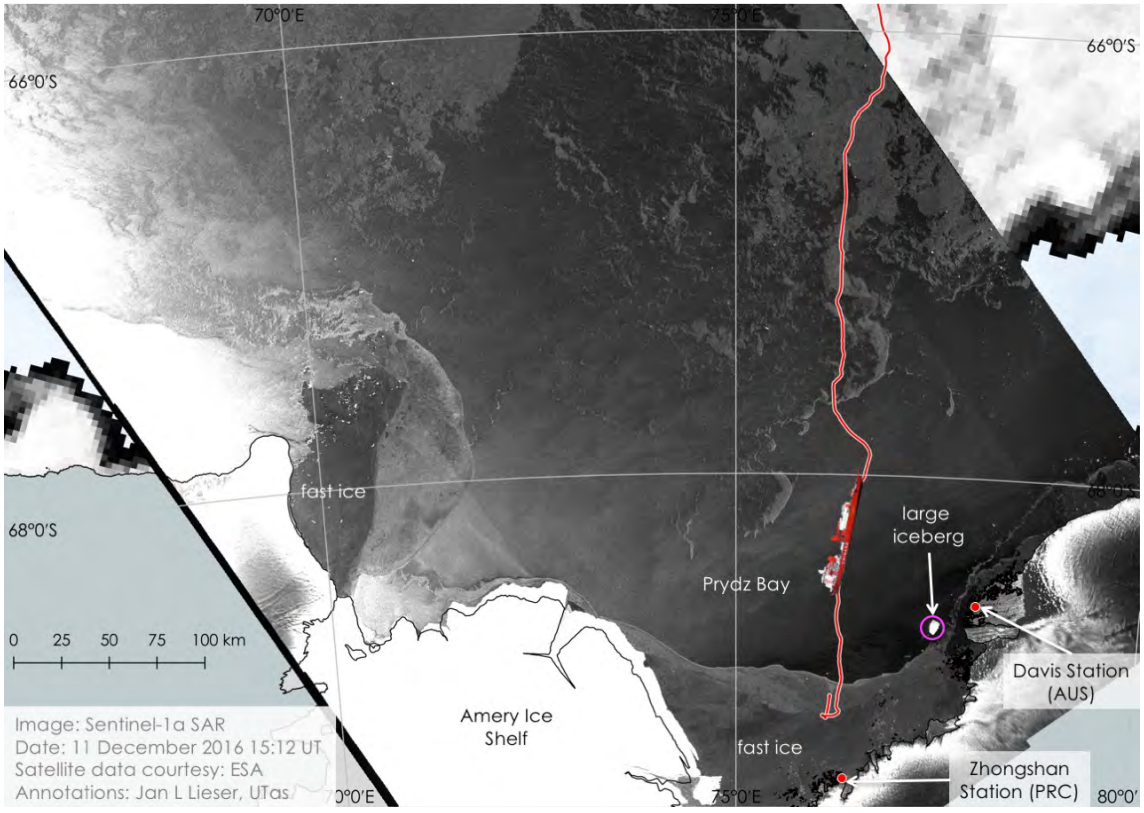

Figure 1: Sentinel-1a SAR scene, acquired on 11/12/2016 and provided by PoalrView.

Prydz Bay is covered only by very low sea-ice concentration. Only in the northeastern part of Figure 1 is medium-high to high sea-ice concentration found. A patch of fast ice remains north of the Amery Ice Shelf, attached to the coast towards Cape Darnley, as well as in the southern part of Prydz Bay.

Figure 2 shows sea-ice concentration data (note: missing data near-shore between 6° E and 10° 30' E), from the Antarctic Peninsula to the Amery Ice Shelf. The cruise track or RSV *Xue Long* is given as red line (up to 12/12/2016 00:00 UT). The white line indicates the median December sea-ice extent.

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The current sea-ice extent is much below (south of) the median, in the area. Most of the sea ice in advanced stage of decay. Great Wall Station is north of the current sea-ice extent.

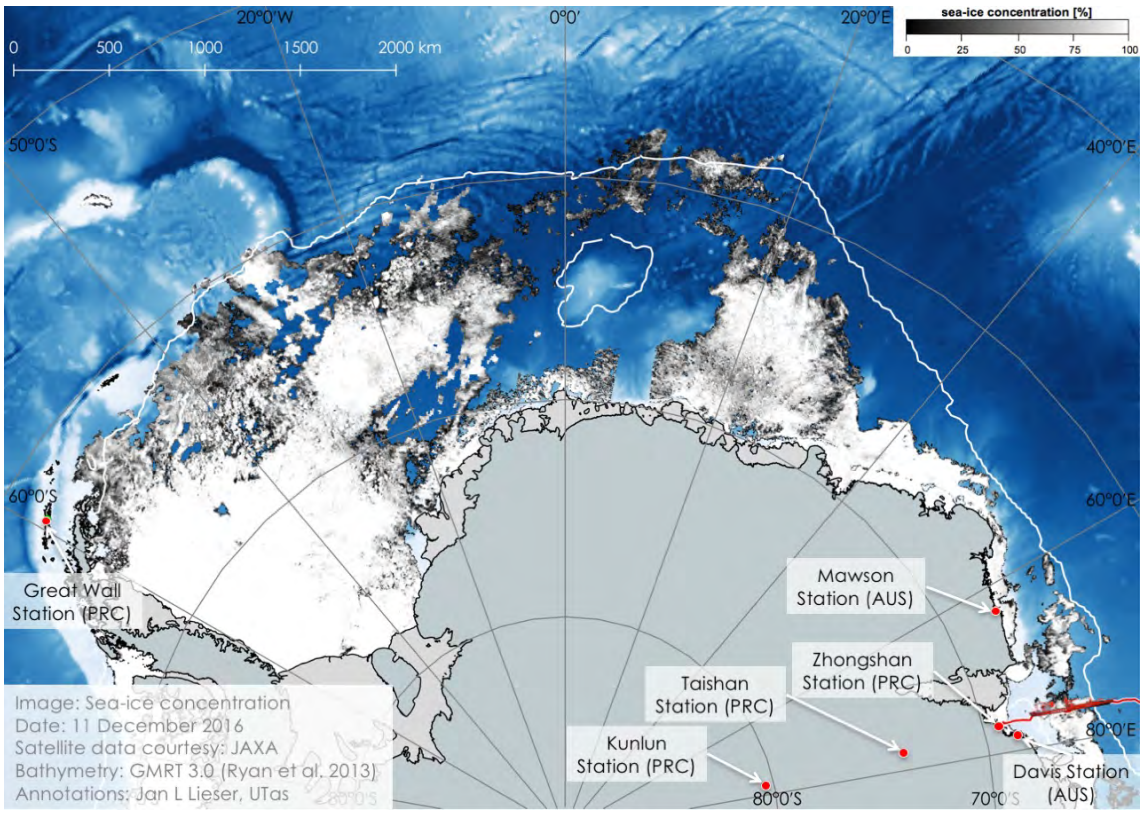

Figure 2: Sea-ice concentration, acquired on 11/12/2016 and provided by Universität Hamburg.

Sea Ice Report #51.2/2016

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

12/12/2016

Sabrina Coast

Figure 1 shows a SAR scene off Sabrina Coast. In the west, the figure is complemented by a Sentinel-1b SAR scene (acquired on 10/12/2016 and provided by PolarView).

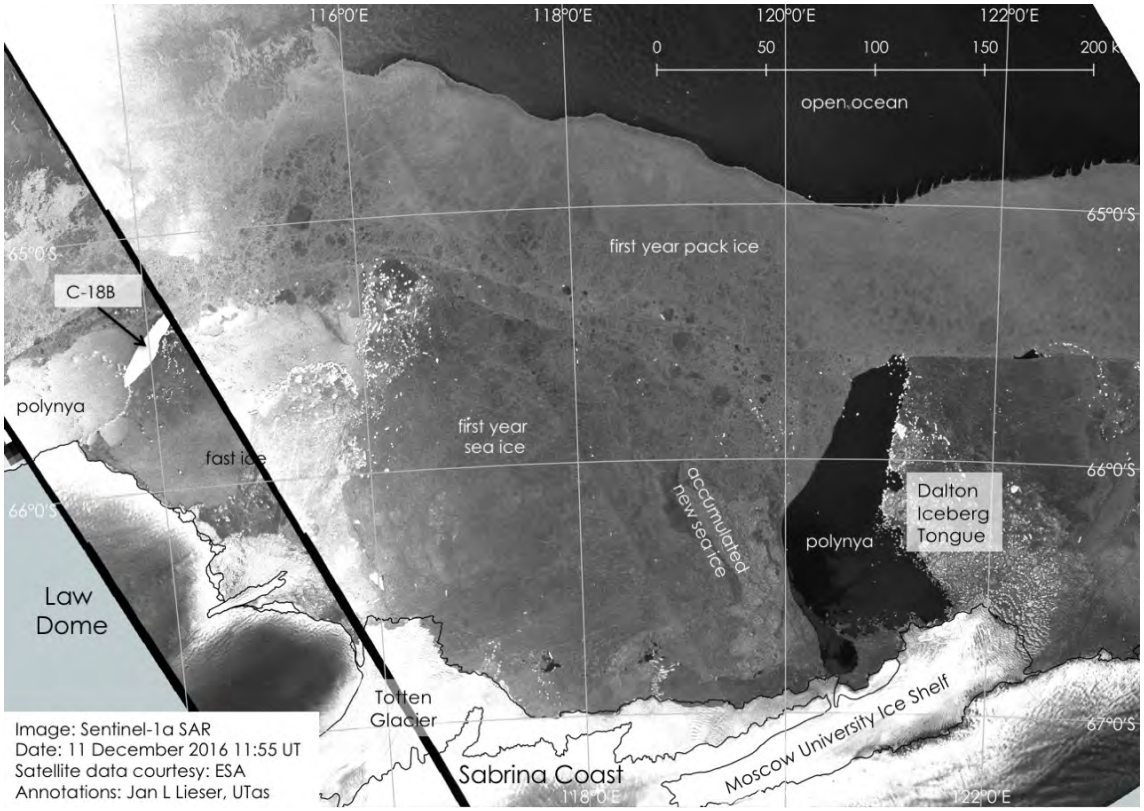

Figure 1: Sentinel-1a SAR scene, acquired on 11/12/2016 and provided by PolarView.

Off Sabrina Coast, the sea-ice extent is between 20 nautical miles and 45 nautical miles south of the December median. The sea-ice edge is rather well defined, but only between the accumulated new ice west of the Dalton polynya and the first year pack ice some older sea-ice floes can be identified. The outer pack ice is showing signs of criss-crossing pressure features while different stages of accumulation show different RADAR signatures, west of the polynya.

North of the sea-ice edge, many icebergs are found drifting freely.

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Sea Ice Report #51.3/2016

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

13/12/2016

Sabrina Coast

Figure 1 shows a SAR scene north of the sea-ice edge off Sabrina Coast.

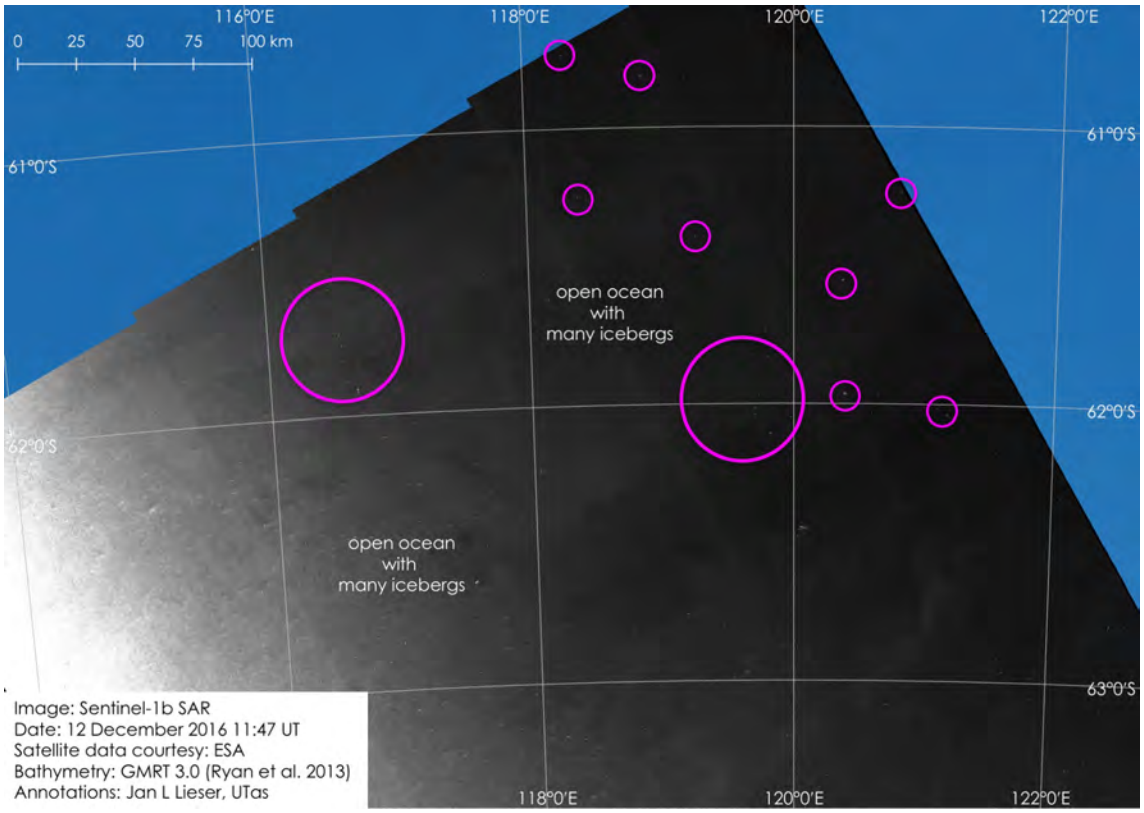

Figure 1: Sentinel-1a SAR scene, acquired on 12/12/2016 and provided by PolarView.

Many icebergs are found drifting freely, only a few are marked with pink circles in the figure, north of 62° S. Many more icebergs are found south of 62° S.

Sea-ice conditions have not changed significantly, south of 64° S, since our last report on the region (see Sea Ice Report #51.2/2016).

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Sea Ice Report #51.4/2016

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

14/12/2016

Casey Station

Figure 1 shows a SAR scene northwest of Law Dome and Casey Station. Two large icebergs are marked by pink outlines. The fast-ice edge is shown as a red scribble line. Orange dashed lines point to linear kinematic features of high deformation.

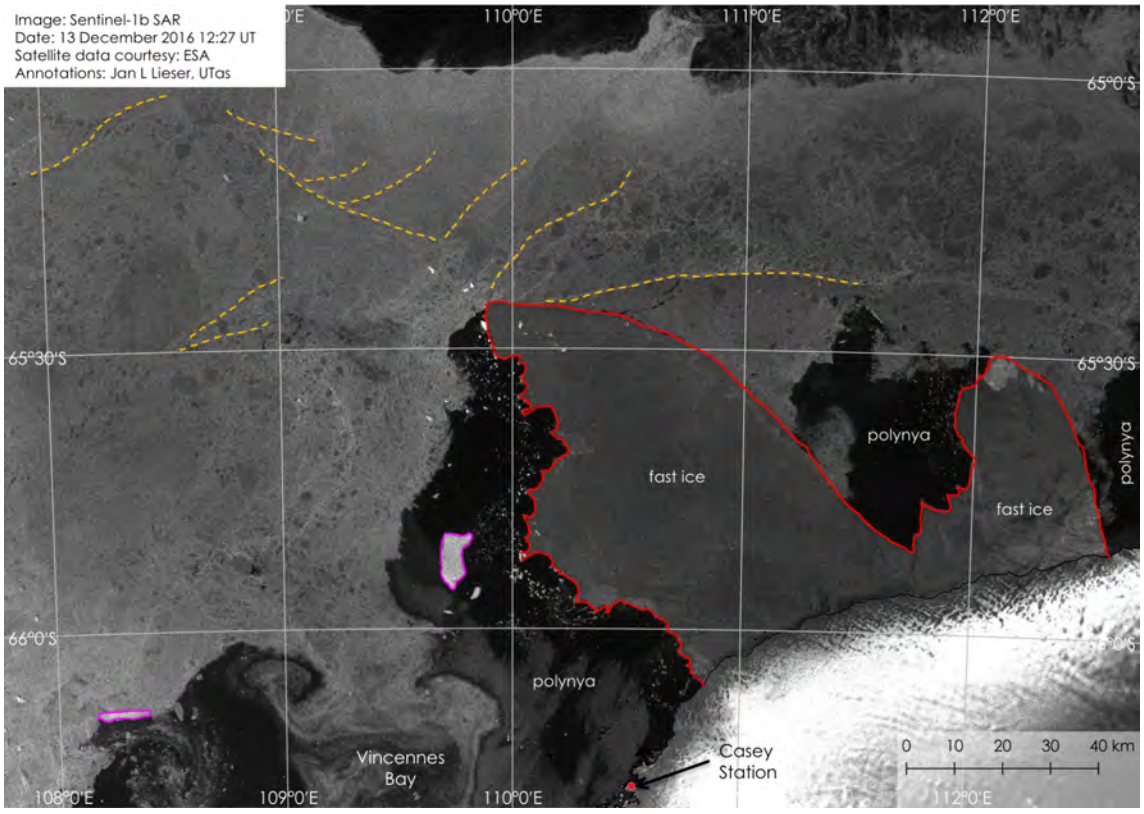

Figure 1: Sentinel-1b SAR scene, acquired on 13/12/2016 and provided by PolarView.

The sea-ice edge is mostly following 65° S in the part of East Antarctica shown in the figure, but strips and patches of sea ice can be encountered south of 64° S and many icebergs are even further north.
North of the fast-ice area, some larger floes of older sea ice (darker shading in the SAR scene) can be identified. Also west of 110° E, larger floes of sea ice are embedded in the matrix of generally decaying sea ice.
The marked icebergs appear to be drifting freely, the larger one has turned 180° since our last report (Sea Ice Report #50.1).

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Sea Ice Report #51.5/2016

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

14/12/2016

Sabrina Coast

Figures 1 and 2 show the same geographical frame, off Law Dome and Sabrina Coast, as seen by the MODIS and AMSR-2 instruments, respectively. Red scribble lines mark the fast-ice edge. Orange dashed lines indicate dynamic fault lines in the outer pack ice. The white line represents the median sea-ice extent for December. The location of a whale acoustic mooring (W-Casey) is shown by a green dot.

Iceberg C-18B is outlined by a pink shape and two icebergs previously identified in Sea Ice Report #51.4 are located in pink circles. The larger of these two bergs (centred at about 65° 51' S and 109° 43' E) has travelled roughly 1.5 nautical miles in a southeasterly direction, during the 10 hours between the acquisitions of the visible data (Figure 1) and the SAR scene (Sea Ice Report #51.4).

Figure 2 shows a higher resolution (about 3 km per pixel) sea-ice concentration chart, based on AMSR-2 data. The different processing allows for a finer resolution of sea-ice concentration particularly of filament-like features, which are for example found in central Vincennes Bay or north of iceberg C-18B.

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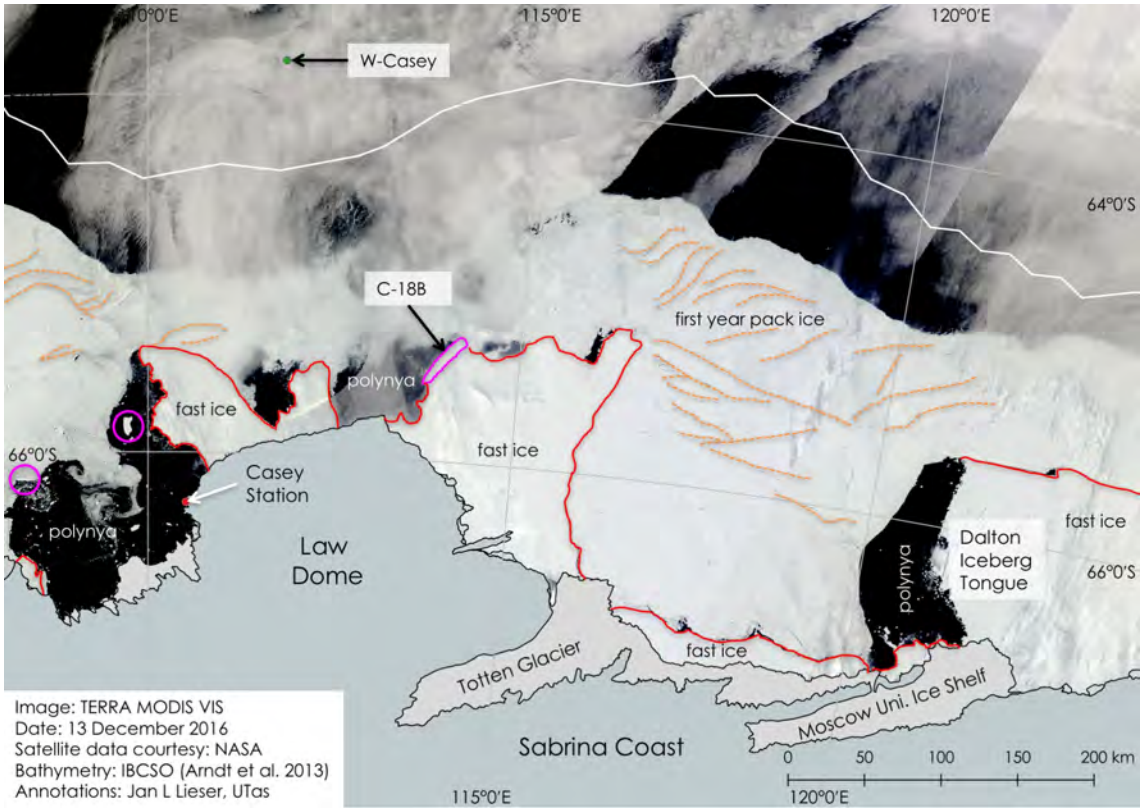

Figure 1: TERRA MODIS VIS scene, acquired on 13/12/2016 and provided by NASA.

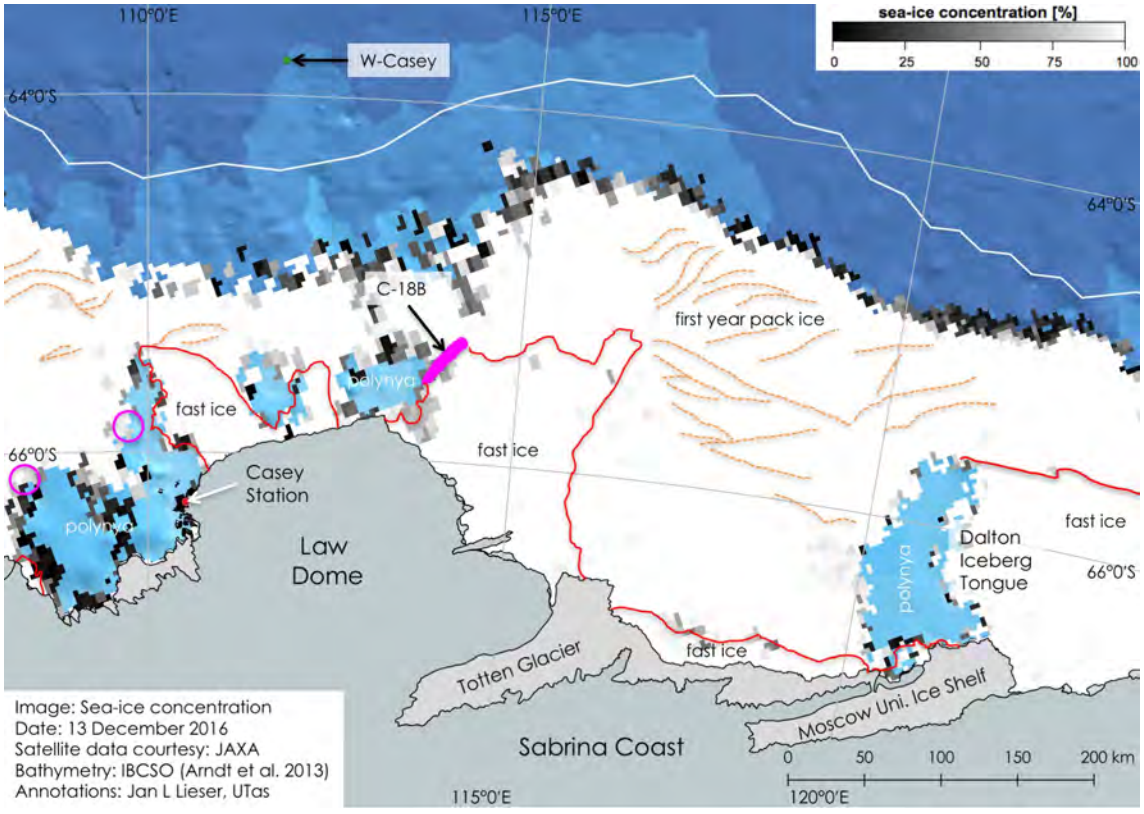

Figure 2: Sea-ice concentration, acquired on 13/12/2016 and provided by Drift & Noise Polar Services.

Sea Ice Report #51.6/2016

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

15/12/2016

Antarctica

Figure 1 shows the November 2016 sea-ice concentration anomaly, which is the difference between the mean sea-ice concentration for November 2016 and the average November sea-ice concentration, for the satellite era. The black line in the figure represents the average sea-ice extent, for November.

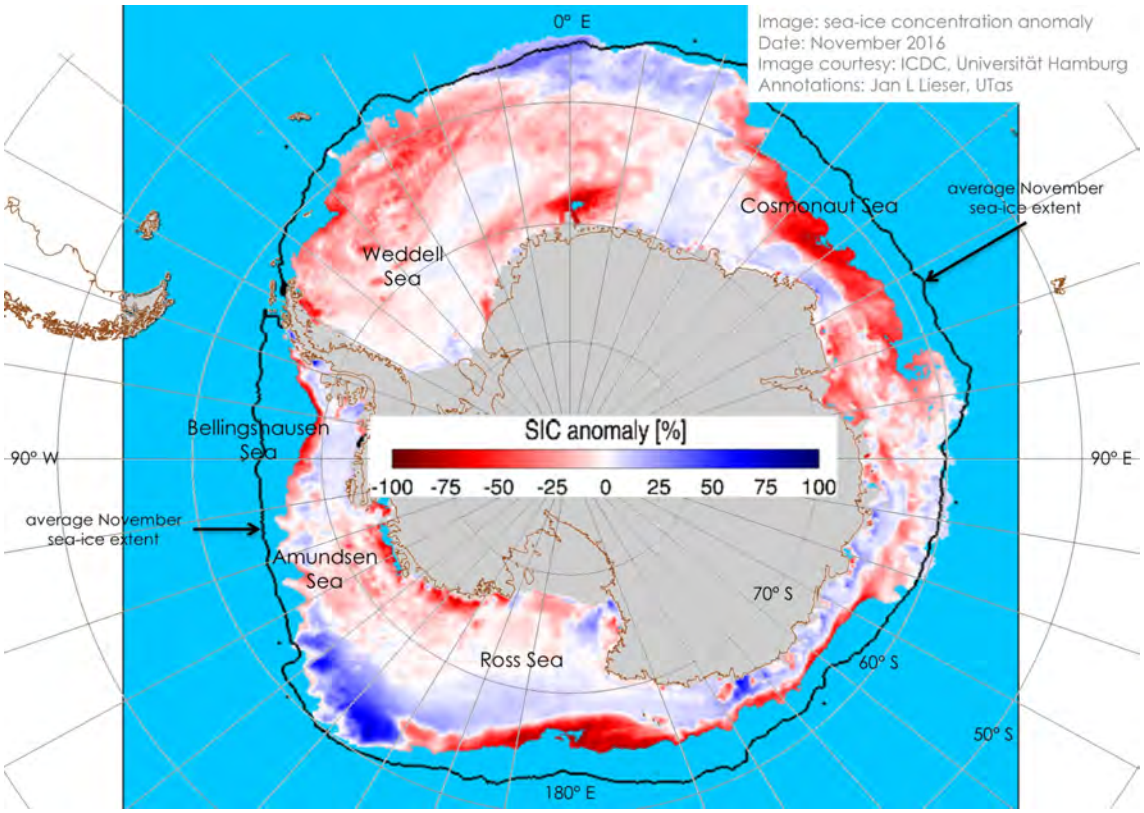

Figure 1: Sea-ice concentration anomaly for November 2016, provided by ICDC, Universität Hamburg.

While the pan-Antarctic sea-ice extent is below the range of ±2 standard deviations of the mean, and therefore anomalously low, the rate of sea-ice decline since October 2016 appears to be as to be expected, but about three to four weeks early. Large regional variations in the pattern of anomalous sea-ice concentration are still showing the heterogenous nature of this season's sea-ice melt.

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Sea Ice Report #51.7/2016

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

16/12/2016

Casey Station

Figure 1 shows a visible scene, northwest of Law Dome and Casey Station. The thin orange line denotes the cruise track of RSV *Aurora Australis* (up to 16/12/2016 06:00UT). A large iceberg is marked by a pink circle (see also Sea Ice Report #51.4/2016).

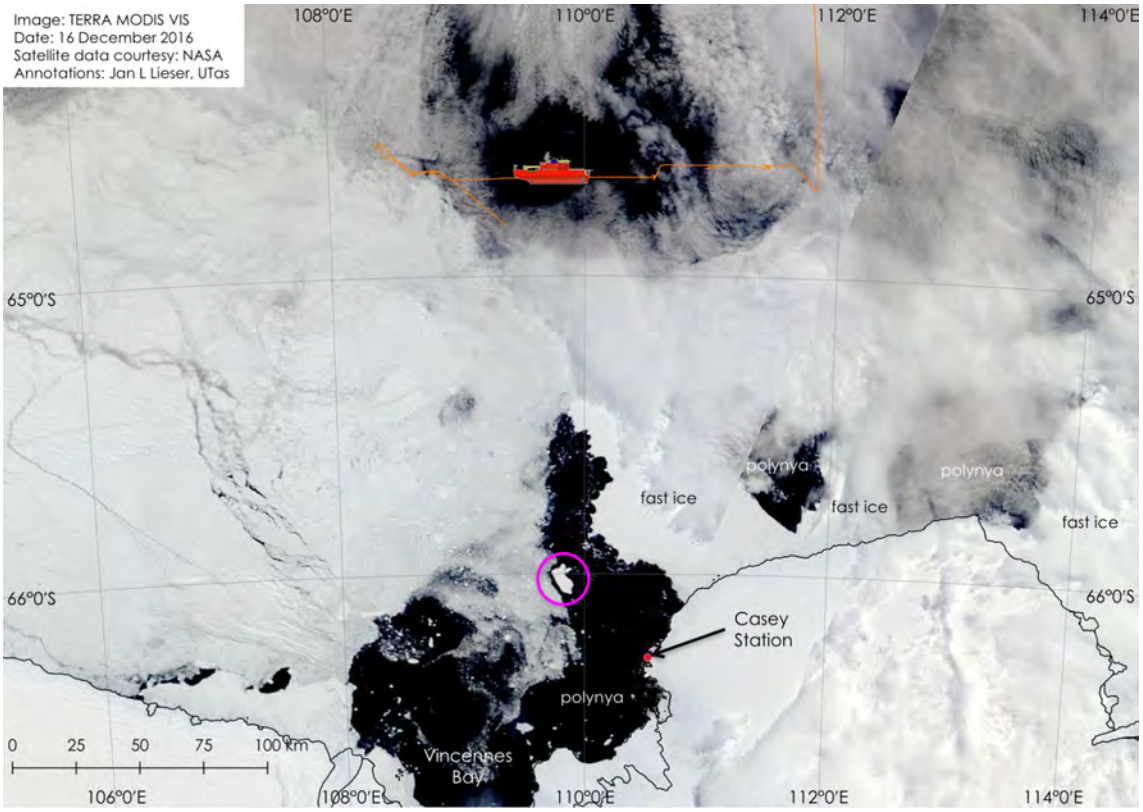

Figure 1: TERRA MODIS VIS scene, acquired on 16/12/2016 and provided by NASA.

The sea-ice edge is more fuzzy, between 108° E and 110° E, than it a few days ago. Even though the scene is slightly obscured by clouds, some large floes can be identified in the matrix of various sea-ice types of the roughly 35 nautical miles wide (north-south extent) band, which separates the Vincennes Bay polynya from the open ocean.

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Sea Ice Report #52.1/2016

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

19/12/2016

Mawson Station

Figure 1 shows a visible scene, north of Mawson Coast. The fast-ice edge is approximated by the red scribble line. Around and east of Mawson Station, areas of near-shore open water patches are marked by red shapes. A transition line, where an apparent fracture is imminent, is marked by a dashed orange line.

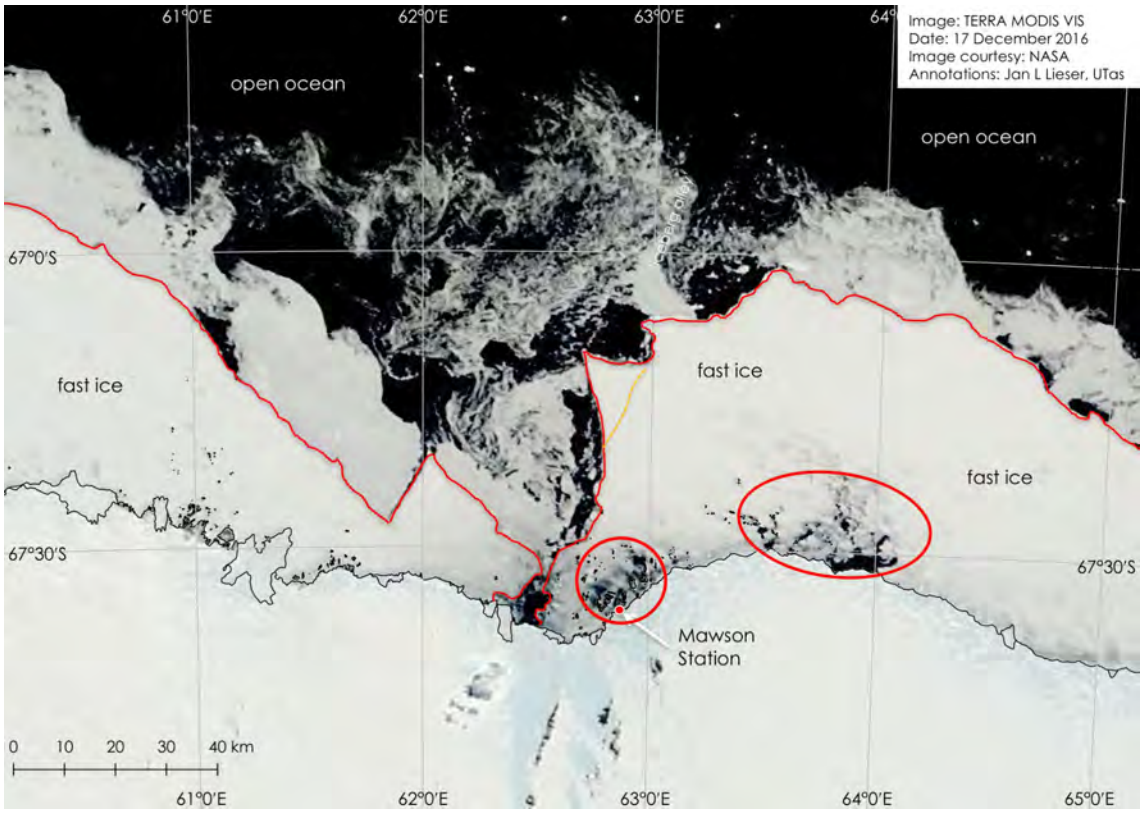

Figure 1: TERRA MODIS VIS scene, acquired on 17/12/2016 and provided by NASA.

Fast ice is melting and breaking up around the station and elsewhere. At 62° 30' E, open water has reached the shore.

"Iceberg alley" is already entirely free of fast ice and only broken ex-fast ice remains in the area.

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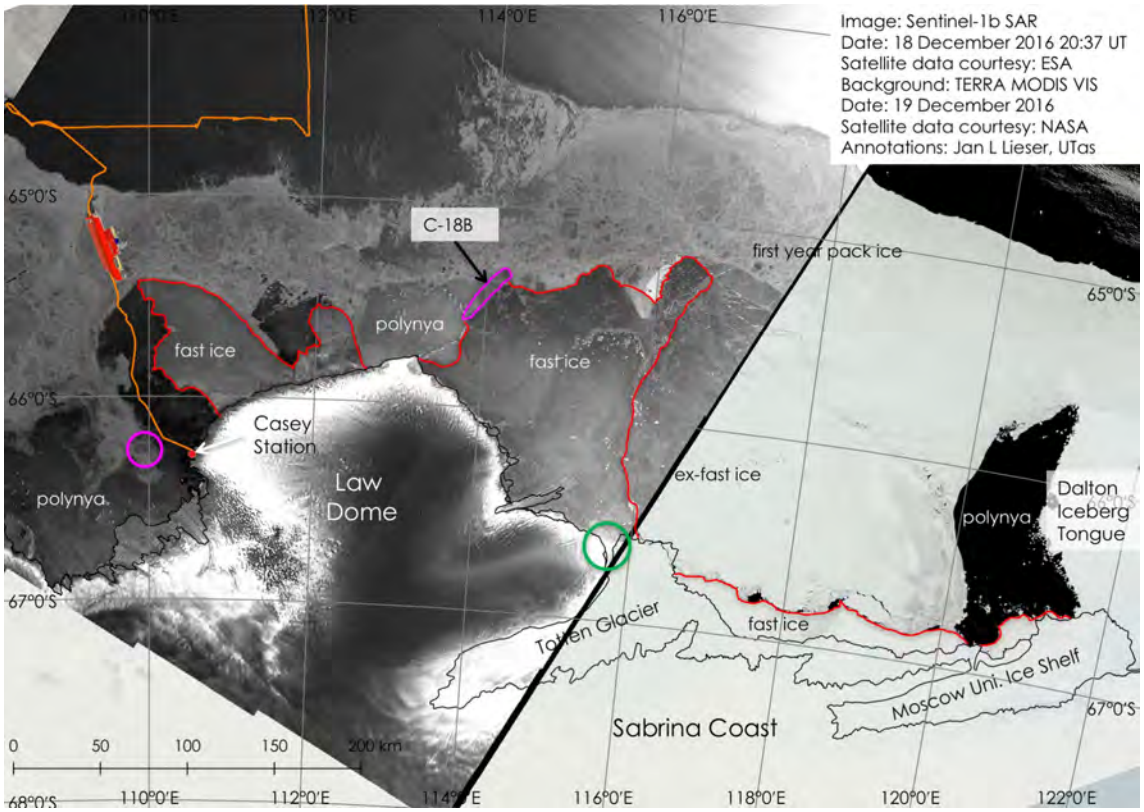

Figure 2: Sentinel-1b SAR scene, acquired on 18/12/2016 and provided by PolarView.

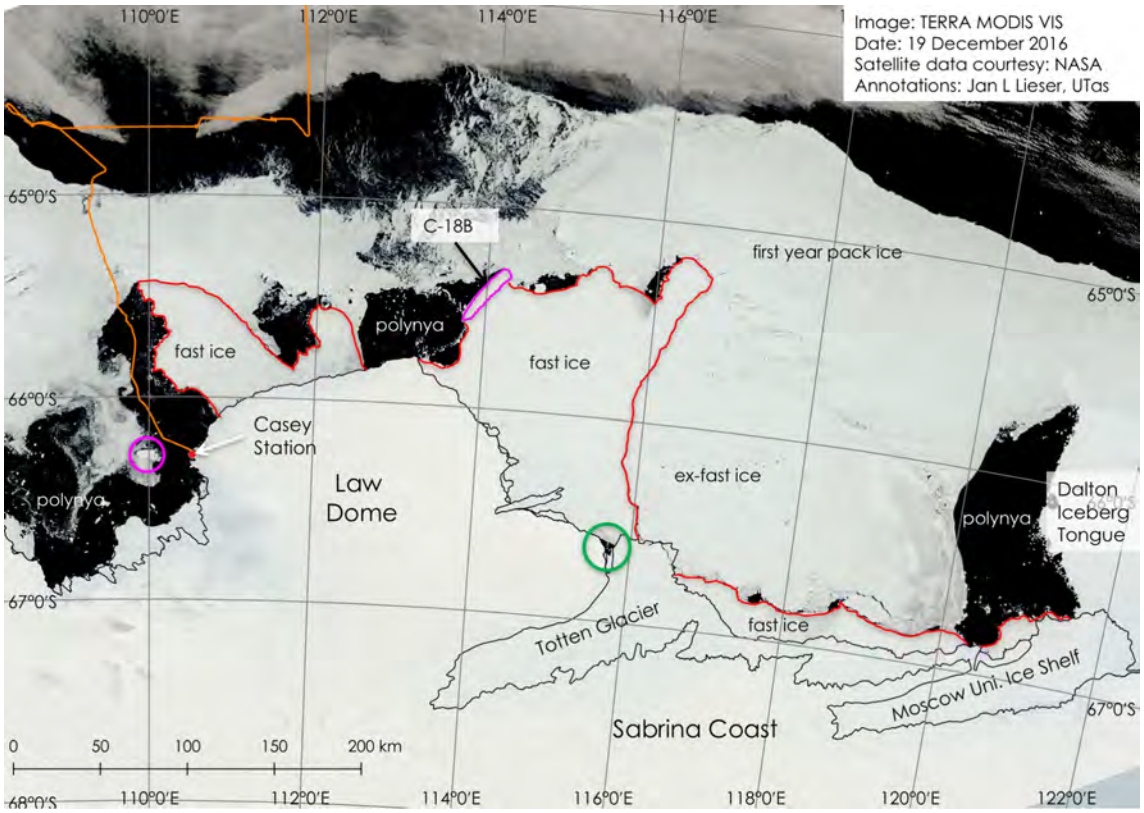

Figure 3: TERRA MODIS VIS scene, acquired on 19/12/2016 and provided by NASA.

Sabrina Coast

Figures 2 and 3 show the same geographical frame off Law Dome and Sabrina Coast as seen by Sentinel-1b SAR and TERRA MODIS instruments, respectively. Fast-ice areas are outlined by a red scribble line. The cruise track of RSV *Aurora Australis* (currently at Casey Station) is given by the orange line.

Sea ice in the region is continuing to retreat and open water in the polynya west of the Dalton Iceberg Tongue is a persistent feature, now. West of this polynya, ex-fast ice shows signs of increasing breaks, particularly in the northern part close to the outer first year pack ice. The criss-crossing pattern of dynamic fault lines (see Sea Ice Report #51.1/2016) has increased in density, highlighting the dynamic nature of the region and a generally decaying trend towards smaller floes.

We also note an area of apparent open water, north of Totten Glacier (marked by a green circle; see also Sea Ice Report #42.2/2016), which has currently an area of almost 40 km^2.

Commonwealth Bay

Figure 4 shows a visible scene off Cape Denison/Commonwealth Bay. Three large icebergs are marked by pink outlines. The fast-ice edge is approximated by red scribble lines. The location of an oceanographic mooring is given by a yellow dot.

Fast ice is breaking up off Commonwealth Bay and elsewhere. The western edge of iceberg B-9B is not surrounded by fast ice anymore. Some larger pieces of ex-fast ice can be seen directly off the fast-ice edge (at 142° E). Those fragments have broken away in the last 24 hours.

The generally decaying trend of fast ice and ex-fast ice can be witnessed, similar to the region off Sabrina Coast. However, northeast of Mertz Glacier, some large floes are still found the matrix of various sea-ice types.

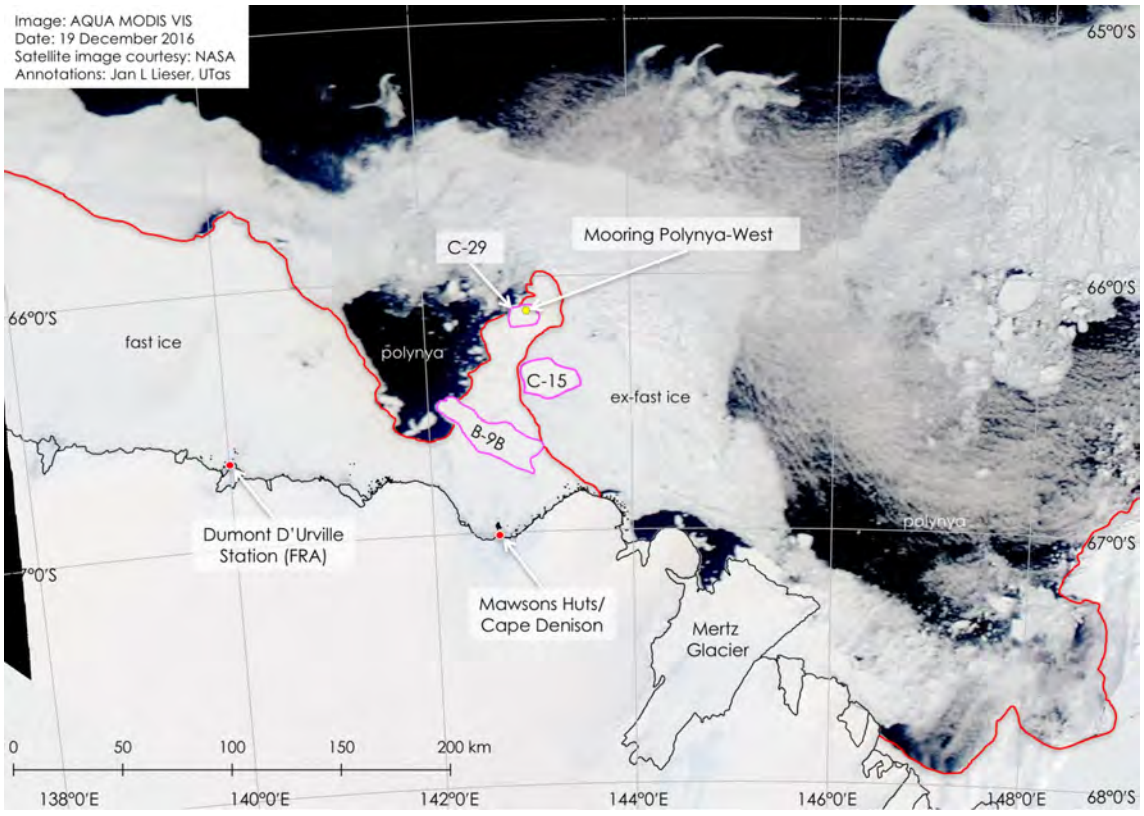

Figure 4: AQUA MODIS VIS scene, acquired on 19/12/2016 and provided by NASA.

Sea Ice Report #52.2/2016

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

20/12/2016

Sabrina Coast

Figure 1 shows a visible image off Sabrina Coast. Figure 2 shows a very high-resolution visible image off Totten Glacier. The position of this figure is indicated by the yellow frame in Figure 1.

An upside-down Y-shaped crack has opened off Totten Glacier, and is indicative for the breaking up of this ex-fast ice and reduced pressure on this area. The small-scale floe structure and heterogenous nature of the ex-fast ice is very clear in the high-resolution image (Figure 2). Even near-shore fast ice is thinning.

Further to Sea Ice Report #52.1/2016, we note that the area of open water, northwest of Totten Glacier (marked by a green circle) is currently close to 43 km^2 but an area of similar size to the north of the open water (as outlined by the cyan shape in Figure 2) is of very thin ice. Fragments of Totten Glacier are floating in this pool.

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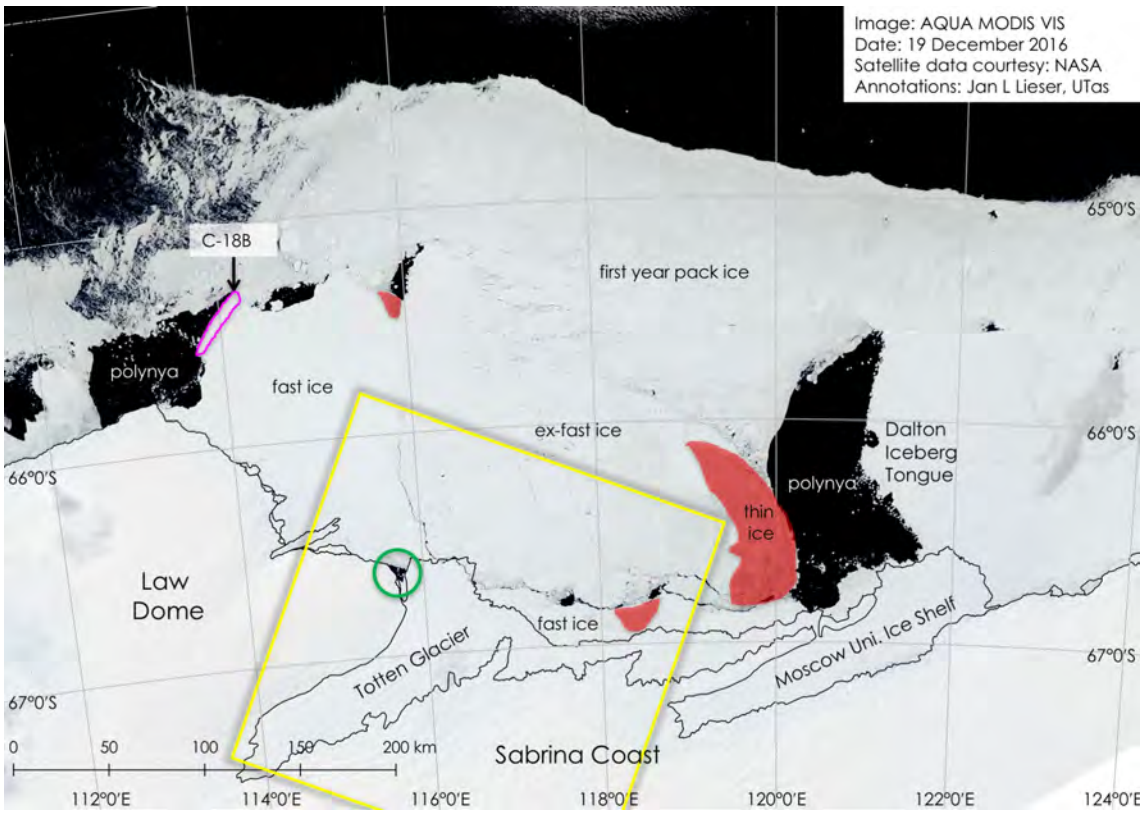

Figure 1: AQUA MODIS VIS scene, acquired on 19/12/2016 and provided by NASA.

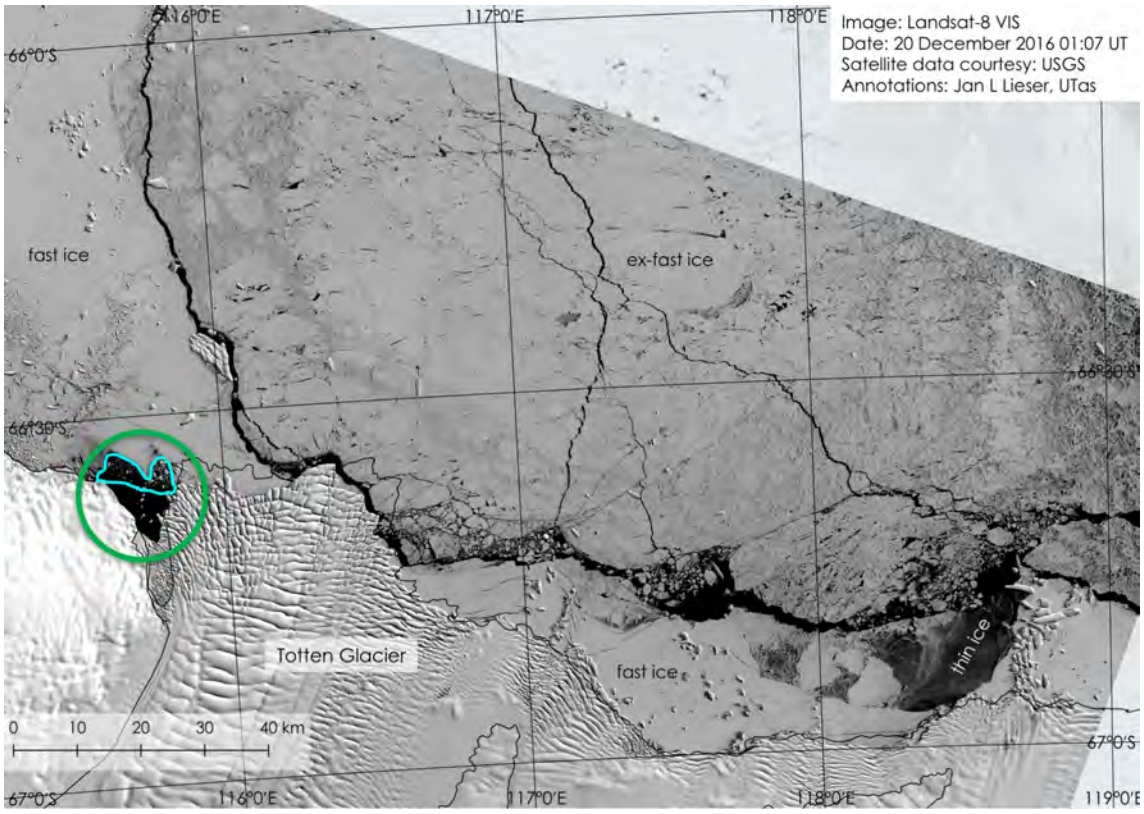

Figure 2: Landsat-8 VIS scene, acquired on 20/12/2016 and provided by USGS.

Sea Ice Report #52.3/2016

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

21/12/2016

Mawson Station

Figure 1 shows a SAR scene off Mawson Coast. Red scribble lines approximate fast-ice edges and orange dashed lines existing fault lines in the fast ice, indicating areas of imminent break-up. A yellow line spans a region of melting fast ice interspersed with open water patches.

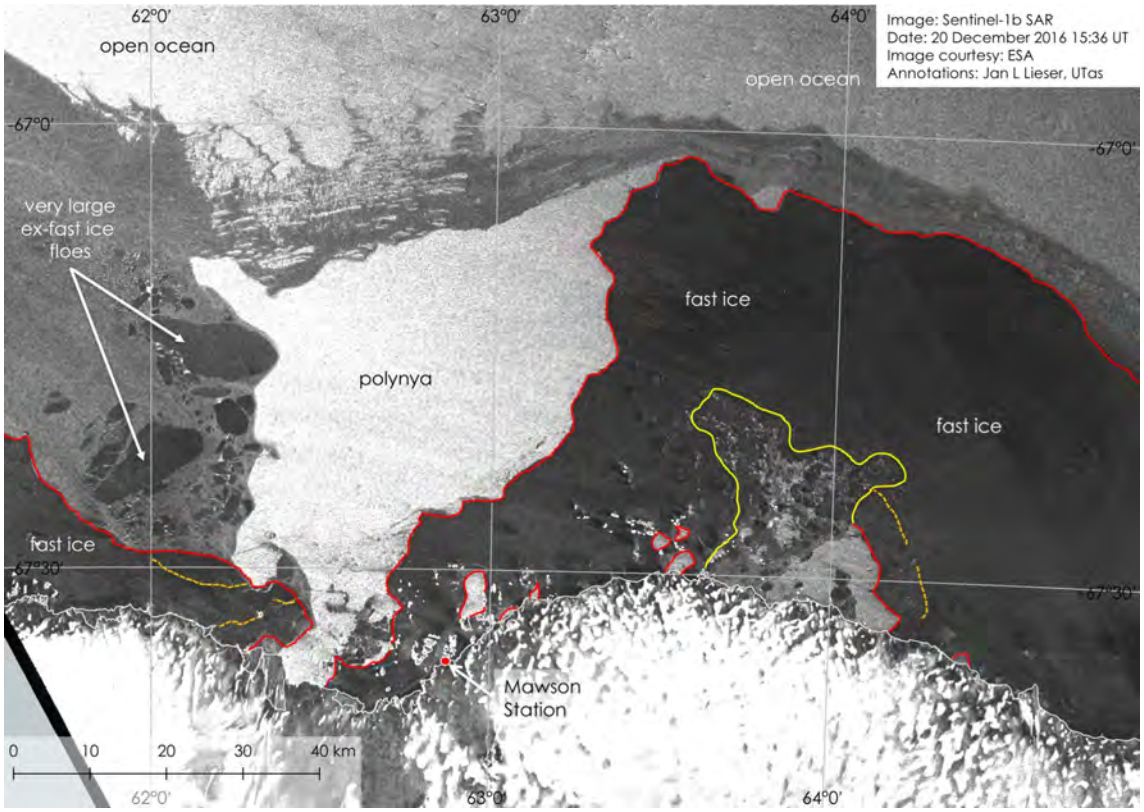

Figure 1: Sentinel-1b SAR scene, acquired on 20/12/2016 and provided by PolarView.

The polynya is separated from the open ocean only by strips and patches of sea ice. West of 62° 20' E, some very large floes of ex-fast ice are mixed into the matrix of melting sea ice, north of the fast-ice edge.

Generally, near-shore areas of open water appear to be thermo-dynamically driven, when wind and wave action (dynamic forces) seem to be of lesser importance, locally.

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Sea Ice Report #52.4/2016

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

21/12/2016

Weddell Sea

Figure 1 shows a sea-ice concentration chart for the Weddell Sea. The orange line marks the cruise track of RSV *XueLong* (up to 21/12/2016 03:30 UT). The December median sea-ice extent is given by the white line.

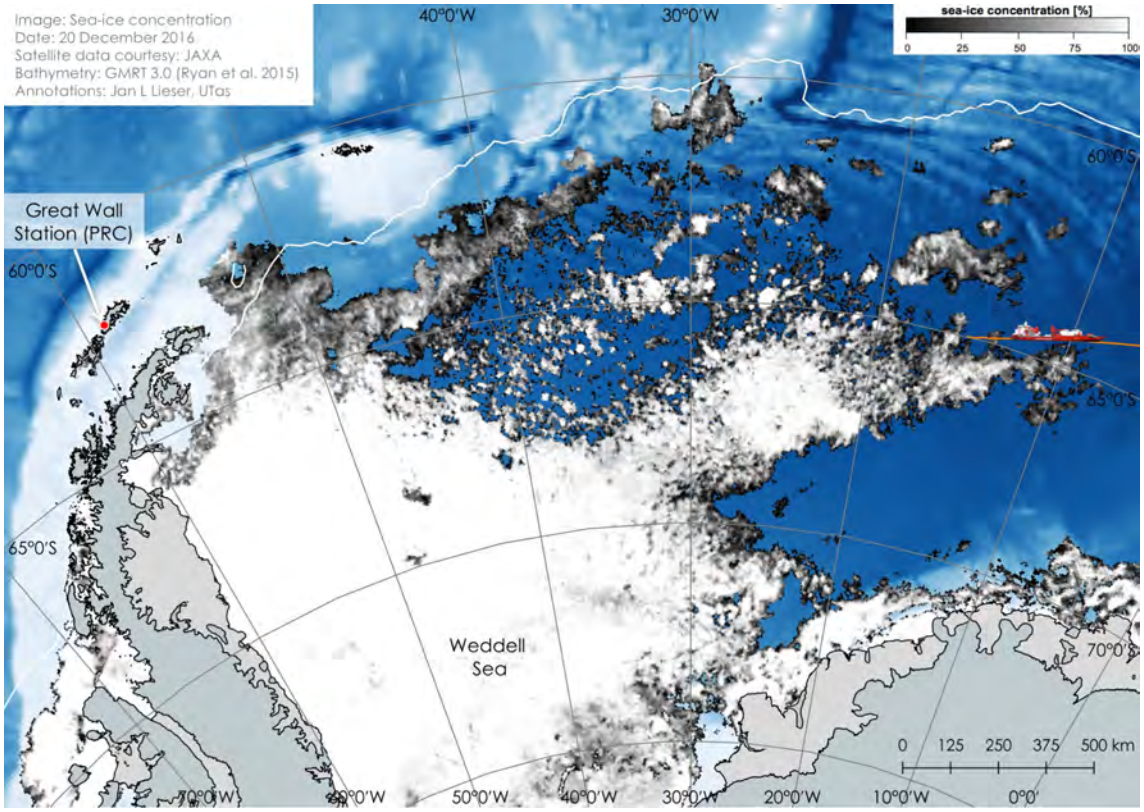

Figure 1: Sea-ice concentration chart, acquired on 20/12/2016 and provided by ICDC.

Sea-ice extent and concentration are much below average. Only the western part of Weddell Sea is currently covered by higher sea-ice concentration. The present sea ice is in an advanced stage of melting and retreat.

King George Island (home of Great Wall Station) is not surrounded by any sea ice.

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Sea Ice Report #52.5/2016

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

23/12/2016

Sabrina Coast

Figure 1 shows a SAR scene off Sabrina Coast.

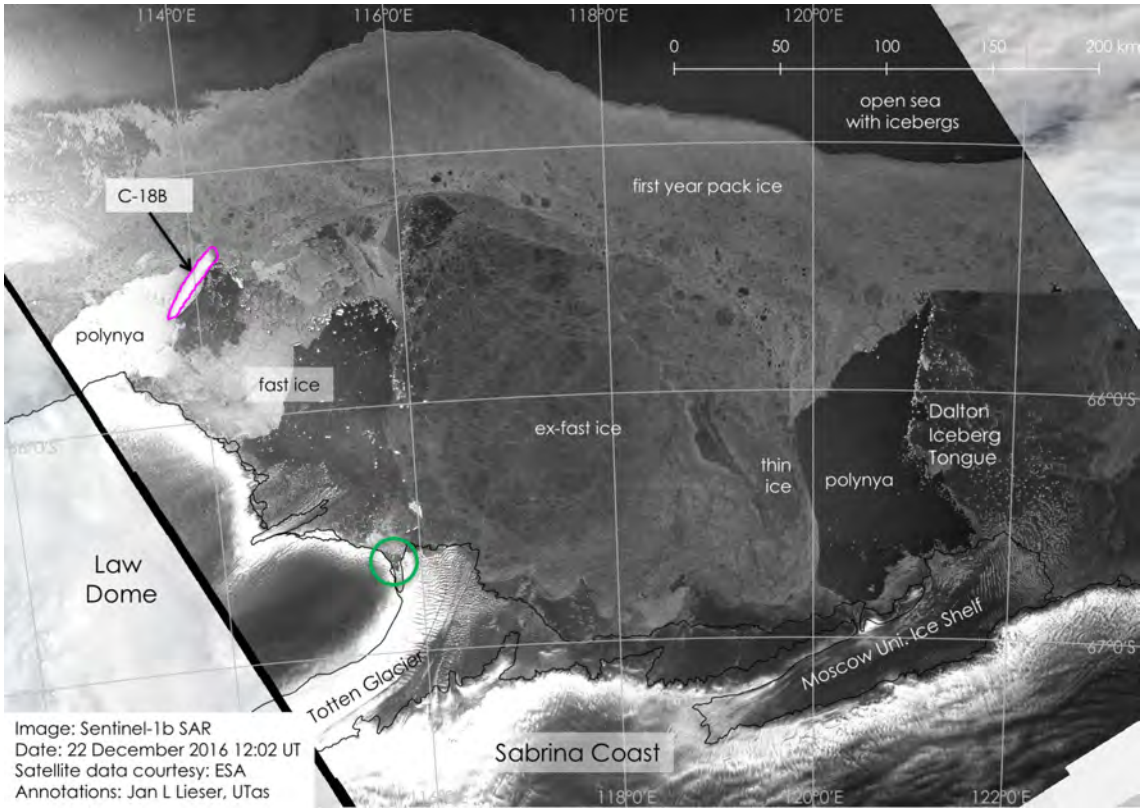

Figure 1: Sentinel-1b SAR scene, acquired on 22/12/2016 and provided by PolarView.

East of 114° E, the sea-ice edge is well defined, but many isolated icebergs are drifting freely north of it. The outer first year pack ice consists largely of small floes. Only isolated large floes (some of which might be multi-year sea-ice floes) are identified, in the northern part of ex-fast ice.

Northwest of Totten Glacier, a patch of open water (marked by a green circle) remains at close to 43 km^2 surface area.

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Sea Ice Report #02.1/2017

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

03/01/2017

Mawson Station

Figure 1 shows a SAR scene off Mawson Coast, complemented by MODIS VIS data in the southeastern and southwestern corner.

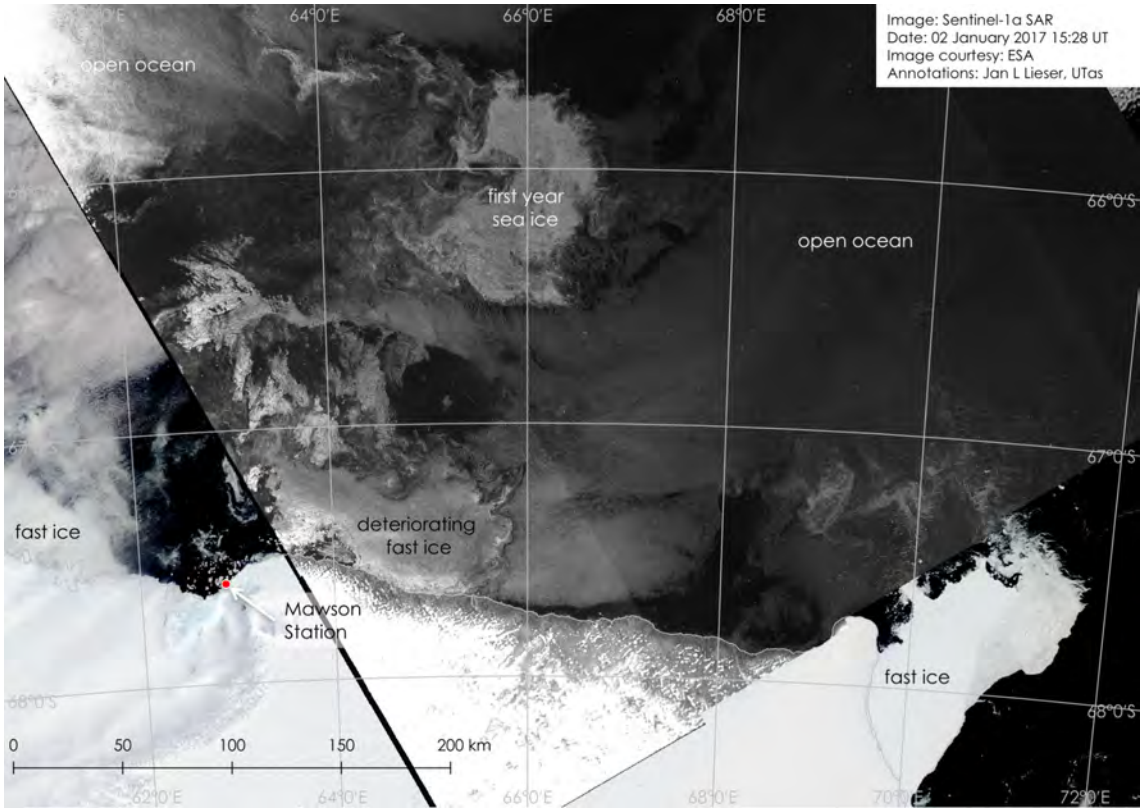

Figure 1: Sentinel-1a SAR scene, acquired on 02/01/2017 and provided by PolarView.

Immediately east and west of Mawson Station, the coast is free of sea ice, while further away some fast ice remains attached to the shore. East of the station, the fast ice appears in an advanced stage of deterioration.

Offshore, sea ice is also in advanced stages of melting, drifting largely as strips and patches even though it is of high concentration locally.

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Sabrina Coast

Figure 2 shows a high-resolution (3 km) sea-ice concentration chart, off Sabrina Coast. The median sea-ice extent for January is given by the black-white line. The cruise track of RSV *Aurora Australis* is given by the red line (up to 03/01/2017 00:00 UT). Areas of intended operations for RV *Investigator* are indicated by coloured rectangles.

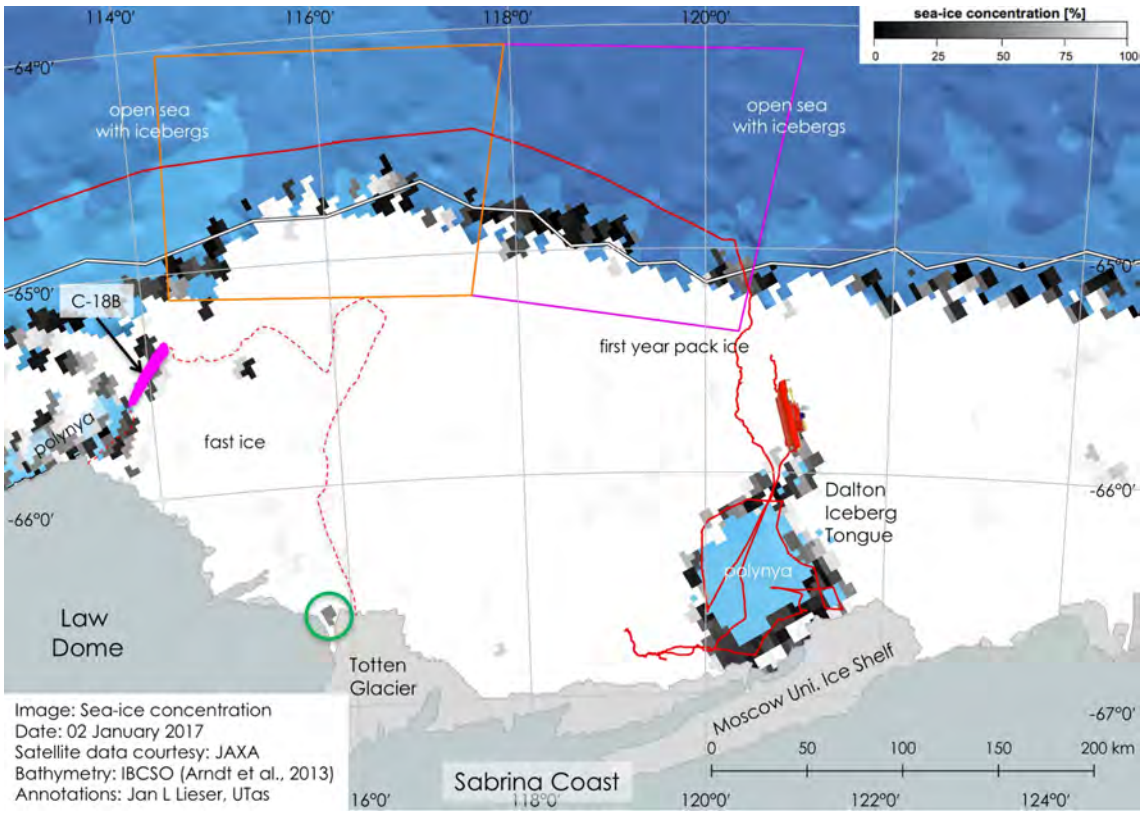

Figure 2: Sea-ice concentraion, acquired on 02/01/2017 and provided by Drift & Noise Polar Services.

Sea ice is already confined south of the median extent in the region, even though it remains at high concentration. Of curious note is again an area of open water of more than 55 km^2, in the northwestern corner of Totten Glacier (marked by a green circle), now large enough to show as low ice concentration in the AMSR-2 data.

Commonwealth Bay

Figure 3 shows a SAR scene, between Dumont D'Urville Station and the Mertz Glacier, complemented by MODIS VIS data in the east. While there is still more sea ice in the region compared to the median for this time of year, we note that iceberg C-29 has shifted southeastward (together with iceberg C-15 and the ex-fast ice in between). The position of an oceanographic mooring (yellow dot) is temporarily clear of iceberg C-29, but remains covered by broken sea ice (see Figure 4; many smaller icebergs are in the area and marked by pink dots in this figure).

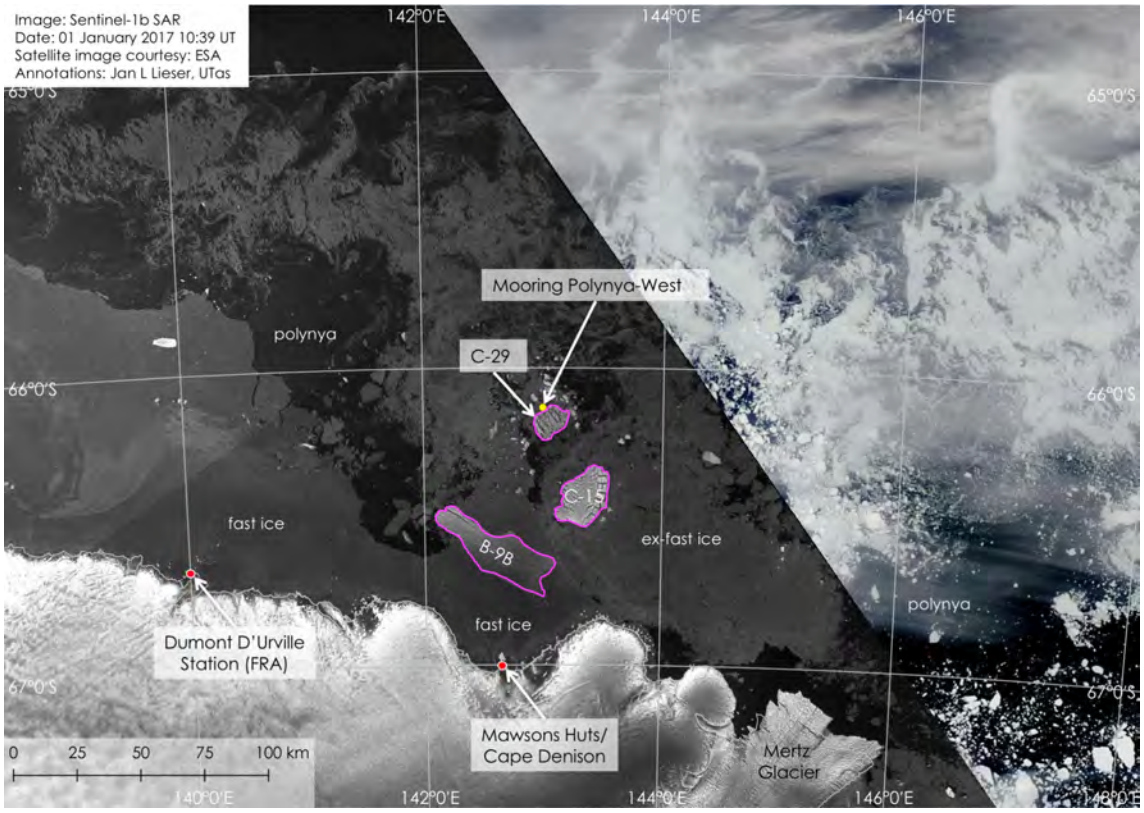

Figure 3: Sentinel-1b SAR scene, acquired on 01/01/2017 and provided by PolarView.

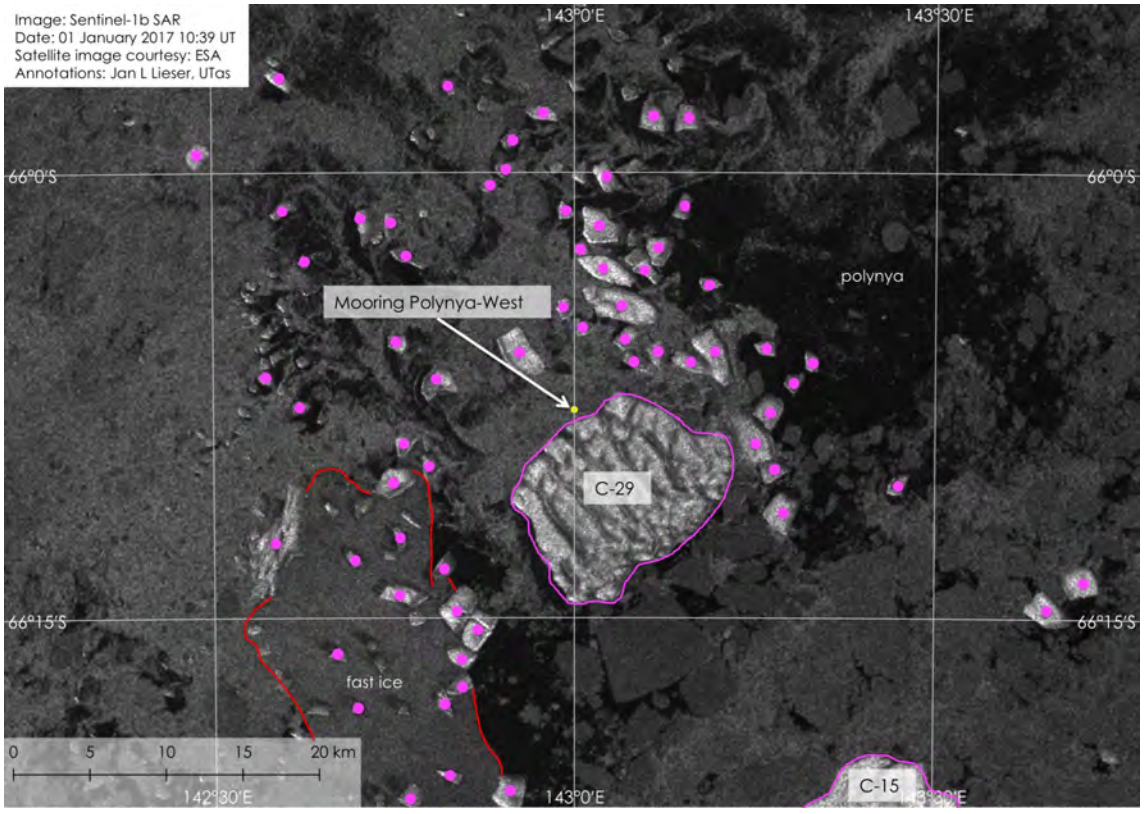

Figure 4: Sentinel-1b SAR scene, acquired on 01/01/2017 and provided by PolarView.

Sea Ice Report #02.2/2017

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

03/01/2017

Weddell Sea

Figure 1 shows a SAR scene of the northern Weddell Sea, complemented by sea-ice concentration data in the southeastern corner. The cruise track of RSV *Xue Long* (up to 03/01/2017 03:00 UT) is given by the orange line.

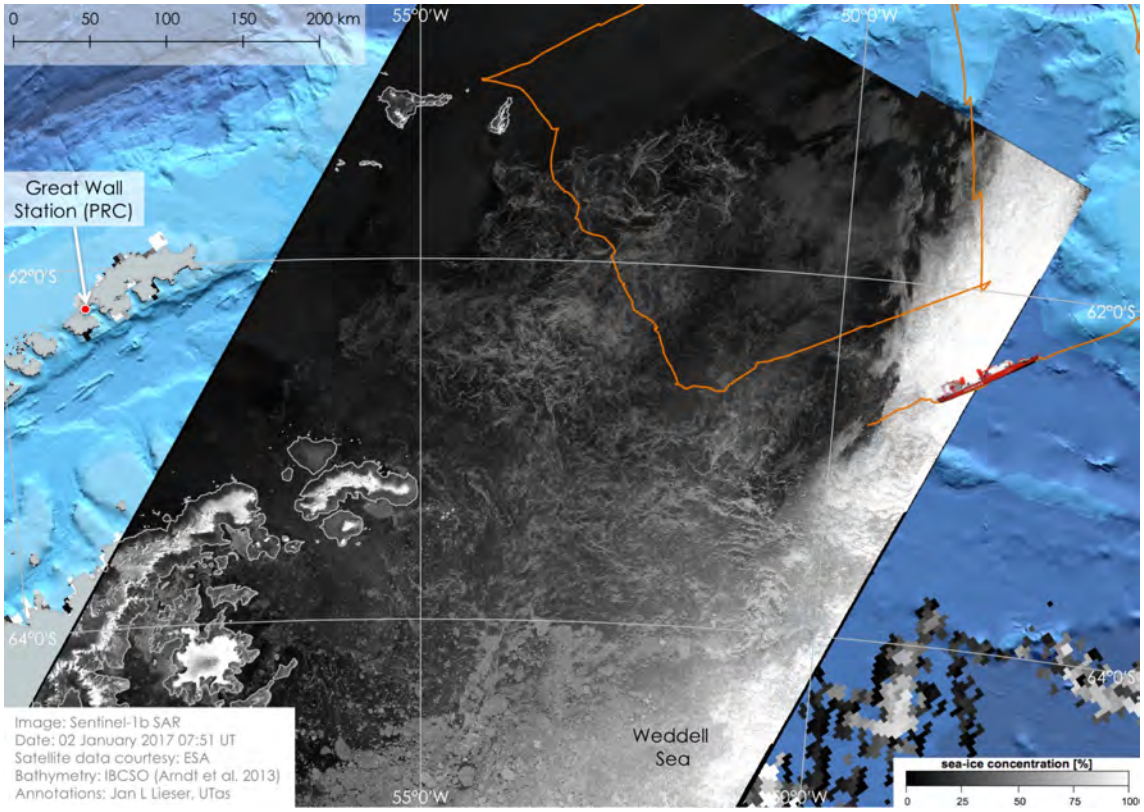

Figure 1: Sentinel-1b SAR scene, acquired on 02/01/2017 and provided by PolarView.

The region is covered by low concentration sea ice, which is below the detection limit of the AMSR-2 sea-ice concentration data processing algorithm. Therefore, sea-ice concentration data from this sensor shows sea ice largely confined south of 64° S, while the SAR data clearly proves presence of sea ice as far north as 61° S. However, this sea ice exists largely as strips and patches of small floes in an advances stage of melting.
King George Island, the home of Great Wall Station, is free of sea ice.

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Sea Ice Report #02.3/2017

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

04/01/2017

Mawson Station

Figure 1 shows a high-resolution visible scene, off Mawson Station.

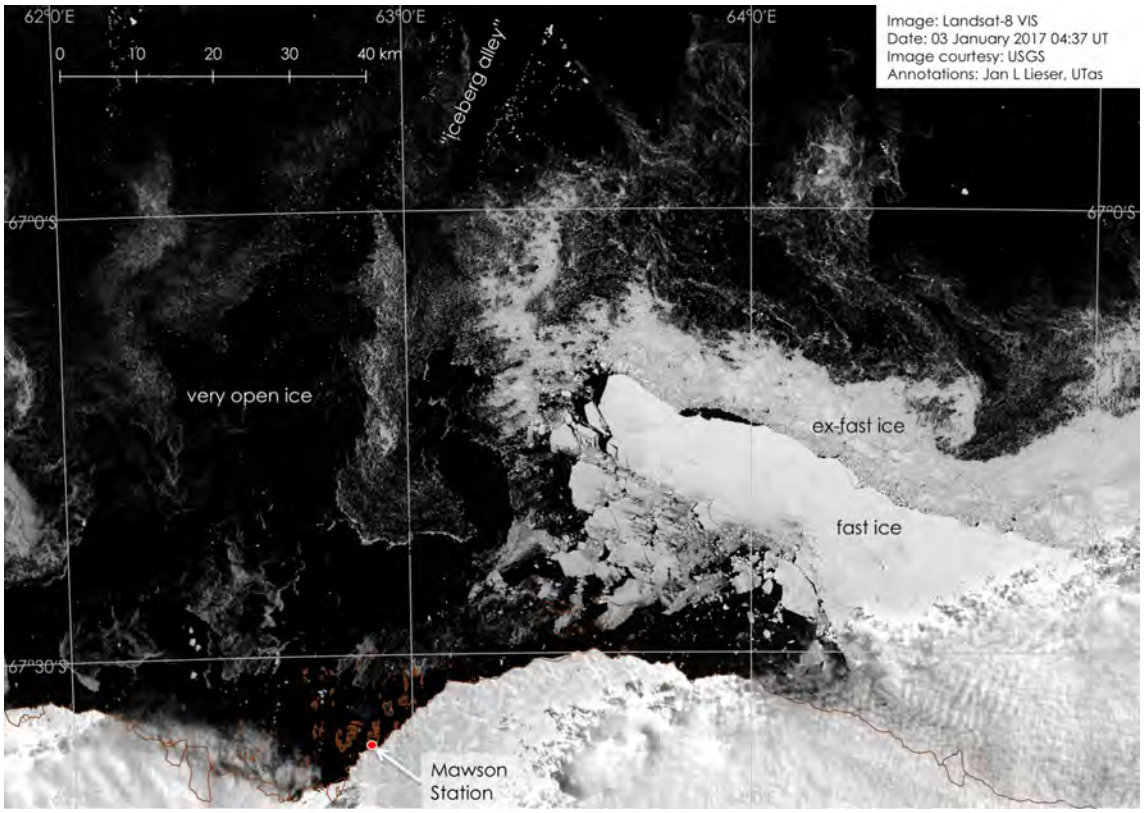

Figure 1: Landsat-8 VIS scene, acquired on 03/01/2017 and provided by USGS.

Mawson Station and the offshore islands are completely free of sea ice. In the east, a tongue of breaking-up fast ice remains local and is surrounded by small floes.

Commonwealth Bay

Figure 2 shows a visible scene off Cape Denison. Two icebergs north of B-9B, namely C-15 and C-29, are mobile and have drifted towards the northeast during the past two days, which means that the location of an

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oceanographic mooring is again occupied by C-29. Iceberg C-15 has also rotated about 20 degrees anticlockwise.

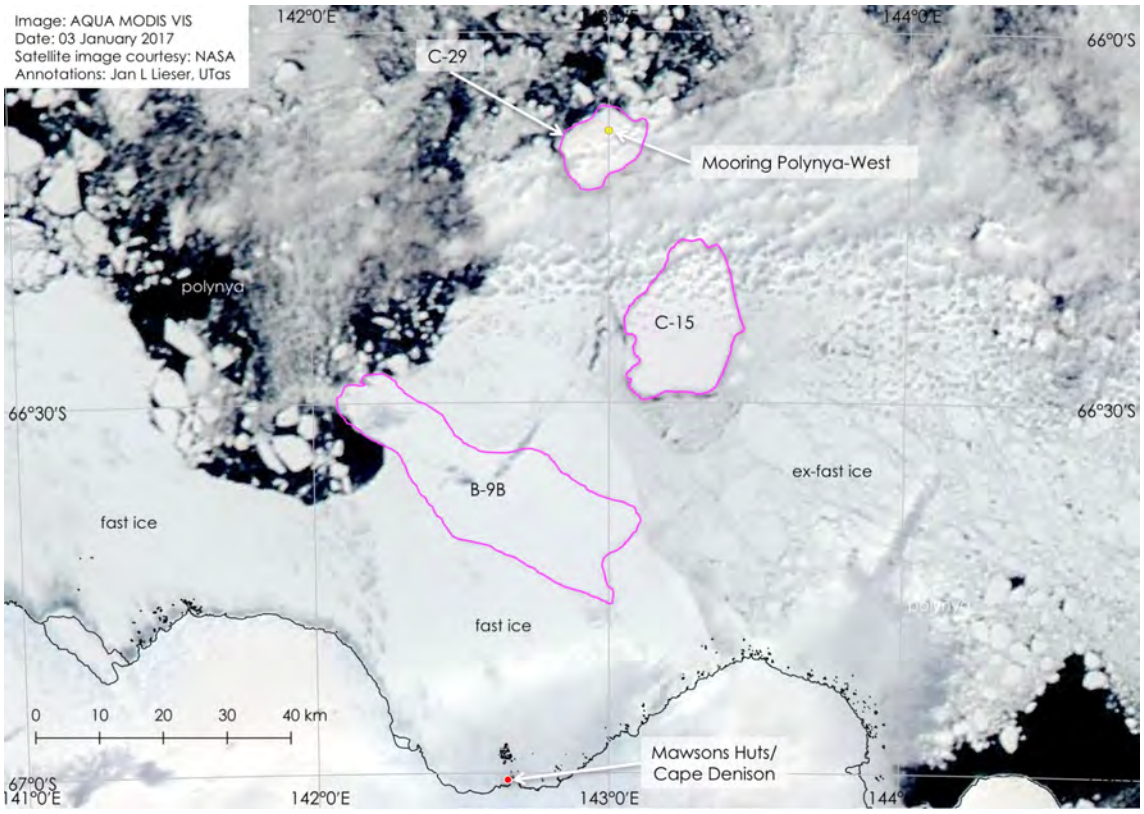

Figure 2: AQUA MIDOS VIS scene, acquired on 03/01/2017 and provided by NASA.

Sea Ice Report #02.4/2017

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

05/01/2017

Sabrina Coast

Figure 1 shows a SAR scene off Sabrina Coast. Areas of intended operations for RV *Investigator* are indicated by coloured rectangles. The scene is complemented by visible MODIS data from the same date.

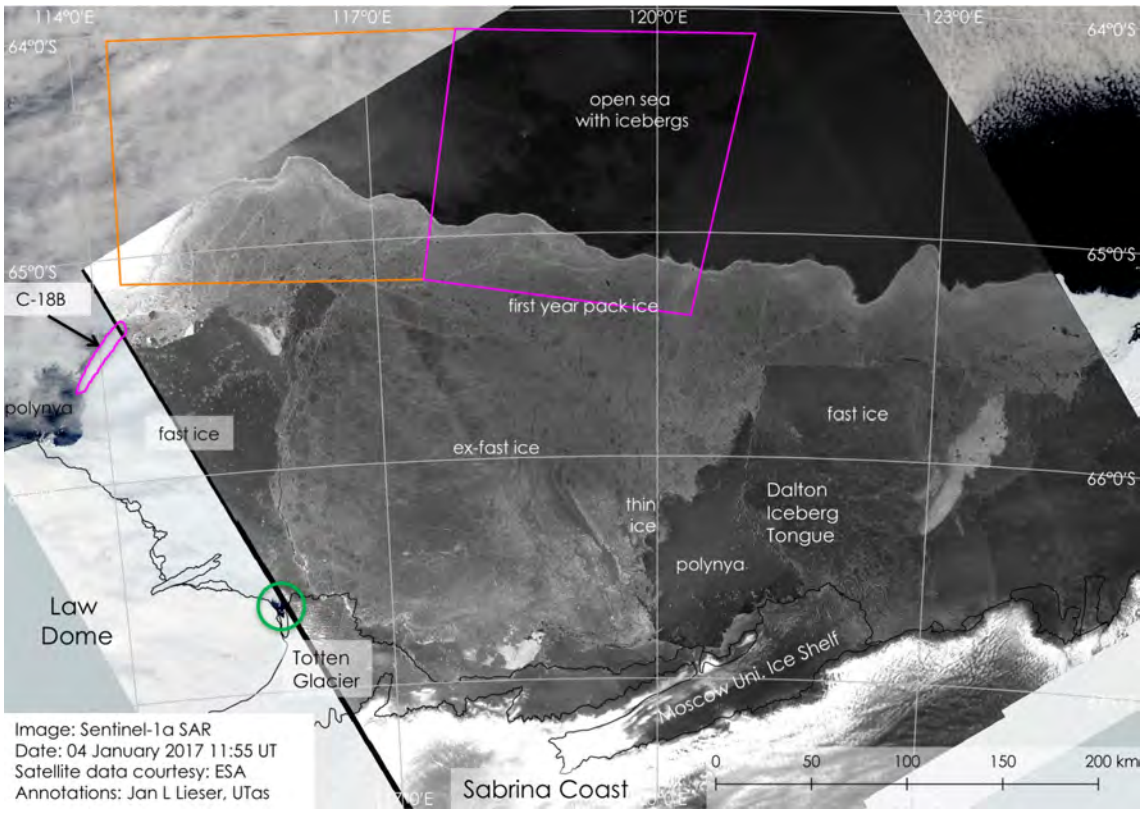

Figure 1: Sentinel-1a SAR scene, acquired on 04/01/2017 and provided by PolarView.

The sea-ice edge in the region is well defined. North of the sea-ice edge, many icebergs are identified in the SAR scene.

The open-water feature (green circle; see Sea Ice Report #02.1/2017) is still present.

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Commonwealth Bay

Figure 2 shows a visible scene off Cape Denison. The movements of two icebergs north of B-9B, namely C-15 and C-29, are visualised by coloured shapes, where the dashed purple shapes indicate positions on 29/12/2016, dashed pink shapes indicate positions on 01/01/2017 and solid magenta shapes outline the icebergs' current positions. The fast-ice edge is approximated by red scribble lines.

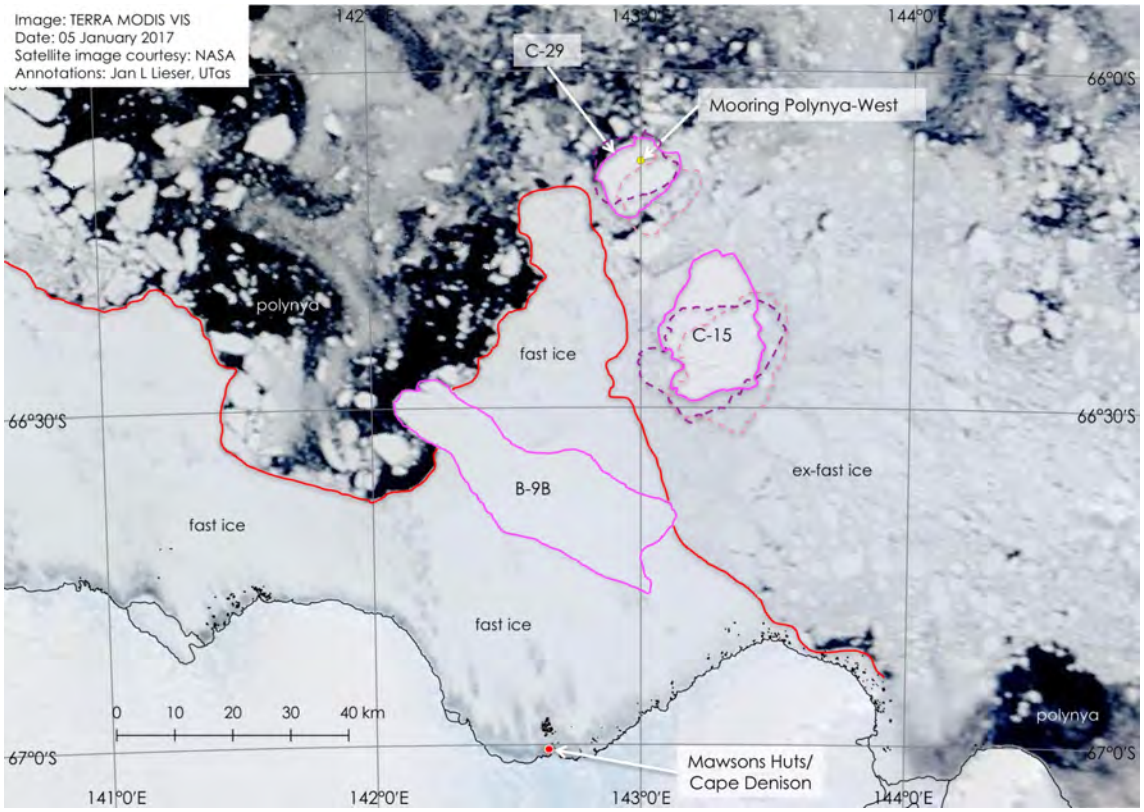

Figure 2: TERRA MIDOS VIS scene, acquired on 05/01/2017 and provided by NASA.

Iceberg C-15 has rotated roughly 55 degrees anti-clockwise, while iceberg C-29 has rotated roughly 25 degrees anti-clockwise.

Sea Ice Report #03.1/2017

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

09/01/2017

D'Urville Sea

Figure 1 shows a SAR and visible data composite between Dumont D'Urville Station and Mertz Glacier. North of Cape Denison, icebergs C-15 and C-29 have moved approximately 1.5 km in north-northwest direction, between 08/01/2017 and 09/01/2017, which means that the location of an oceanographic mooring is now centrally under C-29. A 'loose tooth' is at the northern front of Mertz Glacier, with a surface area of roughly 185 km^2 and only about 5.5 km (dotted pink line) of glacial ice before it snaps off.
The cruise track of RSV *Aurora Australis* is given by the orange line (up until 09/01/2017 01:00 UT).

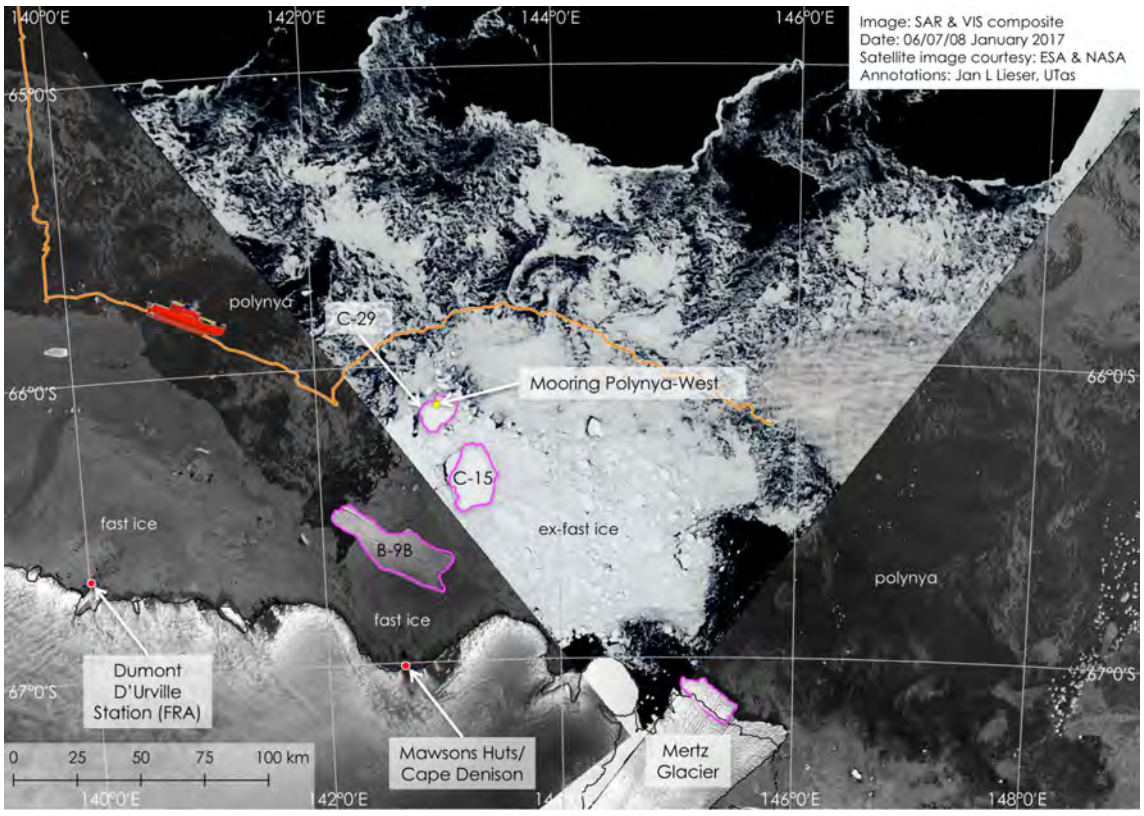

Figure 1: Sentinel-1b SAR scenes: southwest scene acquired on 06/01/2017 10:48 UT, southeast scene acquired on 07/01/2017 17:53 UT and both provided by PolarView; complemented by AQUA MODIS VIS scene, acquired on 08/01/2017 and provided by NASA.

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North of 66° S, sea ice is highly mobile and consists mostly of small floes, which were transported predominantly by ocean currents during a recent low wind period. This is evident from small-scale filament structures such as that at 143° 45' E and 65° 45' S, which appear like a visible manifestation of an oceanic surface eddy.

East of the above mentioned iceberg troika, a melange of ex-fast ice and small sea-ice floes is found. East of that area, a polynya is present with occasional drifting icebergs, and strips and patches of sea ice. Further east, an area of many grounded icebergs is releasing ex-fast ice into the polynya.

Sea Ice Report #03.2/2017

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

11/01/2017

D'Urville Sea

Figure 1 shows a SAR and visible data composite of D'Urville Sea towards Ninnis Glacier. North of Cape Denison, icebergs C-15 and C-29 have moved only very slightly during the past two days. The location of an oceanographic mooring remains under iceberg C-29. The cruise track of RSV *Aurora Australis* is given by the orange line (up until 11/01/2017 01:00 UT).

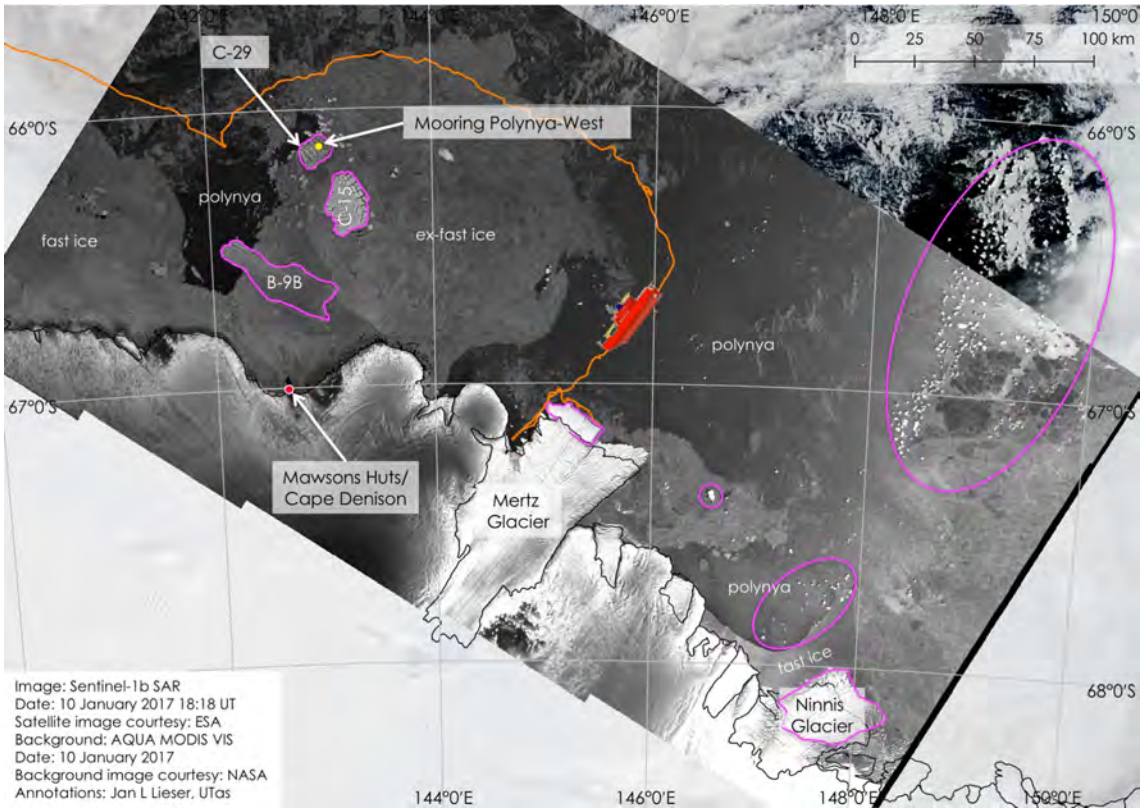

Figure 1: Sentinel-1b SAR scene, acquired on 10/01/2017 and provided by PolarView; complemented by AQUA MODIS VIS scene, acquired on 10/01/2017 and provided by NASA.

Since last autumn, a crack started to appear in Ninnis Glacier. Until October 2016, this crack has progressed about 21 km through the glacier where the glacier is roughly 26 km wide, effectively creating another 'loose tooth' in the region (see Sea Ice Report #03.1/2017) with a potential

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surface area of approximately 880 km^2 and only about 5 km (dotted pink line) of glacial ice before it snaps off. In the central part of the glacier (at 147° 30' E) the rift is more than 500 m wide. Fast ice attached to the northern side of Ninnis Glacier might, however, have a stabilising effect on the 'tooth'.

In the area between 146° E and 148° E, and 67° S and 68° S, a number of icebergs is present, some of which are marked by pink circles. The sea ice in the region is predominantly old ice and only east of 149° E becoming a mixture of old and first-year ice.

Sea Ice Report #03.3/2017

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

11/01/2017

Sabrina Coast

Figure 1 shows a SAR and visible data composite, off Sabrina Coast. Coloured rectangles indicate areas of operational interest to an upcoming marine science voyage on-board RV *Investigator*. Northwest of Totten Glacier, a persistent open water feature (see Sea Ice Report #02.4/2017) is marked by a green circle.

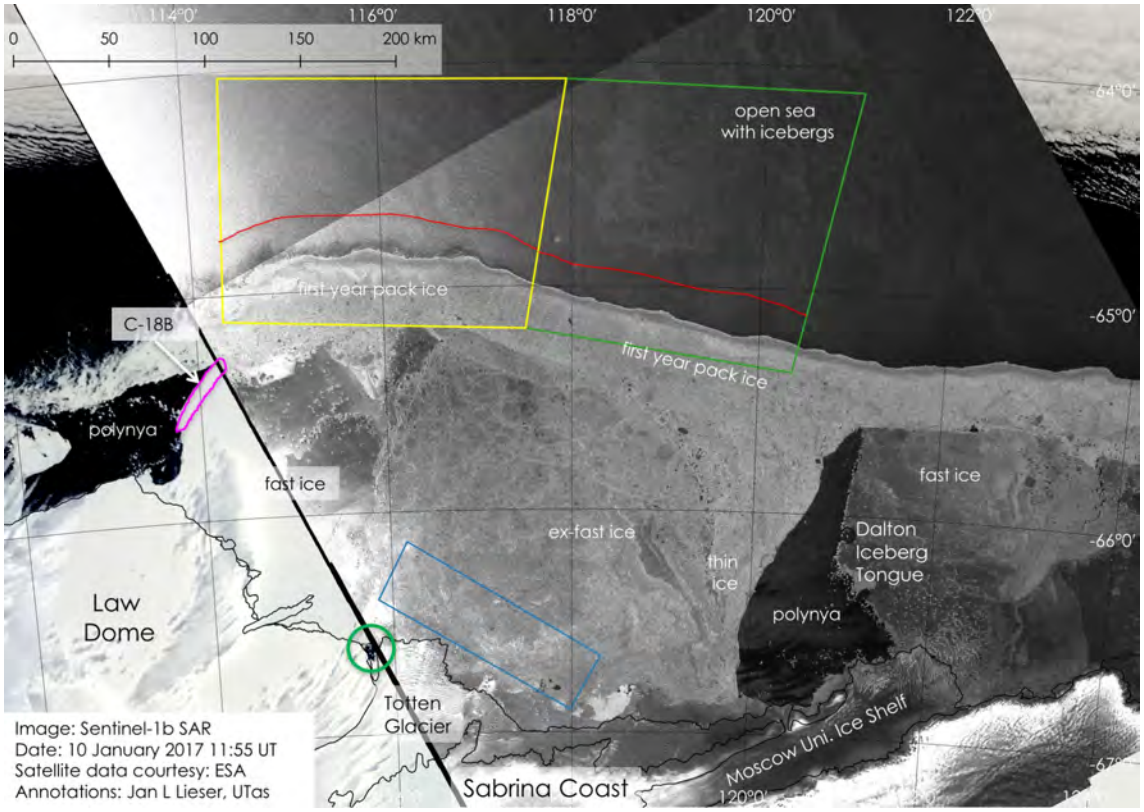

Figure 1: Sentinel-1b SAR scene, acquired on 10/01/2017 and provided by PolarView; complemented by AQUA MODIS VIS scene, acquired on 10/01/2017 and provided by NASA.

North of the ice edge, many icebergs are identified in the SAR scene. In the region south of the red scribble line, some sea ice can reasonably be expected.

Figure 2 shows a sea-ice concentration difference chart based on microwave (AMSR-2) data, for the same geographical frame as Figure 1.

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It highlights the southward retreat of the sea-ice edge by roughly 15 nautical miles, during the past week. In fast-ice regions, near-zero difference values are owed to minor processing adjustments (including atmospheric corrections) on single days.

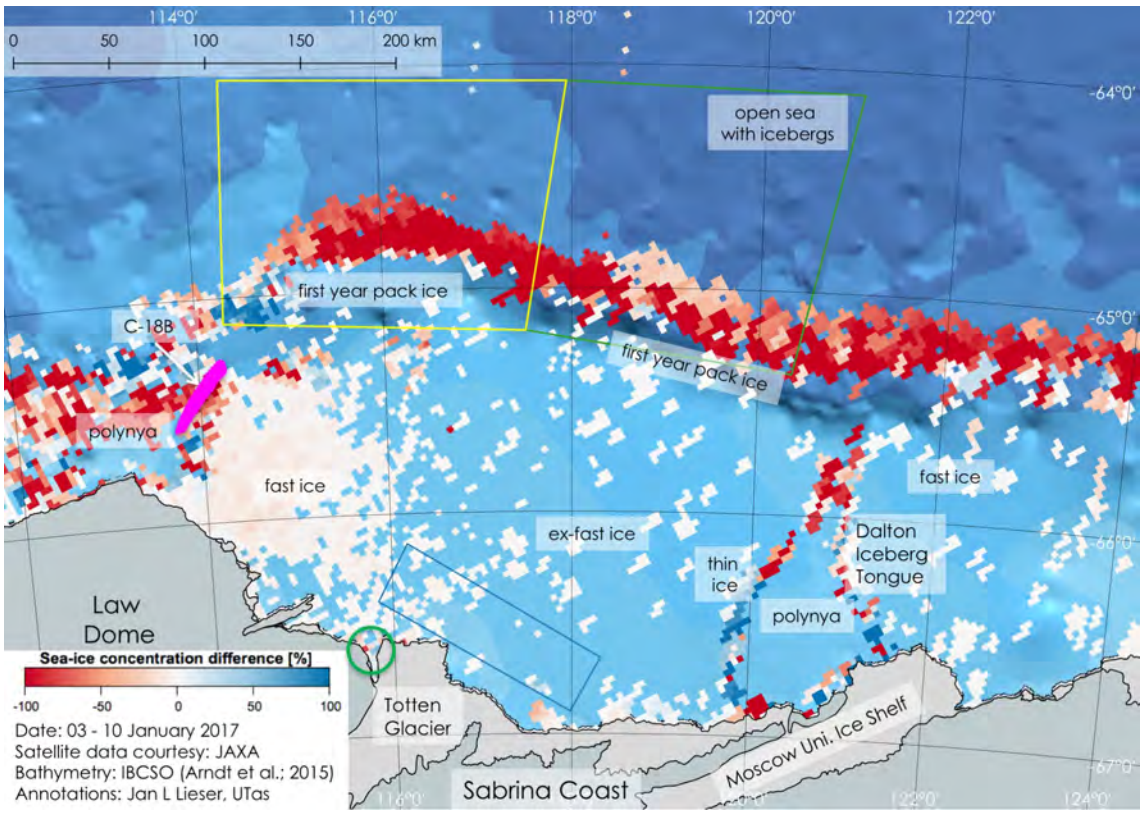

Figure 2: Sea-ice concentration difference chart, based on AMSR-2 data acquired on 03/01/2017 and 10/01/2017. Data provided by Drift & Noise Polar Services.

At the moment, about 70% of the yellow survey area are free of sea ice and approximately 80% of the green survey area. But in both areas, glacial ice (icebergs of various sizes) is present. The blue survey area remains fully covered by sea ice.

Sea Ice Report #03.4/2017

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

13/01/2017

D'Urville Sea

Figure 1 shows a SAR and visible data composite of D'Urville Sea towards Ninnis Glacier. The cruise track of RSV *Aurora Australis* is given by the orange line (up until 12/01/2017 23:00 UT).

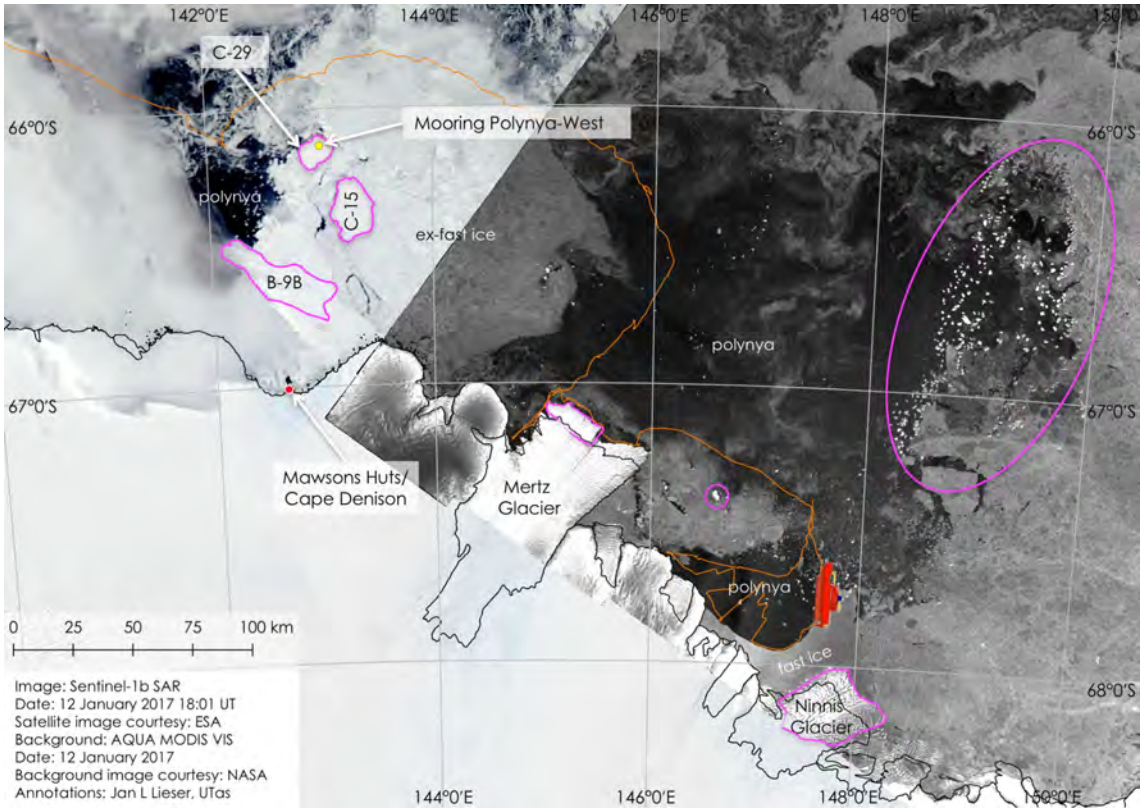

Figure 1: Sentinel-1b SAR scene, acquired on 12/01/2017 and provided by PolarView; complemented by AQUA MODIS VIS scene, acquired on 12/01/2017 and provided by NASA.

North of Cape Denison, iceberg C-15 moved roughly 2.5 nautical miles southward during the past two days, while iceberg C-29 has only moved about 1.5 nautical miles southward. This means the location of an oceanographic mooring remains occupied by the iceberg.

North of Ninnis Glacier, the polynya is covered by very small floes of sea ice that are being redistributed by small scale ocean surface eddies. This is visible by the filament-like structures seen as grey shades.

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Sea Ice Report #03.5/2017

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

13/01/2017

Sabrina Coast

Figure 1 shows a SAR and visible data composite off Sabrina Coast. Coloured rectangles indicate areas of operational interest to an upcoming marine science voyage on-board RV *Investigator*. Northwest of Totten Glacier, a persistent open water feature (see Sea Ice Report #02.4/2017) is marked by a green circle. The red scribble line marks a boundary south of which some sea ice can reasonably be expected. North of the ice edge, many icebergs can be identified in the SAR scene.

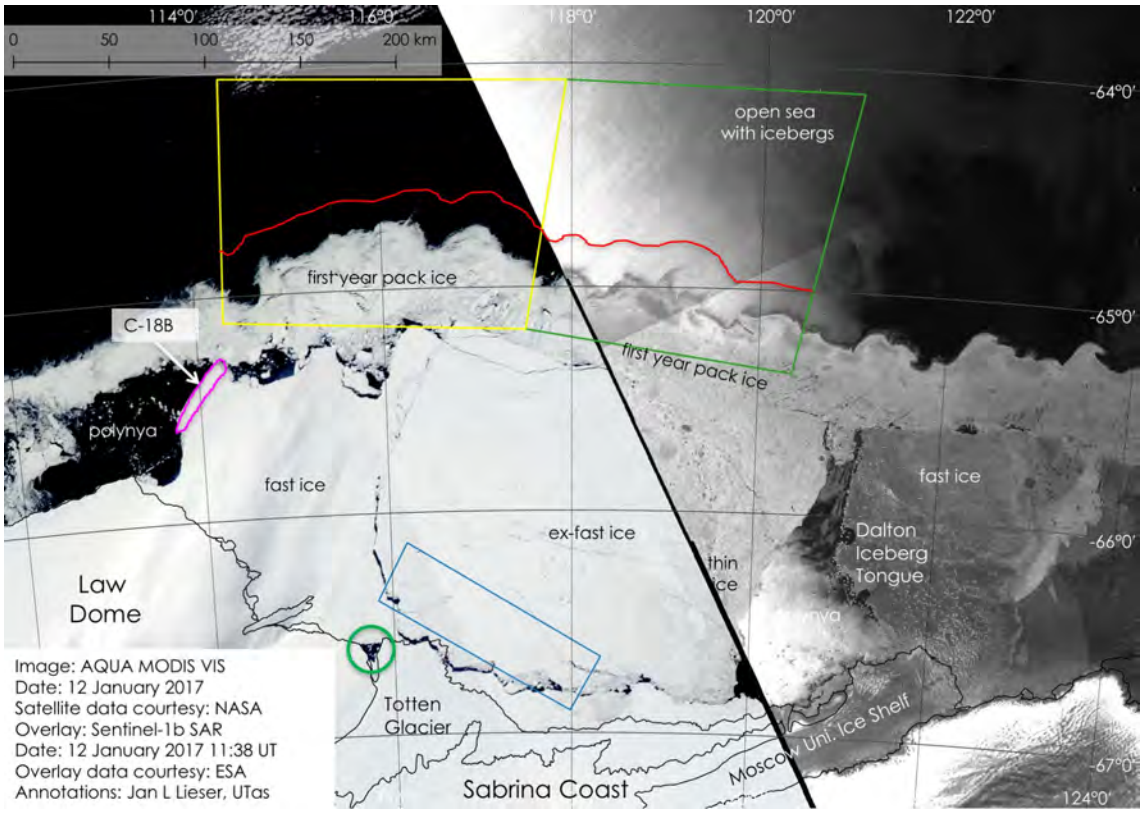

Figure 1: AQUA MODIS VIS scene, acquired on 12/01/2017 and provided by NASA; Overlay Sentinel-1b SAR scene, acquired on 12/01/2017 and provided by PolarView.

During the recent low wind conditions, the outer first-year pack ice has relaxed and expanded slightly northward. It is carried by small-scale ocean eddies, which are manifested in the numerous hook and wave-like features, at the ice edge.

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Sea Ice Report #04.1/2017

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

16/01/2017

Sabrina Coast

Figure 1 shows a SAR and visible data composite, off Sabrina Coast. Coloured rectangles indicate areas of operational interest to a marine science voyage on-board RV *Investigator*. Northwest of Totten Glacier, a persistent open water feature (see Sea Ice Report #02.4/2017) is marked by a green circle (currently 58.5 km^2). North of the ice edge, many icebergs can be identified in the SAR scene.

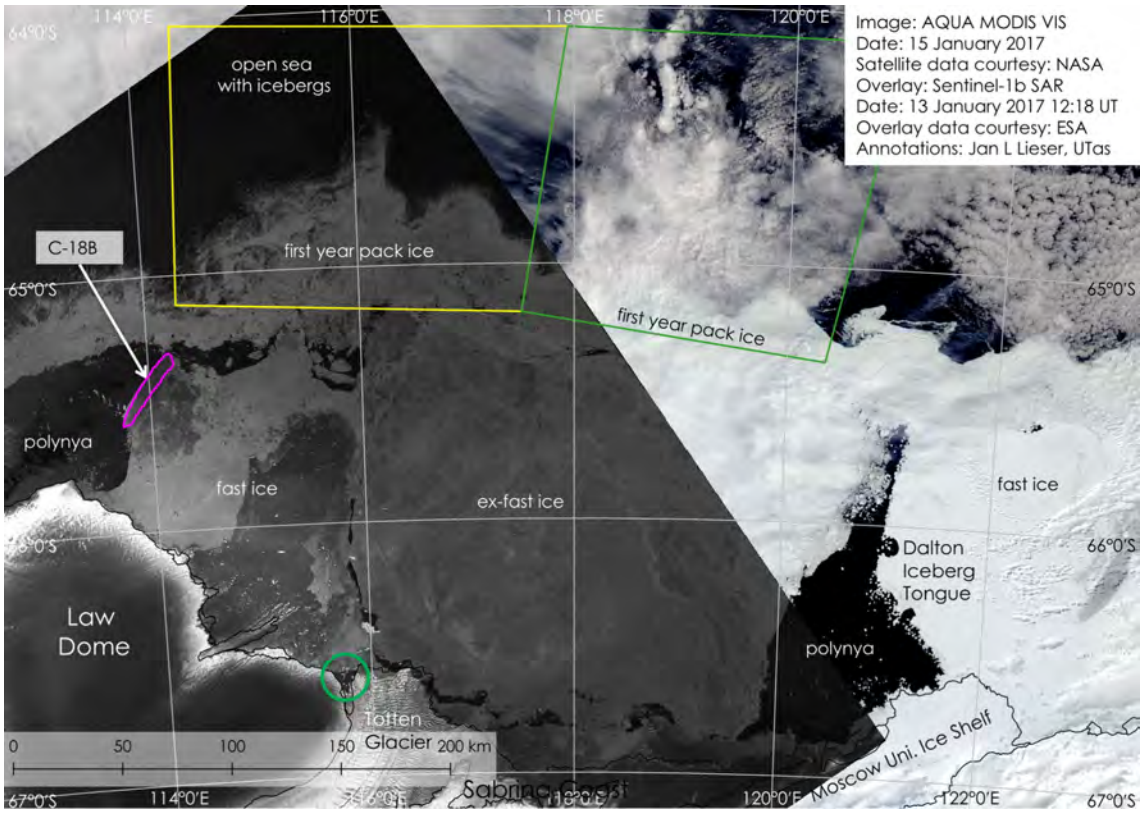

Figure 1: AQUA MODIS VIS scene, acquired on 15/01/2017 and provided by NASA; Overlay Sentinel-1b SAR scene, acquired on 13/01/2017 and provided by PolarView.

Recently, the sea-ice edge migrated northward for a few days, particularly in the region marked by the yellow rectangle. Around 116° 20' E, strips and patches of sea ice were found as far north as 64° 15' S. These strips and patches were redistributed locally by oceanic small-scale surface eddies, which resulted in a wave-like appearance of the sea-ice edge.

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Figure 2 shows a high-resolution sea-ice concentration chart (3.125 km) for the same geographical frame seen in Figure 1. The orange line marks the 15% ice edge, on 14/01/2017, based on AMSR-2 data with a computational detection limit of 15% sea-ice concentration.

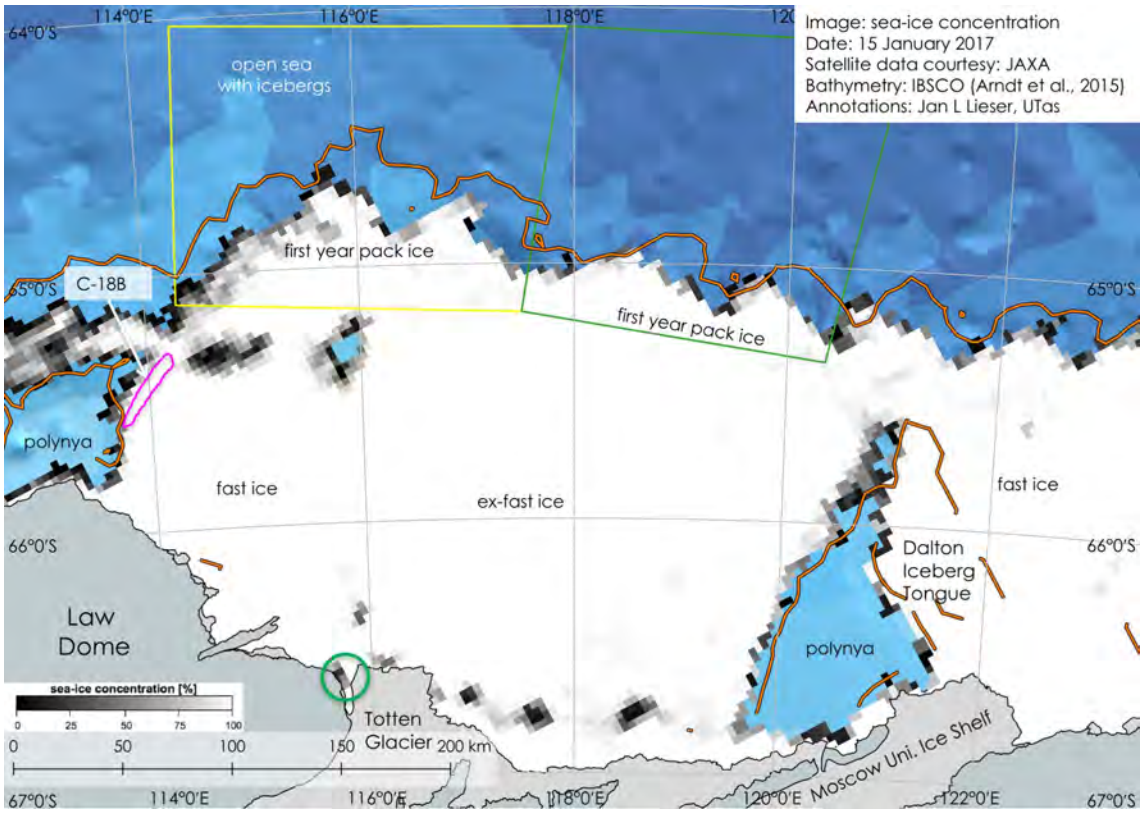

Figure 2: Sea-ice concentration chart, acquired on 15/01/2017 and provided by Universität Hamburg.

It shows the sea-ice edge retreating southwestward following an intensifying of easterly winds, since 14/01/2017.

Sea Ice Report #04.2/2017

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

17/01/2017

Sabrina Coast

Figure 1 shows a SAR scene off Sabrina Coast. Coloured rectangles indicate areas of operational interest to a marine science voyage on-board RV *Investigator*. The white scribble line indicates the long-term median sea-ice extent for January.

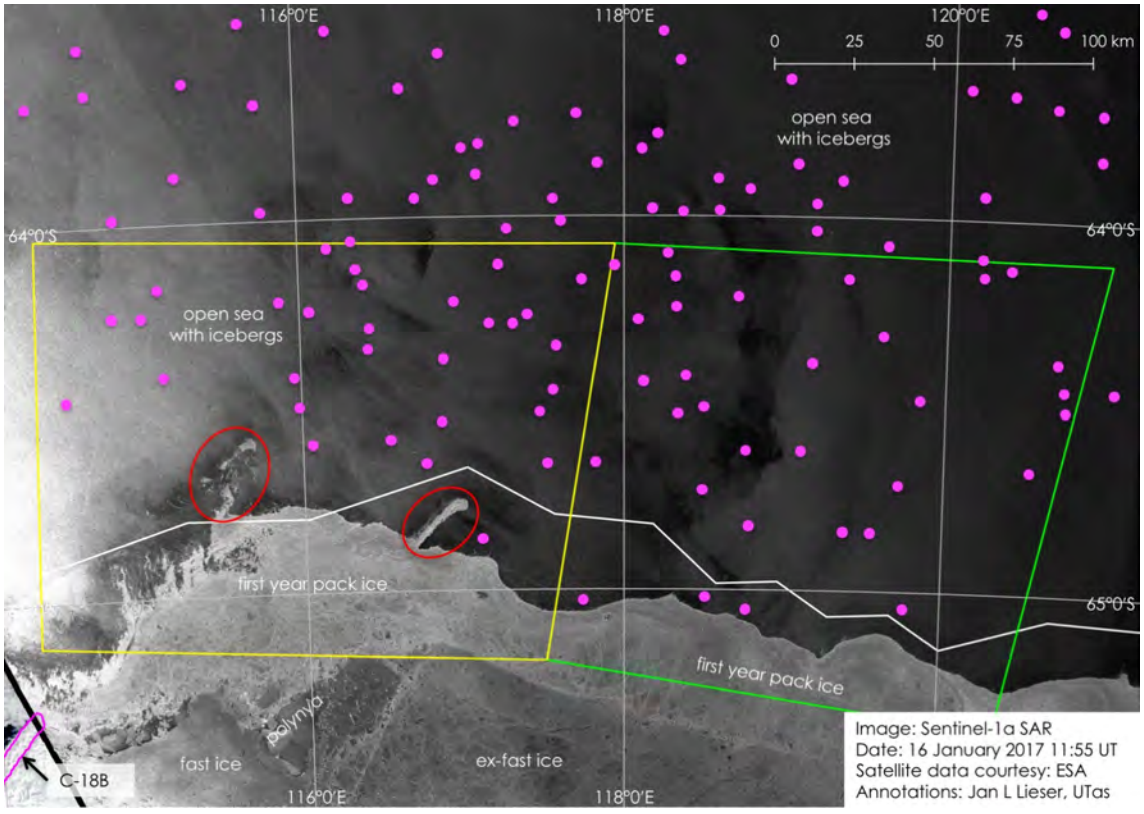

Figure 1: Sentinel-1a SAR scene, acquired on 16/01/2017 and provided by PolarView.

The sea-ice edge is generally below (south of) the median extent. East of 116° E, the sea-ice edge is again well defined, while west of 116° E strips and patches of sea ice extend northward from the first-year sea-ice pack. Two spit-like sea-ice features protruding northward are marked by red circles.

Some of the many free-floating icebergs are marked by pink dots in the figure.

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Sea Ice Report #04.3/2017

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

17/01/2017

Mawson Station

Figure 1 shows a SAR and VIS data composite off Mawson Coast.

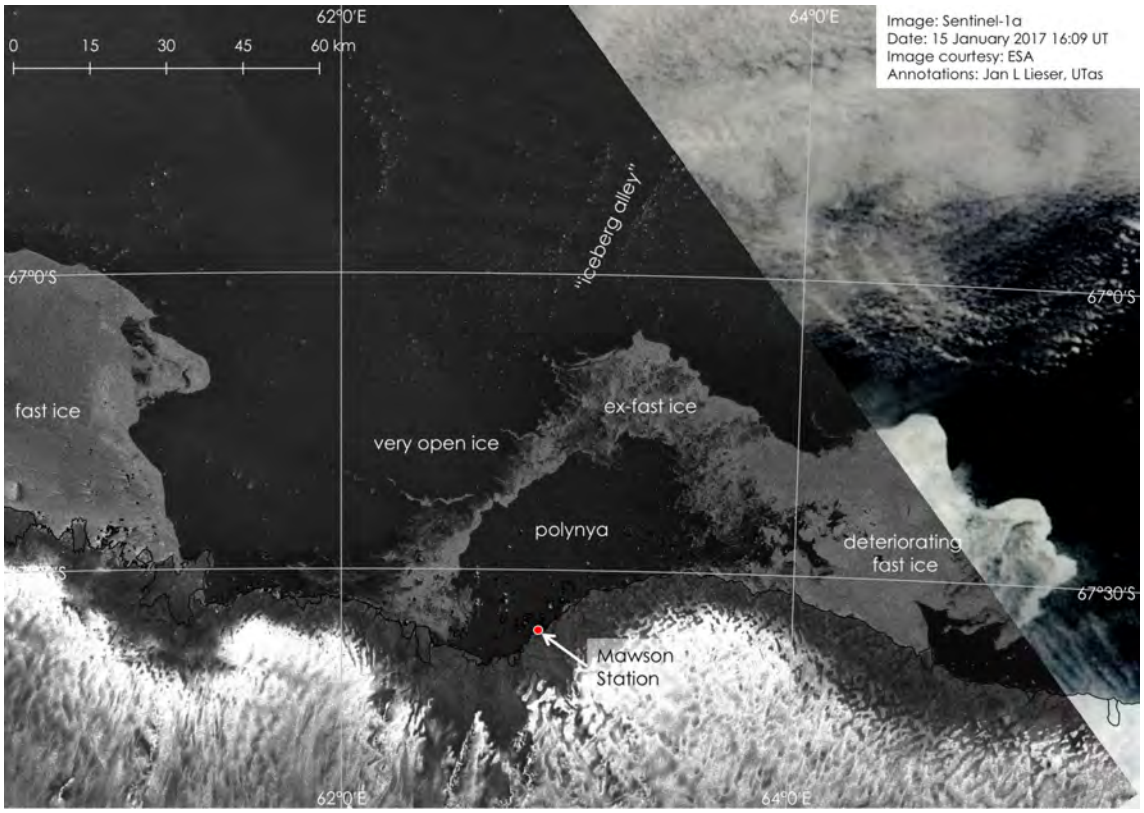

Figure 1: Sentinel-1a SAR scene, acquired on 15/01/2017 and provided by PolarView; complemented by TERRA MODIS VIS scene, acquired 16/01/2017 and provided by NASA.

Fast ice continues to break up, east and west of Mawson Station. Some disintegrating fast ice is being transported westward creating a polynya, offshore the station.

The rows of icebergs constituting 'iceberg alley' can clearly be seen in the SAR scene (Figure 1). In the very open ice region and north of 67° S, many icebergs can be identified.

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D-15A & B

Figure 2 shows a SAR scene offshore the West Ice Shelf.

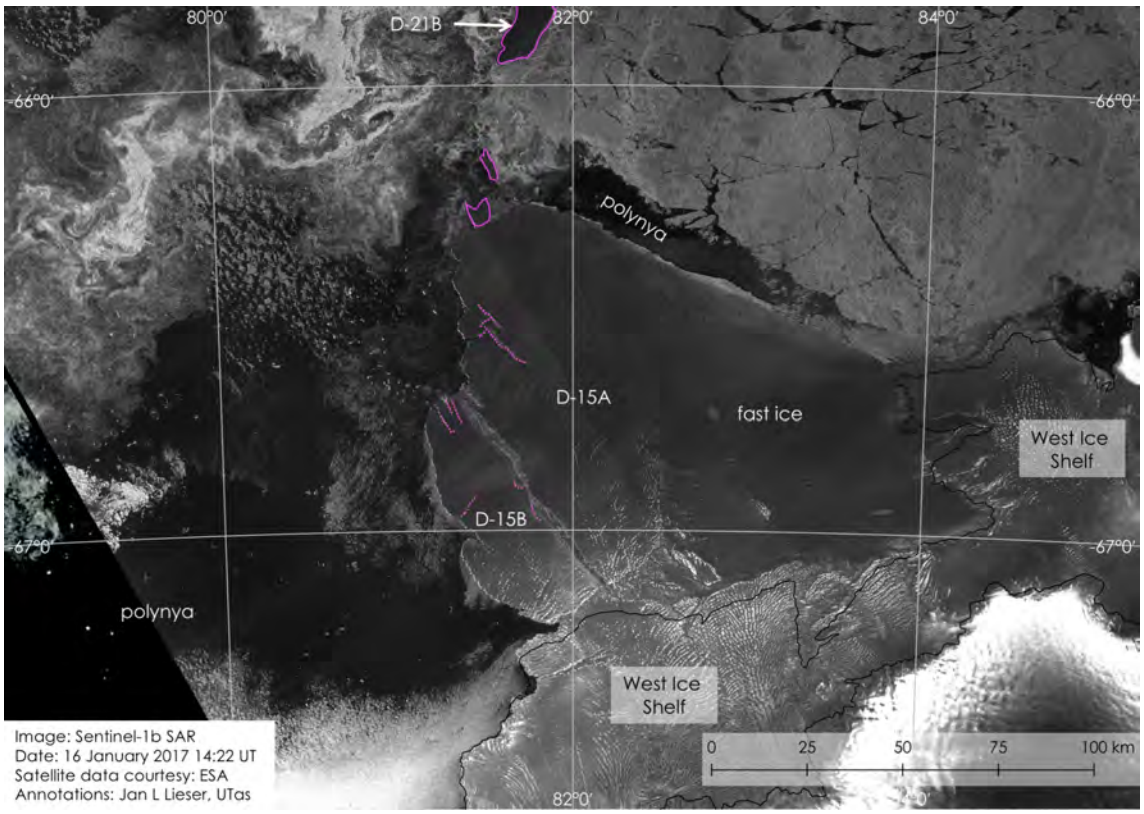

Figure 2: Sentinel-1a SAR scene, acquired on 16/01/2017 and provided by PolarView; complemented by TERRA MODIS VIS scene, acquired 16/01/2017 and provided by NASA.

The major rift between iceberg D15A and D-15B continues to widen. In the northern part, the rift exceeds 2.5 km width. Some developing major crevasses and rifts are indicated by pink dotted lines.

North of iceberg D-15A, three large icebergs are outlined by pink shapes. When old sea ice moved northward, a polynya has developed north of the fast ice attached to the eastern flank of iceberg D-15A. Westward oceanic surface currents move broken old sea ice through gaps between the large bergs mentioned before. This old sea ice is found as small floes of locally high concentration, west of 81° 30' E.

D'Urville Sea

Figure 3 shows a SAR scene offshore Cape Denison/Commonwealth Bay.

Icebergs C-15 and C-29 are still moving, even though C-29 to a lesser degree. The location of an oceanic mooring is still covered by iceberg C-29. Fast ice around iceberg B-9B continues to break up, as indicated by the red shapes in the figure.

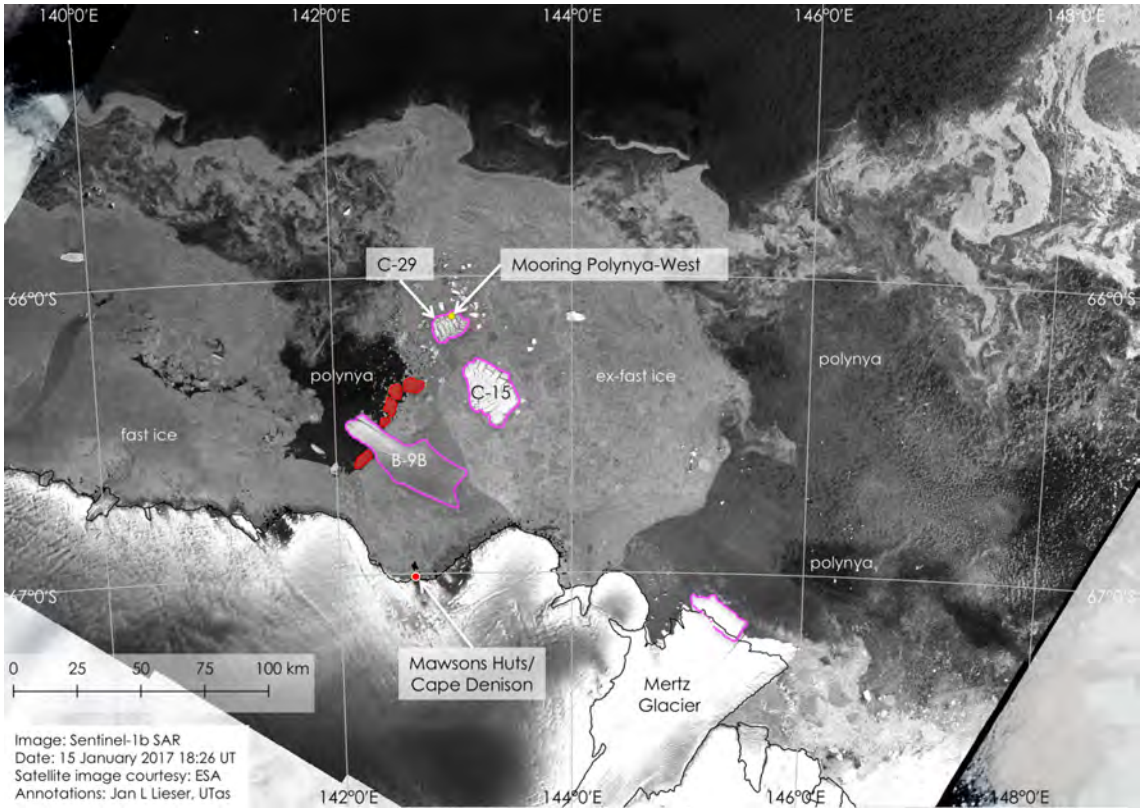

Figure 3: Sentinel-1b SAR scene, acquired on 15/01/2017 and provided by PolarView; complemented by AQUA MODIS VIS scene, acquired 16/01/2017 and provided by NASA.

Sea Ice Report #04.4/2017

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

18/01/2017

Sabrina Coast

Figure 1 shows a visible scene off Sabrina Coast, with the sea-ice zone largely obscured by clouds. Coloured rectangles indicate areas of operational interest to a marine science voyage on-board RV *Investigator*. In the area south of the red scribble line, some sea ice can reasonably be expected.
Northwest of Totten Glacier, a persistent open water feature (see Sea Ice Report #02.4/2017) is marked by a green circle.

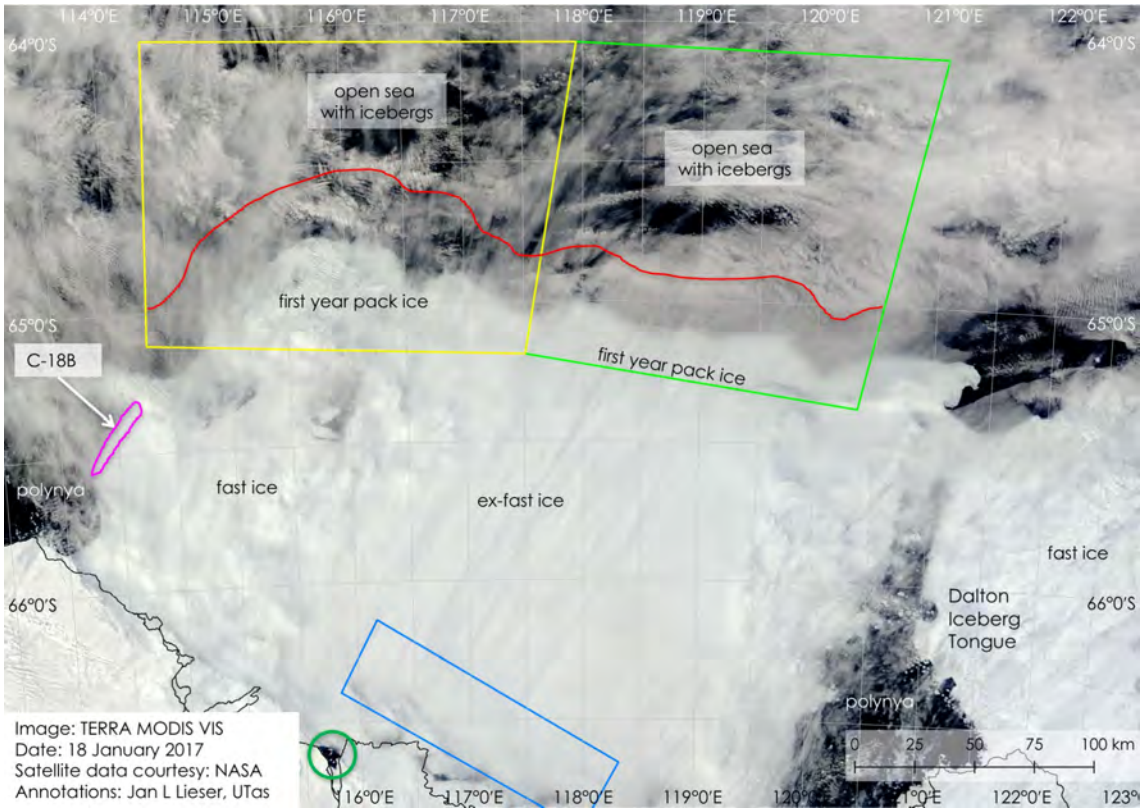

Figure 1: TERRA MODIS VIS scene, acquired on 18/01/2017 and provided by NASA.

The sea-ice edge remains quite dynamic. While the edge has migrated only very little southward, in the eastern operations region (the green rectangle), it is currently expanding slightly northward in the western operations region (the yellow rectangle).

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Figure 2 shows a sea-ice concentration difference chart based on microwave (AMSR-2) data, for the same geographical frame as Figure 1. It highlights the above mentioned dynamic behaviour of the sea-ice edge with positive and negative sea-ice concentration differences closely together, in the regions of operational interest and during the past week.

North of iceberg C-18B, an overall reduction of sea ice occurred, while west of the Dalton Iceberg Tongue, the sea-ice increase (bluish colourisation) can be explained by ex-fast ice breaking out from between the icebergs of the tongue and now drifting in the polynya.

In fast-ice regions, near-zero difference values are due to minor processing adjustments (including atmospheric corrections) on single days.

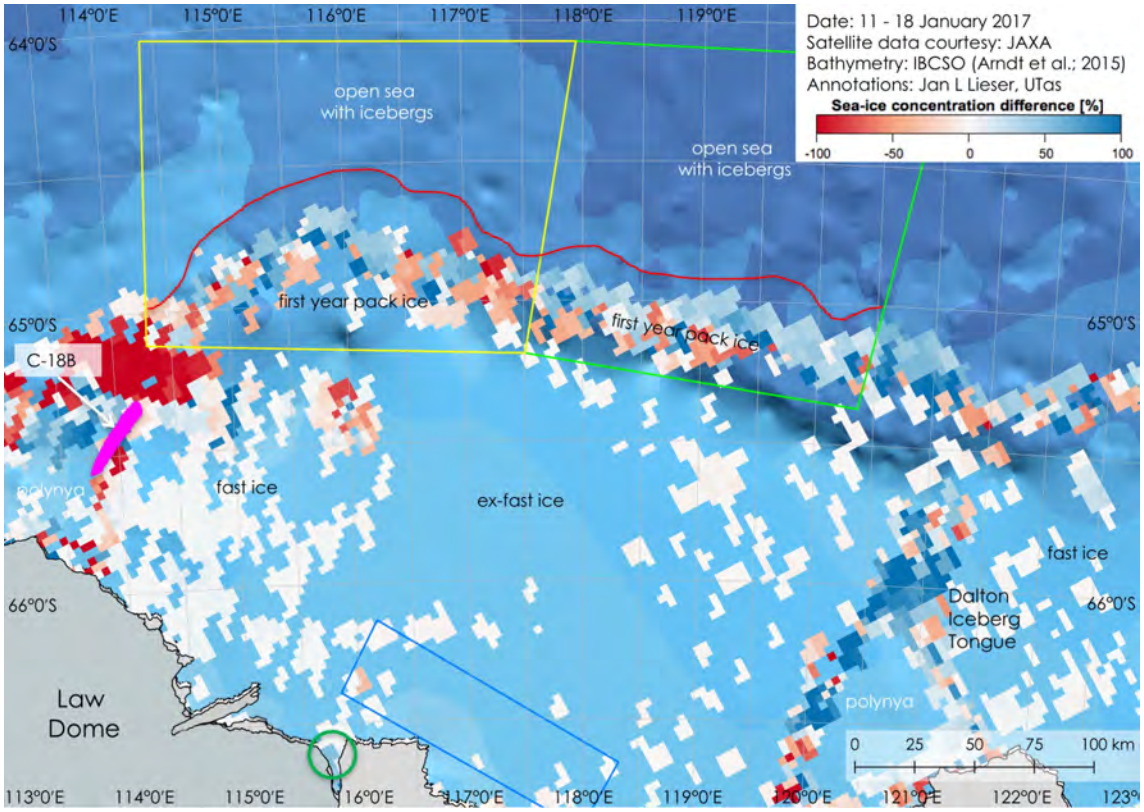

Figure 2: Sea-ice concentration difference chart, based on AMSR-2 data acquired on 11/01/2017 and 18/01/2017. Data provided by Drift & Noise Polar Services.

Sea Ice Report #05.1/2017

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

23/01/2017

Sabrina Coast

Figure 1 shows a SAR scene off Sabrina Coast, with a yellow rectangle indicating an area of operational interest to a marine science voyage on-board RV *Investigator*. The blue line shows the actual cruise track of the vessel (up to 22/01/2017 20:00 UT). Green circles show an image processing artefact, where two SAR scenes are stitched together. A red circle marks the location of a very large iceberg off the sea-ice edge.

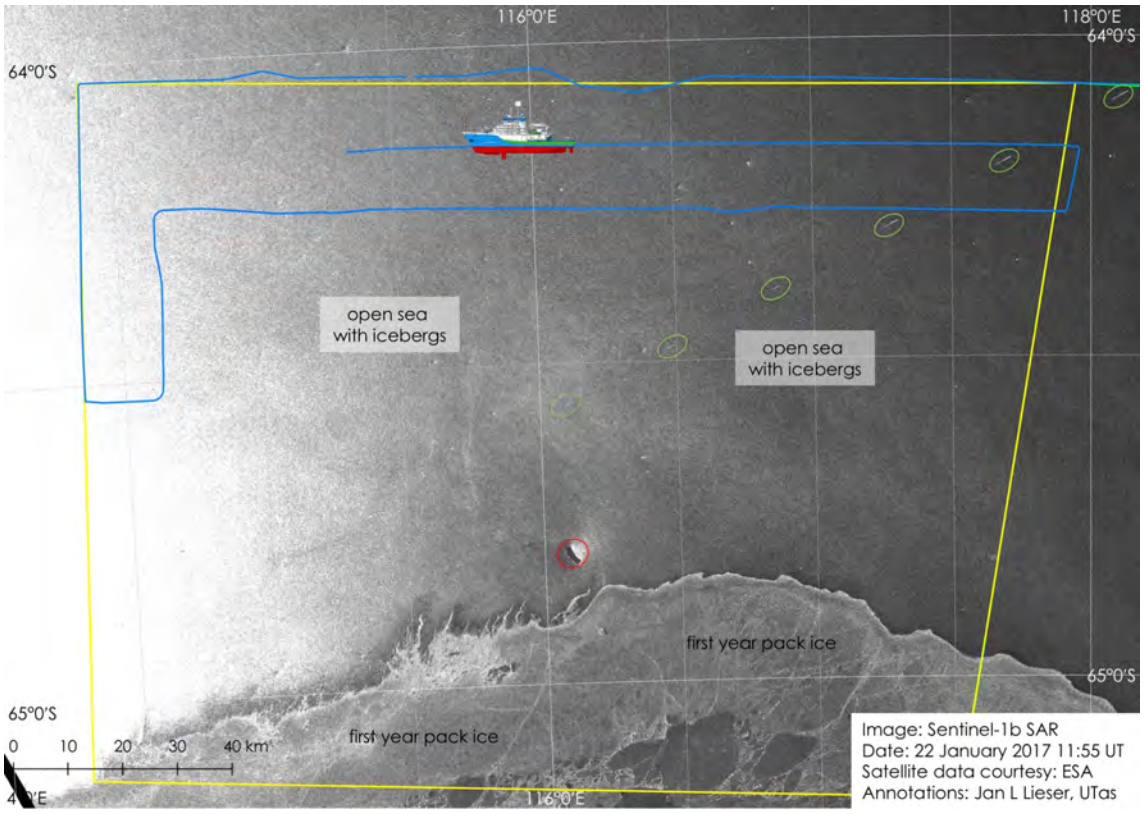

Figure 1: Sentinel-1b SAR scene, acquired on 22/01/2017 and provided by PolarView.

The sea-ice edge has moved southward during the last four days. West of 116° E, the sea-ice edge appears fuzzy, with strips and patches extending northward. Further east, the edge is more well defined, but small floes of sea ice may be encountered as far north as 64° 45' S.
Many icebergs remain floating free in the entire area of operational interest (yellow frame).

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Sea Ice Report #05.2/2017

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

23/01/2017

Prydz Bay

Figure 1 shows a visible scene of the larger Prydz Bay region from Mawson Coast to the West Ice Shelf. The ocean is largely obscured by clouds.

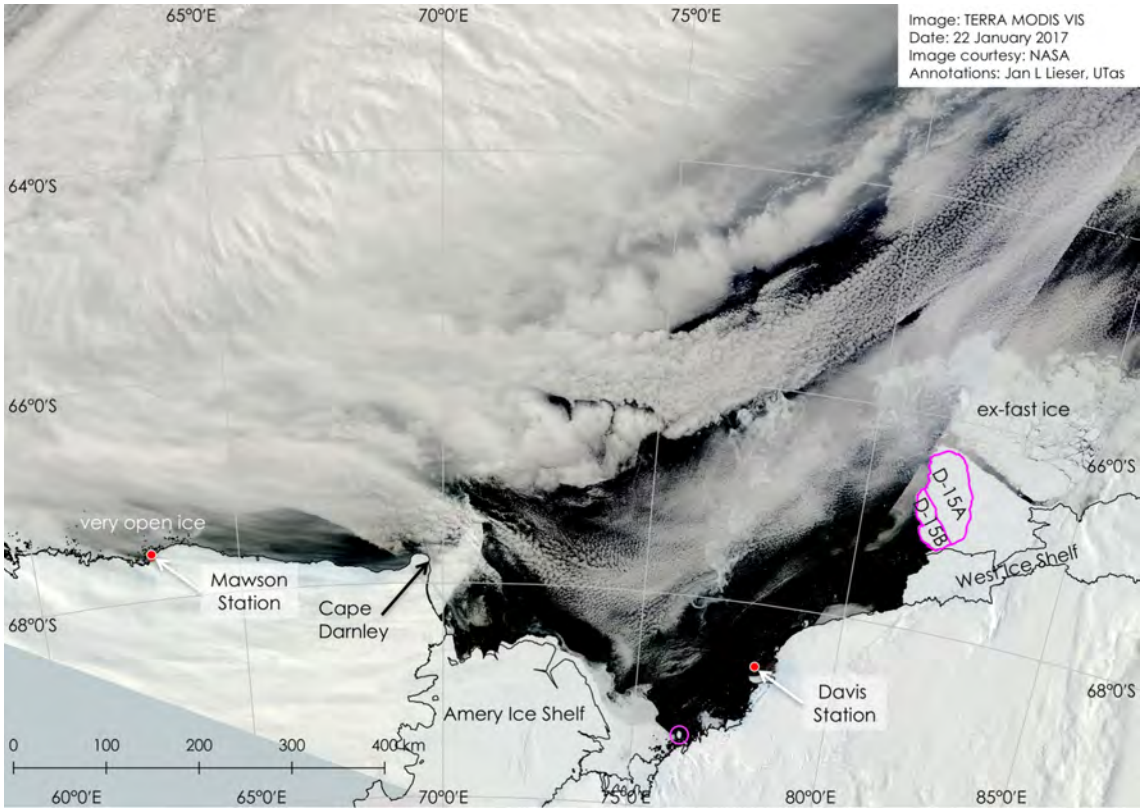

Figure 1: TERRA MODIS VIS scene, acquired on 22/01/2017 and provided by NASA.

The last remaining fast ice has detached from the coast, east of Mawson Station. Some ex-fast ice floes are now drifting westward. Off the station, some grounded and free drifting icebergs remain local.

East of Cape Darnley, fast ice is breaking up and isolated sea-ice floes are drifting westward. Ex-fast ice is also drifting around the barrier of grounded icebergs, north of iceberg D-15A. This ex-fast ice is entering Prydz Bay as patches of loose floes from the northeast.

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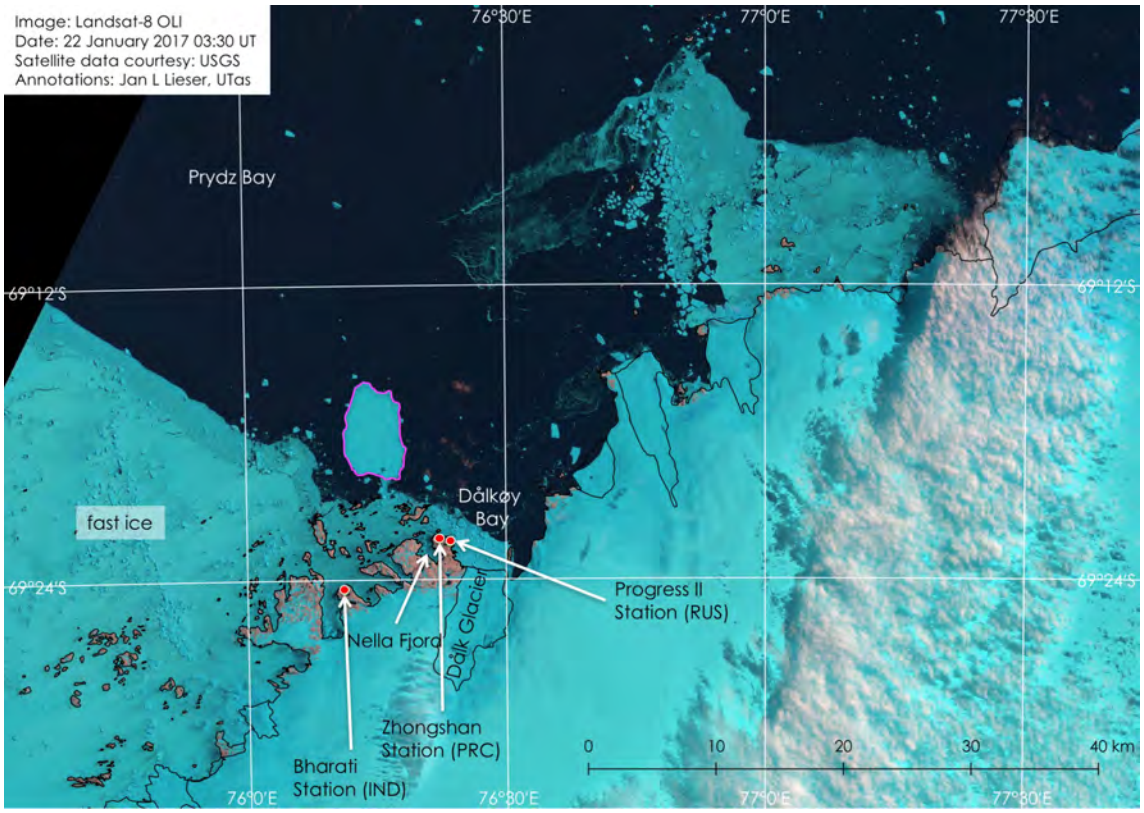

Figure 2: Landsat-8 VIS scene, acquired on 22/01/2017 and provided by USGS.

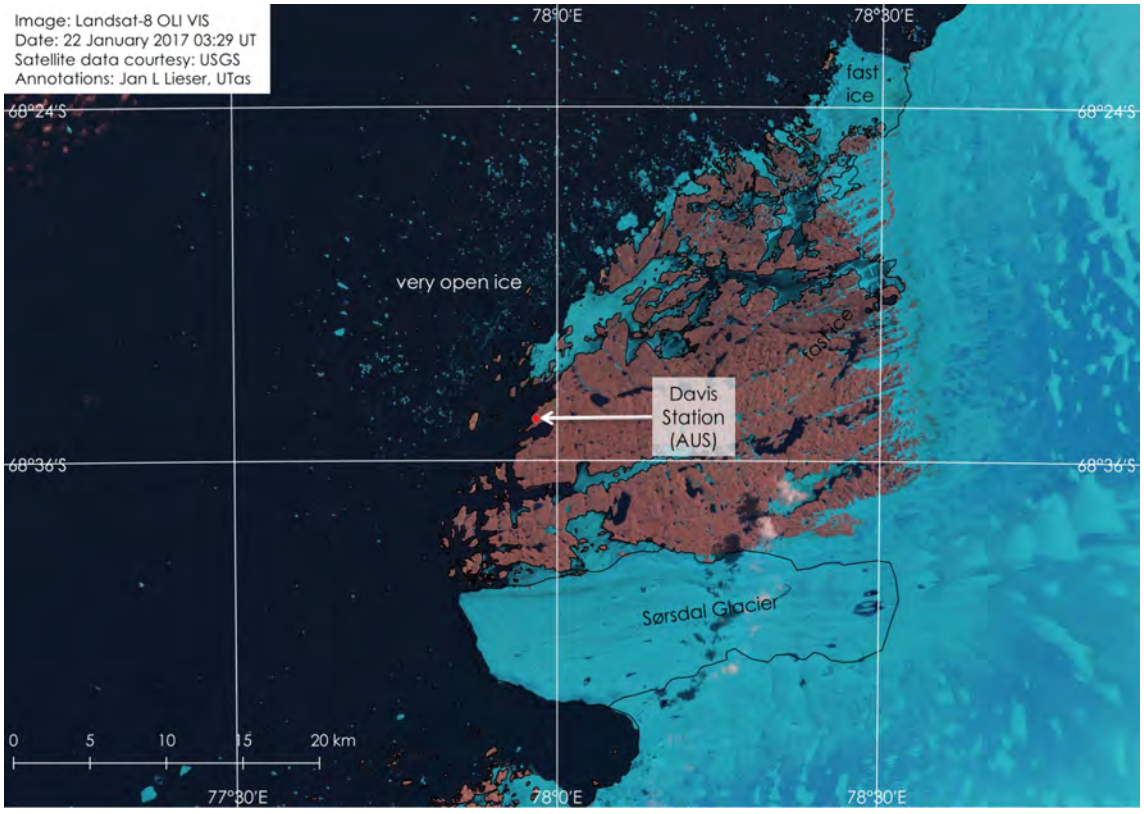

Figure 3: Landsat-8 VIS scene, acquired on 22/01/2017 and provided by USGS.

Larsemann Hills

A high-resolution visible scene of the Vestfold Hills is shown in Figure 2. Fast ice has recently broken away from the coast north of the hills. Dålkøy Bay is still partly covered by fast ice. A very large iceberg, which has been off Davis Station until December 2016, has travelled south and is currently off the outer islands of the Larsemann Hills (pink outline in the figure).

Davis Station

A high-resolution visible scene of the Vestfold Hills is shown in Figure 3. There is no more sea ice off the station and Sørsdal Glacier. Isolated icebergs can be seen offshore the northern hills. Floes of ex-fast ice released from the fjords in the north may be floating in the region.

Totten Glacier

Figure 4 shows a SAR scene of the northern end of Totten Glacier.

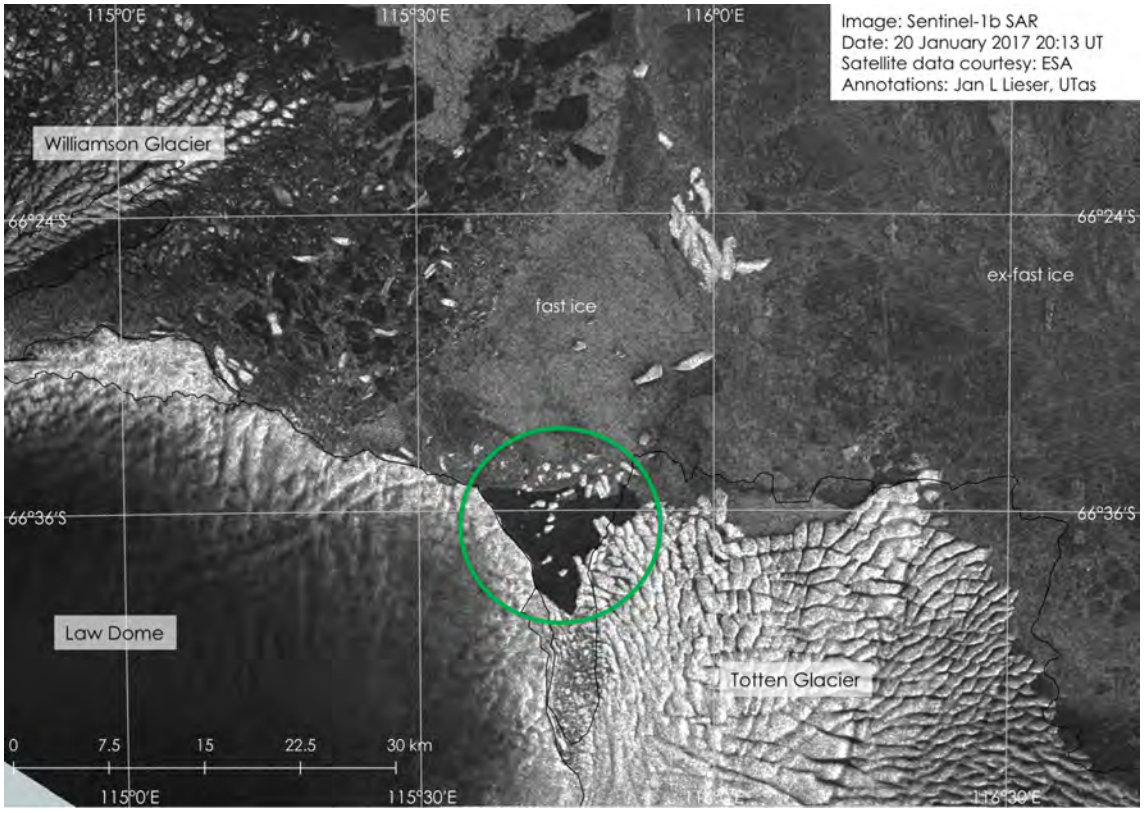

Figure 4: Sentinel-1b SAR scene, acquired on 20/01/2017 and provided by PolarView.

The area of open water (marked by a green circle), monitored since early September (see Sea Ice Report #37.2/2016), has grown to almost 59 km^2.

Sea Ice Report #05.3/2017

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

23/01/2017

Sabrina Coast

Figure 1 shows a largely cloud-free visible scene off Sabrina Coast. Coloured rectangles indicate areas of operational interest to a marine science voyage on-board RV *Investigator*. The vessel's cruise track is given by the blue line (up until 23/01/2017 04:00 UT). In the area south of the red scribble line, some sea ice can reasonably be expected.
Northwest of Totten Glacier, a persistent open water feature (see Sea Ice Report #37.2/2016) is marked by a green circle.

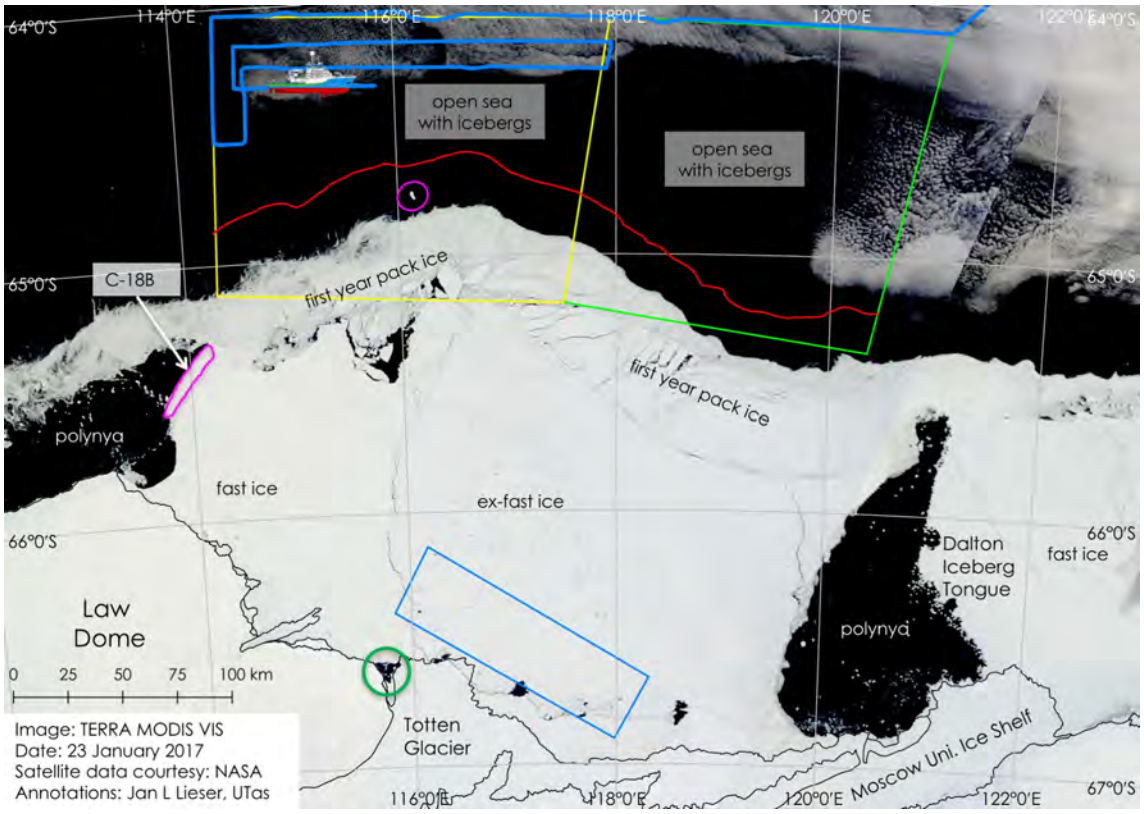

Figure 1: TERRA MODIS VIS scene, acquired on 23/01/2017 and provided by NASA.

A large iceberg north of the sea-ice edge (pink circle; roughly 4 km^2 surface area) has travelled almost 3 nautical miles in north-northeasterly direction, since 22/01/2017 12:00 UT (see Sea Ice Report #05.1/2017).

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Sea Ice Report #05.4/2017

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

24/01/2017

Bellingshausen/Amundsen/Ross Seas

Figure 1 shows a high-resolution sea-ice concentration chart for the region between Ross Sea and the Antarctic Peninsula. The red line gives RSV *Xue Long*'s cruise track (up until 23/01/2017 22:00 UT). Yellow dots mark proposed waypoints for the vessel. The white line denotes the median sea-ice extent for January.

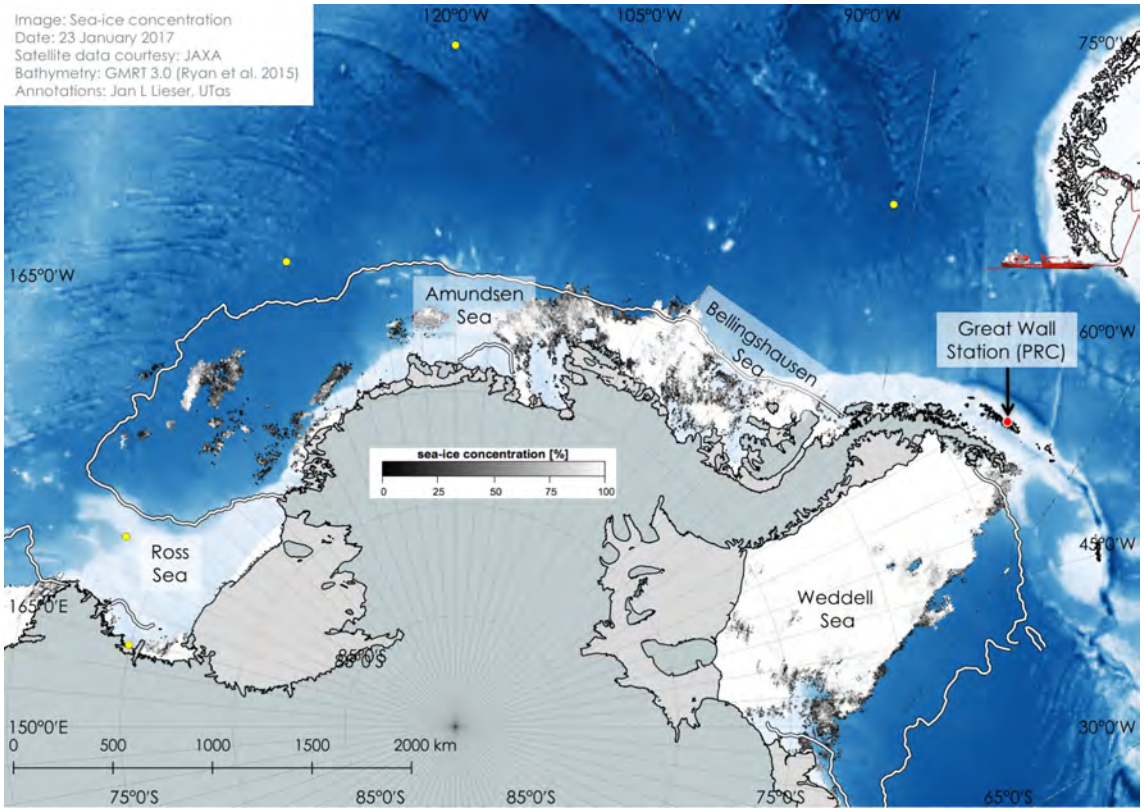

Figure 1: Sea-ice concentration chart, acquired on 23/01/2017 and provided by Drift & Noise Polar Services.

Only in Bellingshausen Sea, sea-ice extent is close to average conditions. Ross Sea, Amundsen Sea and Weddell Sea experience much below long-term average sea-ice coverage. In eastern Ross Sea, only a comparatively small patch of sea ice remains, centred roughly at 155° W and 71° 15' S, with smaller patches scattered around.

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Figure 2 provides a visible image of southwestern Ross Sea. The scene is largely cloud-free. A red scribble line indicates the fast-ice edge off Scott Coast (south of the Drygalski Ice Tongue). Deteriorating ex-fast ice is found off the fast-ice edge.

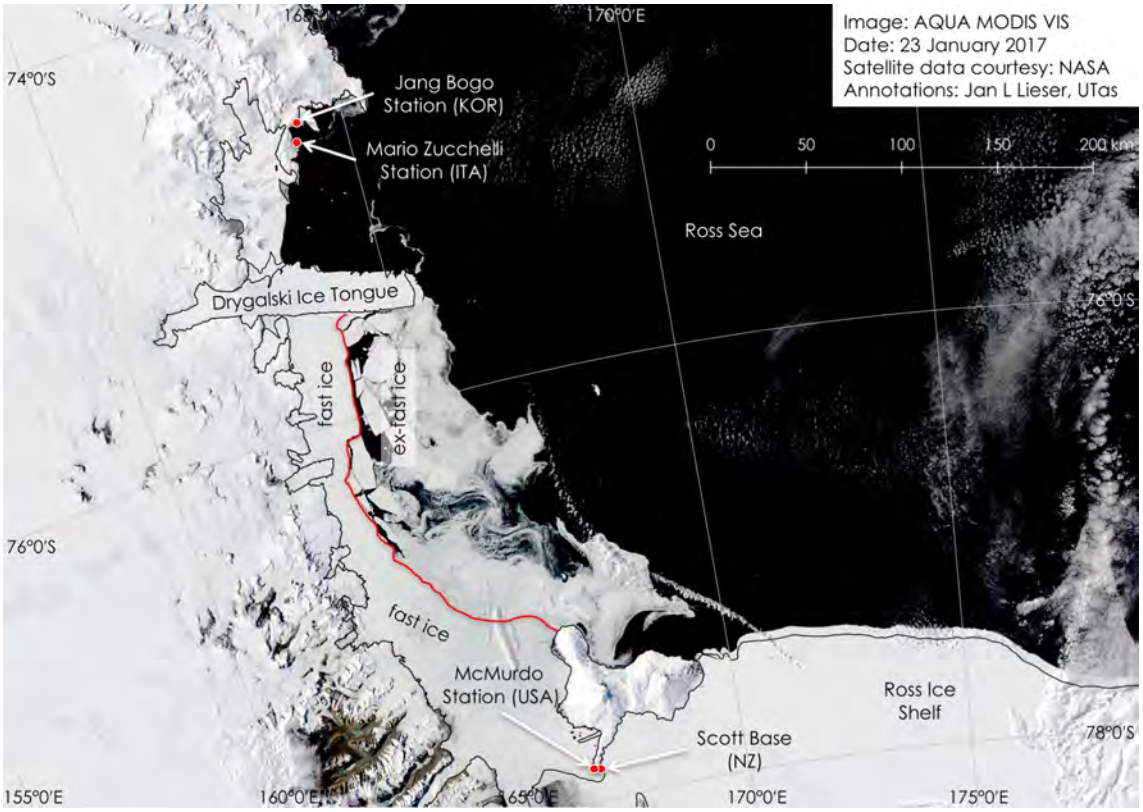

Figure 2: AQUA MODIS VIS scene, acquired on 23/01/2017 and provided by NASA.

Terra Nova Bay (north of the Drygalski Ice Tongue) is almost entirely free of sea ice, with only occasional strips and patches of ex-fast ice entering the bay from the south.

Sea Ice Report #05.5/2017

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

24/01/2017

Sabrina Coast

Figure 1 shows a SAR scene off Sabrina Coast, with coloured rectangles indicating areas of operational interest to a marine science voyage on-board RV *Investigator*. The blue line shows the actual cruise track of the vessel (up to 24/01/2017 04:00 UT). The red dashed line marks the approximate edge of compact sea ice as seen in yesterday's TERRA MODIS scene (see Sea Ice Report #05.3/2017) excluding the fuzzy outer fringe.

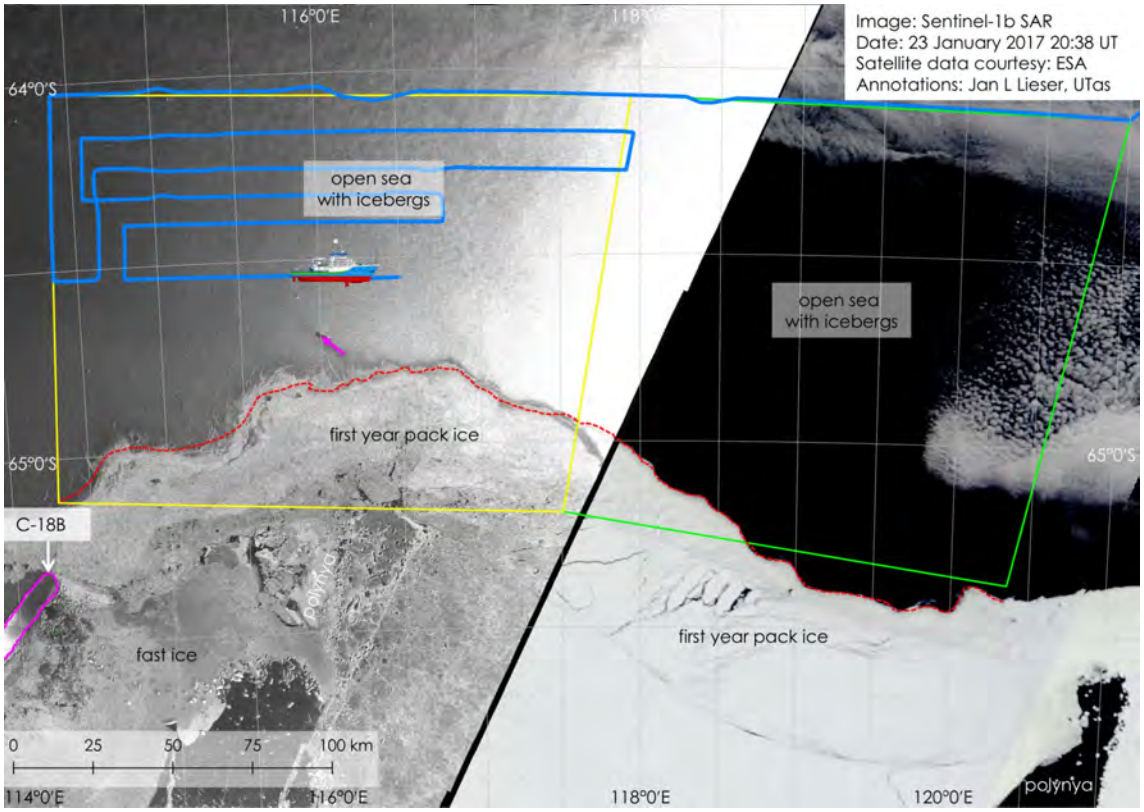

Figure 1: Sentinel-1b SAR scene, acquired on 23/01/2017 and provided by PolarView; complemented by TERRA MODIS VIS scene, acquired 23/01/2017 and provided by NASA.

West of 119° 30' E, the sea-ice zone appears to be expanding slightly. The large iceberg noted in Sea Ice Report #05.3/2017 has travelled roughly 5 nautical miles northwestward since yesterday's TERRA MODIS acquisition.

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Sea Ice Report #05.6/2017

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

24/01/2017

Mawson Coast

Figure 1 shows a visible scene off Mawson Coast.

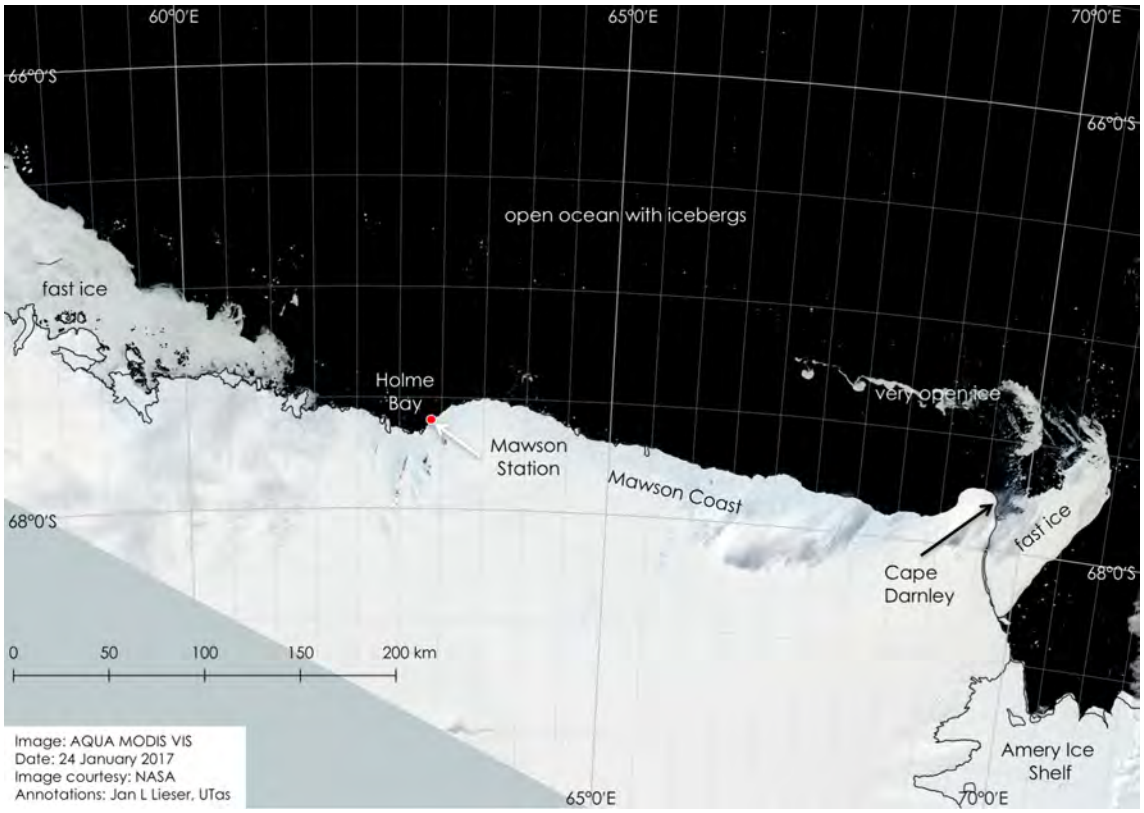

Figure 1: AQUA MODIS VIS scene, acquired 24/01/2017 and provided by NASA.

From Holme Bay to Cape Darnley, the coast is free of sea ice. East of Cape Darnley, fast ice attached to the coast is slowly breaking up and releasing strips and patches of ex-fast ice westward, which are carried by small scale oceanic surface eddies resulting in the typical hook-shapes.

South of 66° S, many icebergs are scattered around and visible in Figure 1. Smaller bergs can be present throughout the area.

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Sea Ice Report #05.7/2017

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

27/01/2017

Mawson Coast

Figure 1 shows a SAR and visible composite off Mawson Coast.

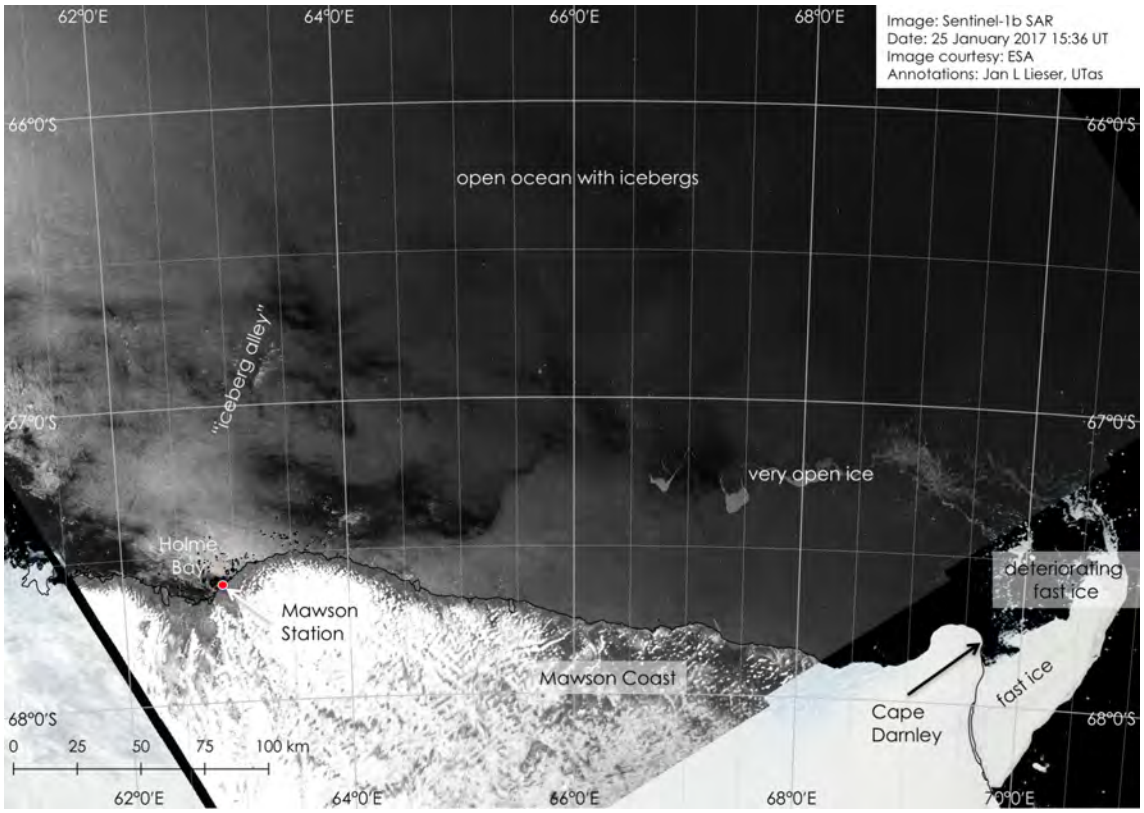

Figure 1: Sentinel-1b SAR scene, acquired 25/01/2017 and provided by PolarView; complemented by AQUA MODIS VIS scene, acquired 26/01/2017 and provided by NASA.

From Holme Bay to Cape Darnley, the coast is free of sea ice. East of Cape Darnley, coastal fast ice continues to break up and strips and patches of ex-fast ice are carried westward by small-scale oceanic surface eddies.

South of 66° S, many icebergs are scattered around and detectable in the SAR scene (Figure 1). Smaller bergs can be present throughout the area.

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Ingrid Christensen Coast

Figure 2 shows a visible scene off Ingrid Christensen Coast between Zhongshan Station and Davis Station.

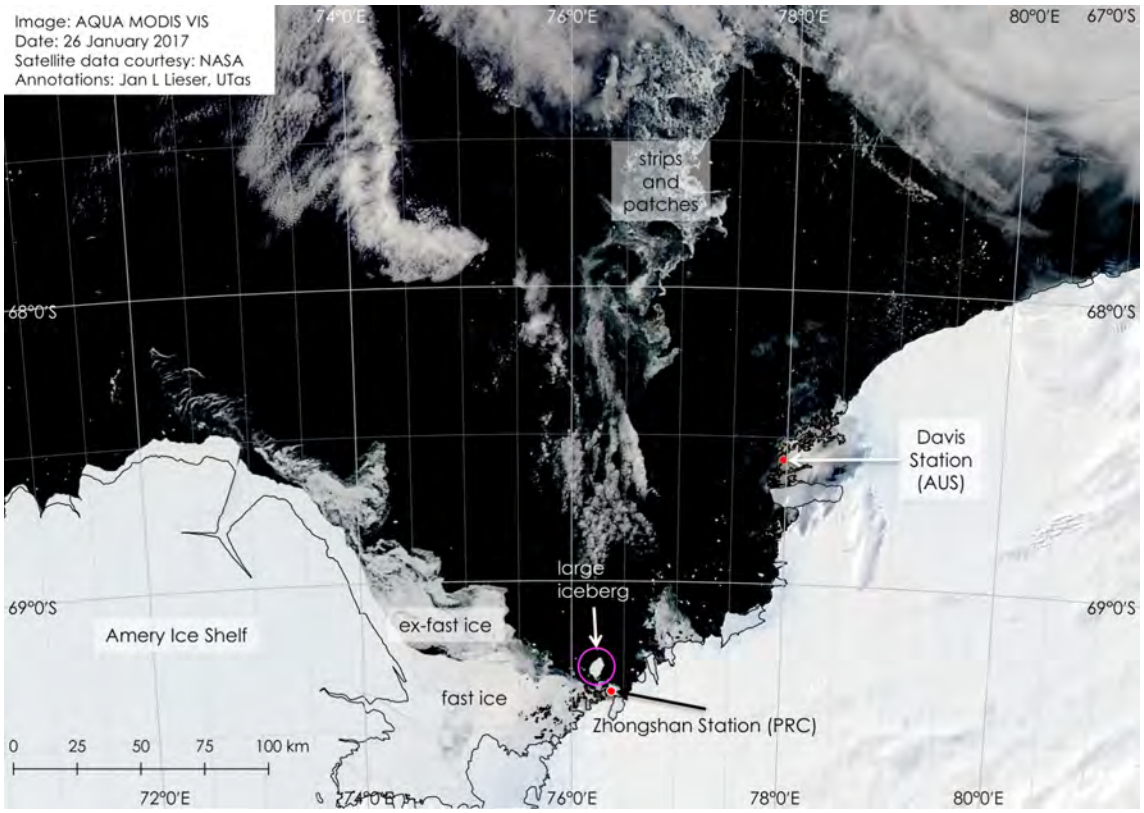

Figure 2: AQUA MODIS VIS scene, acquired 26/01/2017 and provided by NASA.

Prydz Bay is largely free of sea ice but strips and patches of old sea ice are drifting southward between 76° E and 78° E, and ex-fast ice is drifting westward along the front of the Amery Ice Shelf.

A large tabular iceberg (see pink circle in Figure 2) remains offshore Larsemann Hills.

Sea Ice Report #05.8/2017

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

27/01/2017

Sabrina Coast

Figure 1 shows a SAR and microwave data composite off Sabrina Coast, with coloured rectangles indicating areas of operational interest to a marine science voyage on-board RV *Investigator*. The blue line shows the cruise track of the vessel (up to 27/01/2017 01:30 UT).

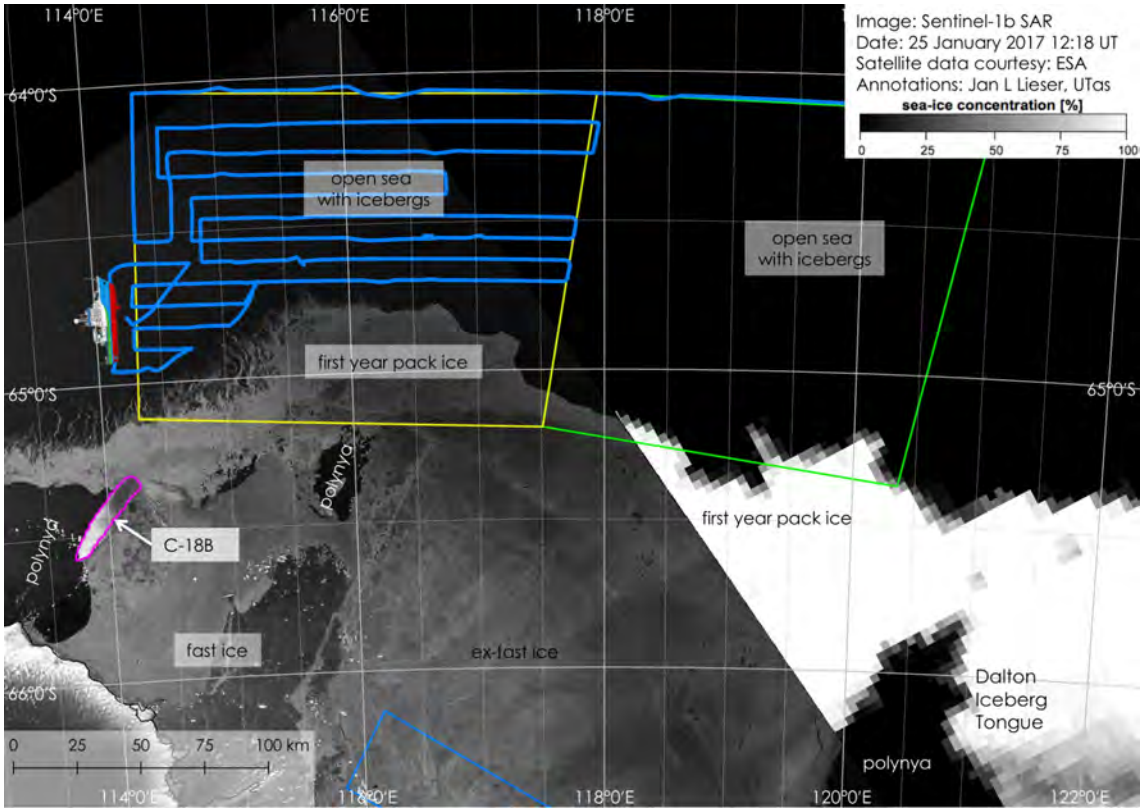

Figure 1: Sentinel-1b SAR scene, acquired on 25/01/2017 and provided by PolarView; complemented by sea-ice concentration chart, acquired 26/01/2017 and provided by Universität Hamburg.

West of 116° E, the fuzzy sea-ice edge is visible as strips and patches of sea ice protruding northward. In the eastern sector (green rectangle), the sea-ice concentration chart also indicates that sea ice appears to be expanding slightly northward while the polynyas shown in the figure are expanding.

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Sea Ice Report #06.1/2017

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

30/01/2017

Sabrina Coast

Figure 1 shows a SAR and visible data composite off Sabrina Coast, with coloured rectangles indicating areas of operational interest to a marine science voyage on-board RV *Investigator*. The blue line shows the cruise track of the vessel (up to 29/01/2017 21:00 UT). South of the red scribble line, some sea ice can reasonably be expected.

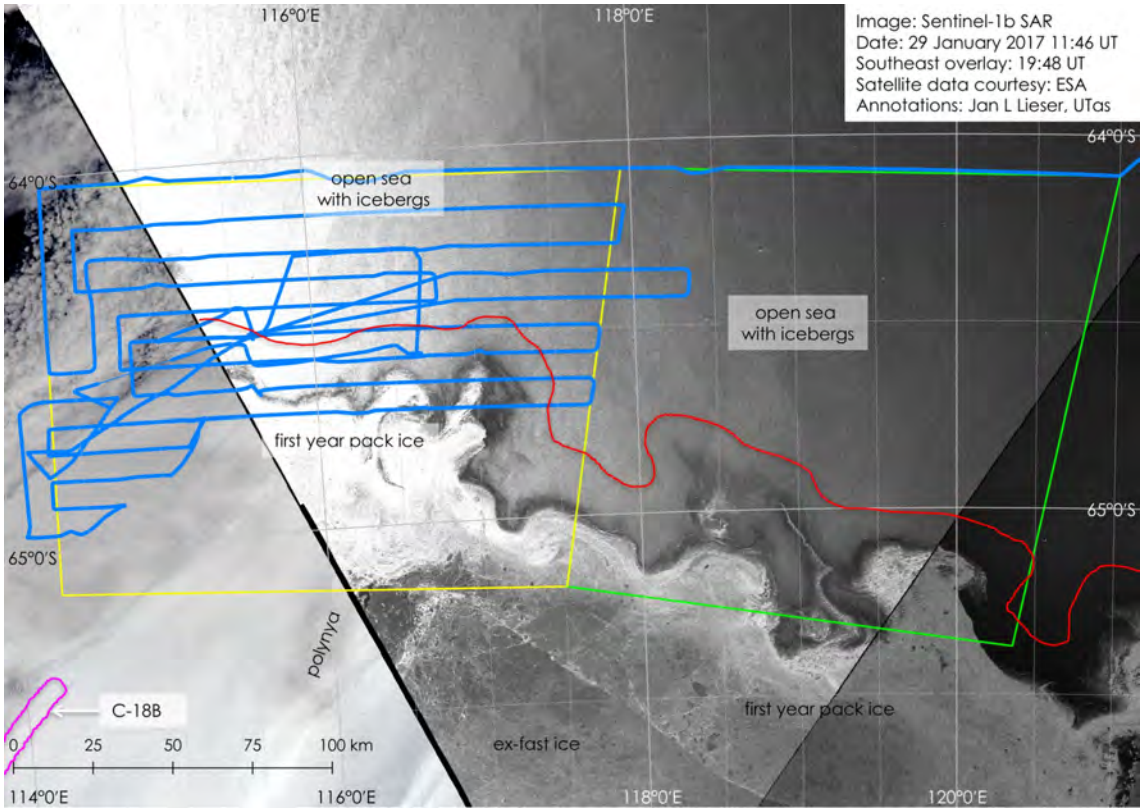

Figure 1: Sentinel-1b SAR scene, acquired on 29/01/2017 and provided by PolarView; southwest complement by AQUA MODIS VIS acquired 29/01/2017 and provided by NASA.

The sea-ice edge continues to migrate slowly northward. As a result of previous low-wind conditions, sea ice is carried around predominantly by oceanic surface eddies. This results in undulations and a fuzzy edge.

Many icebergs remain in the region, overall.

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Sea Ice Report #06.2/2017

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

30/01/2017

Prydz Bay

Figure 1 shows a SAR and visible data composite of the larger Prydz Bay region.

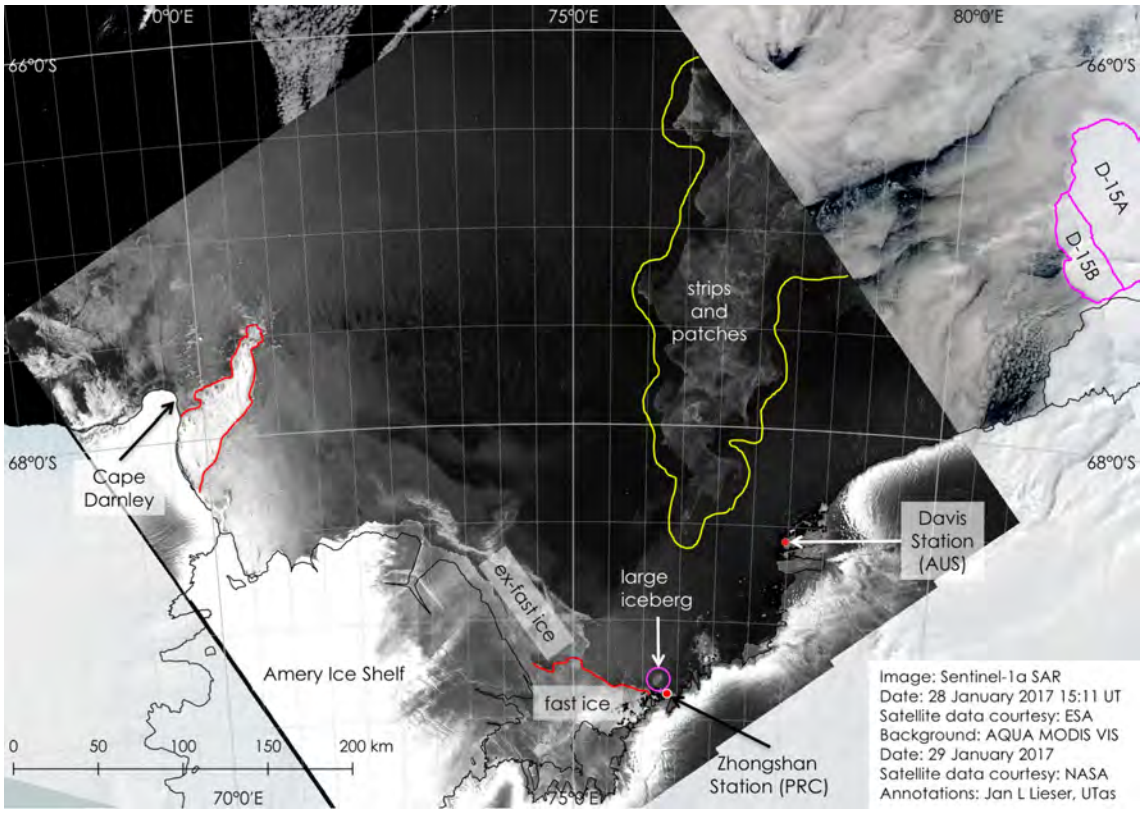

Figure 1: Sentinel-1a SAR scene, acquired on 28/01/2017 and provided by PolarView; complemented by AQUA MODIS VIS acquired 29/01/2017 and provided by NASA.

A tongue of old sea ice is migrating southward into Prydz Bay (yellow outline). This tongue is fed by sea ice (partly ex-fast ice) from the east of iceberg D-15A.

In the region, fast ice is still breaking up. Off the eastern Amery Ice Shelf and east of Cape Darnley strips of ex-fast ice are being released.

In Edward VIII Bay (west of Mawson Station; outside the frame of Figure 1) on 26/01/2017, 1500 km^2 of fast ice has broken off in vast sheets.

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Sea Ice Report #06.3/2017

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

30/01/2017

Ross Sea

Figure 1 shows a SAR and visible data composite of eastern Ross Sea. Some large tabular icebergs are marked by pink circles. The cruise track of RSV *Xue Long* (up until 30/01/2017 03:00 UT) is given by the orange line.

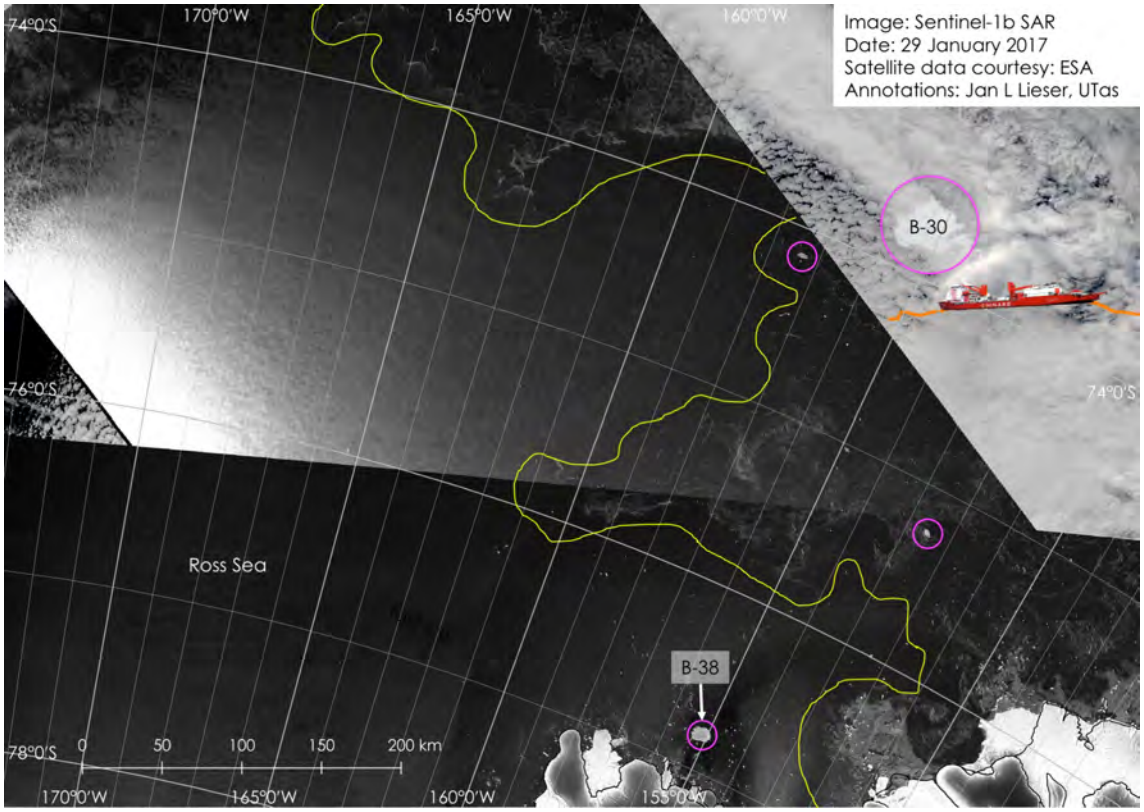

Figure 1: Sentinel-1b SAR scene, acquired on 29/01/2017 at 08:25 UT (northern swath) and 11:39 UT (southern swath) and provided by PolarView; complemented by AQUA MODIS VIS acquired 29/01/2017 and provided by NASA.

West of the yellow scribble line, only very little sea ice is present in the central Ross Sea. However, isolated icebergs are drifting freely throughout the area.

Figure 2 shows a SAR and visible data composite of western Ross Sea. Fast ice is present along Scott Coast (south of the Drygalski Ice Tongue), with loose ex-fast ice drifting off the fast-ice edge.

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Terra Nova Bay (north of the Drygalski Ice Tongue) is largely free of sea ice but some large icebergs are in the bay (marked by pink circles).

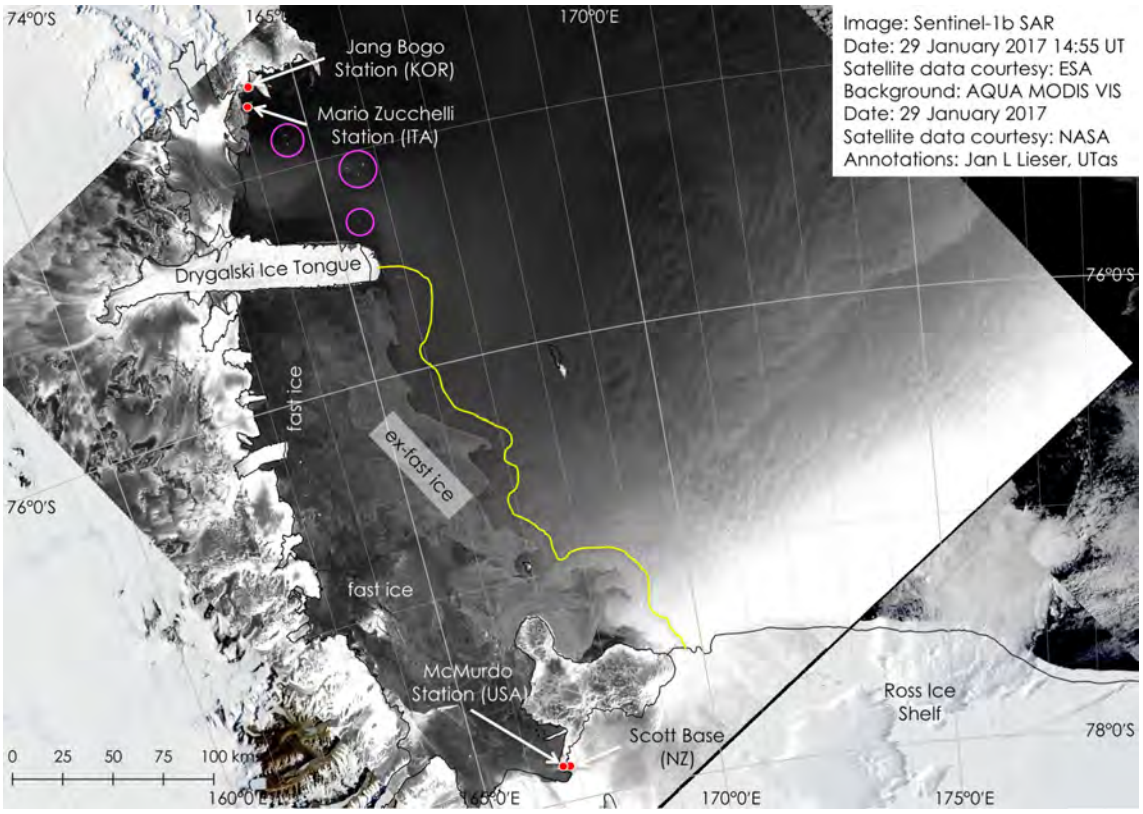

Figure 2: Sentinel-1b SAR scene, acquired on 29/01/2017 and provided by PolarView; complemented by AQUA MODIS VIS acquired 29/01/2017 and provided by NASA.

Sea Ice Report #06.4/2017

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

31/01/2017

D'Urville Sea

Figure 1 shows a visible scene of D'Urville Sea.

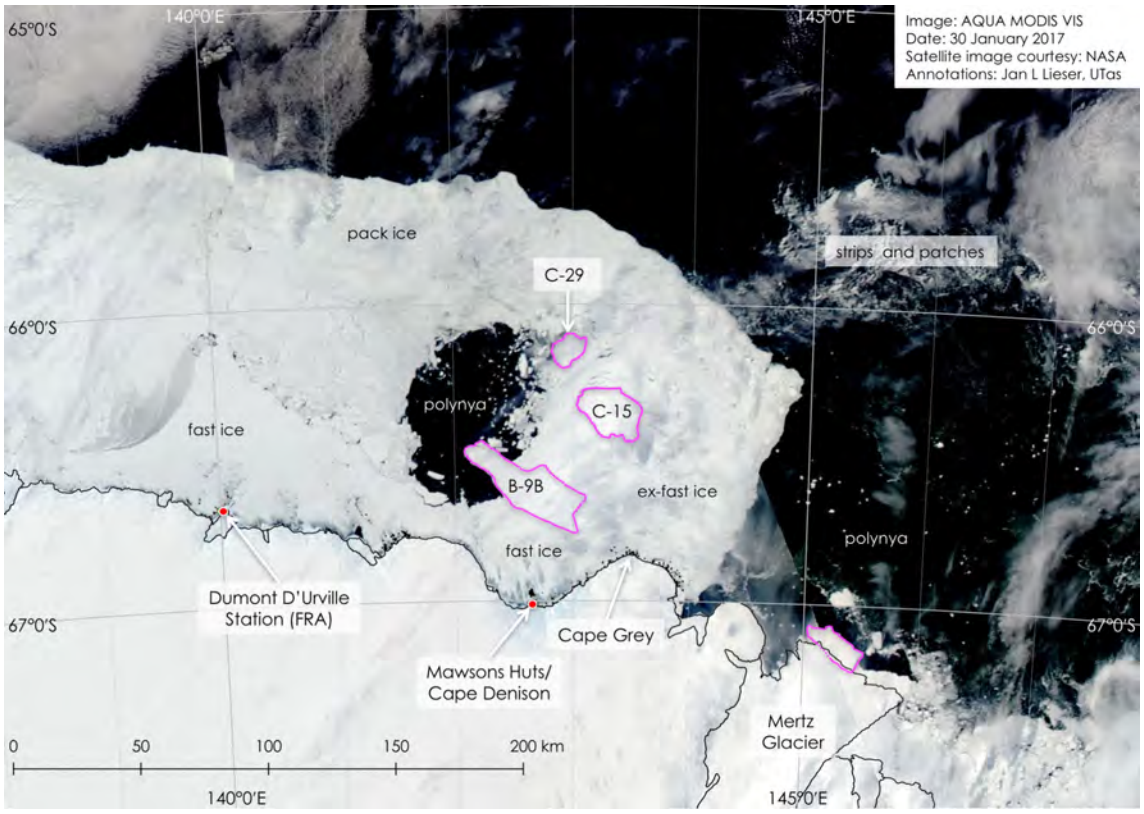

Figure 1: AQUA MODIS VIS acquired 30/01/2017 and provided by NASA.

Fast ice is attached to the coast, between Dibble Glacier (outside of Figure 1 to the west) and Cape Grey. A mixture of ex-fast ice and old sea ice is north of the fast-ice edge. A polynya is present to the west of the large-iceberg troika (B-9B, C-15 and C-29). Iceberg C-15 is mobile within the surrounding ex-fast/pack ice as well as iceberg C-29, although the latter to a lesser degree. Iceberg B-9B is grounded.
Off Mertz Glacier, old ex-fast ice is drifting westward across the face of the glacier, partly as vast floes, and the front of the glacier shows a 'loose tooth' (roughly 880 km^2) attached to the glacier only by less than 5 km of ice.
North of 66° S and east of 145° E, strips and patches of old sea ice are drifting into the area, from the east, separating the so-called Mertz polynya from the open ocean.

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Sea Ice Report #06.5/2017

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

01/02/2017

Davis Station

Figure 1 shows a SAR and visible composite of eastern Cooperation Sea, north of Davis Station.

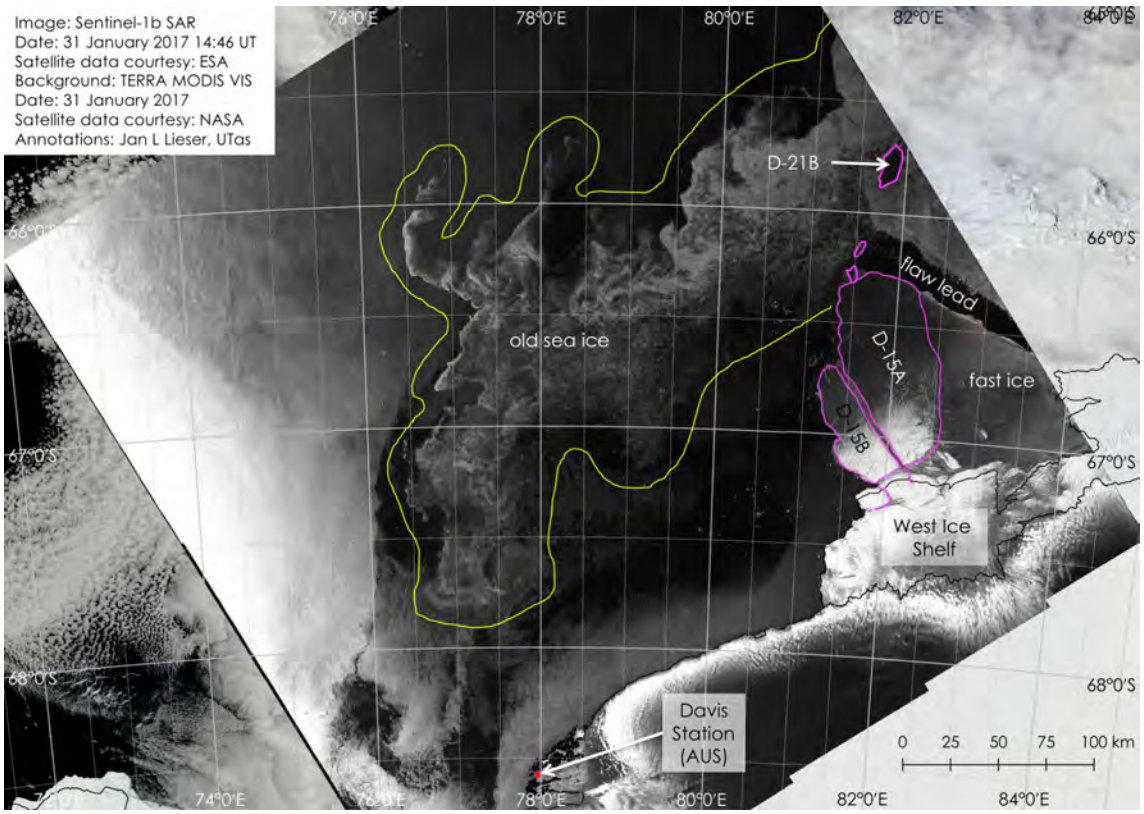

Figure 1: Sentinel-1b SAR scene, acquired 31/01/2017 and provided by PolarView; Background: TERRA MODIS VIS scene, acquired 31/01/2017 and provided by NASA.

Old sea ice continues to spill into the region (yellow outline) fed from a body of sea ice north of the West Ice Shelf, which is separated from the fast ice now with a lead of up to 9.5 nautical miles width.
South of iceberg D-15B, a large piece of shelf (roughly 155 km^2) appears to start to detach from the northwestern corner of the West Ice Shelf. Further east from there, the rift that split D-15A and D-15B has fully traversed the multi-year fast ice between the bergs and the ice shelf, and the rift has also pierced the West ice Shelf at a length of more than 5.5 km (both features are indicated by dashed pink lines).

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Sea Ice Report #06.6/2017

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

02/02/2017

Sabrina Coast

Figure 1 shows a visible scene off Sabrina Coast, with coloured rectangles indicating areas of operational interest to a marine science voyage on-board RV *Investigator*. The blue line shows the cruise track of the vessel (up to 02/02/2017 00:00 UT). A persistent open-water feature is marked by a green circle, north of Totten Glacier.

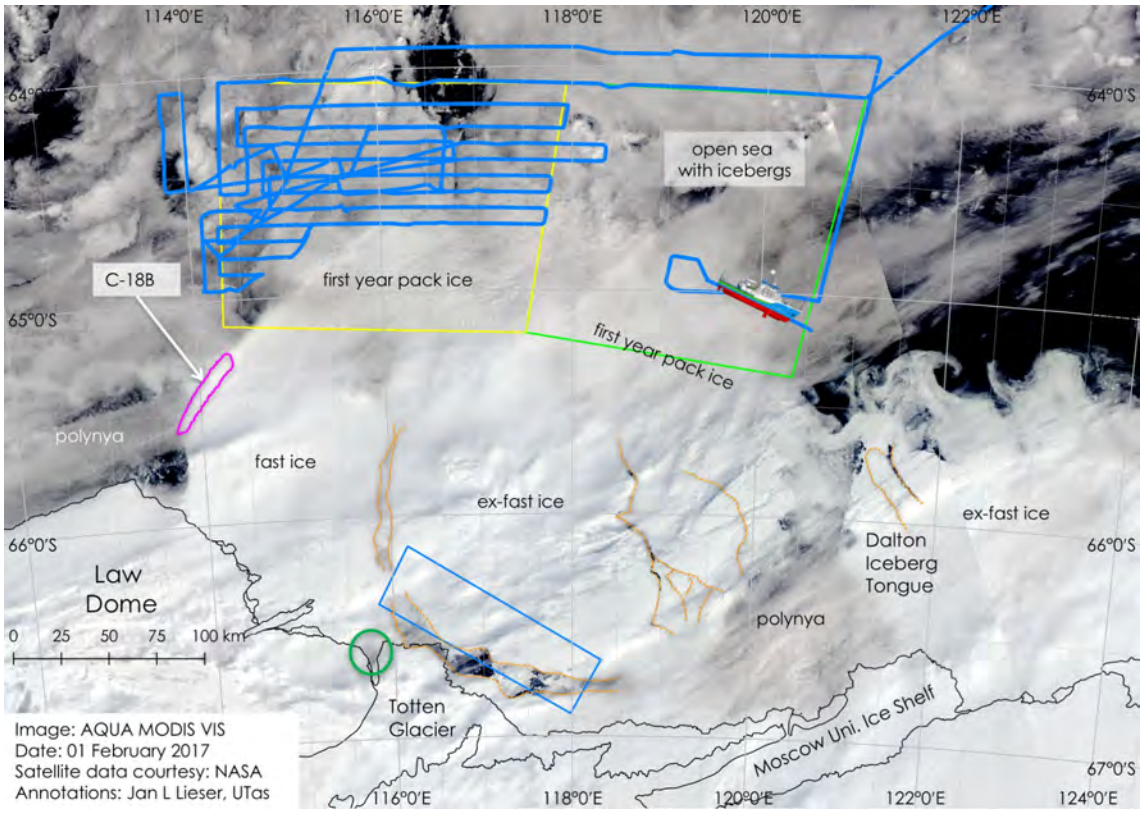

Figure 1: AQUA MODIS VIS scene, acquired 01/02/2017 and provided by NASA.

The sea-ice edge is largely obscured by clouds, but further south, thinner clouds allow for a rough assessment of cracks that have opened recently through the ex-fast ice (some are marked by dashed orange lines). Offshore Totten Glacier, the northward drift of ex-fast ice has opened a coastal lead of up to 8 nautical miles width at the face of the glacier.
North of the Dalton Iceberg Tongue, fast ice has separated from the glacier tongue as well.

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Figure 2 shows the same geographical frame as Figure 1, but as a high-resolution sea-ice concentration chart. Some of the above mentioned cracks through the ex-fast ice are recognisable in the concentration data.

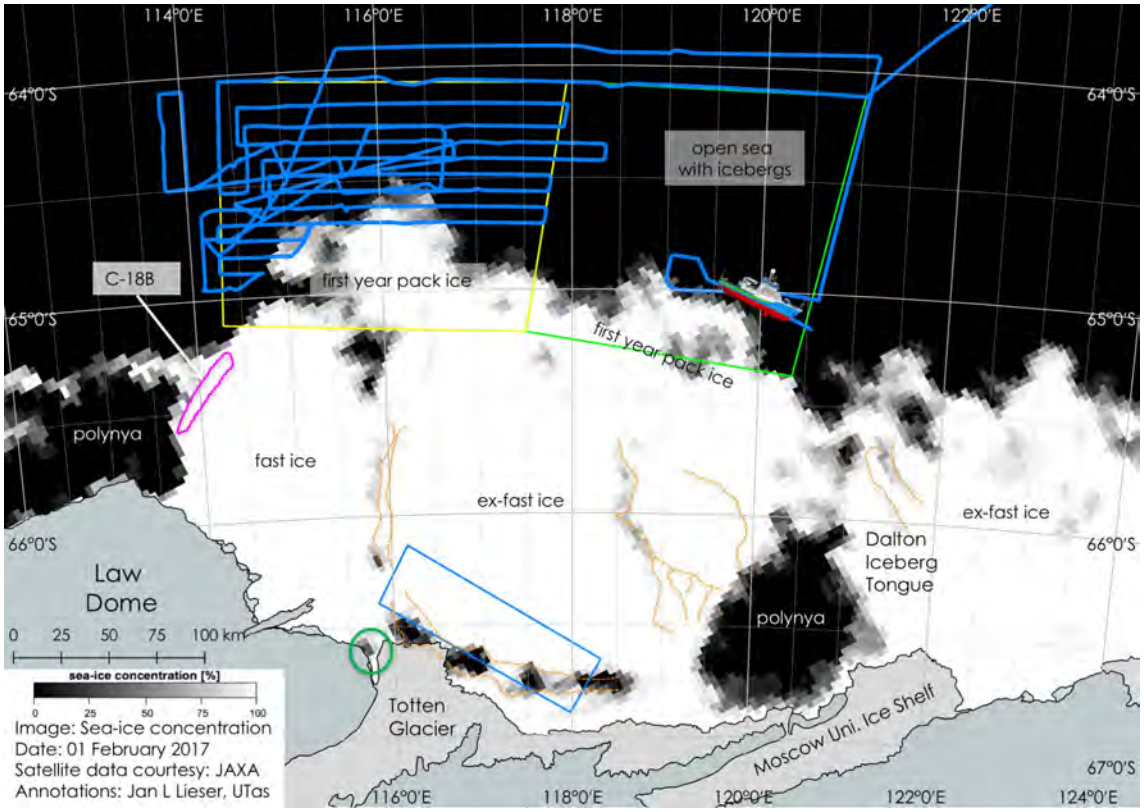

Figure 2: Sea-ice concentration chart, acquired 01/02/2017 and provided by Universität Hamburg.

Except for fast ice between iceberg C-18B and Totten Glacier, the general drift direction of sea ice in the region remains northward, which explains the opening of cracks throughout the pack due to reduced horizontal pressure/stress.

Sea Ice Report #07.1/2017

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

06/02/2017

Sabrina Coast

Figure 1 shows a SAR and visible data composite off Sabrina Coast, with coloured rectangles indicating areas of operational interest to a marine science voyage on-board RV *Investigator*. The blue line shows the cruise track of the vessel (up to 05/02/2017 22:00 UT). A persistent open-water feature is marked by a green circle, north of Totten Glacier.

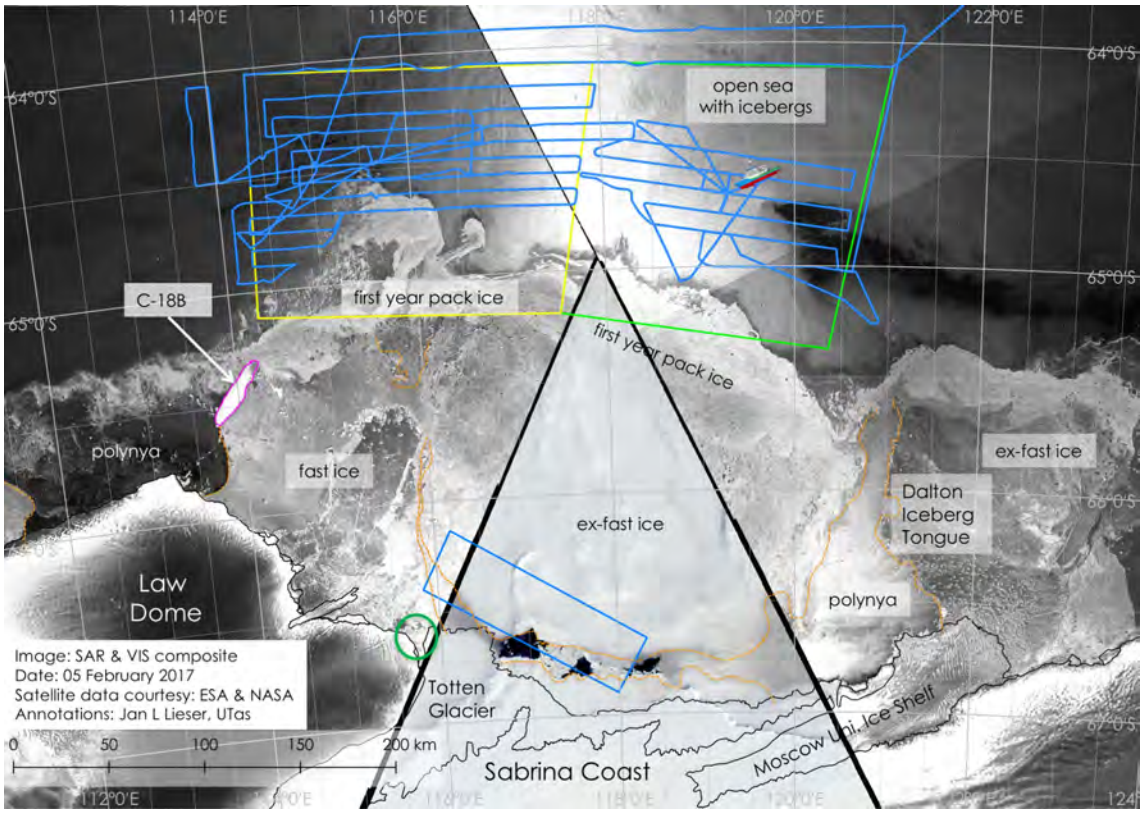

Figure 1: Sentinel-1b SAR, acquired 04/02/2017 20:37 UT (southwest) and acquired 05/02/2017 11:38 UT (southeast), both provided by PolarView; Complemented by: AQUA MODIS VIS scene, acquired 05/02/2017 and provided by NASA.

During the weekend, the sea-ice edge has continued to spread slightly northward, in the western (yellow) operations area. Simultaneously, in the eastern (green) operations area, the sea-ice edge showed an overall more southerly movement. However, the main body of ex-fast, which is

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off the Sabrina Coast, has moved very slightly northward while the offshore open water patches and polynyas (outlined by dashed orange scribble lines) are growing.

Sea Ice Report #07.2/2017

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

06/02/2017

Mawson Coast

Figure 1 shows a SAR and visible data composite off Mawson Coast. The orange line shows the cruise track of RSV *Aurora Australis* (up to 06/02/2017 00:00 UT).

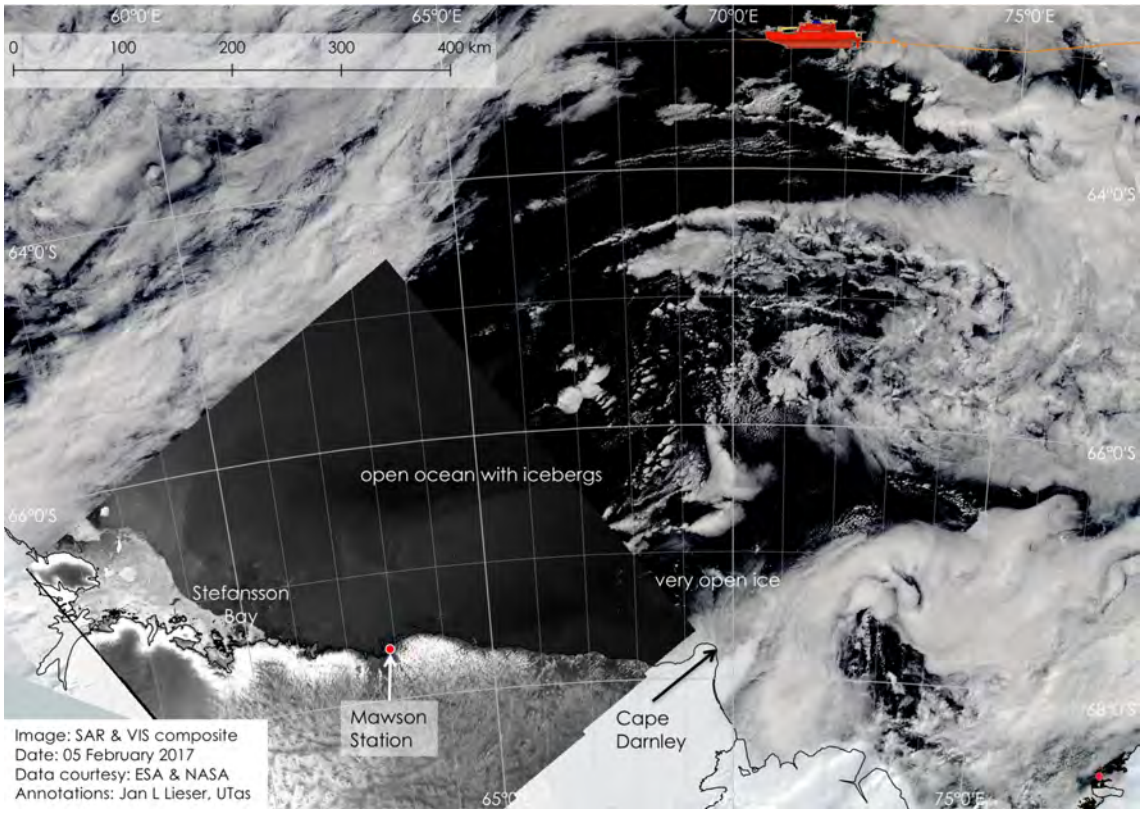

Figure 1: AQUA MODIS VIS scene, acquired 05/02/2017 and provided by NASA; Overlay: Sentinel-1b SAR, acquired 05/02/2017 15:52 UT and provided by PolarView.

West of Mawson Station, fast ice is still breaking up and the islands of Stefansson Bay are largely free of sea ice. East of Cape Darnley, fast ice continues to crumble, and releases strips and patches of ex-fast ice that are drifting westward and melting.

On the continental shelf, some large icebergs are grounded, while further offshore, icebergs are drifting freely.

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Prydz Bay

Figure 2 shows a SAR and visible data composite of the larger Prydz Bay region.

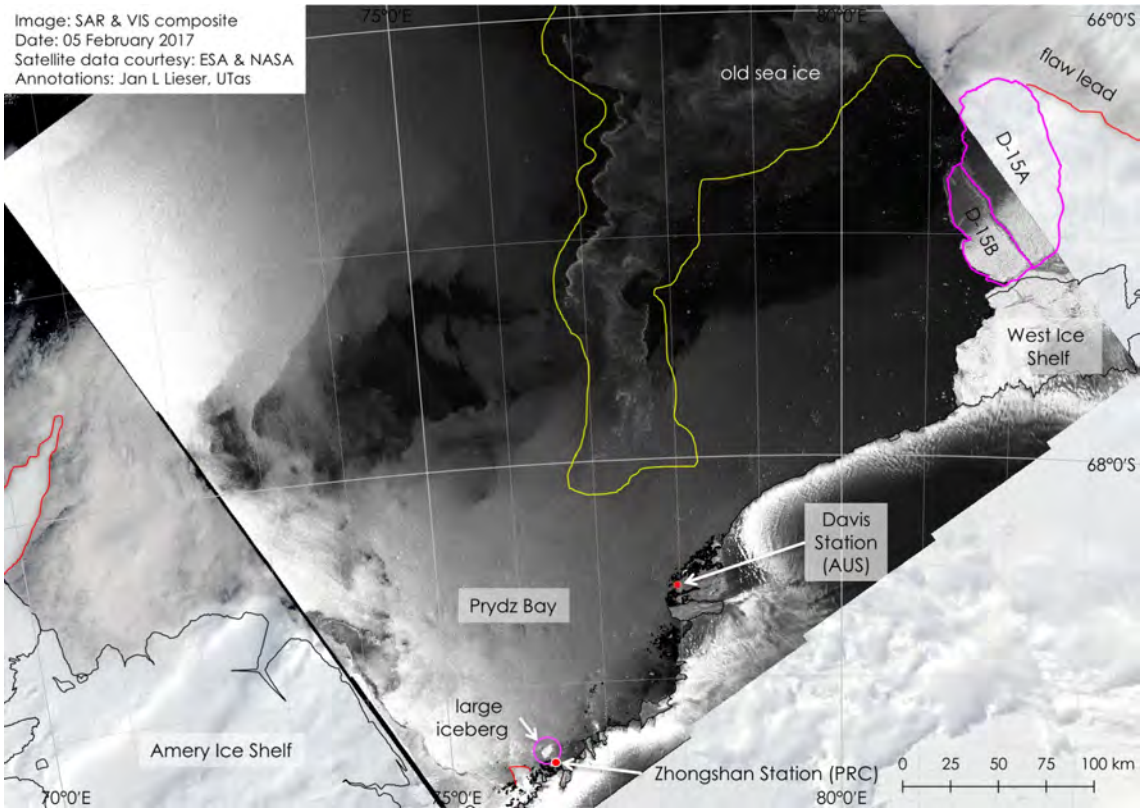

Figure 2: Sentinel-1b SAR, acquired 05/02/2017 14:55 UT and provided by PolarView; Background: AQUA MODIS VIS scene, acquired 05/02/2017 and provided by NASA.

Most of the coast of the Larsemann Hills (home of Zhongshan Station, among others) is free of sea ice, but a large tabular iceberg remains local off the northern part of the hills.

North and east of iceberg D-15A, a large lead continues to widen and old sea ice is still spilling into the northern Prydz Bay region (yellow outline).

Sea Ice Report #07.3/2017

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

06/02/2017

Adélie Coast/George V Coast/Oates Coast

Figure 1 shows a high-resolution sea-ice concentration chart with the median sea-ice extent for February (black-white line), off the East Antarctic coast between Dibble Glacier and Drygalski Ice Tongue. The red line shows the cruise track of RSV *Xue Long* (up to 06/02/2017 03:00 UT).

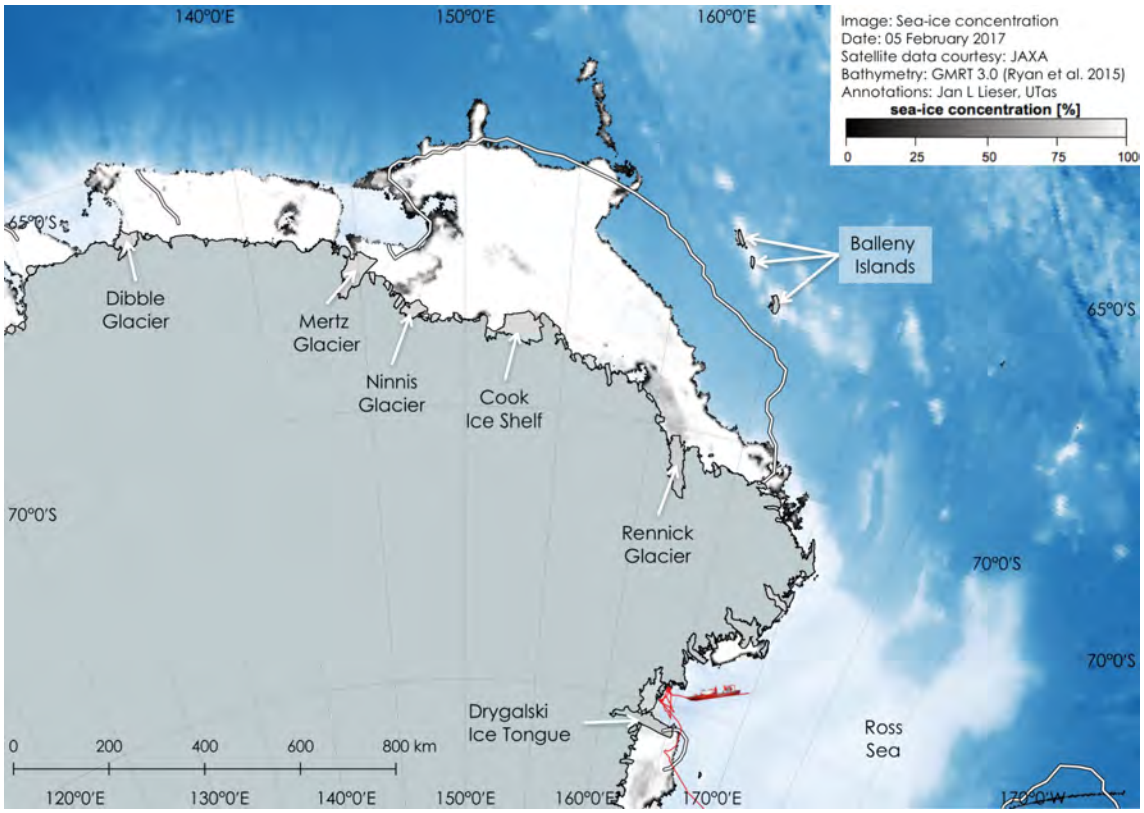

Figure 1: Sea-ice concentration chart acquired 05/02/2017 and provided by Universität Hamburg.

Off the Adélie Coast (between Dibble Glacier and Mertz Glacier), the sea-ice edge follows roughly the continental shelf break. Off George V Coast (between Mertz Glacier and Cook Ice Shelf), sea-ice is largely confined to the median sea-ice extent for February, but further east, off Oates Coast (between Cook Ice Shelf and Rennick Glacier), the sea-ice edge is about 60 nautical miles south of the February median extent.

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Sea Ice Report #07.4/2017

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

08/02/2017

Sabrina Coast

Figure 1 shows a high-resolution sea-ice concentration chart, off Sabrina Coast, with coloured rectangles indicating areas of operational interest to a marine science voyage on-board RV *Investigator*. The blue line shows the cruise track of the vessel (up to 08/02/2017 04:00 UT).

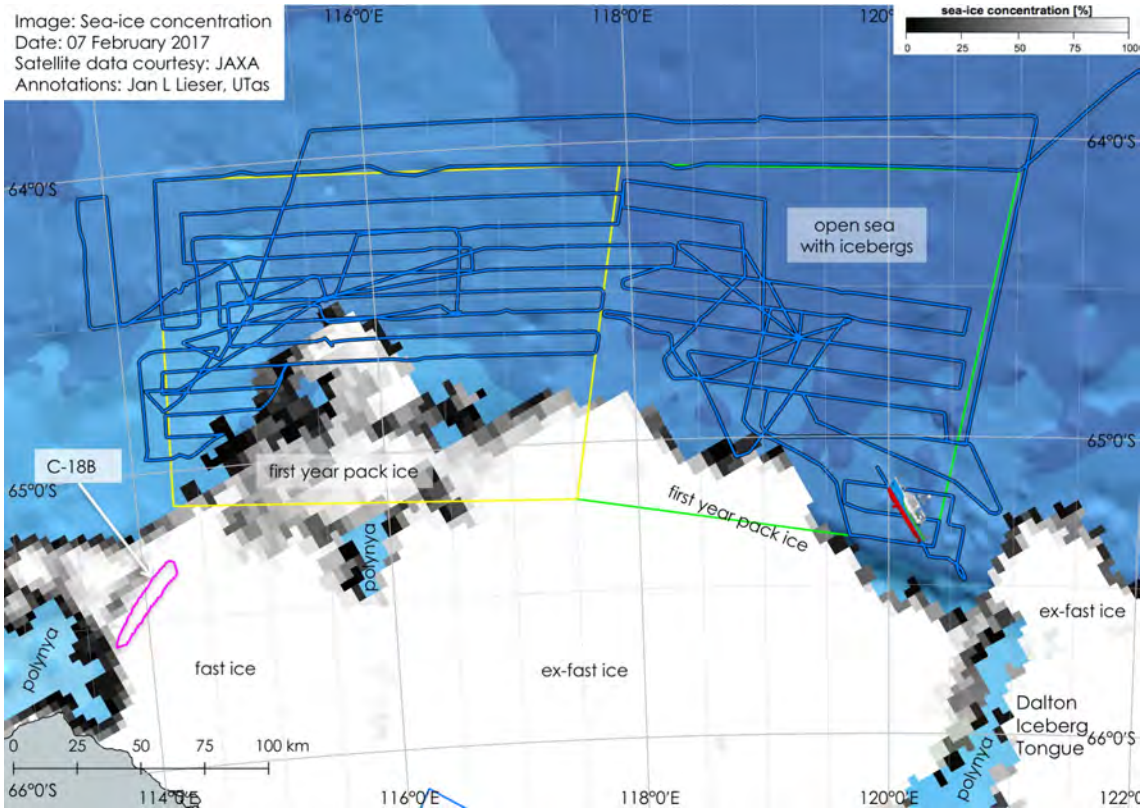

Figure 1: Sea-ice concentration chart, acquired 07/02/2017 and provided by Universität Hamburg.

In the eastern area of operations (green rectangle), the sea-ice edge shows signs of starting consolidation with an increased southwesterly shift of the pack ice where the sea ice is responding to increasing easterly winds.

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Sea Ice Report #07.5/2017

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

09/02/2017

Sabrina Coast

Figure 1 shows a SAR scene off Sabrina Coast, with coloured rectangles indicating areas of operational interest to a marine science voyage on-board RV *Investigator*. The blue line shows the cruise track of the vessel (up to 08/02/2017 23:00 UT).

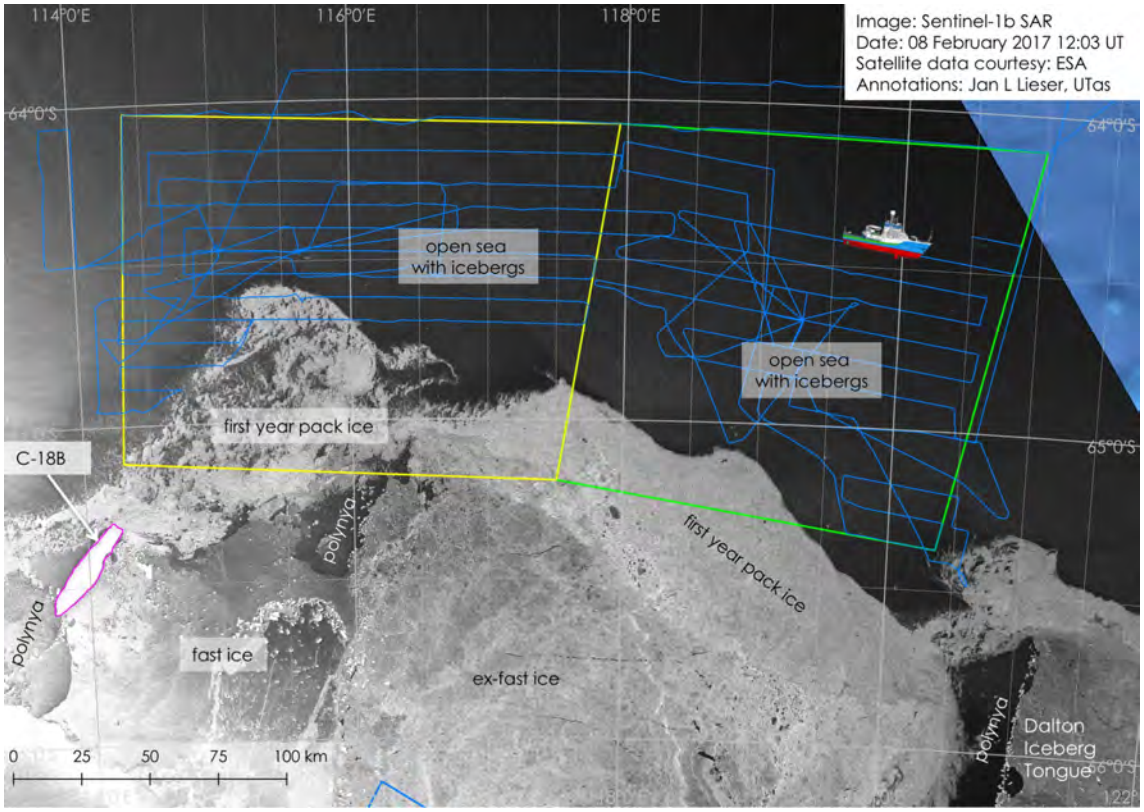

Figure 1: Sentinel-1b SAR scene, acquired 08/02/2017 and provided by PolarView.

The prevailing easterlies have compacted the sea-ice edge, in the eastern area of operation (green rectangle), and pushed it southwestward. This trend appears to be extending into the southeastern corner of the western operations area (yellow rectangle), but not quite reaching 116° E.

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Sea Ice Report #07.6/2017

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

09/02/2017

Prydz Bay

Figure 1 shows a SAR and visible data composite of the larger Prydz Bay region.

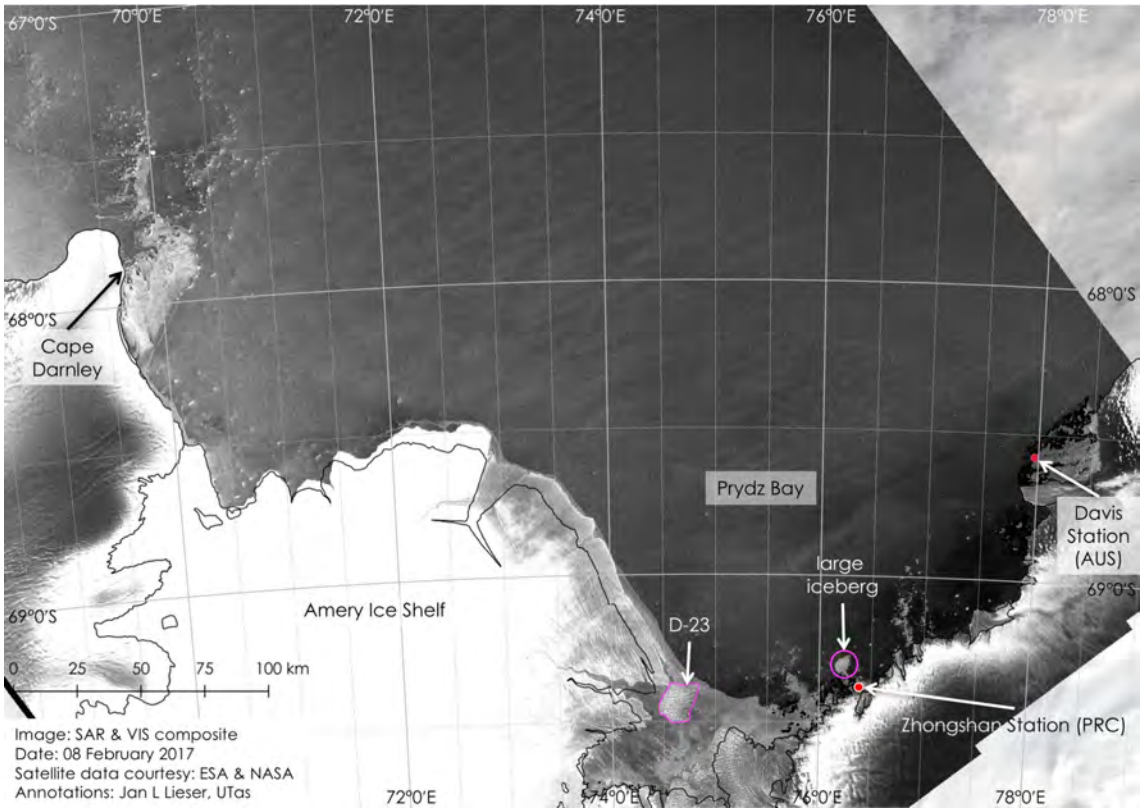

Figure 1: Sentinel-1b SAR, acquired 08/02/2017 15:20 UT and provided by PolarView; complemented by AQUA MODIS VIS scene, acquired 08/02/2017 and provided by NASA.

The last remaining fast ice in the region continues to break up. East of Cape Darnley, roughly 550 km^2 of fast ice have disintegrated, during the last week, and most of it has melted on its westward drift. Only little ex-fast ice is still trapped east of a row of icebergs, west of 70° E.

Off Zhongshan Station, a tabular iceberg (roughly 27 km^2) is grounded. East of the Amery Ice Shelf, the large tabular iceberg D-23 (roughly 160 km^2) remains enclosed by fast ice.

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Sea Ice Report #07.7/2017

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

09/02/2017

Sabrina Coast

Figure 1 shows a sea-ice concentration difference chart off Sabrina Coast, with coloured rectangles indicating areas of operational interest to a marine science voyage on-board RV *Investigator*. The blue line shows the cruise track of the vessel (up to 09/02/2017 02:00 UT).

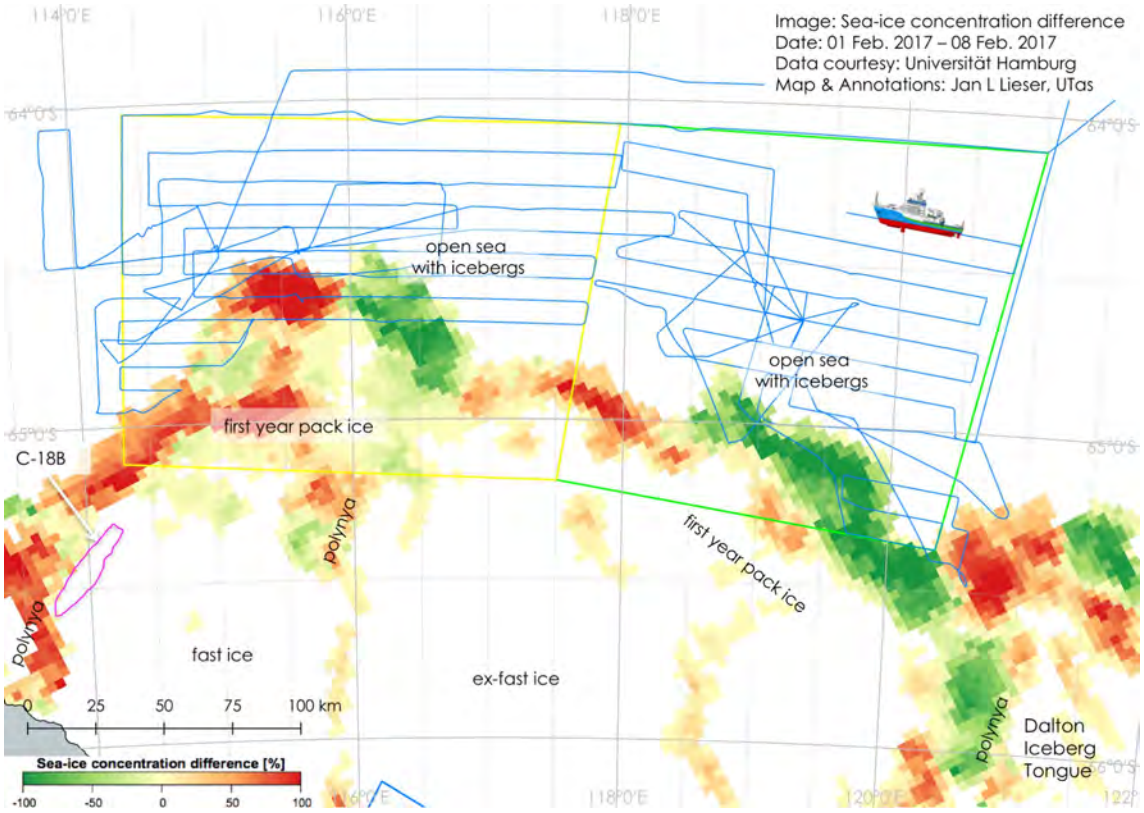

Figure 1: Sea-ice concentration difference, data provided by Universität Hamburg.

The colour-coding of the chart shows areas that have less sea ice now (08/02/17), compared to a week earlier (01/02/17), in green shading and areas that have more sea ice now in red shading (zero difference is white). It shows the overall westward drift of the ice edge, during the past week. West of the Dalton Iceberg Tongue, a region with less sea ice has opened and larger cracks within the ex-fast ice have closed (red streaks crossing the ex-fast ice area).

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Sea Ice Report #08.1/2017

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

14/02/2017

Sabrina Coast

Figure 1 shows a visible scene off Sabrina Coast, with coloured rectangles indicating areas of operational interest to a marine science voyage on-board RV *Investigator*. The blue line shows the cruise track of the vessel (up to 13/02/2017 23:00 UT).

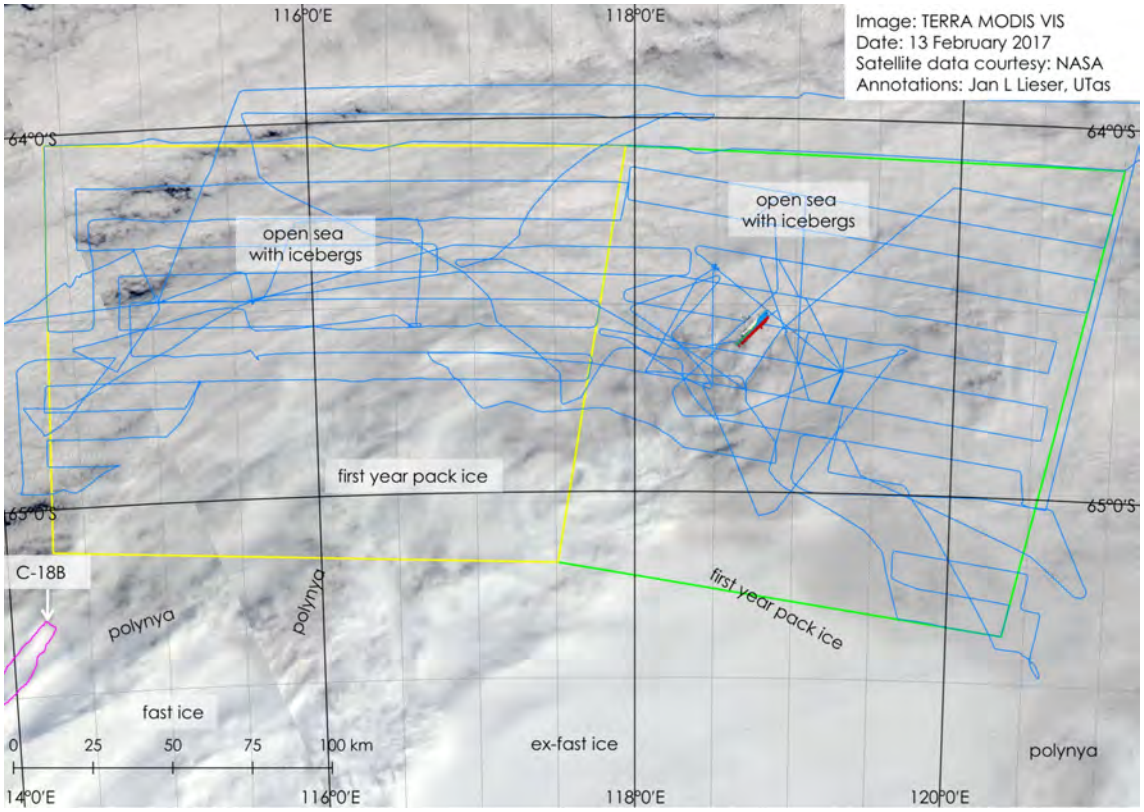

Figure 1: TERRA MODIS VIS scene, data acquired 13/02/2017 and provided by NASA.

The scene is entirely obscured by clouds and the sea-ice edge is not positively identifiable. The cloud pattern shows a small vortex with its centre at 117° E and 65° S.
During the previous couple of days, variations in wind direction and strength have allowed for sea ice to extend further northward, drifting as strips and patches as far north as 64° 25' S, at 116° 10' E.
Further south, ex-fast ice shows many wide, predominantly east-west oriented cracks and leads throughout its main body.

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Sea Ice Report #08.2/2017

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

14/02/2017

Sabrina Coast

As an update to Sea Ice Report #8.1/2017, Figure 1 shows a SAR scene on top of visible data off Sabrina Coast, with coloured rectangles indicating areas of operational interest to a marine science voyage on-board RV *Investigator*. The blue line shows the cruise track of the vessel (up to 14/02/2017 00:00 UT).

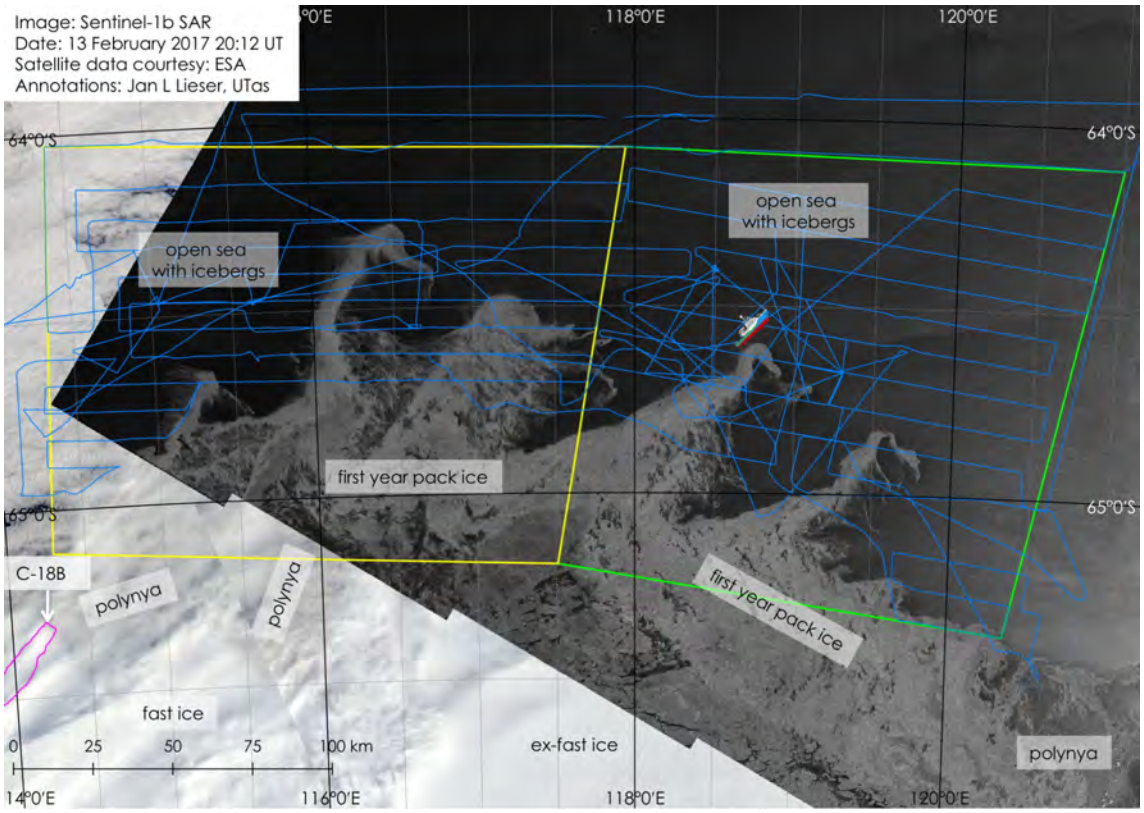

Figure 1: Sentinel-1b SAR scene, acquired 13/02/2017 and provided by PolarView; Background: TERRA MODIS VIS scene, acquired 13/02/2017 and provided by NASA.

The SAR scene provides a view through the clouds. Hook-like sea-ice features extending northward from the first-year pack ice are clearly identifiable. Open water patches are also visible in the southern part of the SAR scene, showing some of the cracks and leads mentioned previously.

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Figure 2 shows the same geographical frame as Figure 1, but a high resolution sea-ice concentration chart.

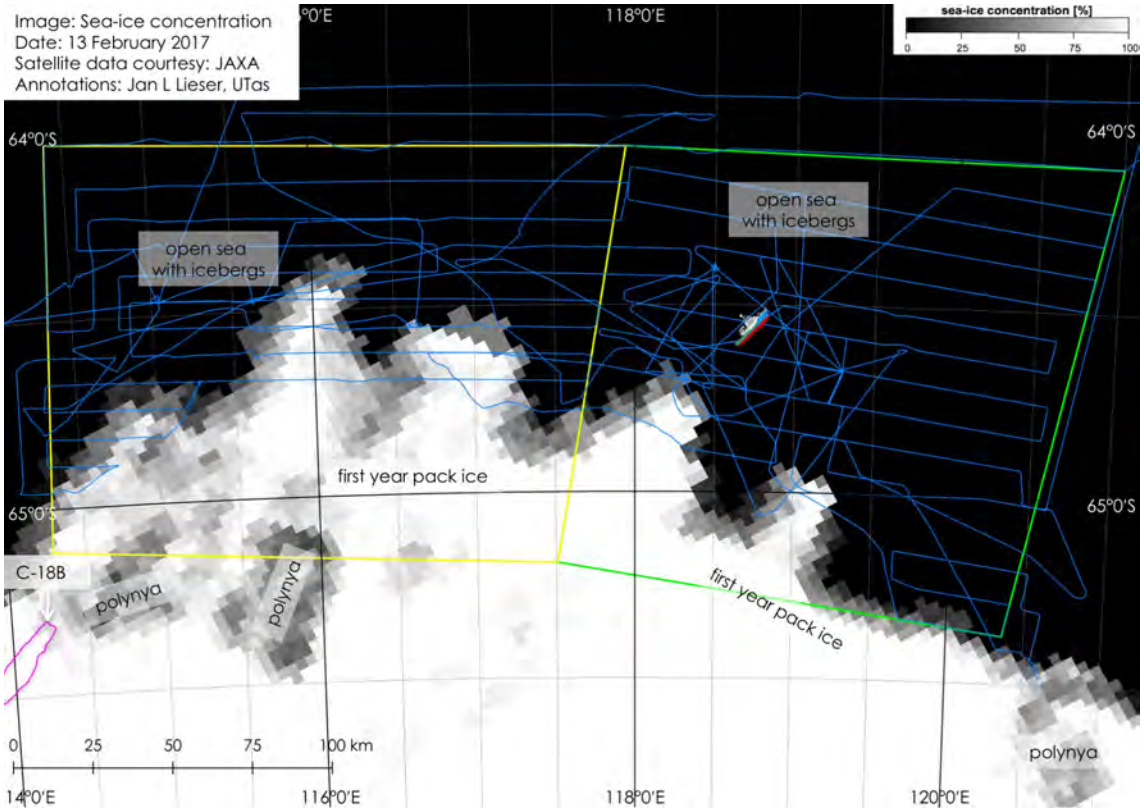

Figure 2: Sea-ice concentration chart, acquired 13/02/2017 and provided by Universität Hamburg.

The general shape of the sea-ice edge is recognisable, but the small scale features visible in the SAR scene are not, due to the processing of the AMSR-2 data.

Sea Ice Report #08.3/2017

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

14/02/2017

Mawson Coast

Figure 1 shows visible data off Mawson Coast. The orange line shows the cruise track of RSV *Aurora Australis* (up to 14/02/2017 00:00 UT).

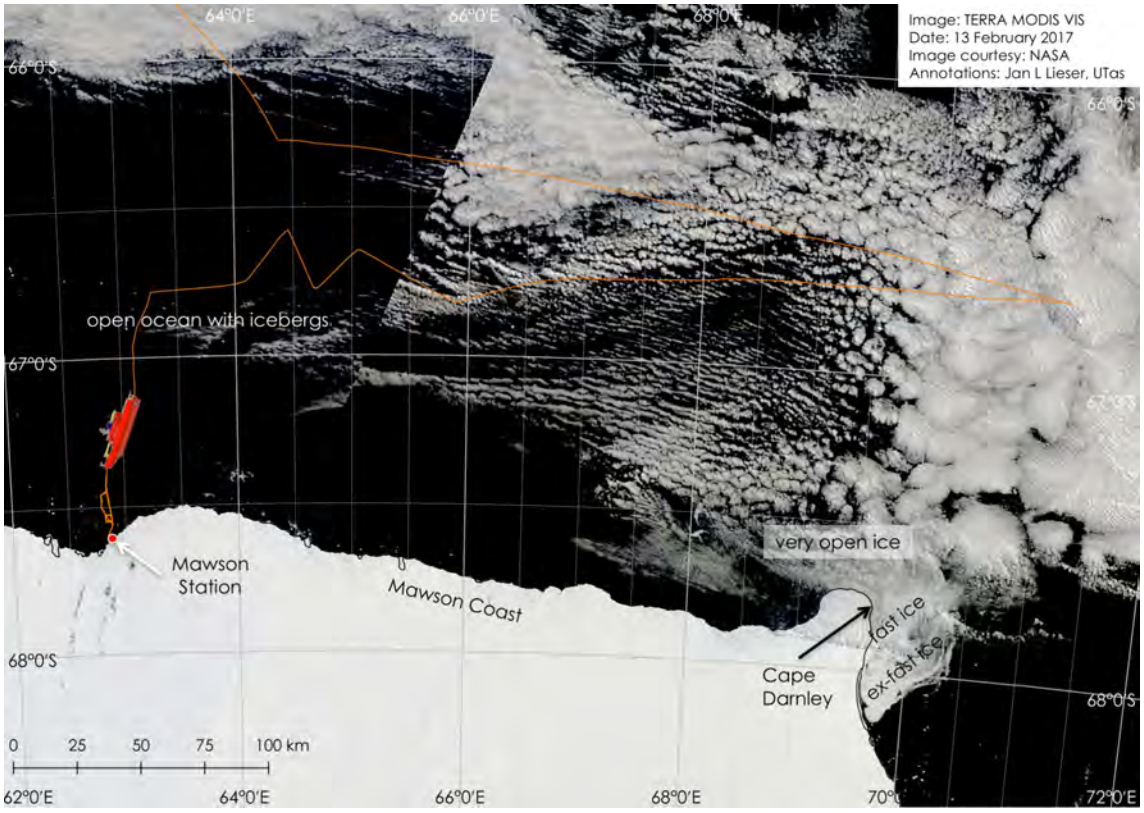

Figure 1: TERRA MODIS VIS scene, acquired 13/02/2017 and provided by NASA.

Mawson Coast remains free of sea ice and fast ice. Only far west of Mawson Station, some fast ice is still in Edward VIII Bay. Off Cape Darnley, the last fast ice attached to the coast crumbles and only loose ex-fast ice around the cape is drifting westwards.

D'Urville Sea

Figure 2 shows a SAR scene, between Dumont D'Urville Station and Mertz Glacier.

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Off Dumont D'Urville Station, the large sheet of fast ice is breaking up, with a polynya appearing west of the station and Antarctic coast being exposed to the large polynya, which is west of three large tabular icebergs north of Mawsons Huts/Cape Danison. Fast ice around those bergs is also breaking further, particularly around the many smaller bergs grounded between icebergs C-29 and B-9B and around iceberg B-9B. Iceberg C-15 appears still not grounded, as it was rotating by roughly 25 degrees counter-clockwise since the end of January.

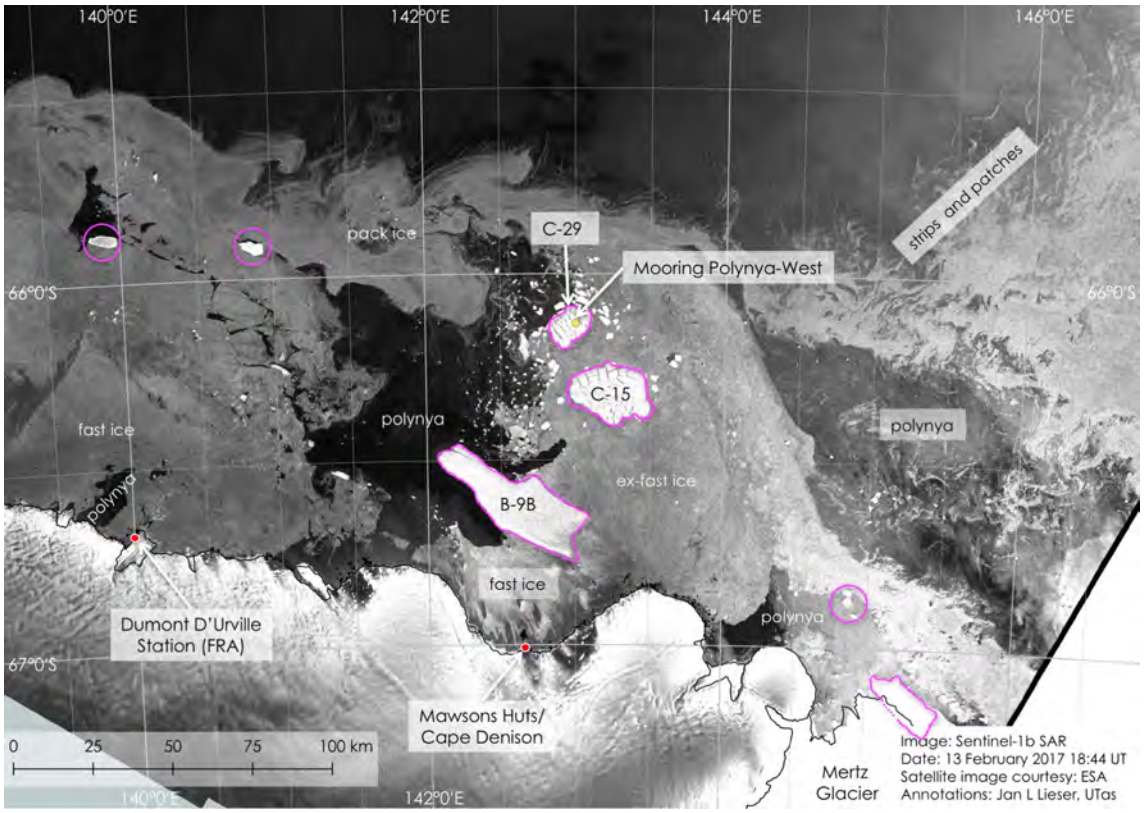

Figure 2: Sentinel-1b SAR scene, acquired 13/02/2017 and provided by PolarView.

The location of an oceanographic mooring (yellow dot) remains occupied by iceberg C-29.

Sea Ice Report #08.4/2017

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

15/02/2017

Antarctica

Figure 1 shows the sea-ice concentration anomaly for January 2017, which is the difference between the mean sea-ice concentration for January 2017 and the average January sea-ice concentration (reference period 1992-2016). The black line in the figure represents the average January sea-ice extent.

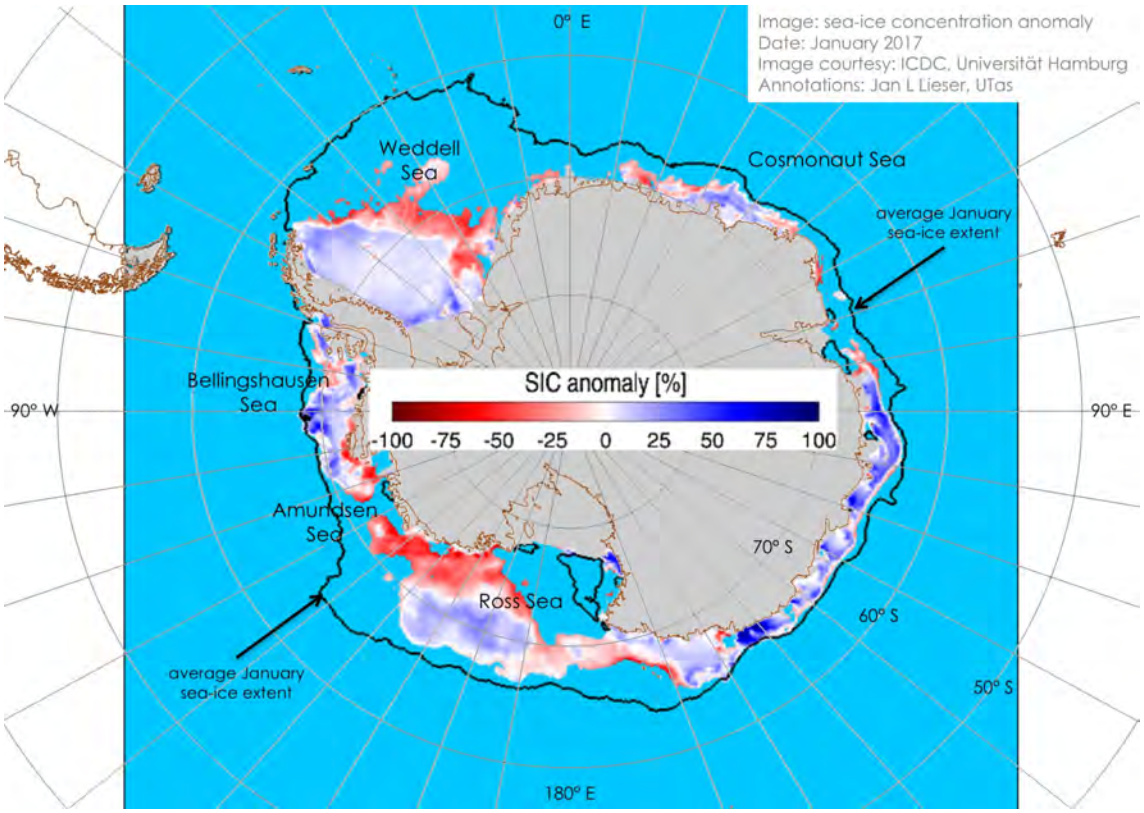

Figure 1: Sea-ice concentration anomaly for January 2017, provided by ICDC, Universität Hamburg.

The pan-Antarctic sea-ice extent is well below the range of ± 2 standard deviations of the mean and therefore anomalously low. The regional distribution of sea-ice concentration anomaly reveals how much below the average the sea-ice extent is, except for two regions — at around 90° W and in parts of East Antarctica. On 12/02/2017, a new lowest sea-ice extent minimum was recorded (2.246×10^6 km^2), but the end of the sea-ice season is still ahead and it is likely to go even lower.

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Sea Ice Report #08.5/2017

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

15/02/2017

Sabrina Coast

Figure 1 shows a visible scene off Sabrina Coast, with coloured rectangles indicating areas of operational interest to a marine science voyage on-board RV *Investigator*. The blue line shows the cruise track of the vessel (up to 15/02/2017 02:00 UT).

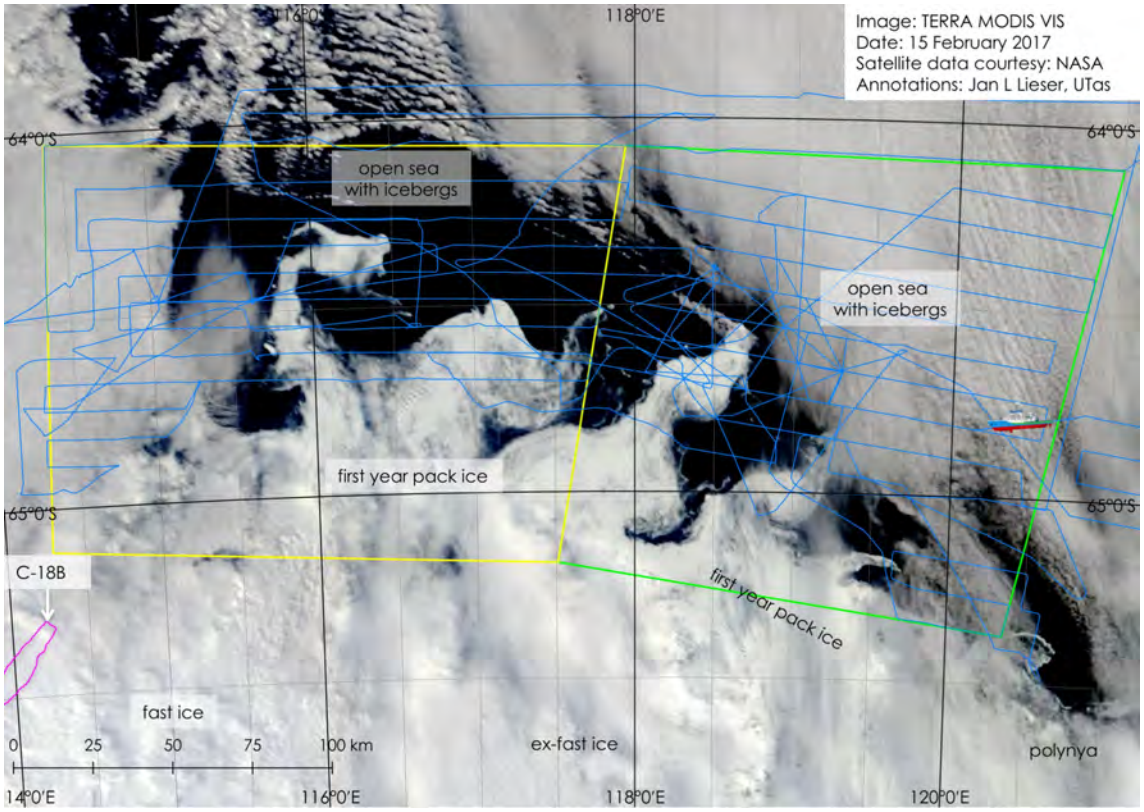

Figure 1: TERRA MODIS VIS scene, data acquired 15/02/2017 and provided by NASA.

The figure shows the extent of hook-like pattern of sea ice protruding northward from the main sea-ice pack.

Figure 2 shows a high-resolution sea-ice concentration chart for the same geographical frame as Figure 1. Comparison of the two figures highlights where the sea-ice concentration chart misses presence of sea ice, due to the radiometric limitations. The median sea-ice extent for February is added as an orange line, in Figure 2.

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Between 114° 15' E and 119° 30' E, the sea-ice extent is above (north of) the median extent.

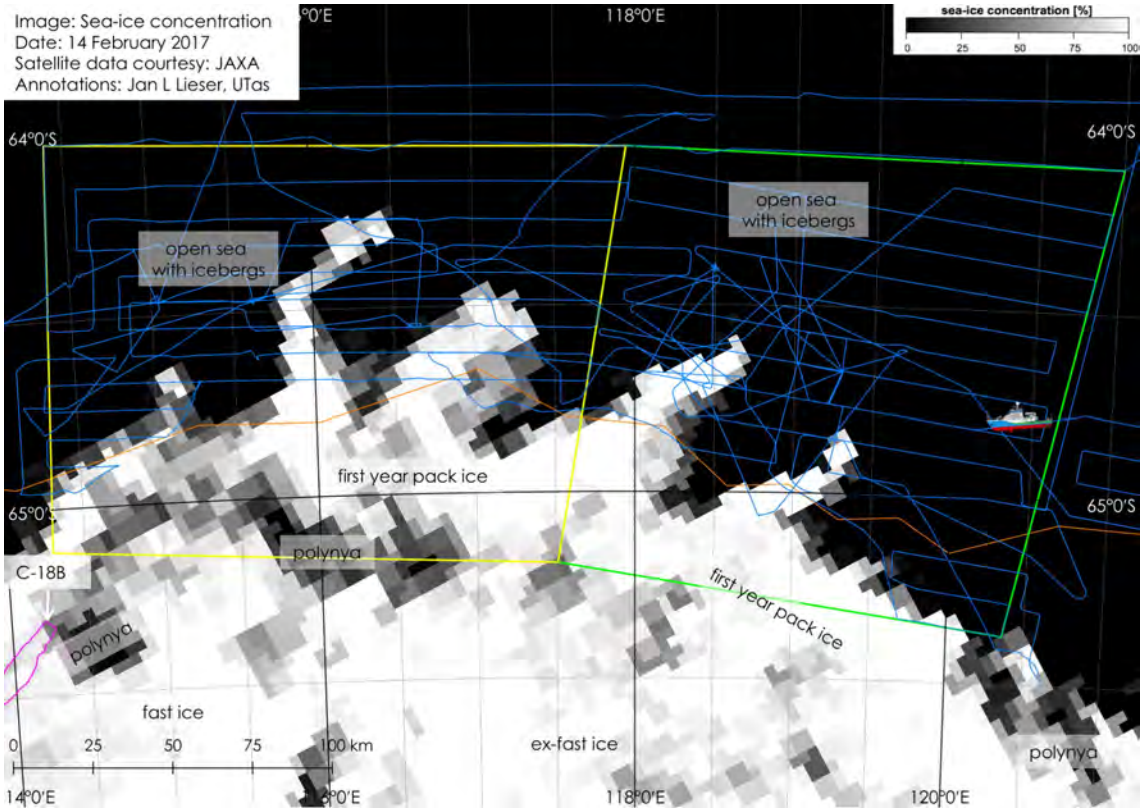

Figure 2: Sea-ice concentration chart, data acquired 14/02/2017 and provided by Universität Hamburg.

Sea Ice Report #08.6/2017

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

15/02/2017

George V Coast/Oates Coast

Figure 1 shows a high-resolution sea-ice concentration chart, with the median sea-ice extent for February (yellow line) off the East Antarctic coast between Mertz Glacier and western Ross Sea. The red line shows the cruise track of RSV *Xue Long* (up to 15/02/2017 05:00 UT).

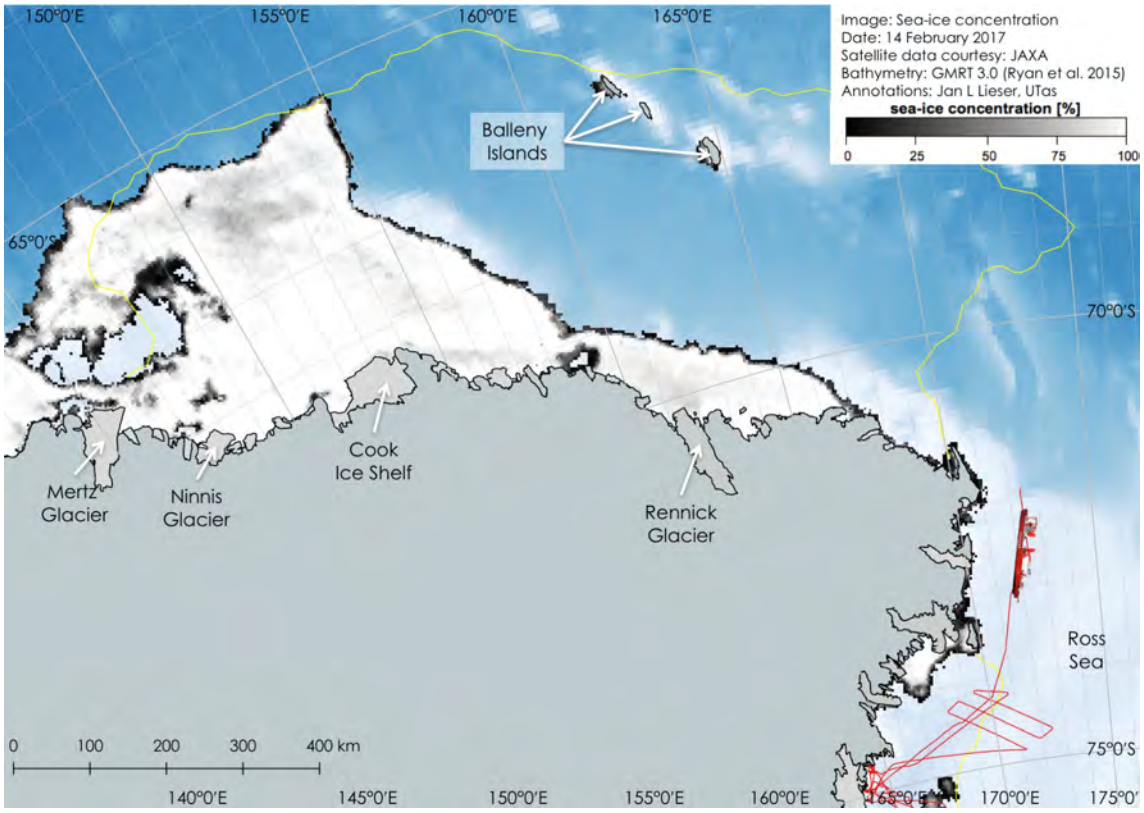

Figure 1: Sea-ice concentration chart acquired 05/02/2017 and provided by Universität Hamburg.

Between the longitudes of Ninnis Glacier and Cook Ice Shelf, sea-ice is around the median sea-ice extent for February, but further west, off Mertz Glacier, sea ice extends further north than average. Off Oates Coast (between Cook Ice Shelf and Rennick Glacier), the sea-ice edge is between 90 nautical miles – at 155° E – and more than 200 nautical miles south of the February median extent.

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Sea Ice Report #08.7/2017

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

16/02/2017

Sabrina Coast

Figure 1 shows a SAR and visible data composite off Sabrina Coast, with coloured rectangles indicating areas of operational interest to a marine science voyage on-board RV *Investigator*. The blue line shows the cruise track of the vessel (up to 15/02/2017 21:00 UT). A persistent open water feature is marked by a green circle, northwest of Totten Glacier.

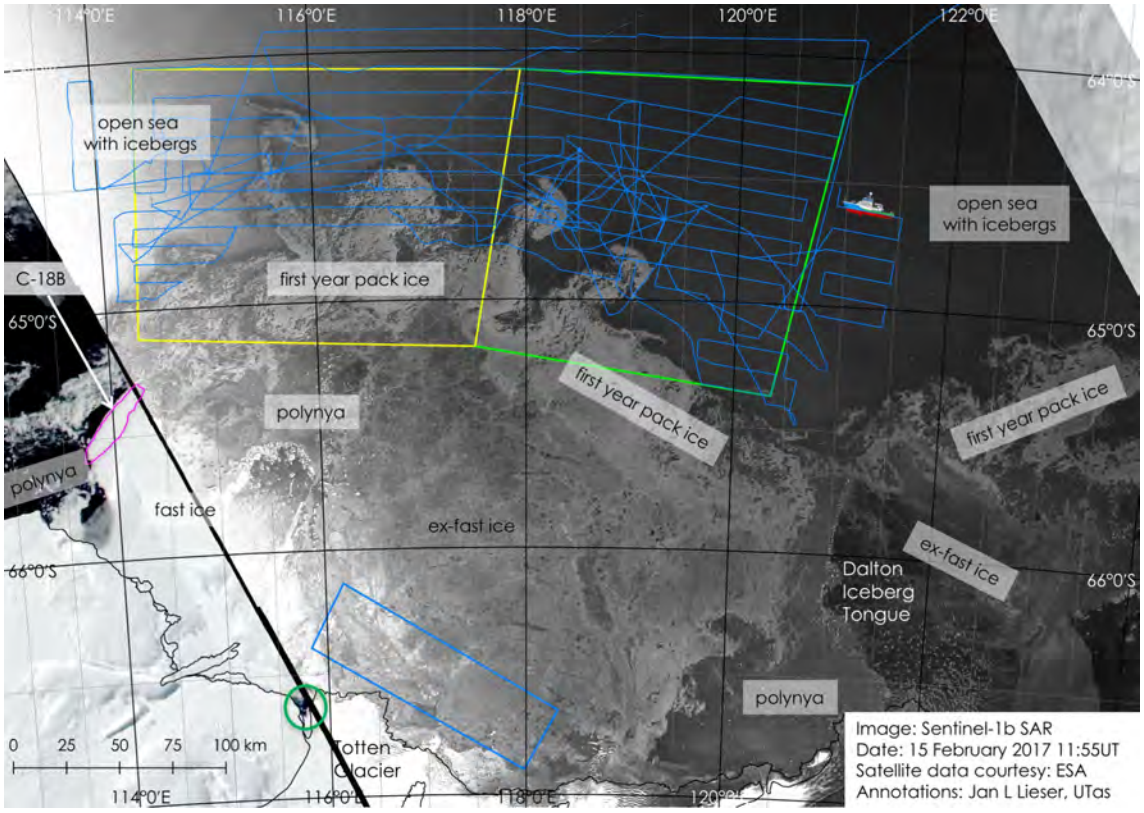

Figure 1: Sentinel-1b SAR scene, data acquired 15/02/2017 and provided by PolarView, complemented by Soumi-NPP VIIRS VIS data (see Figure 2).

The northward protruding hook-like features of sea ice are drifting westward (roughly 35 nautical miles since 13/02/2017 20:00 UT; see Sea Ice Report #08.2/2017), while ex-fast ice north of Totten Glacier is expanding northward, with many cracks and leads opening.

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Figure 2 shows the same geographical frame as Figure 1. The eastern part of the image is obscured by thin clouds, but some of the general sea-ice characteristics are still visible, particularly the many openings in the ex-fast ice, which show up as dark linear streaks in the pack.

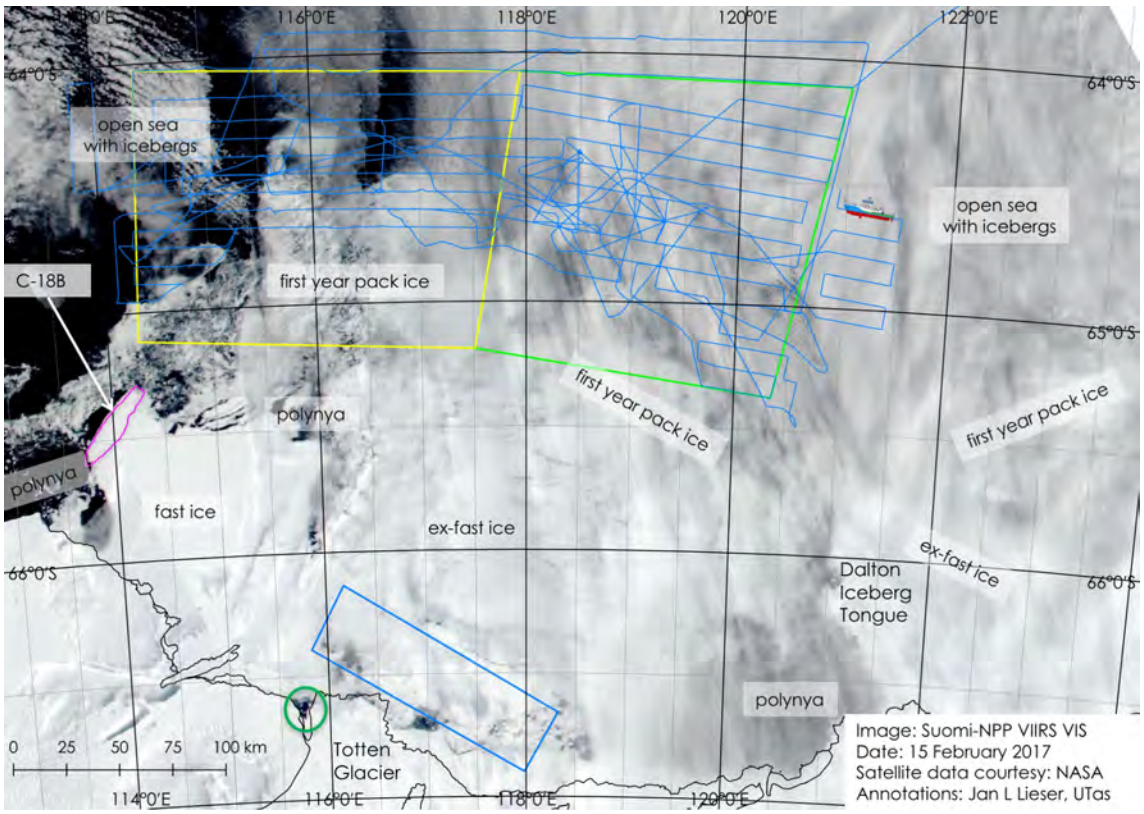

Figure 2: Suomi-NPP VIIRS VIS scene, data acquired 15/02/2017 and provided by NASA.

Sea Ice Report #08.8/2017

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

16/02/2017

Sabrina Coast

Figure 1 shows a visible scene off Sabrina Coast, with coloured rectangles indicating areas of operational interest to a marine science voyage on-board RV *Investigator*. The blue line shows the cruise track of the vessel (up to 16/02/2017 04:00 UT). A persistent open water feature is marked by a green circle, north of Totten Glacier.

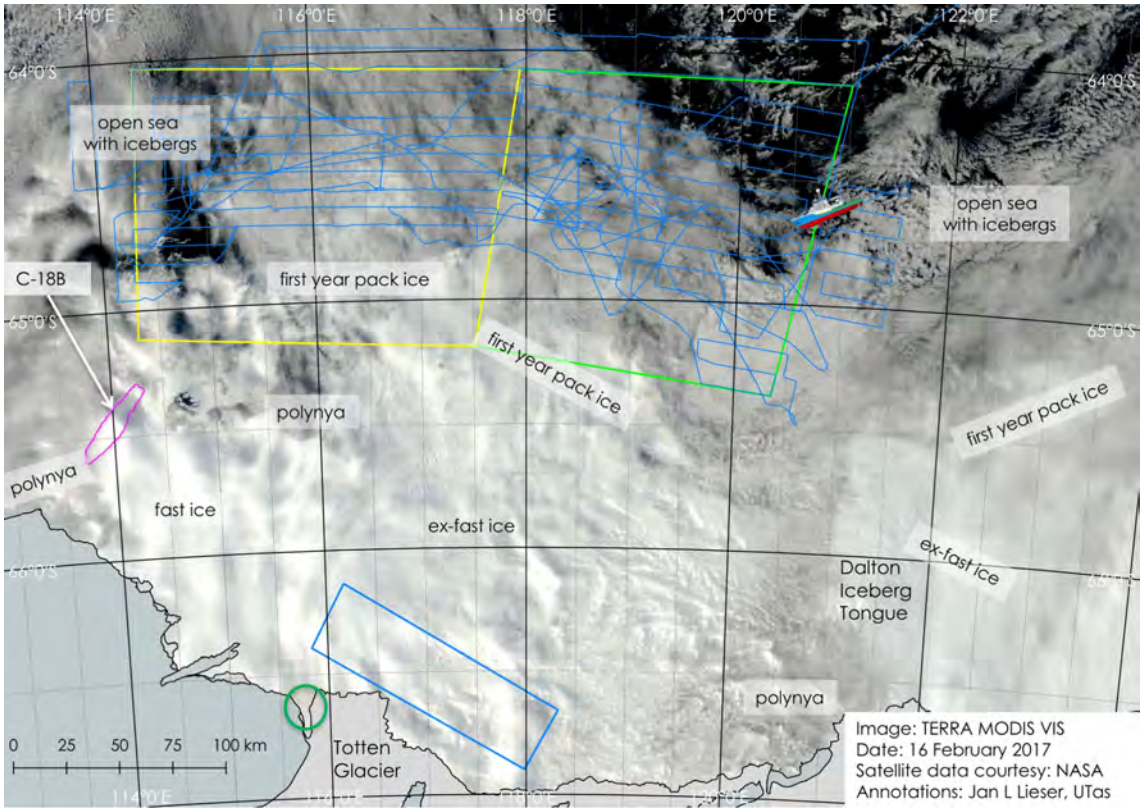

Figure 1: TERRA MODIS VIS scene, data acquired 16/02/2017 and provided by NASA.

The scene is largely obscured by clouds, but it is evident that the currently prevailing winds are pushing loose sea ice of the sea-ice edge westward, even though the precise location of the sea-ice edge is not detectable.

Figure 2 shows a high-resolution sea-ice concentration chart for the same geographical frame as Figure 1. The general westward drift of the ice edge is confirmed (see for comparison Sea Ice Report #08.5/2017).

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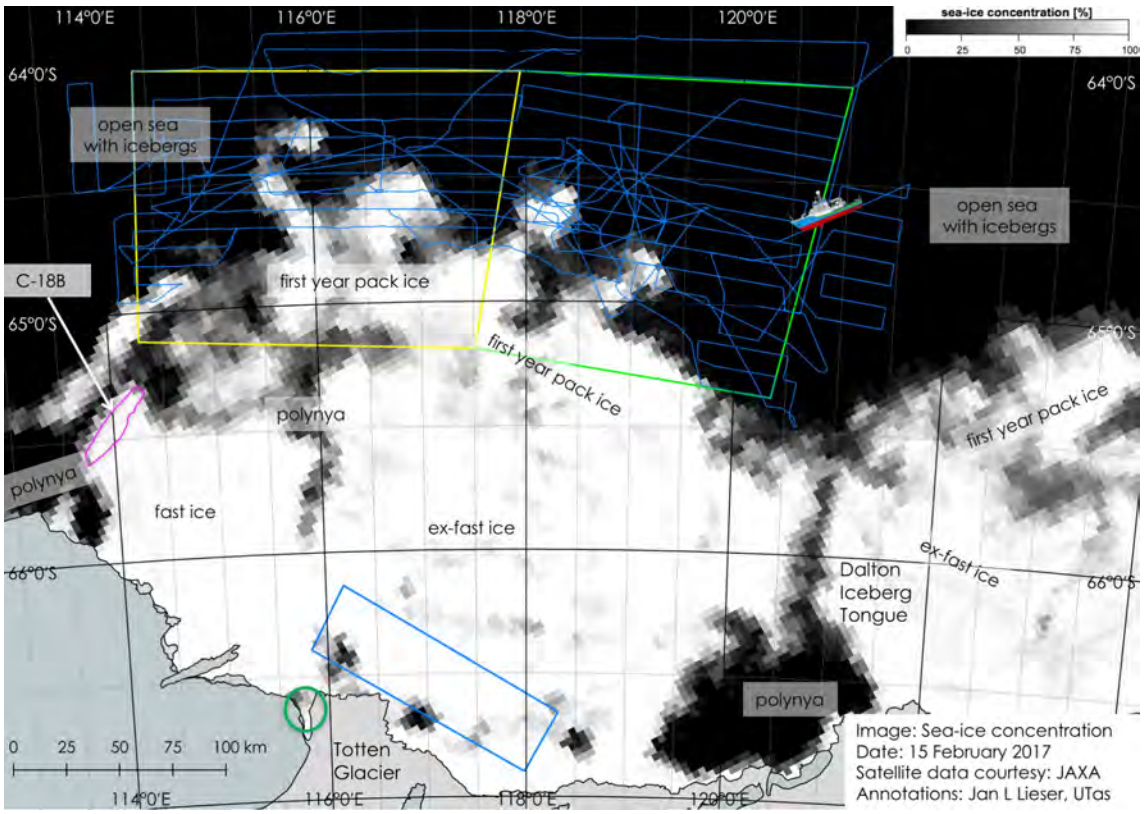

Figure 2: Sea-ice concentration chart, data acquired 15/02/2017 and provided by Universität Hamburg.

Sea Ice Report #09.1/2017

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

20/02/2017

Mawson Coast

Figure 1 shows a SAR scene off Mawson Coast. The orange line shows the cruise track of RSV *Aurora Australis* (up to 19/02/2017 23:00 UT).

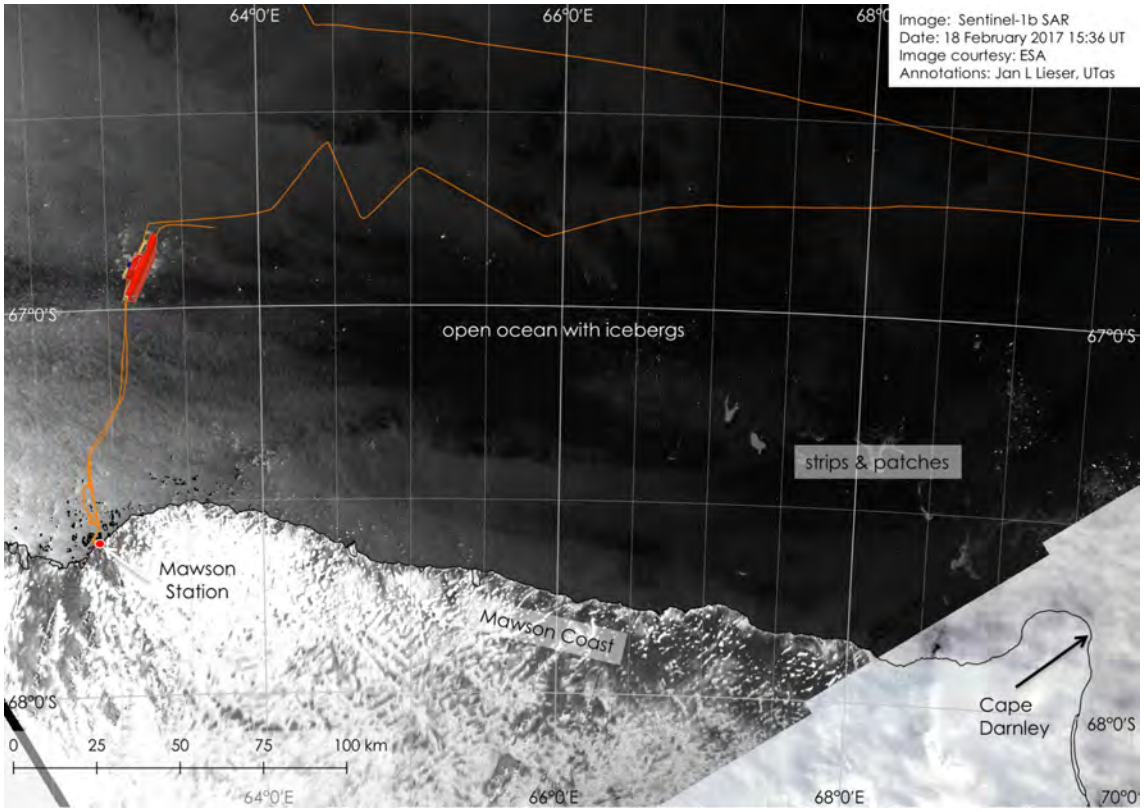

Figure 1: Sentinel-1b SAR scene, acquired 18/02/2017 and provided by PolarView; complemented by AQUA MODIS VIS data, acquired 19/02/2017 and provided by NASA.

No fast ice is attached to Mawson Coast. Southeast of Cape Darnley, the last pieces fast ice are breaking up and drifting as very open strips and patches northwestward. Many icebergs remain floating in the area.

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Prydz Bay

Figure 2 shows a SAR scene of Prydz Bay.

Only in the southern tip of Prydz Bay, some fast ice remains, mostly around iceberg D-23. Off the Larsemann Hills (home of Zhongshan Station), many icebergs are grounded, but only little fast ice. One large tabular iceberg is located north of the hills and has moved slightly northward while rotating a little clockwise.

Off Vestfold Hills (home of Davis Station), no fast ice is found but icebergs are grounded offshore.

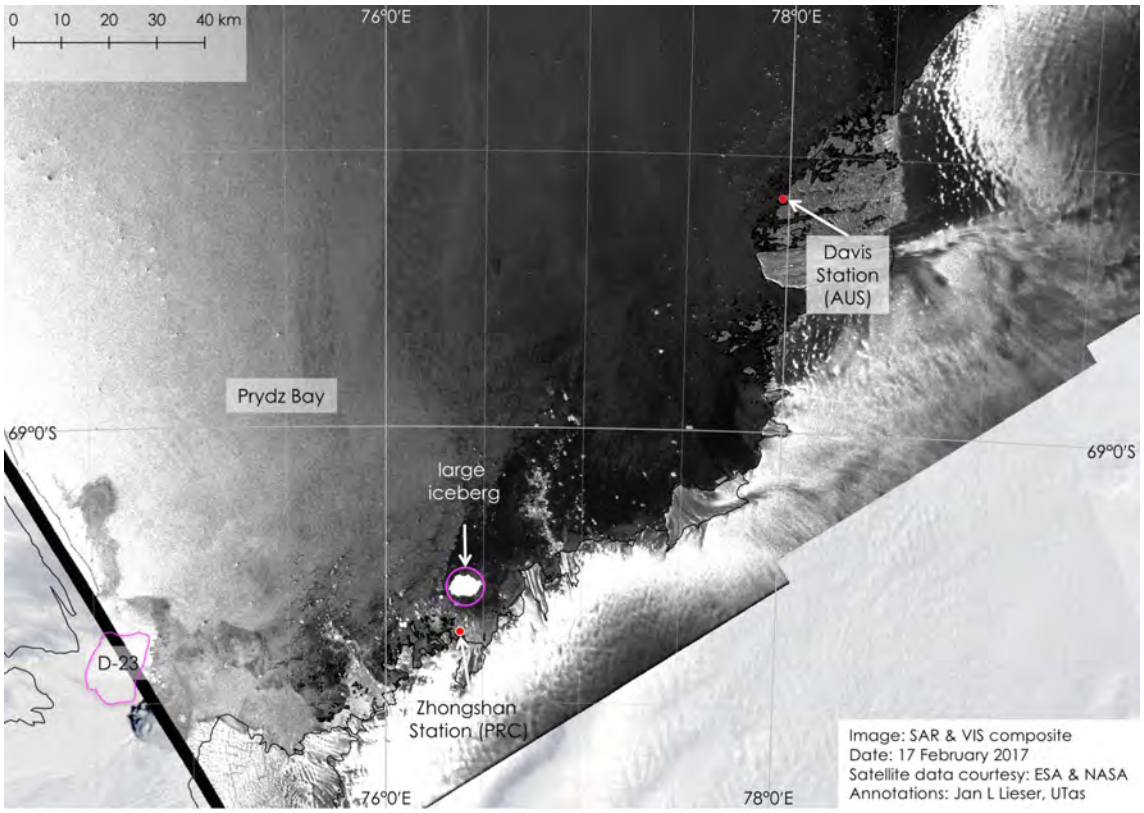

Figure 2: Sentinel-1b SAR scene, acquired 17/02/2017 and provided by PolarView; complemented by AQUA MODIS VIS data, acquired 19/02/2017 and provided by NASA.

Sea Ice Report #09.2/2017

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

20/02/2017

East Antarctica

Figure 1 shows a sea-ice concentration chart off East Antarctica. The red line shows the cruise track of RSV *Xue Long* (up to 20/02/2017 00:00 UT). The median sea-ice extent for February is given by the black-yellow line. Large tabular icebergs are marked as pink dots.

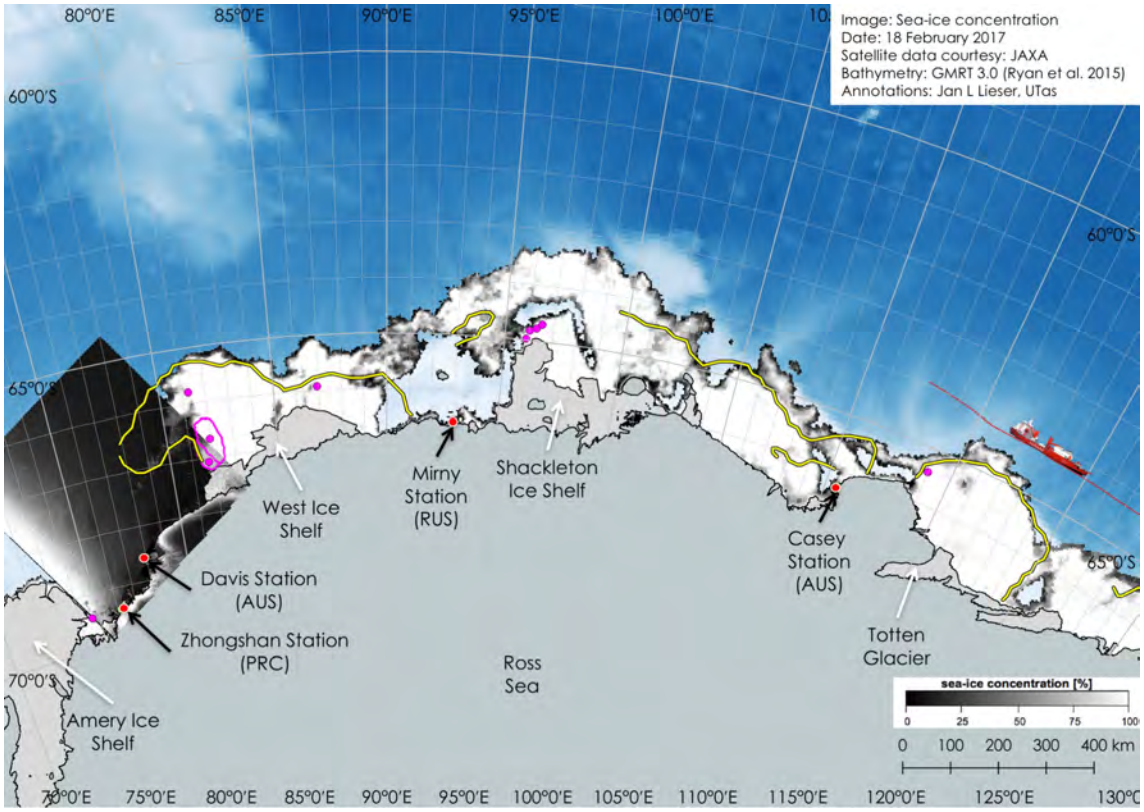

Figure 1: Sea-ice concentration chart, acquired 18/02/2017 and provided by Universität Hamburg. (Prydz Bay SAR overlay see Figure 2.)

Sea ice is largely found within the bounds of the median extent, except off the Shackleton Ice Shelf where sea ice still reaches as far north as almost 63° S.

A SAR scene of southern Prydz Bay is provided in Figure 2. Off Larsemann Hills (home of Zhongshan Station), very little sea ice remains, but a large tabular iceberg is located just north of the hills. This berg has moved slightly northward recently, and rotated a little clockwise.

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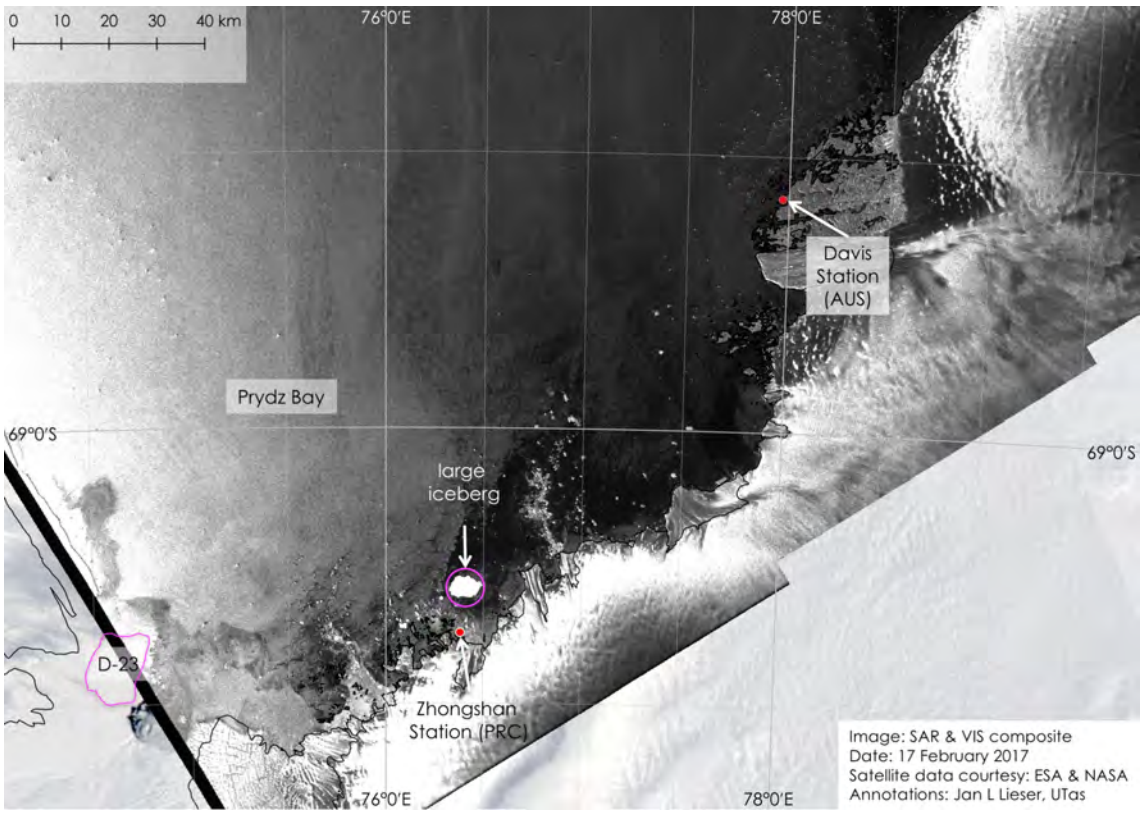

Figure 2: Sentinel-1b SAR scene, acquired 17/02/2017 and provided by PolarView; complemented by AQUA MODIS VIS data, acquired 19/02/2017 and provided by NASA.

Sea Ice Report #09.3/2017

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

21/02/2017

Sabrina Coast

Figure 1 shows a SAR scene off Sabrina Coast, with coloured rectangles indicating areas of operational interest to a marine science voyage on-board RV *Investigator*. The blue line shows the cruise track of the vessel (up to 20/02/2017 22:00 UT).

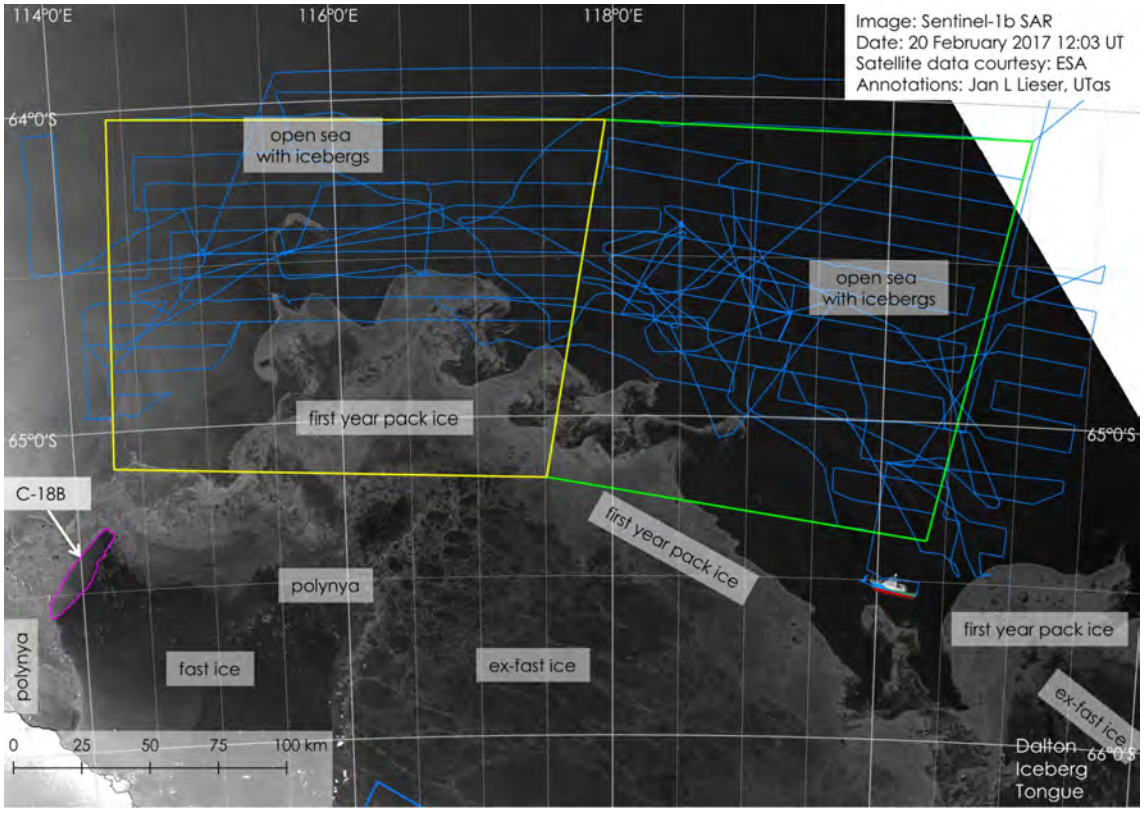

Figure 1: Sentinel-1b SAR scene, acquired 20/02/2017 and provided by PolarView.

East of 118° 30' E, the sea-ice edge has been pushed southwestward and presents as a well defined line.

However, west of 118° 30' E, the sea-ice edge remains fuzzy and small-scale oceanic eddies manifest in the hook-like shapes of loose sea ice, at the northern marginal ice zone.

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Sea Ice Report #09.4/2017

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

21/02/2017

Prydz Bay

Figure 1 shows a SAR scene of Prydz Bay. The orange line shows the cruise track of RSV *Aurora Australis* (up to 20/02/2017 23:00 UT).

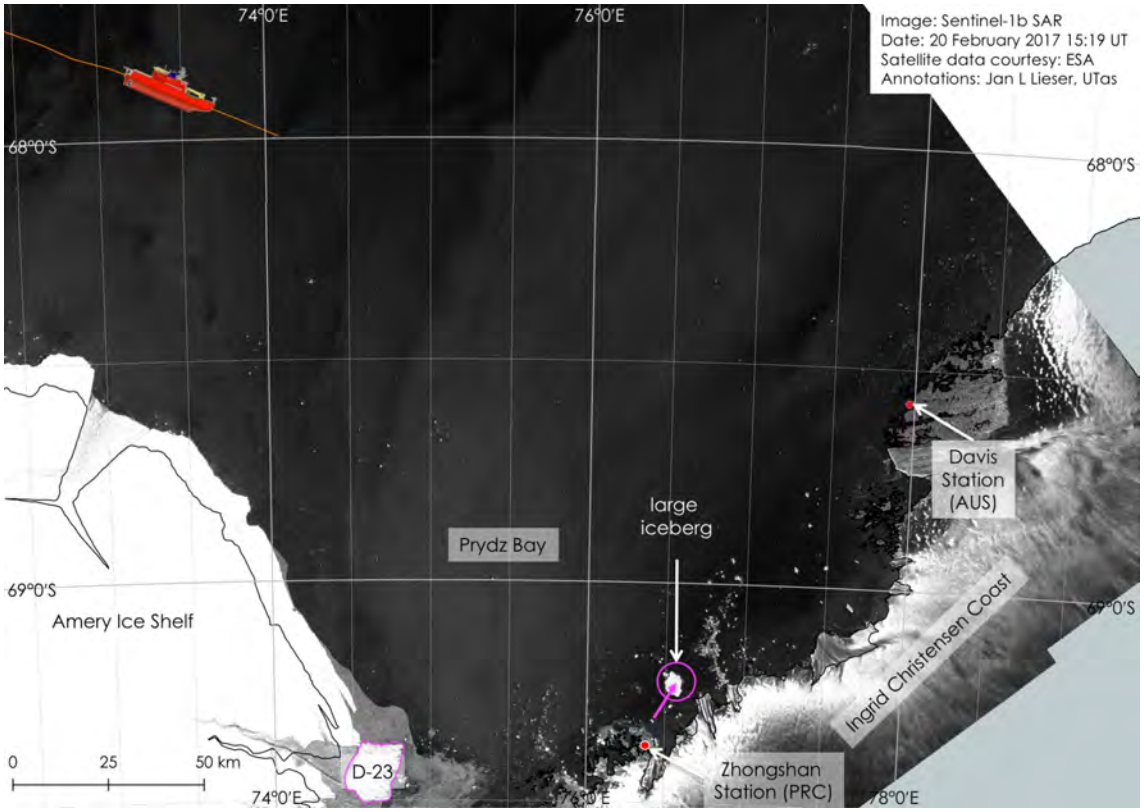

Figure 1: Sentinel-1b SAR scene, acquired 20/02/2017 and provided by PolarView.

Only in southern Prydz Bay, some fast ice remains, mostly around iceberg D-23. Off Davis Station, some icebergs are grounded and a few larger ones are drifting along Ingrid Christensen Coast.

A very large iceberg (marked with a pink circle in the figure), has moved roughly 5 nautical miles northeastward, since 17/02/2017.

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Sea Ice Report #09.5/2017

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

22/02/2017

Sabrina Coast

Figure 1 shows a SAR scene off Sabrina Coast, with coloured rectangles indicating areas of operational interest to a marine science voyage on-board RV *Investigator*. The blue line shows the cruise track of the vessel (up to 21/02/2017 21:00 UT).

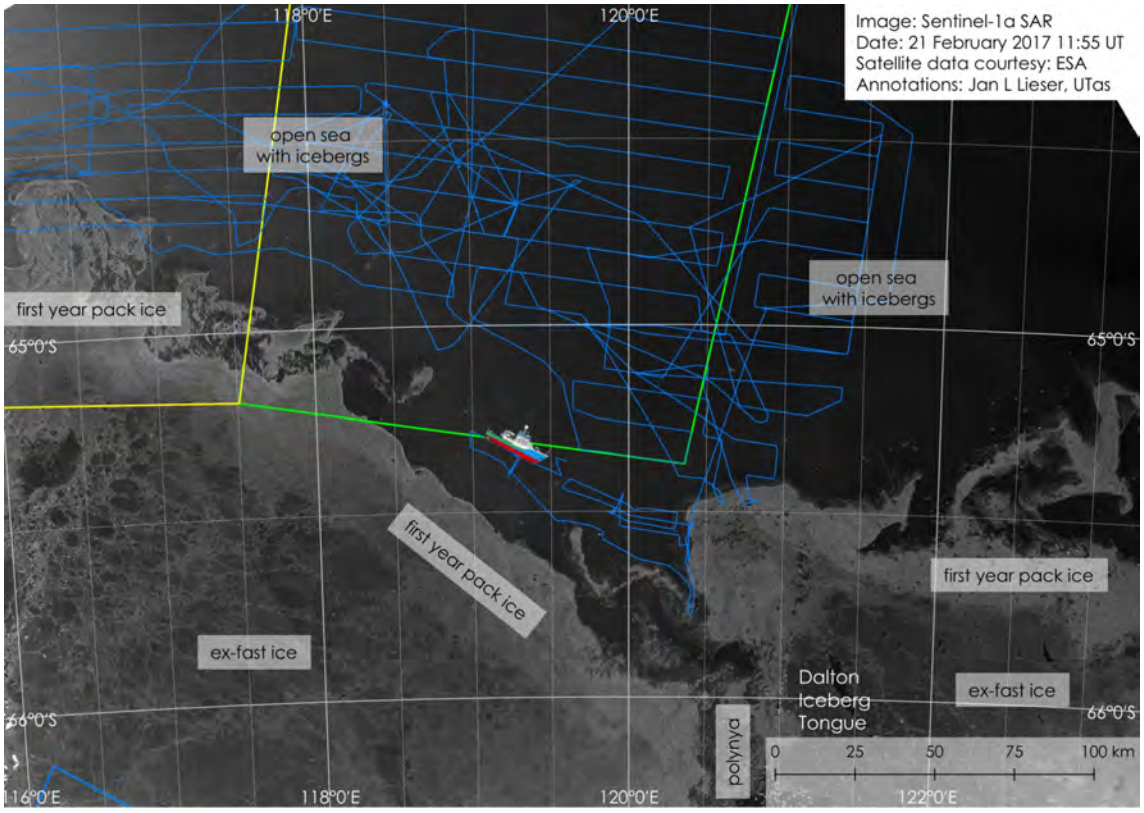

Figure 1: Sentinel-1a SAR scene, acquired 21/02/2017 and provided by PolarView.

During the past 24 hours, the sea-ice edge has been pushed further southwestward. West 118° E, the fuzzy edge is compacted very slightly with a spit-like patch of sea ice still reaching 118° 45' E.

Figure 2 shows the same geographical frame as Figure 1, but visible data from VIIRS instrument. The area of current operations of the vessel is under thin clouds, but the sea-ice edge in the region is clearly discernible.

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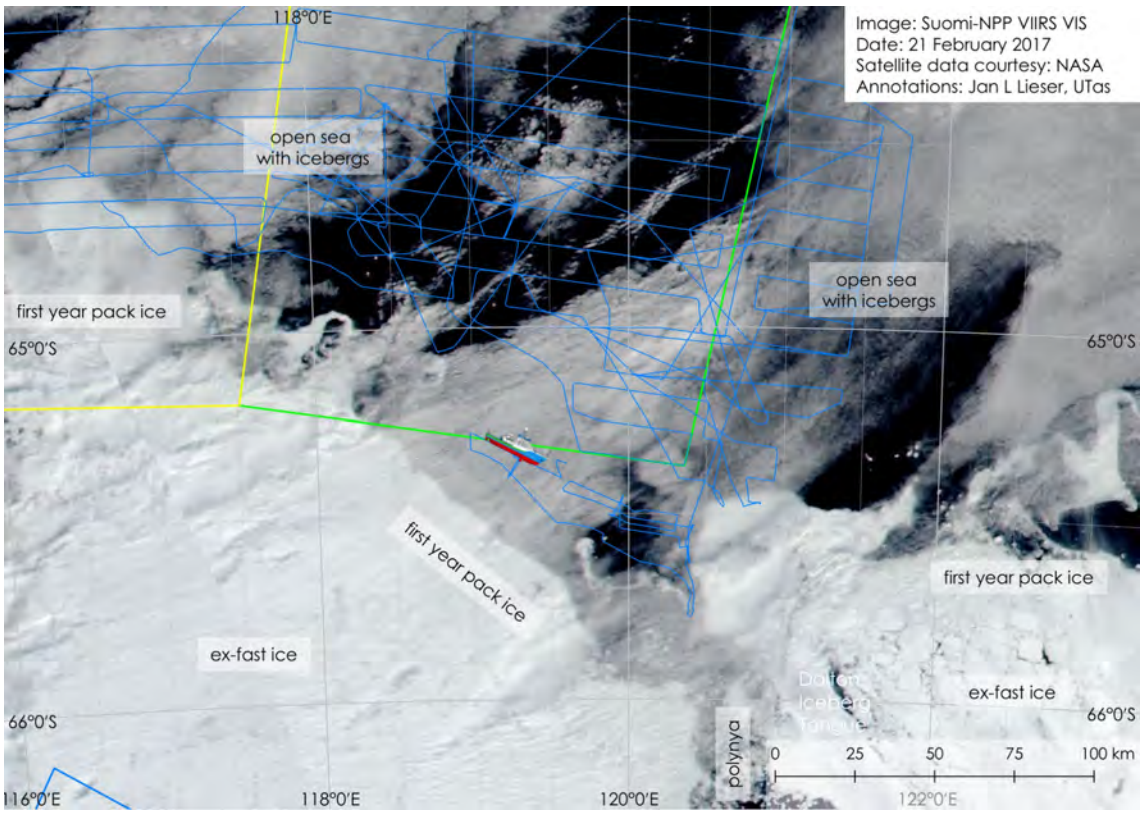

Figure 2: Suomi-NPP VIIRS scene, acquired 21/02/2017 and provided by NASA.

Sea Ice Report #09.6/2017

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

22/02/2017

Cooperation Sea

Figure 1 shows a SAR scene off the West Ice Shelf and southeastern Cooperation Sea.

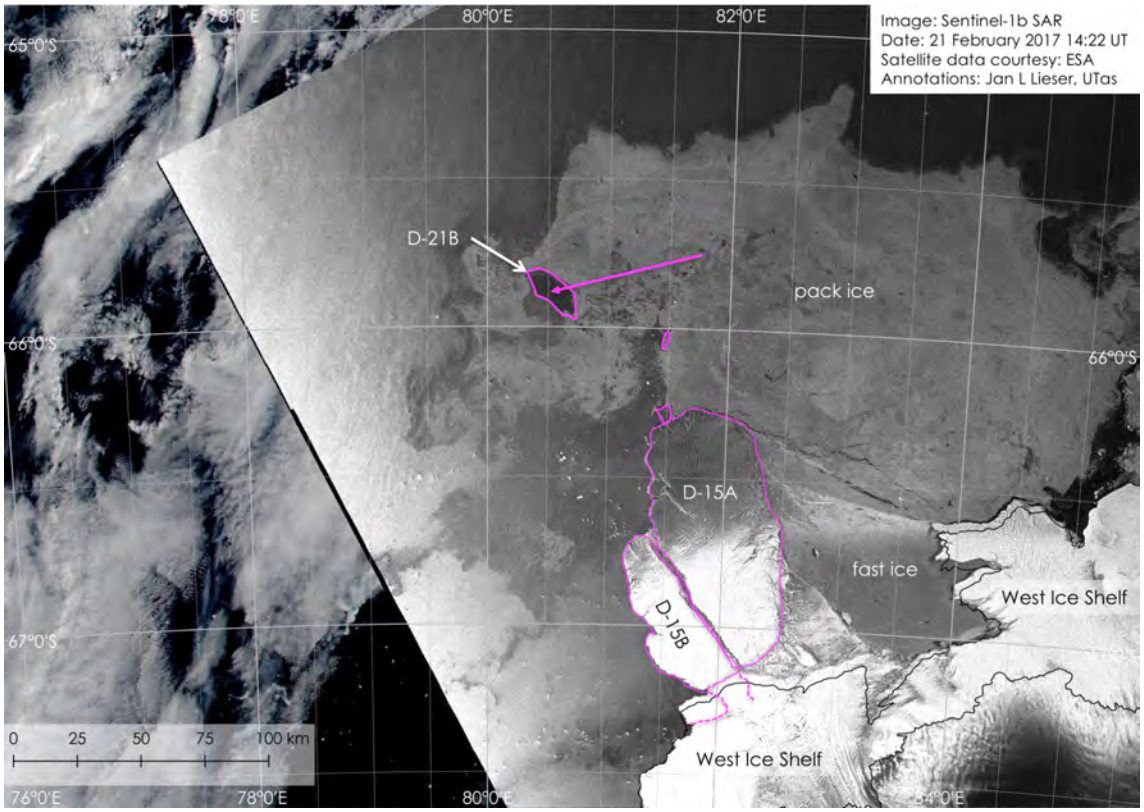

Figure 1: Sentinel-1b SAR scene, acquired 21/02/2017 and provided by PolarView.

A trickle of old pack ice is entering the region west of the West Ice Shelf mostly around the northern extent of a row of smaller iceberg, along 81° 30' E. Up until 06/02/2017, iceberg D-21B was grounded at the northern end of this row of icebergs, but has drifted more than 20 nautical miles westward since then (pink arrow in Figure 1), in a rotating movement. This iceberg has crossed the 1000 m bathymetry into deeper waters and is expected to drift freely now.

Figure 2 shows the same geographical frame as Figure 1, but visible data from VIIRS instrument.

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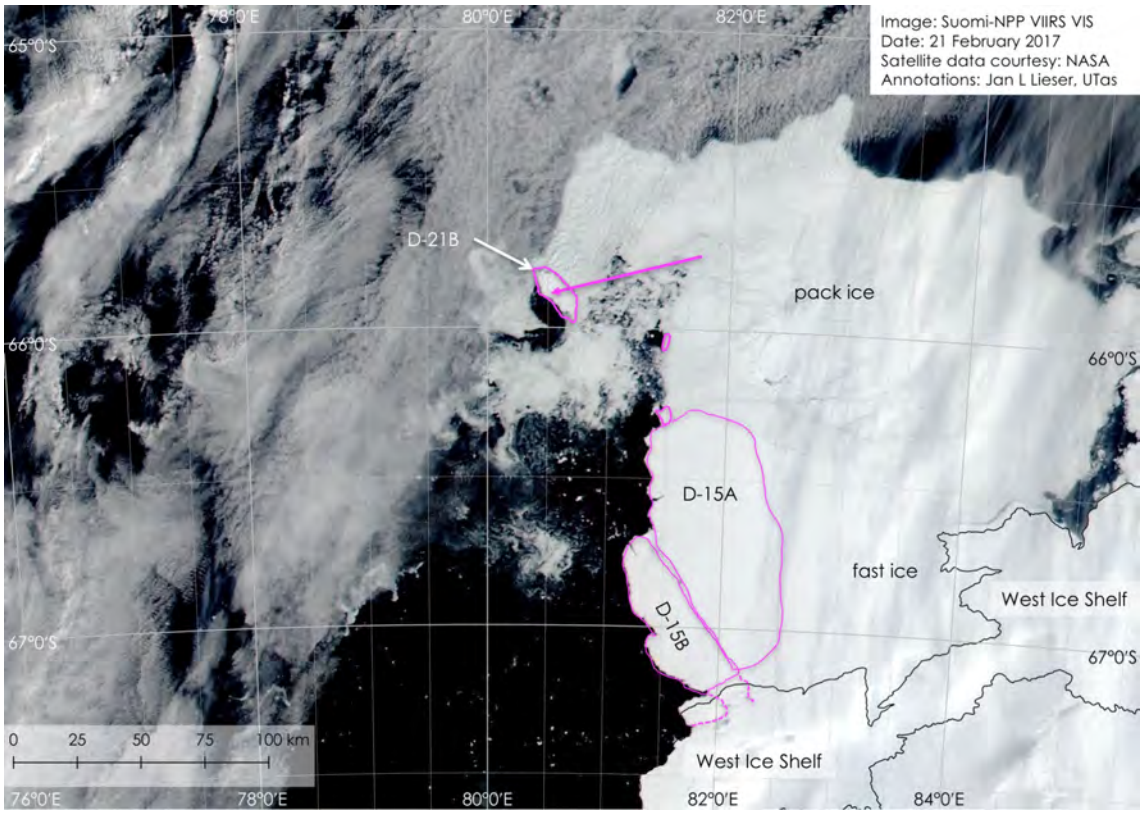

Figure 2: Suomi-NPP VIIRS VIS scene, acquired 21/02/2017 and provided by NASA.

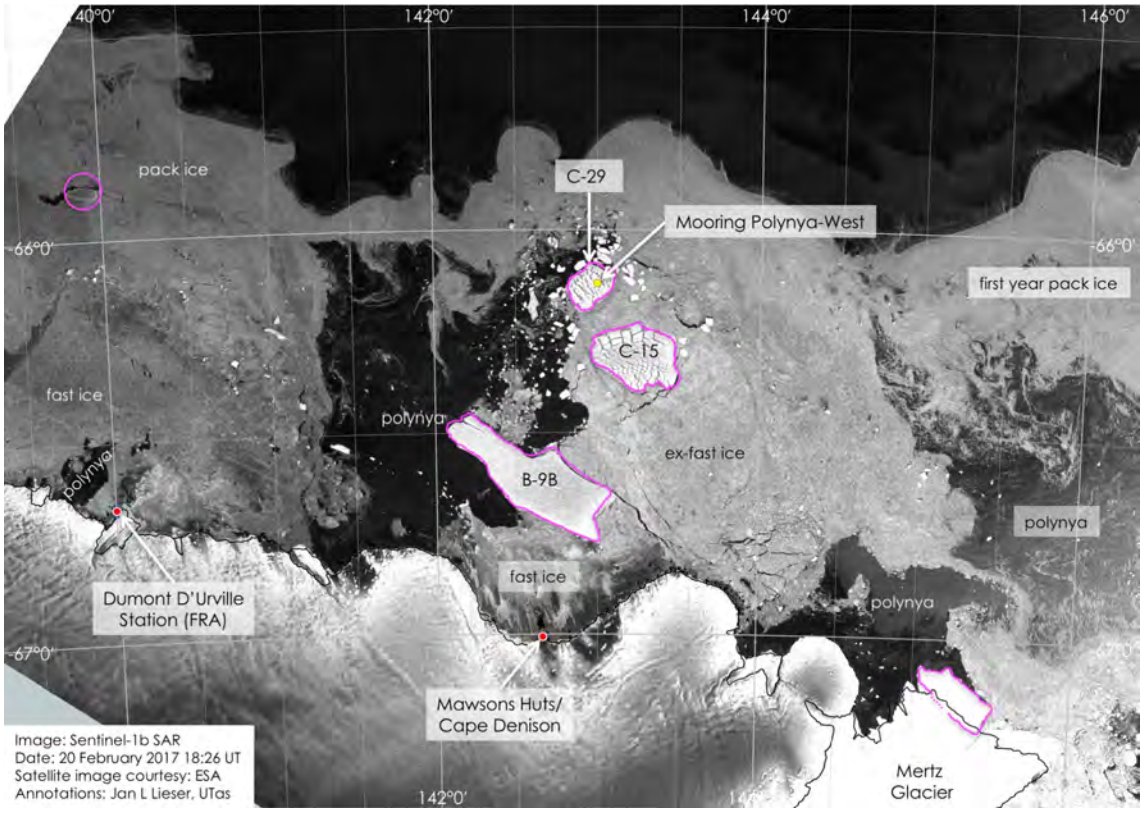

Figure 3: Sentinel-1b SAR scene, acquired 20/02/2017 and provided by PolarView.

D'Urville Sea

Figure 3 shows a SAR scene of D'Urville Sea.

Overall sea-ice conditions have not changed significantly in the area during the past week (see Sea Ice Report #08.3/2017), but fast ice between icebergs C-29 and B-9B is still breaking up. Iceberg C-15 remains unsettled and the location of an oceanographic mooring (yellow dot in Figure 3) continues to be occupied by iceberg C-29.

Sea Ice Report #09.7/2017

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

22/02/2017

Sabrina Coast/Banzare Coast

Figure 1 shows a visible scene off Sabrina Coast, with coloured rectangles indicating areas of operational interest to a marine science voyage on-board RV *Investigator*. The blue line shows the cruise track of the vessel (up to 22/02/2017 03:00 UT). A dashed blue line indicates a proposed course of the vessel, when returning to Tasmania. A red scribble line gives the 15% sea-ice edge, on 20/02/2017, based on AMSR-2 data. Northwest of Totten Glacier, persistent open water feature is marked by a green circle.

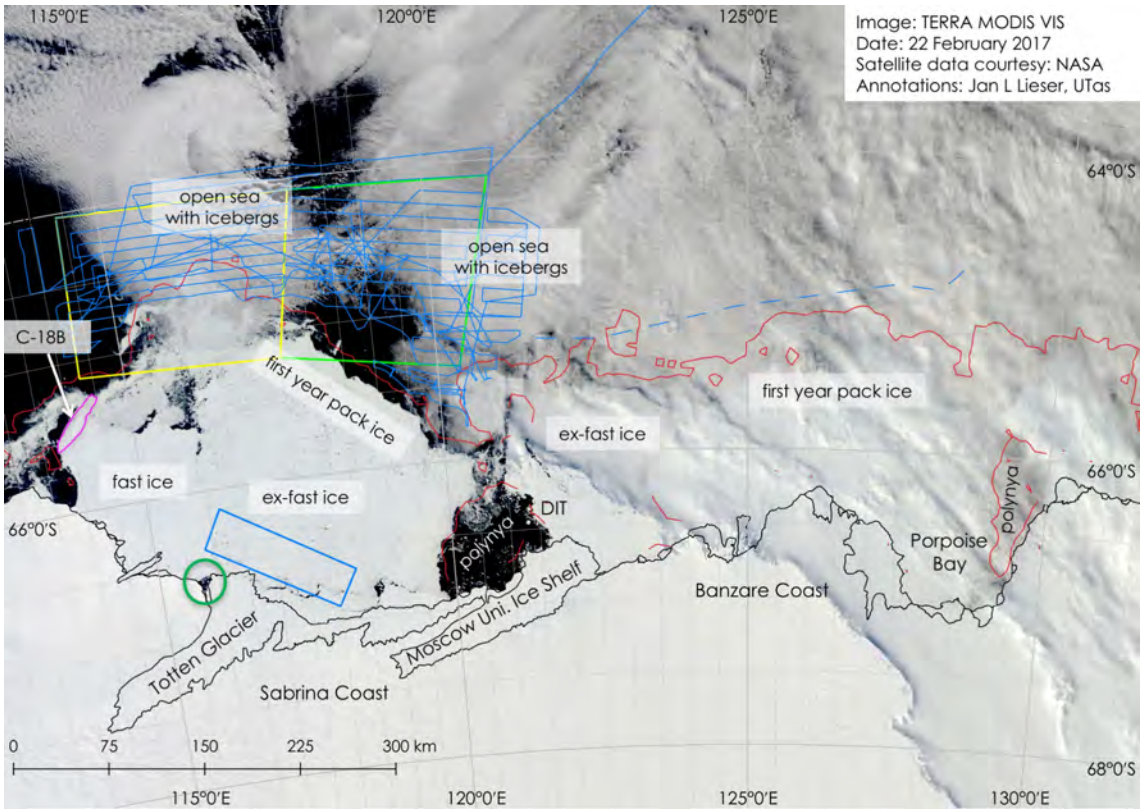

Figure 1: TERRA MODIS VIS scene, acquired 22/02/2017 and provided by NASA ('DIT' = Dalton Iceberg Tongue).

The general southwestward migration of the sea-ice edge is clear.

Figure 2 shows the same geographical frame as Figure 1, but with high-resolution sea-ice concentration data. Off Banzare Coast, isolated patches of sea ice are drifting north of the pack-ice edge.

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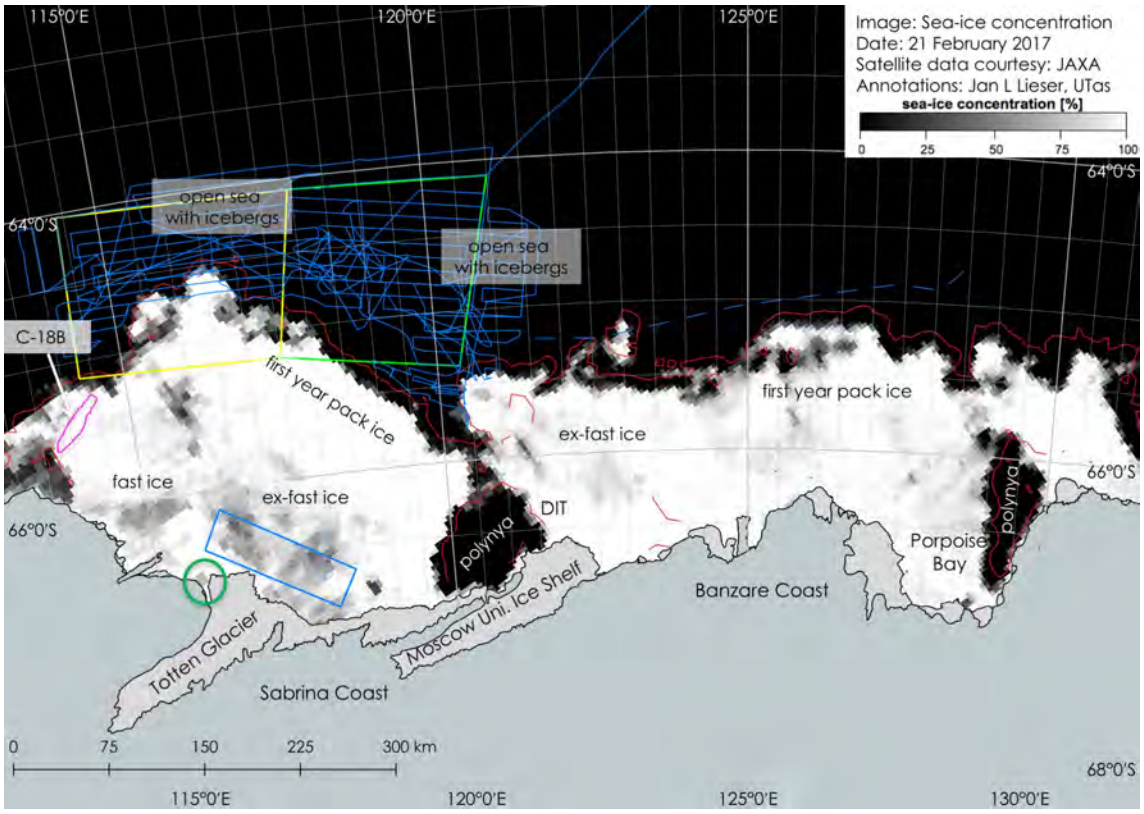

Figure 2: Sea-ice concentration chart, acquired 21/02/2017 and provided by Universität Hamburg ('DIT' = Dalton Iceberg Tongue).

Sea Ice Report #09.8/2017

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

23/02/2017

Sabrina Coast

Figure 1 shows a visible and SAR composite off Sabrina Coast, with coloured rectangles indicating areas of operational interest to a marine science voyage on-board RV *Investigator*. The blue line shows the cruise track of the vessel (up to 22/02/2017 23:00 UT). Northwest of Totten Glacier, a persistent open water feature is marked by a green circle.

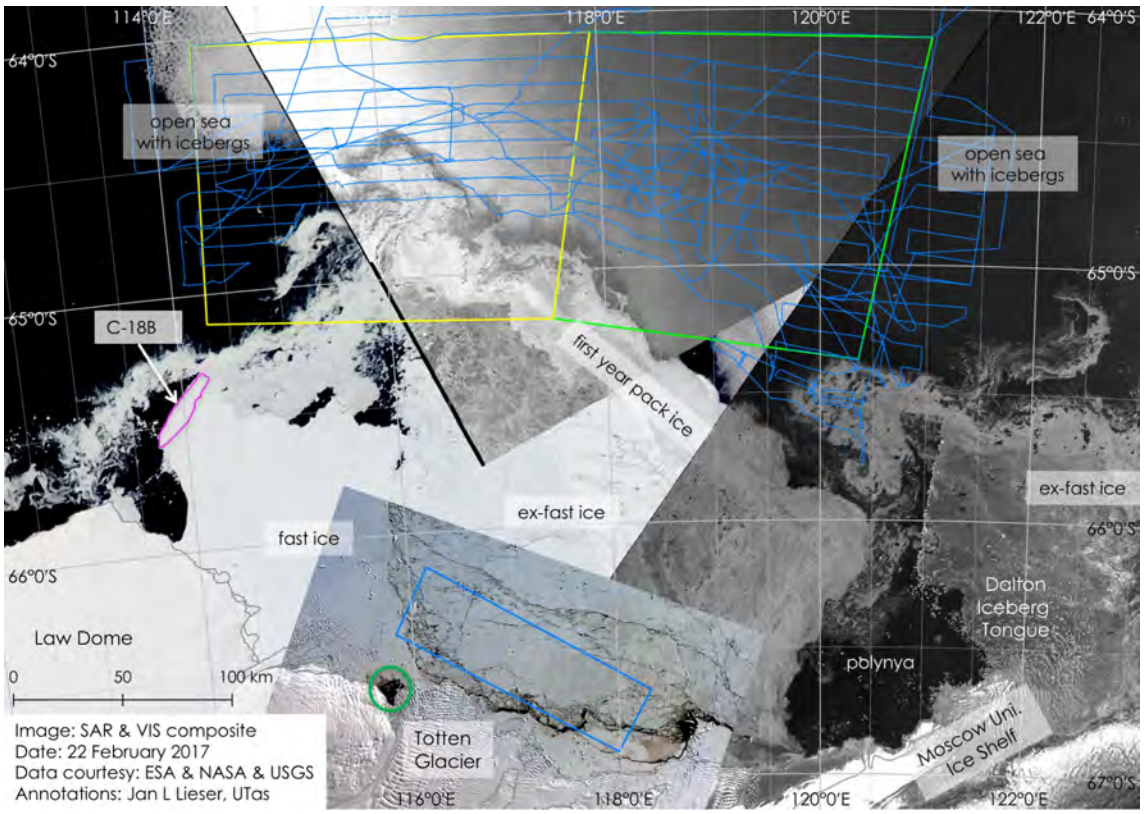

Figure 1: Visible and SAR data composite, all data acquired 22/02/2017; northern SAR scene at 11:47 UT; eastern SAR scene at 19:49 UT; southern Landsat-8 VIS scene at 01:07 UT; background AQUA MODIS VIS; SAR scenes provided by PolarView, Landsat-8 provided by USGS, MODIS provided by NASA.

Between 118° E and 119° 30' E, the sea-ice edge is well defined, but east and west from there, the edge is more fuzzy as can be clearly seen in the SAR scenes.

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Northwest of Totten Glacier, the open water feature is now roughly 65 km^2 big and appears to continue to grow westward.

Figure 2 shows the same geographical frame as Figure 1, but with high-resolution sea-ice concentration data.

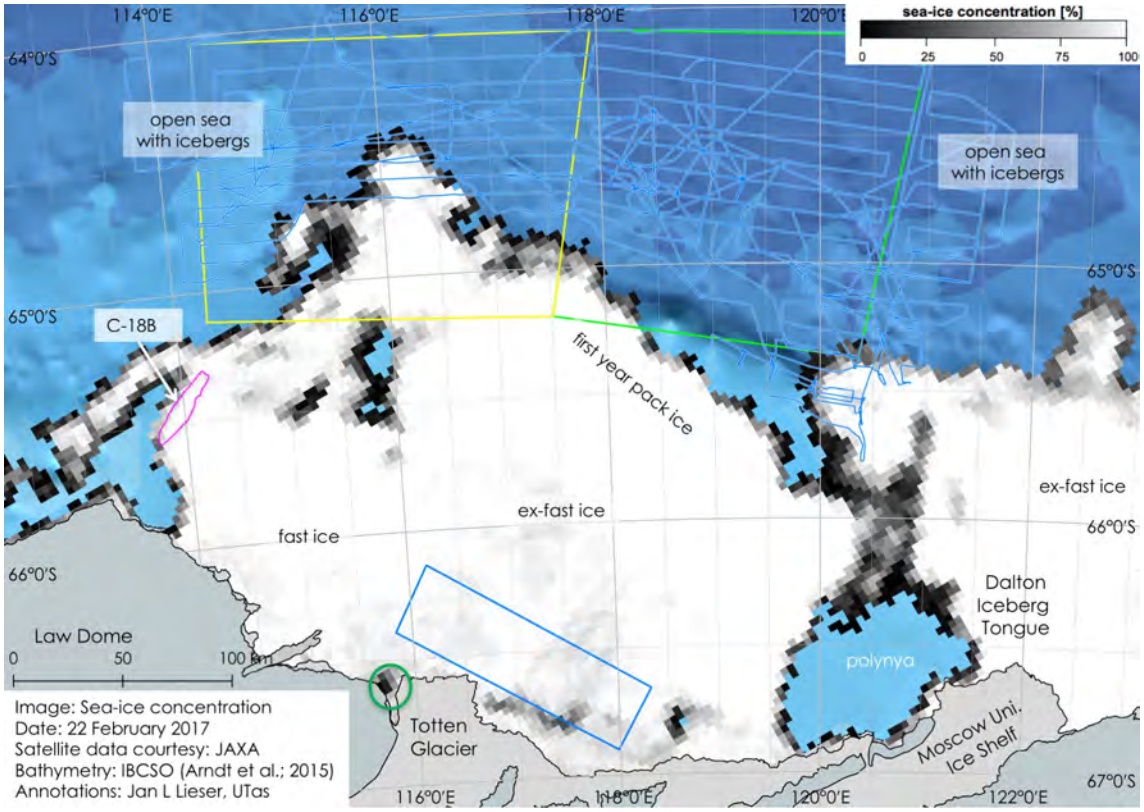

Figure 2: Sea-ice concentration chart, acquired 22/02/2017 and provided by Universität Hamburg.

Sea Ice Report #10.1/2017

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

27/02/2017

Banzare Coast

Figure 1 shows a visible and SAR data composite off Banzare Coast. The blue line shows the cruise track of RV *Investigator* (up to 26/02/2017 22:00 UT).

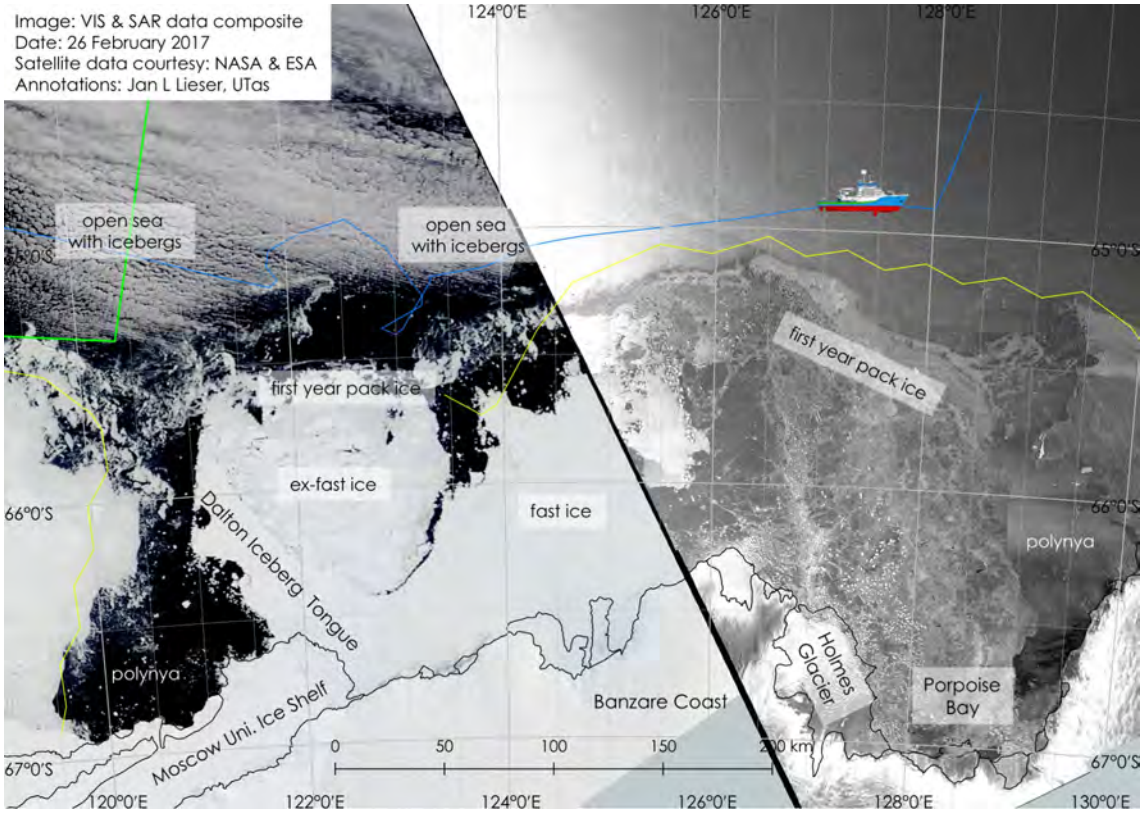

Figure 1: Visible and SAR data composite, all data acquired 26/02/2017; SAR scene at 11:13 UT provided by PolarView, TERRA MODIS VIS provided by NASA.

The sea-ice season is nearing its annual minimum extent around Antarctica, and hitting new record lows on an almost daily basis recently. However, along Sabrina Coast and Banzare Coast, the sea-ice extent appears to remain closely to the long-term median extent (yellow line in Figure 1).

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Sea Ice Report #10.2/2017

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

27/02/2017

Cooperation Sea

Figure 1 shows a visible and SAR data composite off Davis Station and the West Ice Shelf. The orange line shows the cruise track of RSV *Aurora Australis* (up to 27/02/2017 00:00 UT).

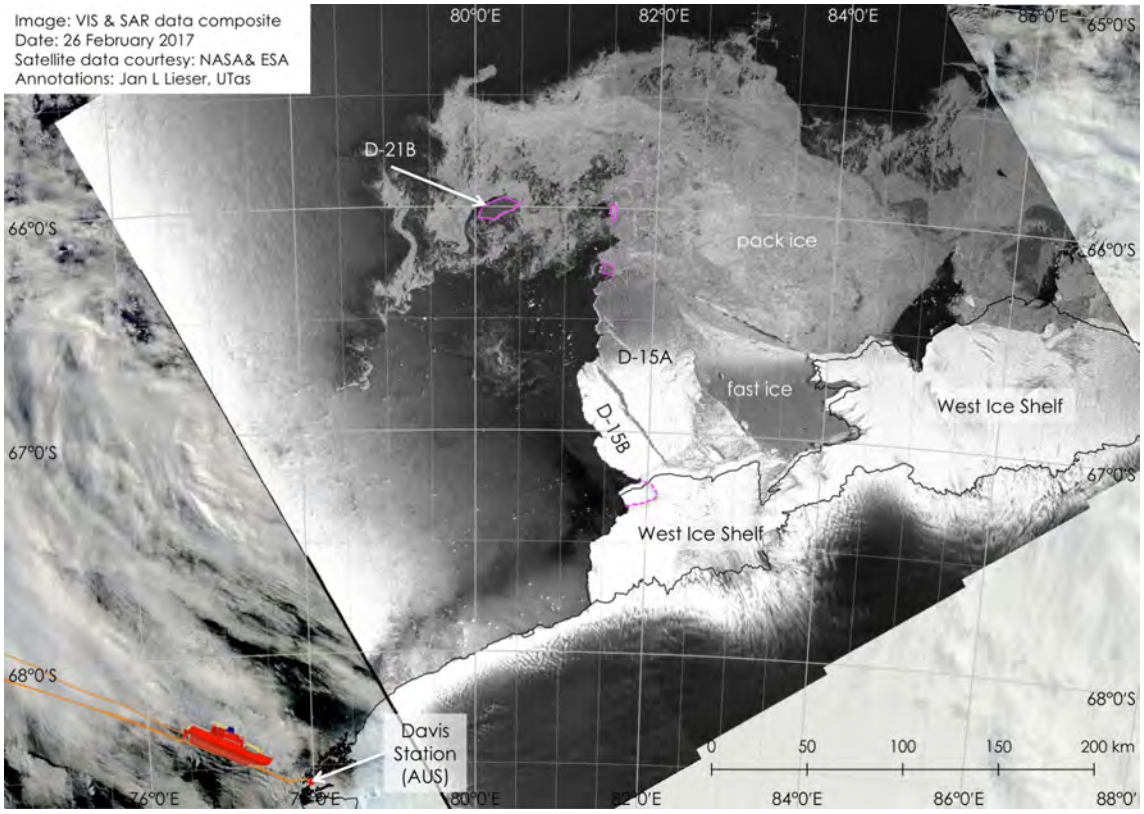

Figure 1: Visible and SAR data composite, all data acquired 26/02/2017; SAR scene at 14:30 UT provided by PolarView, TERRA MODIS VIS provided by NASA.

Some sea ice is entering eastern Cooperation Sea from a reservoir of pack ice, north of the West Ice Shelf and iceberg D-15A. Immediately north of iceberg D-15A, a former large iceberg continues to break up and is releasing smaller bergs westward. Iceberg D-21B also continues its westward journey surrounded by loose first-year sea ice.

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Sea Ice Report #10.3/2017

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

27/02/2017

Prydz Bay/Cooperation Sea

Figure 1 shows a visible and SAR data composite off Davis Station and the West Ice Shelf. The orange line shows the cruise track of RSV *Xue Long* (up to 27/02/2017 02:00 UT).

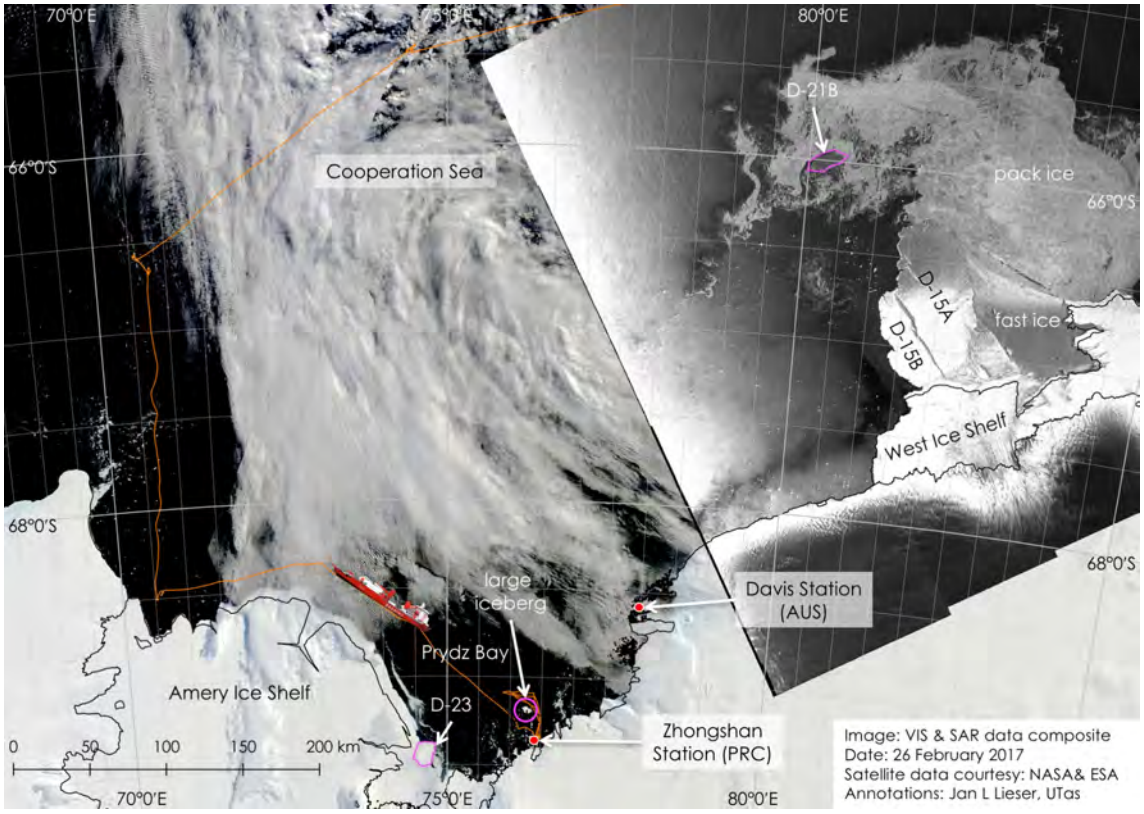

Figure 1: Visible and SAR data composite, all data acquired 26/02/2017; SAR scene at 14:30 UT provided by PolarView, TERRA MODIS VIS provided by NASA.

Prydz Bay is almost entirely free of sea ice, only around iceberg D-23 some fast ice exists but is breaking up with strips and patches of ex-fast ice drifting along the front of the eastern Amery Ice Shelf. North of Zhongshan Station, a large iceberg is drifting freely, while smaller parts of it are breaking up. Some sea ice is entering eastern Cooperation Sea from a reservoir of pack ice north of the West Ice Shelf and iceberg D-15A. Iceberg D-21B continues its westward journey surrounded by loose first-year sea ice.

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Sea Ice Report #10.4/2017

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

02/03/2017

Bunger Hills

Figure 1 shows a visible scene of the Bunger Hills.

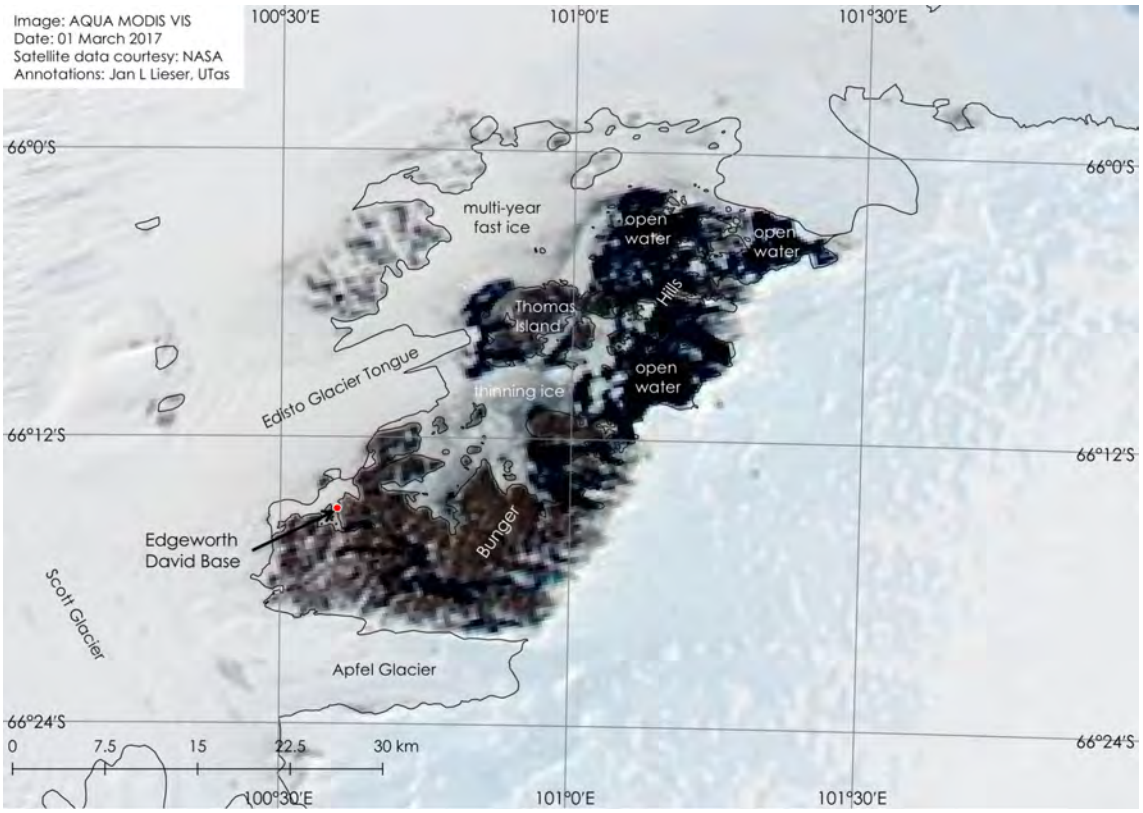

Figure 1: AQUA MODIS VIS scene, data acquired 01/03/2017 and provided by NASA.

During February 2017, ice around the islands of the northern Bunger Hills started to melt, even though it is in a rather land-locked location with the Antarctic continent in the southeast and the Shackleton Ice Shelf to the north and west. Around the northern hills, the combined area of open water is roughly 150 km^2 and a further approximately 80 km^2 show increasing signs of thinning in the central part of the hills.

To the northeast of the Bunger Hills, open water is only 25 nautical miles away off Cape Elliot between Mill Island and Bowman Island (see Figure 2). This water is suspected to be sufficiently warm and penetrating underneath

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the shelf ice reaching the Bunger Hills and providing enough heat to melt the multi-year fast ice, which is typical for the Bunger Hills, from below.

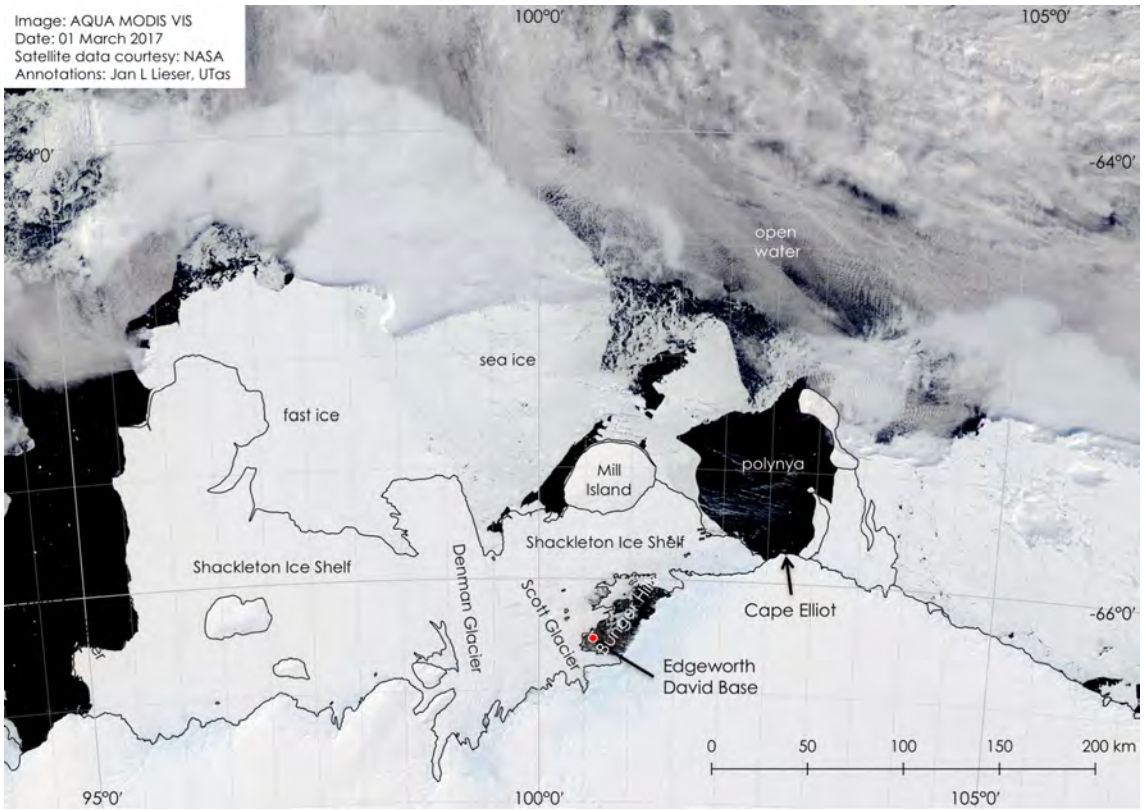

Figure 2: Same as Figure 1 but a larger frame.

Sea Ice Report #12.1/2017

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

14/03/2017

Bunger Hills

Figure 1 shows a high-resolution visible scene of the Bunger Hills.

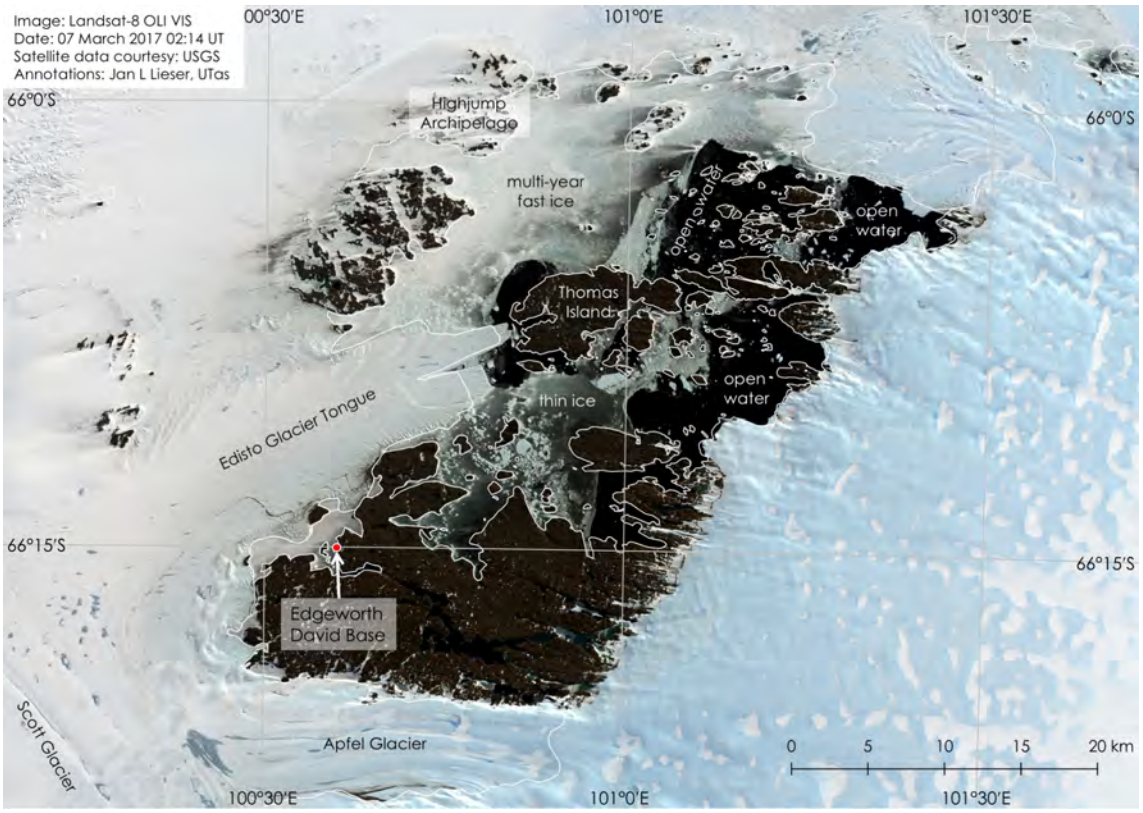

Figure 1: Landsat-8 OLI VIS scene, data acquired 07/03/2017 and provided by USGS.

The figure shows the extent of this summer's melt around the Bunger Hills, which appears to have just reached the fjord off Edgeworth David Base, where open water can be found in the channel going eastward from the fjord, south of the base. Open water and partly very thin ice is found throughout the entire Bunger Hills, except for the northwestern region, where some multi-year fast ice has survived this summer's melt event, southeast of Highjump Archipelago.

More recently, the winter chill appears to have set in and the open water patches are freezing over again.

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Sabrina Coast

Figure 2 shows a SAR and visible data composite off Sabrina Coast. Coloured rectangles show regions of scientific interest to a recently completed voyage on-board RV *Investigator*. An open-water feature is still found northwest of Totten Glacier (green circle).

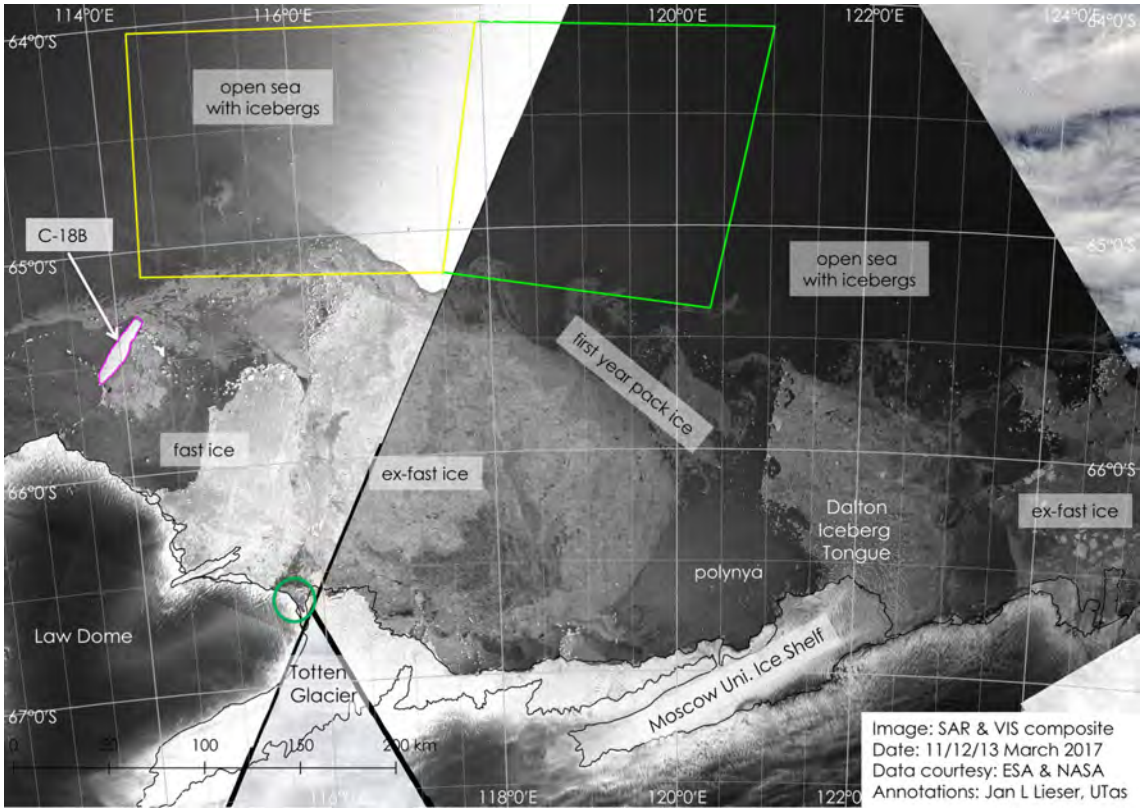

Figure 2: Sentinel-1b SAR and MODIS VIS composite: western SAR scene acquired 12/03/2017 at 20:37 UT, eastern SAR scene acquired 11/03/2017 at 11:54 UT, both SAR scenes provided by PolarView; background AQUA MODIS VIS data acquired 13/03/2017 and provided by NASA.

Patches of sea ice remain in the western area (yellow rectangle), as far north as 64° 30' S at 115° 15' E, but as the sea-ice growth season has started around Antarctica, the polynya west of the Dalton Iceberg Tongue experiences an increase in sea-ice cover.

D'Urville Sea

Figure 3 shows a visible scene between Dumont D'Urville Station and Ninnis Glacier.

Since 11/03/2017, fast has been breaking out of Commonwealth Bay, off Cape Denison, and open water is now found at the shore in the bay. While iceberg B-9B has not moved recently, icebergs C-29 and C-15 have both rotated roughly 50° anti-clockwise since late February, with iceberg C-15 additionally moving northward and very close to iceberg C-29.

Currently, there is only about 1.25 nautical miles between the two bergs and the location of an oceanographic mooring remains occupied by iceberg C-29.

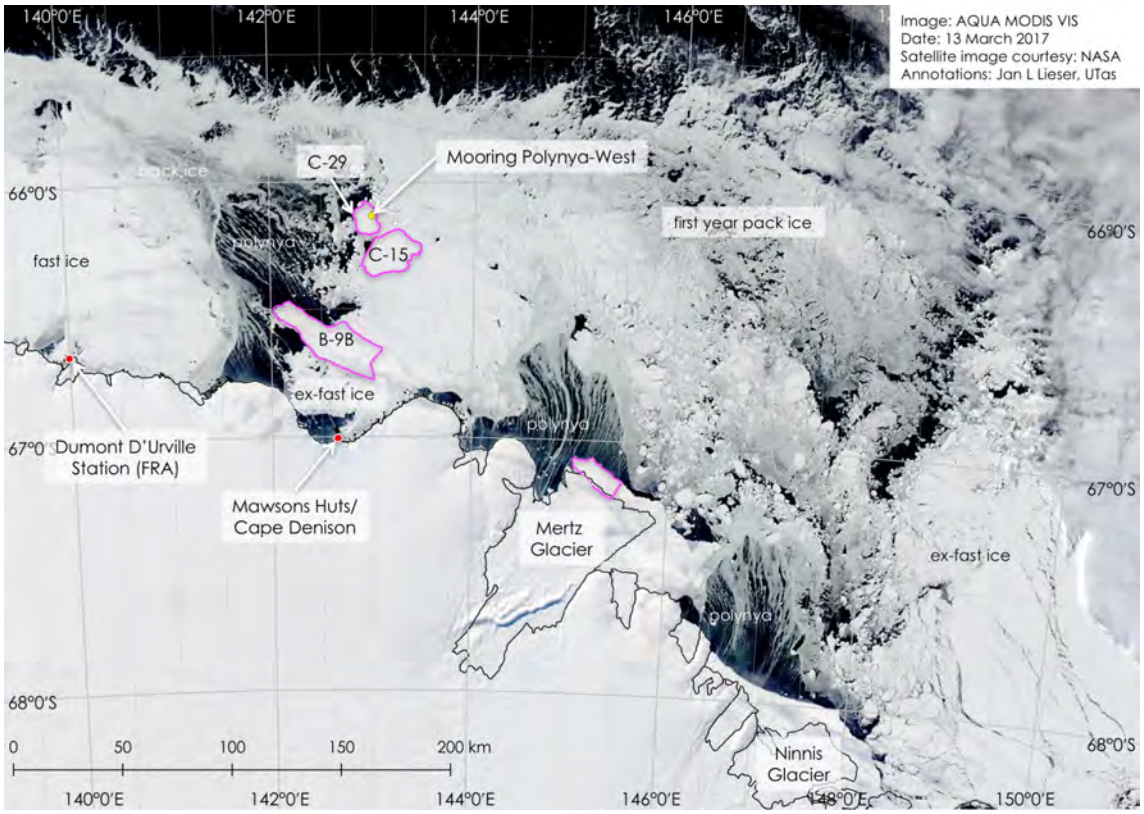

Figure 3: AQUA MODIS VIS scene, data acquired 13/03/2017 and provided by NASA.

Sea Ice Report #13.1/2017

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

21/03/2017

Cooperation Sea

Figure 1 shows a SAR and visible data composite, north of Davis Station.

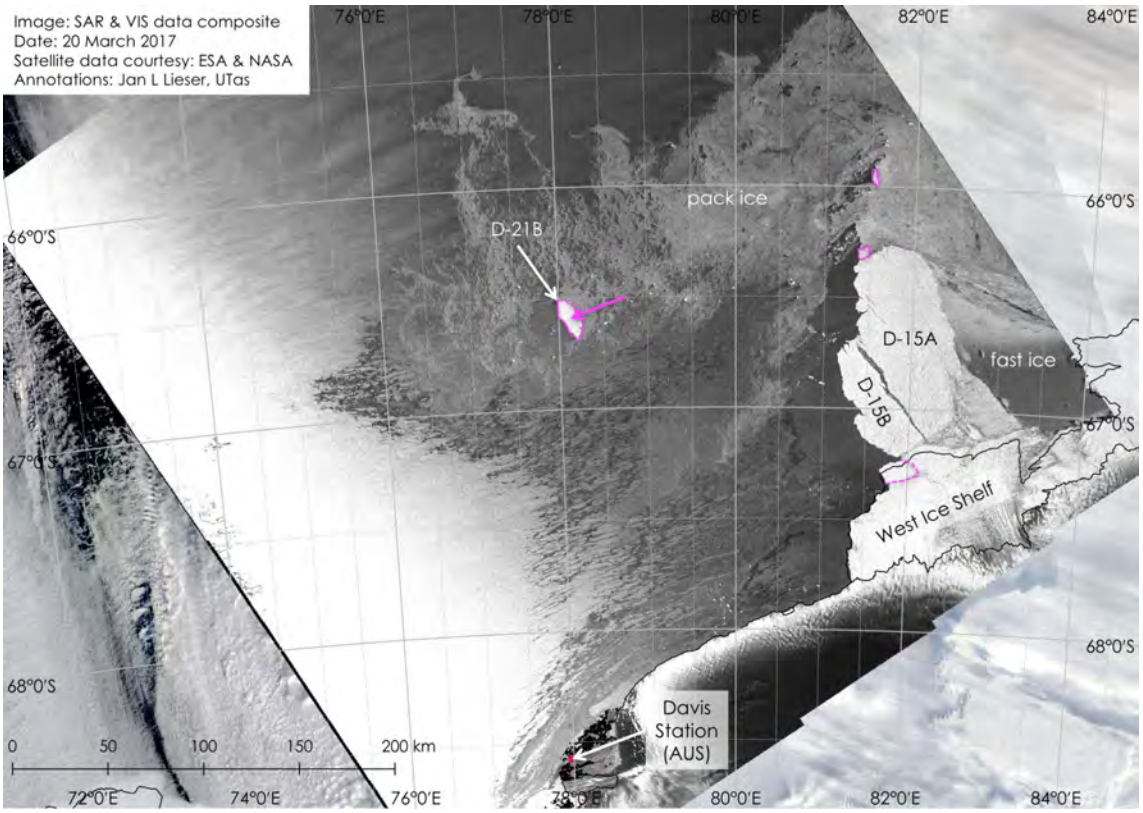

Figure 1: Sentinel-1b SAR and MODIS VIS composite: SAR scene acquired 20/03/2017 at 14:46 UT and provided by PolarView; background: AQUA MODIS VIS data acquired 20/03/2017 and provided by NASA.

Sea ice is forming in the region, which is also fed by old sea ice entering Cooperation Sea from the east around iceberg D-15A.

Iceberg D-21B is drifting freely and has travelled approximately 15 nautical miles, since 17/03/2017 (pink arrow) in a westerly direction, and rotated roughly 90 degrees clockwise.

Directly north of iceberg D-15A, a smaller berg (pink outline) had moved northward during February, but sits now back against iceberg D-15A.

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Bunger Hills

Figure 2 shows a visible scene of the Bunger Hills.

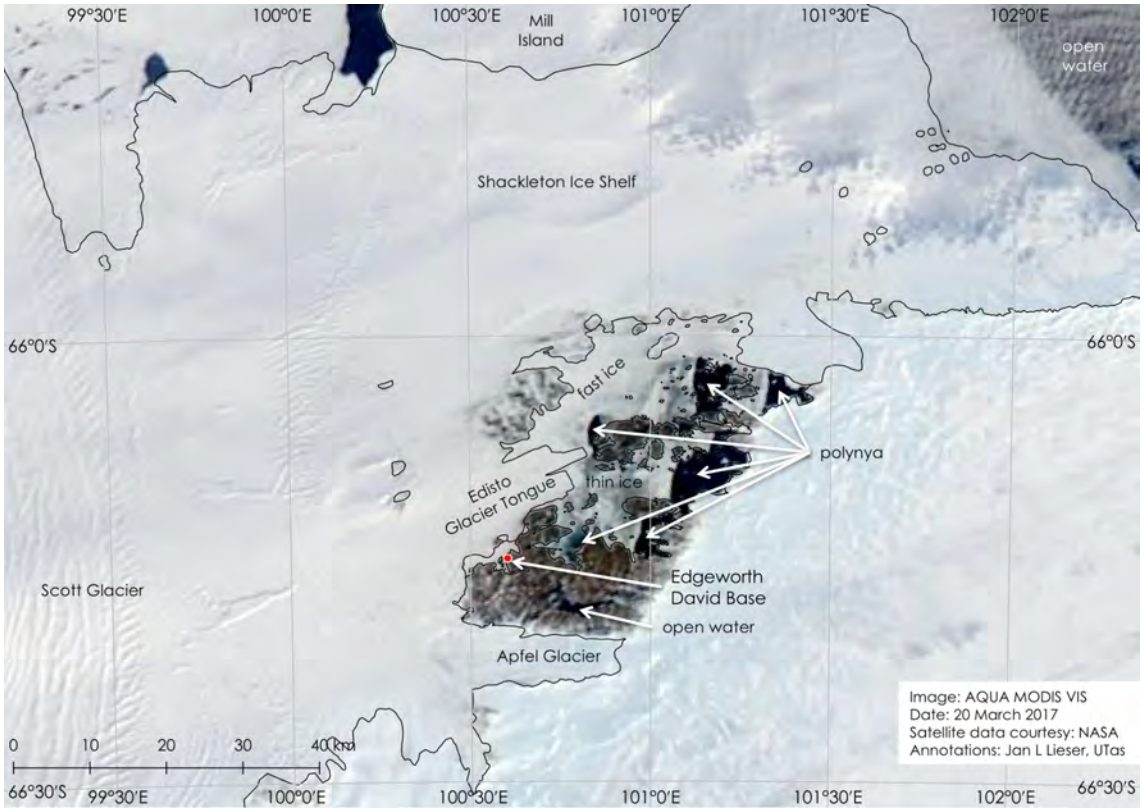

Figure 2: AQUA MODIS VIS data acquired 20/03/2017 and provided by NASA.

The figure shows still open water (marked polynya) in between the northern islands of the hills. Southeast of Edgeworth David Base more open surface water is identified, which is a lake with no known connection to the sea.

Sabrina Coast

Figure 3 shows a SAR and visible data composite off Sabrina Coast. Coloured rectangles show regions of scientific interest to a recently completed voyage on-board RV *Investigator*. Northwest of Totten Glacier, an open-water feature remains (green circle).

Patches of sea ice are still found within the southern region of the western area (yellow rectangle). Recent wind conditions appear to have pushed sea ice southward, almost below (south of) 65° S.

West of the Dalton Iceberg Tongue, the polynya is dynamic and newly formed sea ice accumulates against ex-fast ice, off Totten Glacier.

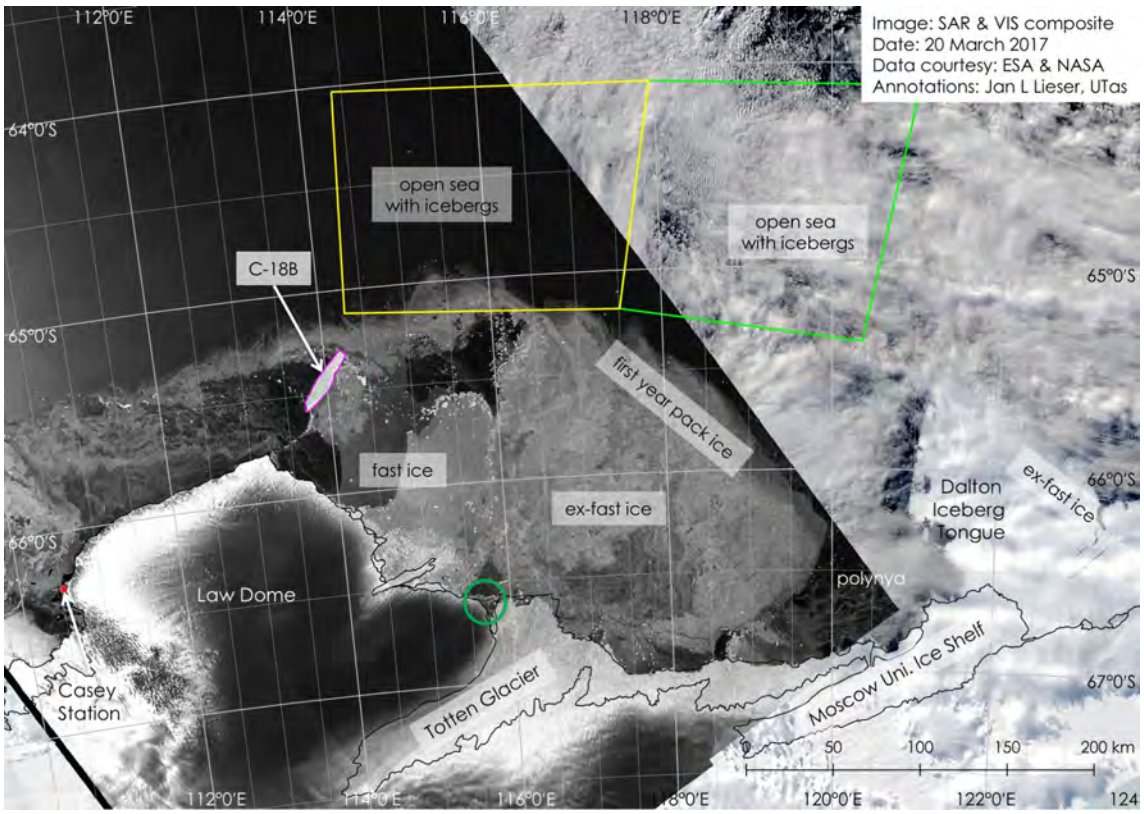

Figure 3: Sentinel-1b SAR and MODIS VIS composite: SAR scene acquired 20/03/2017 at 12:20 UT and provided by PolarView; background AQUA MODIS VIS data acquired 20/03/2017 and provided by NASA.

D'Urville Sea

Figure 4 shows a visible scene between Dumont D'Urville Station and Mertz Glacier.

Fast ice continues to break out of Commonwealth Bay off Cape Denison. Off Mertz Glacier and west of the iceberg troika north of Cape Denison, both polynyas appear active and show newly forming sea ice.

Iceberg C-29 has rotated roughly 20 degrees and icebergs C-15 and C-29 appear to be touching each other now. The location of an oceanographic mooring remains occupied by iceberg C-29.

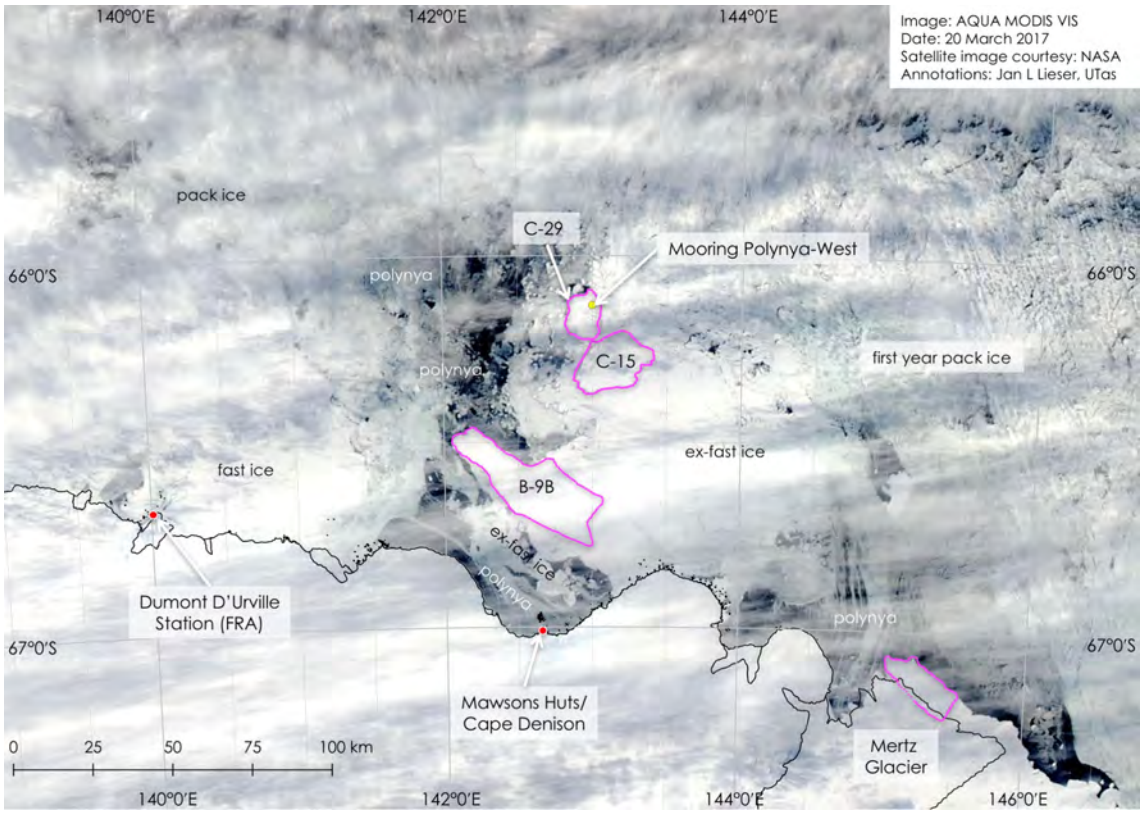

Figure 4: AQUA MODIS VIS scene, data acquired 20/03/2017 and provided by NASA.

About the author:

Jan L Lieser

Dr Jan Lieser is a meteorologist and marine glaciologist with the Antarctic Gateway Partnership: a special research initiative by the Australian Research Council. His research focus is airborne imaging techniques using digital aerial photography and scanning LiDAR to estimate sea-ice thickness. He has also researched on-site polar meteorological observations and sea ice geophysical properties, as well as numerical modelling of Arctic sea ice and Antarctic subglacial Lake Vostok, and the interpretation of remote sensing data. He was a wintering scientist at the German Neumayer Station and participated in several field research programs in both Antarctica and the Arctic Ocean conducted by the University of Tasmania's research partners, the Australian Antarctic Division, and the German Alfred Wegener Institute for Polar and Marine Research. Jan has spent more than 450 days at sea, on-board icebreakers.

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