

TECHNICAL REPORT

Sea ice reports for the season 2012-2013



Prepared by Dr Jan L Lieser, Dr Robert A Massom, Dr Petra Heil
Antarctic Climate and Ecosystems Cooperative Research Centre 2013

ANTARCTIC CLIMATE
& ECOSYSTEMS CRC

Sea ice reports for the season 2012-2013

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ANTARCTIC CLIMATE
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Executive summary:

This document is a compilation of weekly sea ice reports for East Antarctica. The reports were prepared to support ship operations in the region during the shipping season in 2012/2013. They were primarily used as a guidance for the Australian Antarctic program, but were partly provided to other Antarctic operators. In particular, *Amaltal Explorer's* whale acoustics and tagging voyage (VWHALE, 30/01/2013 to 16/03/2013) and *Tangaroa's* Mertz Polynya voyage 2013 (03/02/2013 to 13/03/2013) were supported with sea ice reports.

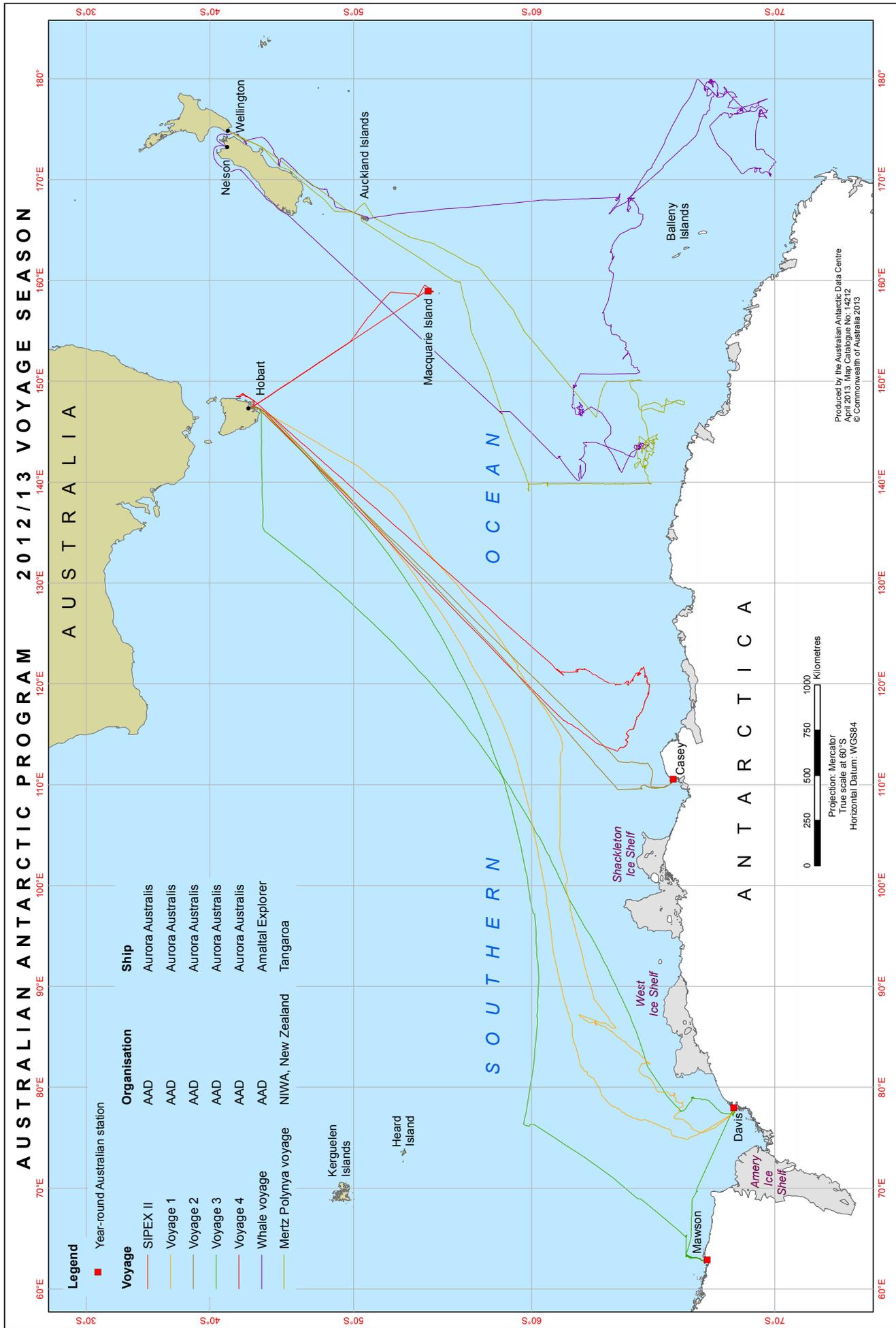
The focus of individual reports shifts with the main purpose of specific voyages of the Australian Antarctic research and supply vessel *Aurora Australis*, throughout the season. The Antarctic voyages of the 2012/2013 season were:

No.	Leave port	Main Purpose	Return
VMS	14/09/2012	Marine science (SIPEX-2)	16/11/2012
V1	19/11/2012	Davis Station resupply	14/12/2012
V2	17/12/2012	Casey Station resupply	08/01/2013
V3	13/01/2013	Davis and Mawson stations resupply	22/02/2013
V4	28/02/2013	Macquarie Island resupply	14/03/2013

In general, sea ice conditions for the 2012/2013 season were characterised by a late retreat of the outer pack ice in East Antarctica, after above-average sea ice area and extent generally, in Antarctica during winter. This season's first voyage of RSV *Aurora Australis* (VMS) was heavily affected by difficult sea ice conditions. However, all Australian Antarctic bases could be reached relatively easily throughout the rest of the shipping season. But Mawson's Huts in Commonwealth Bay were inaccessible due to the presence of iceberg B09B.



RSV *Aurora Australis* in East Antarctic pack ice during the Sea Ice Physics and Ecosystem experiment SIPEX-2 (image credit: Jan L Lieser).



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About this report

This report is the second volume of collated, weekly sea ice reports. The first report of this volume is the 16th report for the year 2012. Previous reports are available from the Manager Communications, Antarctic Climate & Ecosystems Cooperative Research Centre (see inside cover for details).

About the authors

The Sea Ice Group of the Antarctic Climate & Ecosystems Cooperative Research Centre and Australian Antarctic Division consists of research scientists from a broad spectrum, including physics, meteorology, oceanography, and ecology. Short biographies of the authors of this report can be found on the inside back cover.

Frequently used acronyms

AAD	Australian Antarctic Division
ACE CRC	Antarctic Climate & Ecosystems Cooperative Research Centre
AMSR-2 ¹	Advanced Microwave Scanning Radiometer 2
MODIS ²	Moderate Resolution Imaging Spectroradiometer
NASA	National Aeronautics and Space Administration
SIPEX-2	Sea Ice Physics & Ecosystem eXperiment 2
SSMIS	Special Sensor Microwave Imager/Sounder
TSX	TerraSAR-X satellite, operated by German Aerospace Center (DLR)
VMS	Voyage Marine Science

¹ The AMSR-2 instrument is onboard the GCOM-W1 satellite, which is operated by Japan Aerospace Exploration Agency.

² The MODIS instrument is operational on two satellites: AQUA and TERRA, both operated by NASA.

Sea Ice Report #16/2012

by the AAD/ACE CRC Sea Ice Group

22/11/2012

Welcome to the new season.

After the successful completion of the first voyage of the 2012/13 season, VMS SIPEX-2, we resume sea ice reporting today.

There is one region in the focus of this report:

- **Davis station**

Sea ice in eastern Prydz Bay has retreated northwards significantly. There is low sea ice concentration between 63° S and 67° S. Even though it appears quite patchy in yesterday's AMSR image, the general large scale concentration is only between 50% and 60%. Today's MODIS image (Figure 1) provides a clear picture of the locations of sea ice filaments with localised higher concentrations. Sea ice and ocean is only partly obscured by thin clouds. To the south of 66° 30' S, the eastern bay is virtually ice free.

With best regards,

Jan, for the sea ice group.

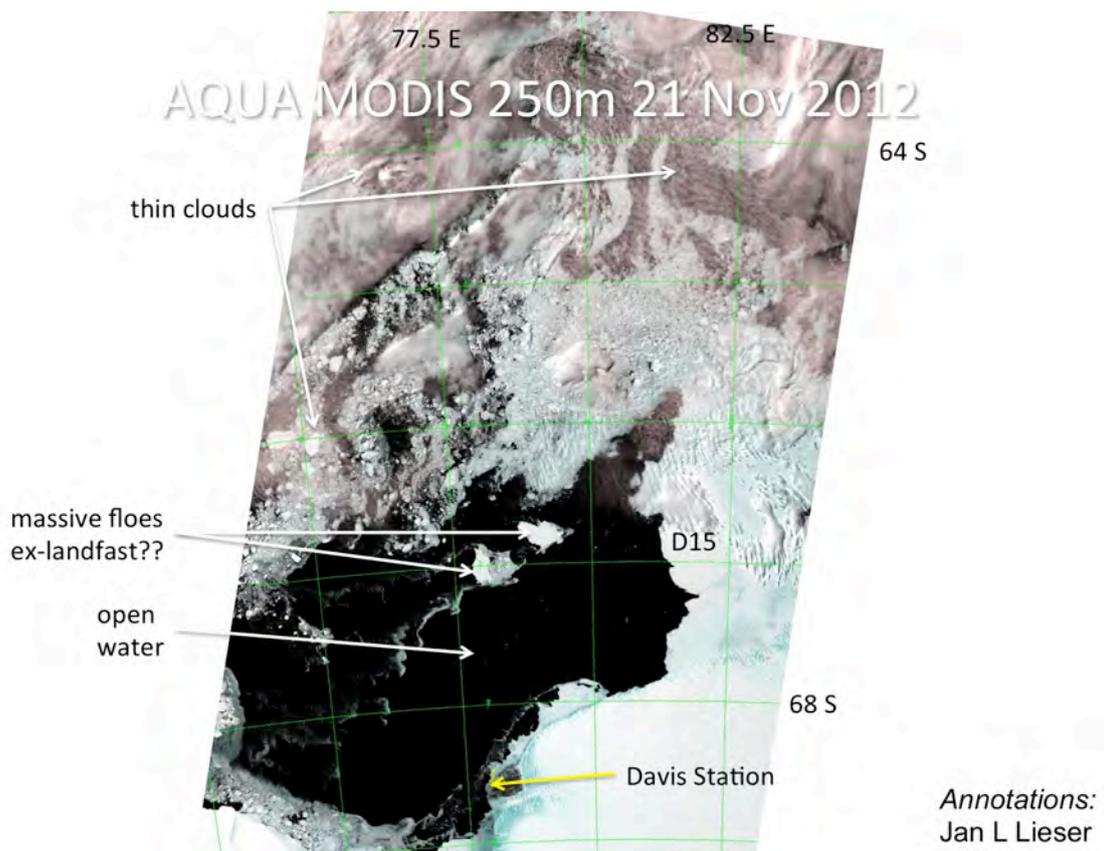


Figure 1: AQUA MODIS image, acquired 21/11/2012 and provided by NASA.

Sea Ice Report #17/2012

by the AAD/ACE CRC Sea Ice Group

29/11/2012

There is one region in the focus of this report:

- **Davis station**

In eastern Prydz Bay, sea ice shows low concentrations between 63° 30' S and 67° S in a sector roughly between 75° E and 78° E. It still appears quite patchy in the AMSR-2 image (Figure 1) but the general large scale concentration is only between 50% and 60%. To the south of 67° S the eastern bay is virtually ice free.

Note 1: the geo-reference of this image is slightly out by about 10-13 nm in east-west direction.

Note 2: the thin red line in the north-eastern corner of the image denotes RSV *Aurora Australis*' recent cruise track.

With best regards,

Jan, for the sea ice group.

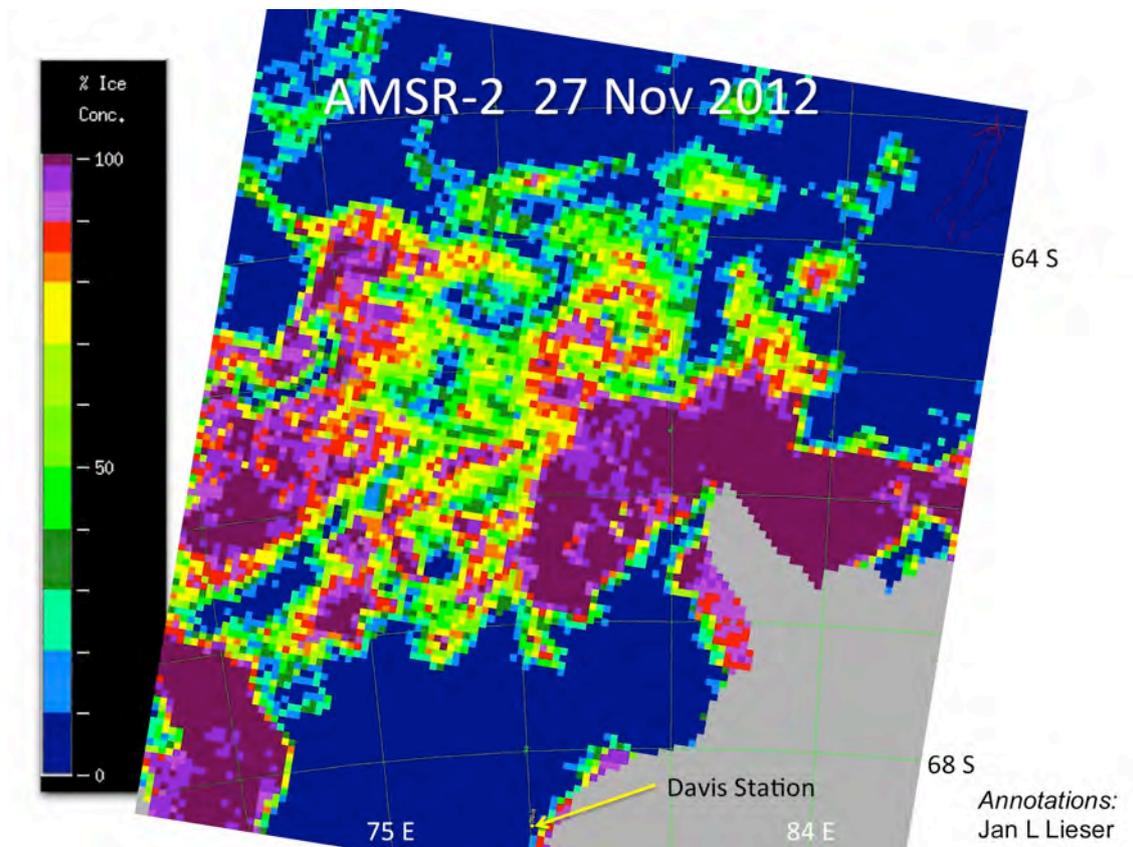


Figure 1: AMSR-2 sea ice concentration, acquired 27/11/2012 and provided by Universität Bremen.

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Sea Ice Report #18/2012

by the AAD/ACE CRC Sea Ice Group

06/12/2012

This report provides a quick overview of sea ice conditions near all Australian Antarctic bases, and Commonwealth Bay:

- **Davis Station**

Eastern Prydz Bay is currently covered only by very little sea ice. A sector of almost ice free seas spans between 67° S, 74° 30' E and 65° S, 76° 30' E, see Figure 1. The thin red line in the figure denotes *RSV Aurora Australis*' recent cruise track. She has just left Davis Station. To the north of 65° S is even less sea ice, and the ocean north of 64° S and east of 76° E shows no sea ice at all in yesterday's AMSR image.

- **Casey Station**

As of yesterday, there is still a band of high sea ice concentration to the north of Casey Station, roughly between 64° 20' S and 65° 30' S. The region appears quite dynamic, even though the band of high concentration remains persistent over the last week or two.

- **Mawson Station**

At this stage, sea ice off Mawson Station shows strong retreat towards the coast, but with still some high concentration areas between 64° S and the coast, with a large area of open water south of 67° S and the station.

- **Commonwealth Bay**

Sea ice in Commonwealth Bay is still protected by iceberg B09B, see Figure 2. The bay itself is filled with fast ice. To the northeast of the bay, pack ice is trapped in its westward drift behind B09B and a range of smaller bergs to the north of B09B. Along 142° E however, open water extends south down to about 66° 45' S. The inverted-'C'-shaped fast ice tongue to the west of the bay shows signs of disintegration at its northern tip.

With best regards,

Jan, for the sea ice group.

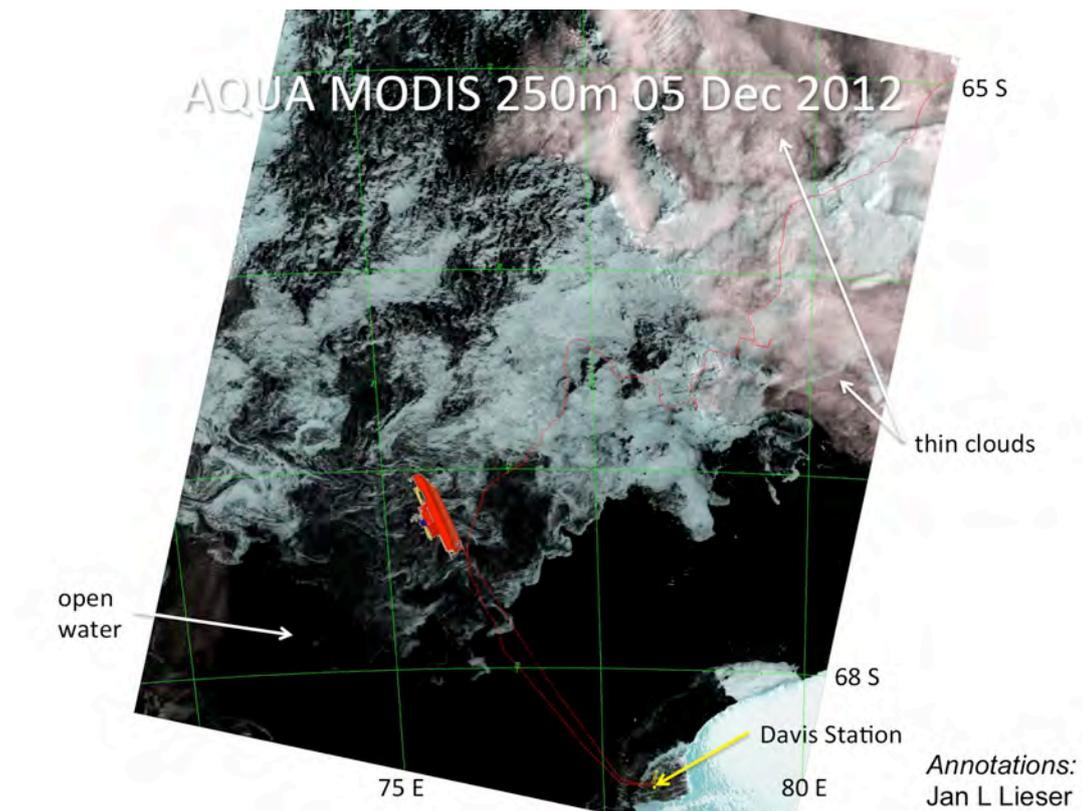


Figure 1: AQUA MODIS image, acquired 05/12/2012 and provided by NASA.

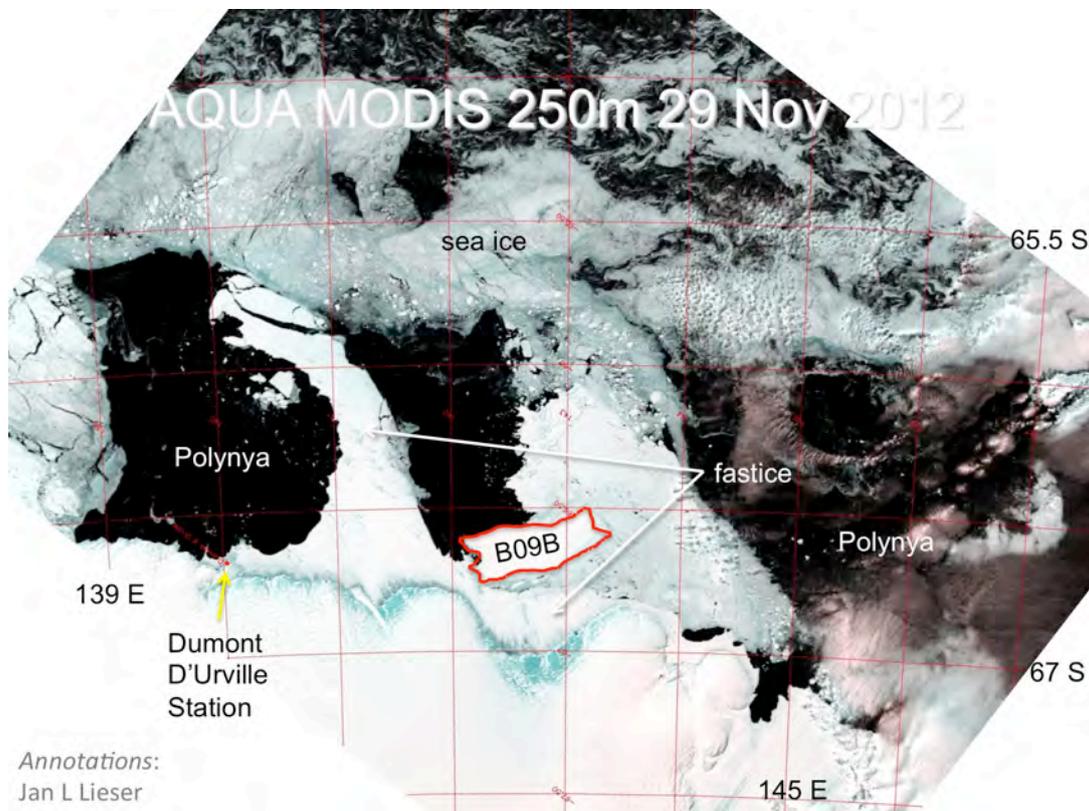


Figure 2: AQUA MODIS image, acquired 29/11/2012 and provided by NASA.

Sea Ice Report #19/2012

by the AAD/ACE CRC Sea Ice Group

13/12/2012

This report is concerned with the region north of Casey Station.

- **Casey Station**

Yesterday's MODIS image shows Vincennes Bay mostly cloud and sea ice-free (see Figure 1), at least south of $65^{\circ} 20' S$ at about $109^{\circ} 40' E$. To the north from there is still a band of high sea ice concentration between $64^{\circ} 30' S$ and $65^{\circ} 20' S$. That range is a bit less than last week. In this area, the true colour image shows a mélange of larger floes and ground, smaller ones with very little openings between. The AMSR sea ice concentration image shows 100% sea ice concentration for the entire region.

There is also still a fair amount of fast ice between icebergs along and to the north of Petersen Bank, as marked in Figure 1.

With best regards,

Jan, for the sea ice group.

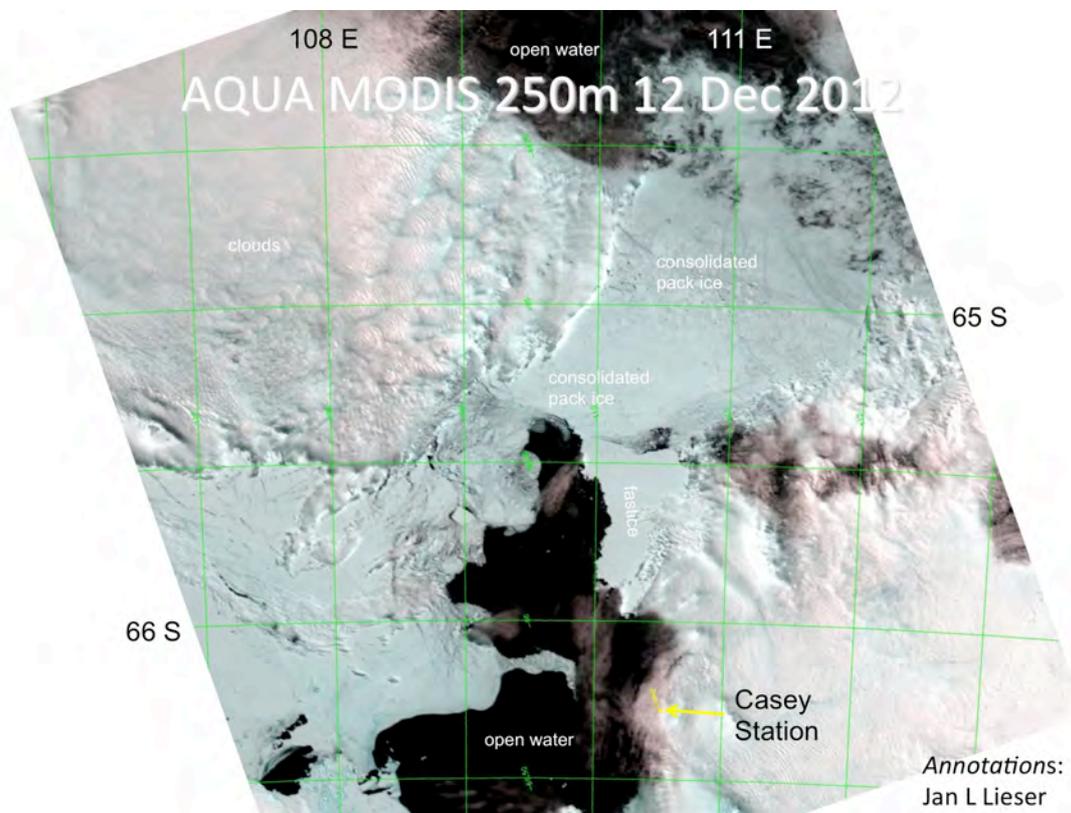


Figure 1: AQUA MODIS image, acquired 12/12/2012 and provided by NASA.

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Sea Ice Report #20/2012

by the AAD/ACE CRC Sea Ice Group

20/12/2012

This report is concerned with the region north of Casey Station.

- **Casey Station**

Yesterday's MODIS image shows Vincennes Bay mostly cloud and sea ice-free (see Figure 1). The sea ice conditions have eased slightly over the last week. The thick band of high sea ice concentration that was prominent over the past few weeks has loosened, and the AMSR image shows much more patchiness recently. There is still a band of consolidated pack ice at about 65° S and south of there.

The large, tabular iceberg B09D is moving through the area and has travelled 16 nautical miles in the 48 hours prior to image acquisition (Figure 1) in a westerly direction (at approximately 295°). To the north of the iceberg, some massive floes are visible in the MODIS image, but showing a bit of structure of the smaller floes they consist of. However, the shape and pattern looks very similar to the conditions that SIPEX-2 experienced earlier this season.

There is also still a fair amount of fast ice between icebergs along and to the north of Petersen Bank, as marked in Figure 1.

Happy day of solstice tomorrow and Merry Christmas to all.
With best regards,

Jan, for the sea ice group.

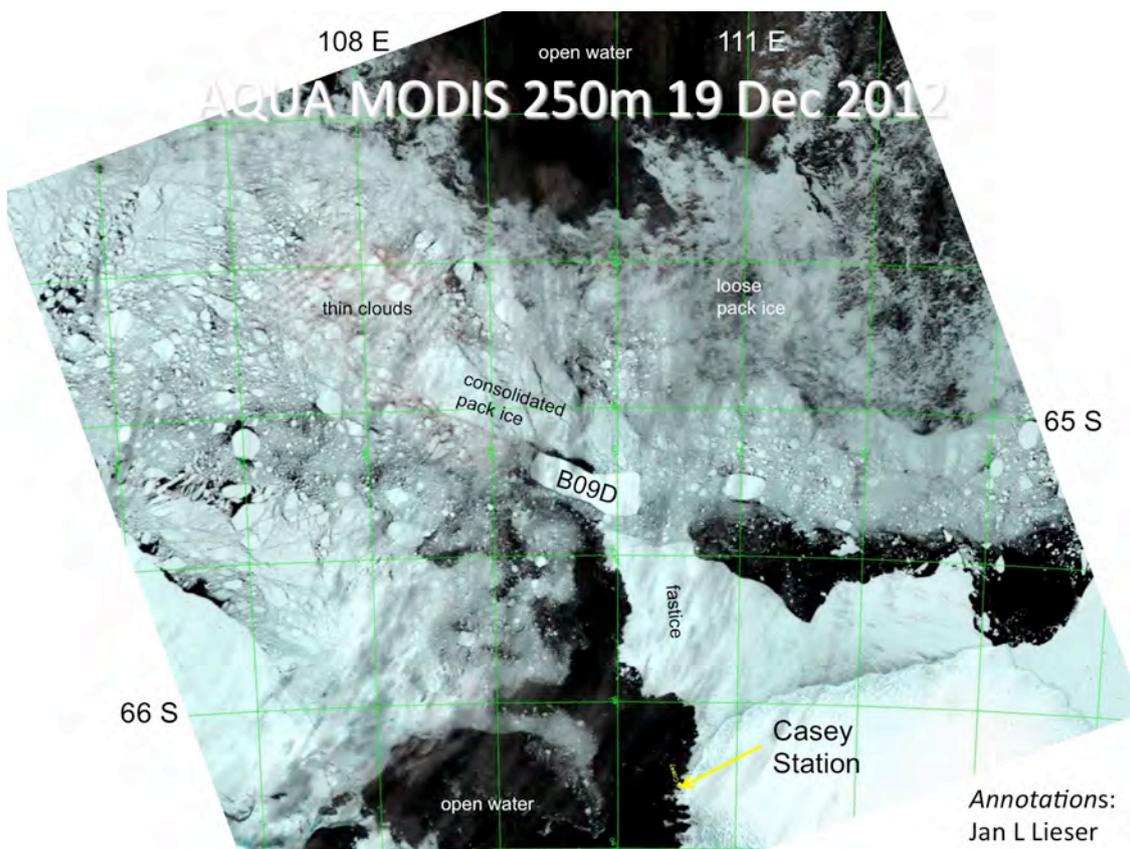


Figure 1: AQUA MODIS image, acquired 19/12/2012 and provided by NASA.

Sea Ice Report #21/2012

by the AAD/ACE CRC Sea Ice Group

26/12/2012

This report (this week issued on Wednesday instead of Thursday) focuses on the region north of Casey Station (V2 2012/13).

- **Casey Station**

MODIS imagery from 24th and 25th December 2012 is affected by cloud cover. The Terra image from 24/12/2012 (Figure 1) shows a tongue of compact pack ice extending as far west 65° 16' S and 109° 16' E, with only a light scattering of sea ice to the west and south of this. This tongue is one of the remnants of the band of highly concentrated sea ice described in last week's report. The western part of this band has now formed a triple-headed band of loose pack ice to the southwest, which also holds many small to medium sized icebergs. The second band is to the west and south of 65° 16' S & 109° 33' E, and has pulsed in extent, with a general tendency to disperse itself. To the south and the coastal region near Casey Station the satellite imagery suggests near to sea-ice free conditions with a light scattering of small to medium-sized icebergs.

A large iceberg, namely B09D, has moved northwestward and is now found west of 108° 45' E. This berg is now mainly surrounded by medium sized and thinner sea-ice floes, with few remnant vast and thick ice floes on its far northeastern flank. The sea ice to the east of B09D (and to the north of *RSV Aurora Australis*' current position) is now at about 96% ice concentration.

At the resolution of the satellite imagery, the fast-ice extent in the region appears generally unchanged during the last week.

Kind regards,

Petra, for the sea-ice group.

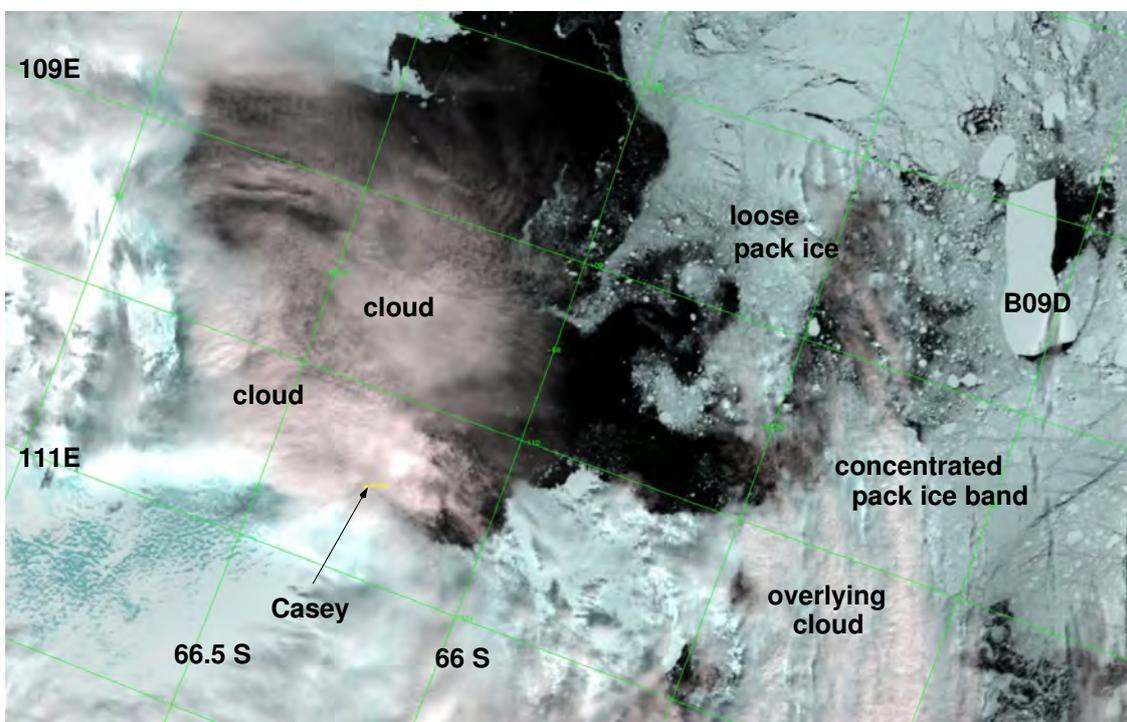


Figure 1: TERRA MODIS image acquired 24/12/2012. Image courtesy NASA.

Sea Ice Report #01/2013

by the AAD/ACE CRC Sea Ice Group

03/01/2013

This report provides information on the regions near Casey Station (V2 2012/13) and Davis and Mawson stations (V3 2012/13).

- **Casey Station**

Recent MODIS imagery is largely affected by cloud cover. As a side note, the cloud structures on 02/01/2013 are not only very beautiful but also fantastic messengers of the upper air movements. A guestimate of the northern ice edge based on cloud-affected Terra and Aqua imagery is around 64° 20' S in the vicinity of the V2 (2012/13) northward route, with very few ice fingers protruding north of this, for example at 64° 08' S at 113° 50' E. It is anticipated that for this trip the vessel has already cleared or will clear the sea-ice zone by late today.

- **Davis Station**

With MODIS imagery from 2013 so far being affected by dense cloud coverage over the region of interest, the MODIS image from 31/12/2012 reveals general open-water conditions in the approach to Davis (Figure 1). There are remnants of fast ice littered around the coastal line, especially where held in by islands or grounded/slow moving icebergs. Apart from this, passive microwave imagery from 21 to 31 December 2012 shows the eastward retreat of a pack-ice filament from the southern outflow of the West Ice Shelf Region. On 31/12/2012, it protruded as far west as 77° E (at about 66° 40' S) with ice concentrations around 50% along its edge but reaching around 80% in its interior.

- **Mawson Station**

The near-coastal region off Mawson Station is clearly shown in MODIS imagery from late December 2012, while the most recent images are adversely affected by cloud. The MODIS image from 31/12/2012 clearly shows the fast ice edge, grounded icebergs and a moderately ice filled entry path toward iceberg alley (Figure 2). Considering the presence of a polynya along the eastern edge of this entrance bay towards Mawson Station, and the relatively low ice concentration shown by passive-microwave data of the region, it is speculated that this ice will disappear during the next weeks, leading the way for the breakout of near-shore fast ice closer to Mawson Station.

Note:

There are no up-to-date passive microwave imagery available through the SealceView image library.

Kind regards,

Petra, for the sea-ice group.

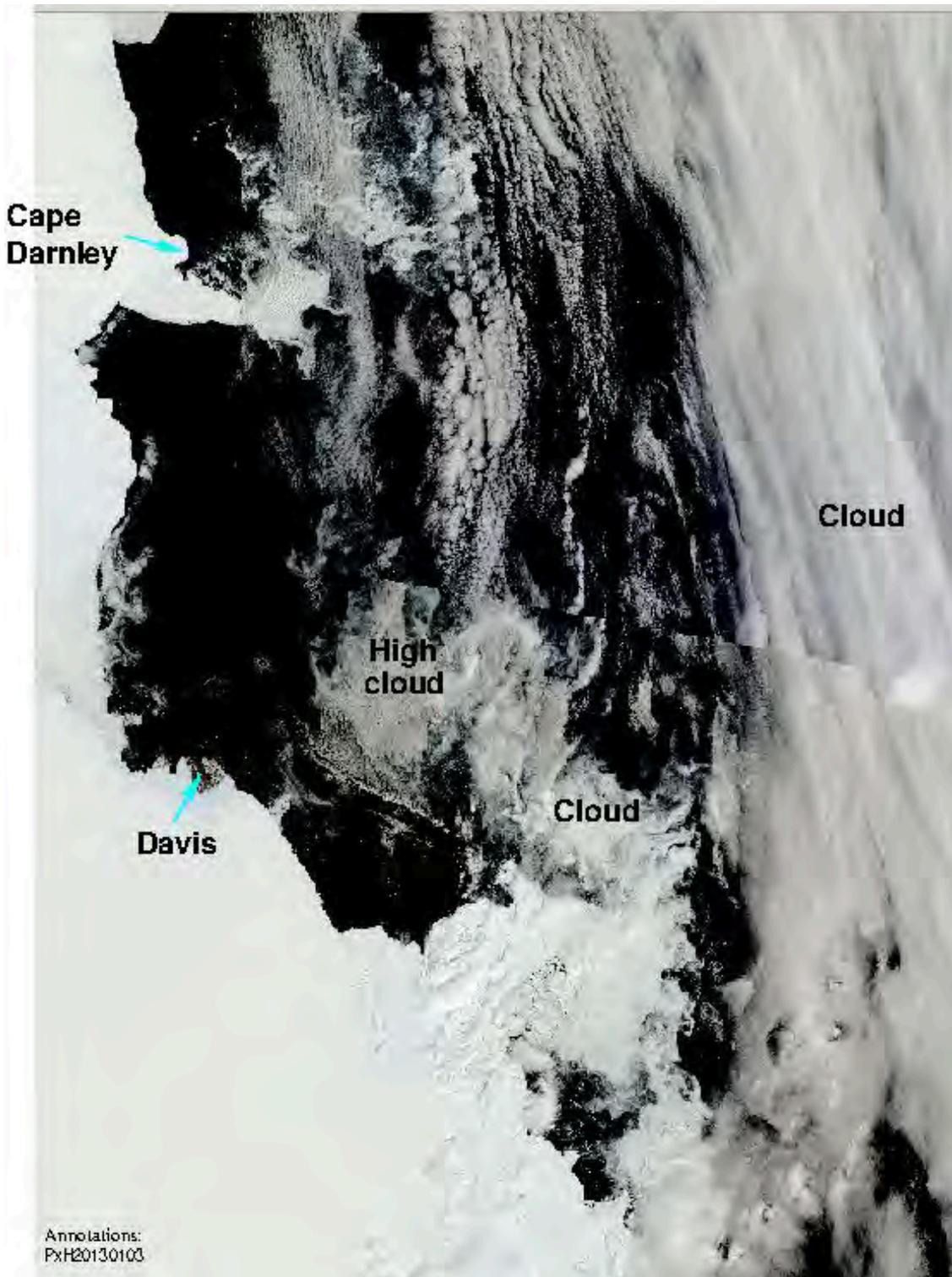


Figure 1: TERRA MODIS image acquired 31/12/2012. Image courtesy NASA.

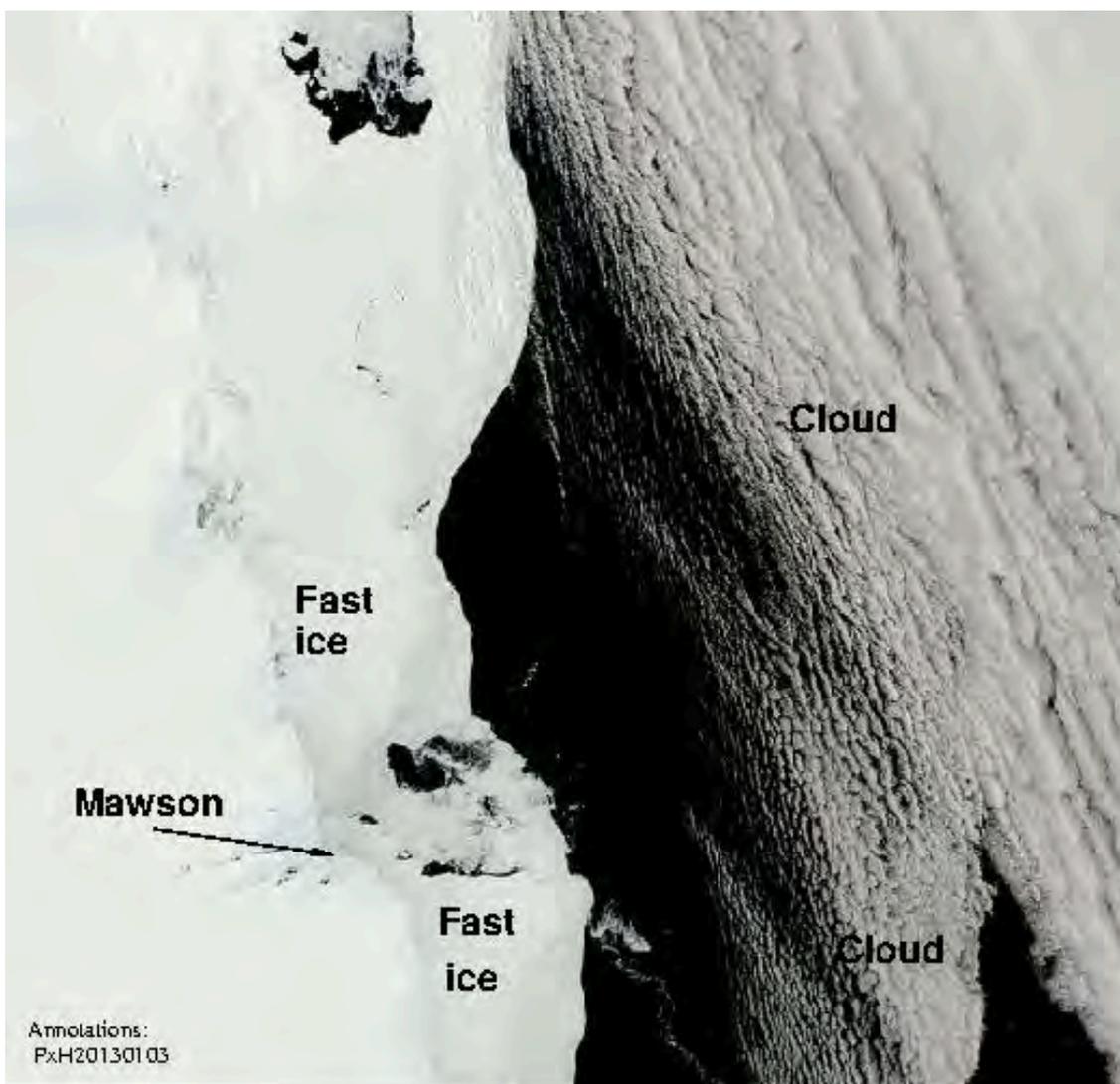


Figure 2: TERRA MODIS image acquired 31/12/2012. Image courtesy NASA.

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Sea Ice Report #02/2013

by the AAD/ACE CRC Sea Ice Group

10/01/2013

This report is concerned with the regions of stations Davis and Mawson.

- **Davis Station**

Eastern Prydz Bay is almost entirely free of sea ice this week, with only a band of filaments of low concentration extending from the western end of the West Ice Shelf and iceberg D15, in a south-westerly direction. To the immediate north of Davis Station, the concentration is reported to be below 50%. Apart from a number of smaller icebergs in the area, the vicinity of Davis Station is ice free. Large tabular icebergs in the region are reported to be B09C at 66° 44' S and 77° 16' E, and C28A (still carrying Benoît Legrésy's GPS unit) at 63° 28' S and 79° 45' E.

- **Mawson Station**

The region of Mawson Station is persistently under clouds recently (see Figure 1 completely cloud covered). However a slight hint of a low ice concentration channel leading south-southwest from about 67° S and 63° 30' E toward the continent can be seen through clouds at times. Also, the fast ice edge to the east of that location shows signs of retreat toward the coast.

Mawson Station's Horseshoe Harbour is still filled with sea ice, as can be seen from web-cam imagery.

With best regards,

Jan, for the sea ice group.

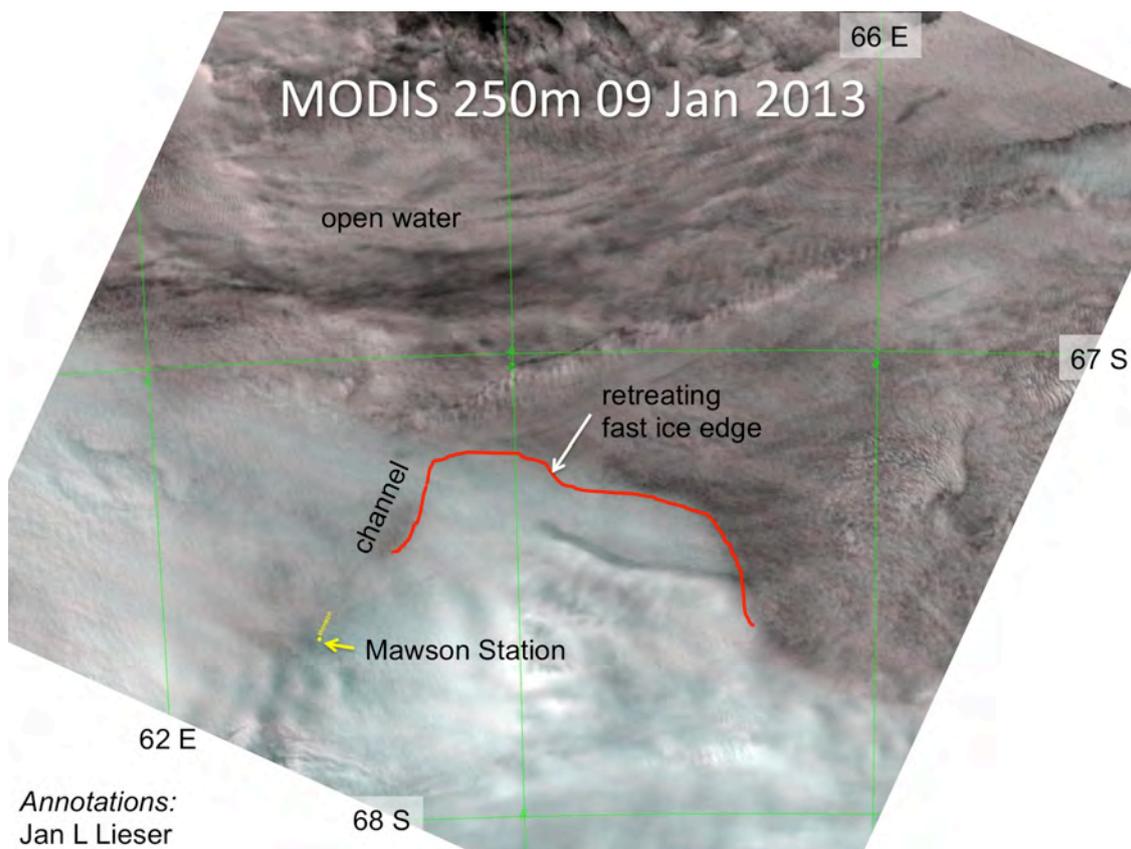


Figure 1: TERRA MODIS image, acquired 09/01/2013 and provided by NASA.

Sea Ice Report #02a/2013

by the AAD/ACE CRC Sea Ice Group

11/01/2013

This report provides an update on the Dumont d'Urville Station/Mertz Glacier Region.

- **Commonwealth Bay**

Commonwealth Bay is still sheltered and blocked by iceberg B09B (see Figure 1; note: most of the scene is slightly obscured by thin clouds). Even though B09B has swivelled only very slightly in a clockwise rotation a few days ago, it seems to be still of major influence over the overall sea ice conditions in the region. The bay is solidly filled with fast ice, with an additional fast ice tongue immediately north of the iceberg B09B, stretching in north-south direction. Further to the west toward Dumont d'Urville Station are two persistent fast ice tongues protruding north from the continent. North of Dumont d'Urville Station is a polynya that is separated from the open ocean by a consolidated band of sea ice, extending about 45 nautical miles in north-south direction. Currently, this band of sea ice shows a quite defined northern edge at about 65° 22' S (see blue line in Figure 1). This edge is not so defined to the east of 142° E, as indicated by the dashed blue line in Figure 1.

There is a lot of sea ice piled up behind iceberg B09B and the fast ice surrounding it, between about 143° 20' E and 145° 30' E. The face of Mertz Glacier is mostly covered by sea ice, even though a very small polynya is visible at places (for example at about 67° 12' S and 144° 44' E). There are a few smaller bergs scattered throughout the polynya to the northwest of Mertz Glacier, and C15 appears grounded at its current position.

With best regards,

Jan, for the sea ice group.

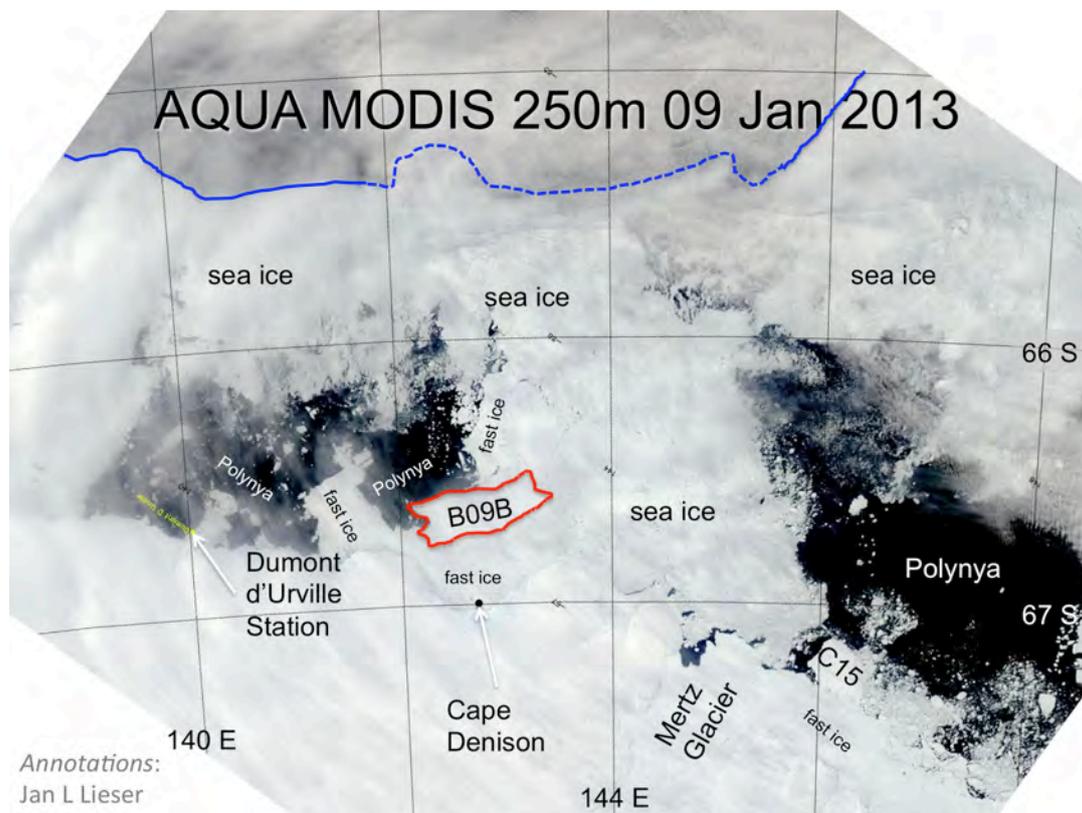


Figure 1: AQUA MODIS image, acquired 09/01/2013 and provided by NASA.

Sea Ice Report #03/2013

by the AAD/ACE CRC Sea Ice Group

17/01/2013

This report is concerned with the regions of stations Davis and Mawson, and Mertz Glacier.

- **Davis Station**

To the west of 78° E Prydz Bay is entirely free of pack ice this week. The band of filaments of low sea ice concentration that was mentioned in last week's report, has retreated to the north and east. Still a number of smaller icebergs are in the area, but the immediate vicinity of Davis Station is sea ice free. Large, freely drifting tabular icebergs in the region are reported to be B09C at 66° 48' S and 76° 54' E, and C28A at 63° 24' S and 79° 56' E.

- **Mawson Station**

A high resolution (about 5m) TerraSAR-X image of the Mawson Station area is shown in Figure 1. Holme Bay is covered by fast ice and the shortest distance to the fast ice edge, as indicated by the red line in Figure 1, is about 13 nautical miles (about 25km). The pack ice appears to be detached from the fast ice (see the north-western side of the red line) and smaller floes accumulate further west against pack ice consisting of larger floes. The pack ice edge in the north of Mawson Station is about 28 nautical miles from the continent (outside of Figure 1). Recent microwave sea ice concentration maps show this area at up to 100% sea ice concentration.

- **Mertz Glacier**

The region between Dumont d'Urville Station and the Mertz Glacier is shown in Figure 2. Since last week, iceberg B09B has moved about 2 nautical miles almost due east. The sea ice between Commonwealth Bay and the face of Mertz Glacier has detached slightly from the coastal fast ice and shows some signs of loosening. Still, there are some substantial floes within the sea ice zone visible in the scene in Figure 2. The northern sea ice edge appears a bit more diffuse in the image, but is slightly obscured by clouds. It is currently located at about 65° 25' S. More recent MODIS visible imagery shows total cloud coverage of the region, unfortunately.

With best regards,

Jan, for the sea ice group.

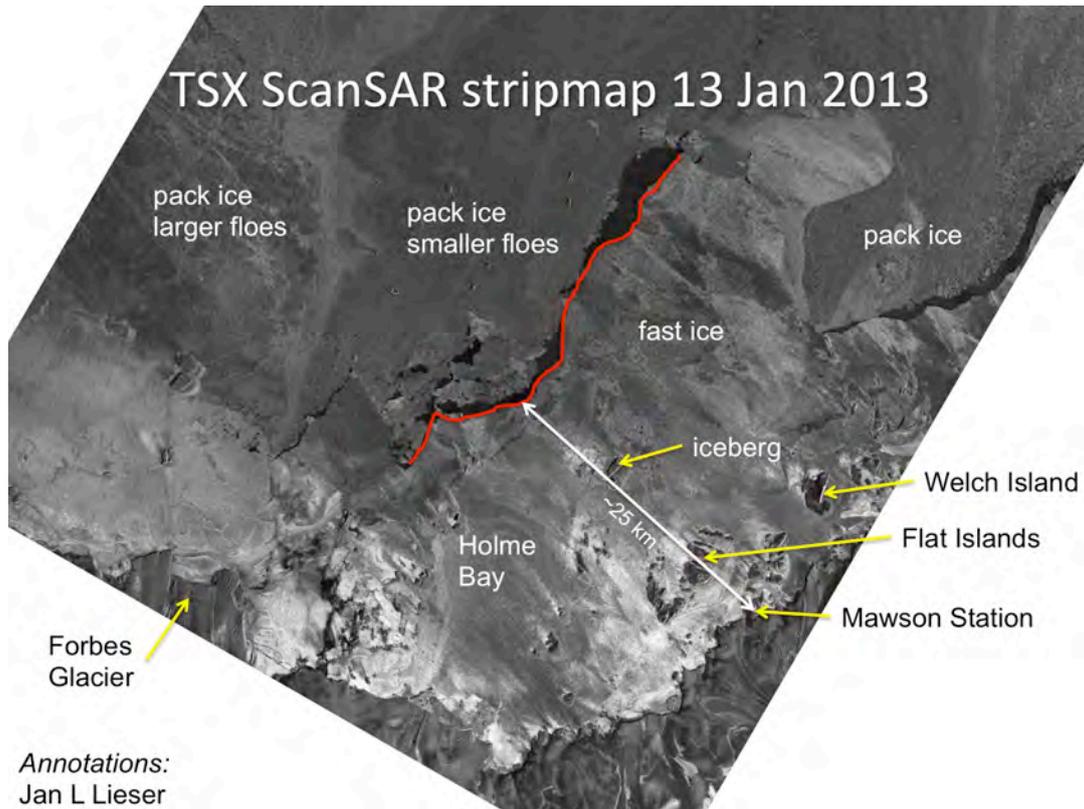


Figure 1: TerraSAR-X ScanSAR image, acquired 13/01/2013 and provided by German Aerospace Center (DLR).

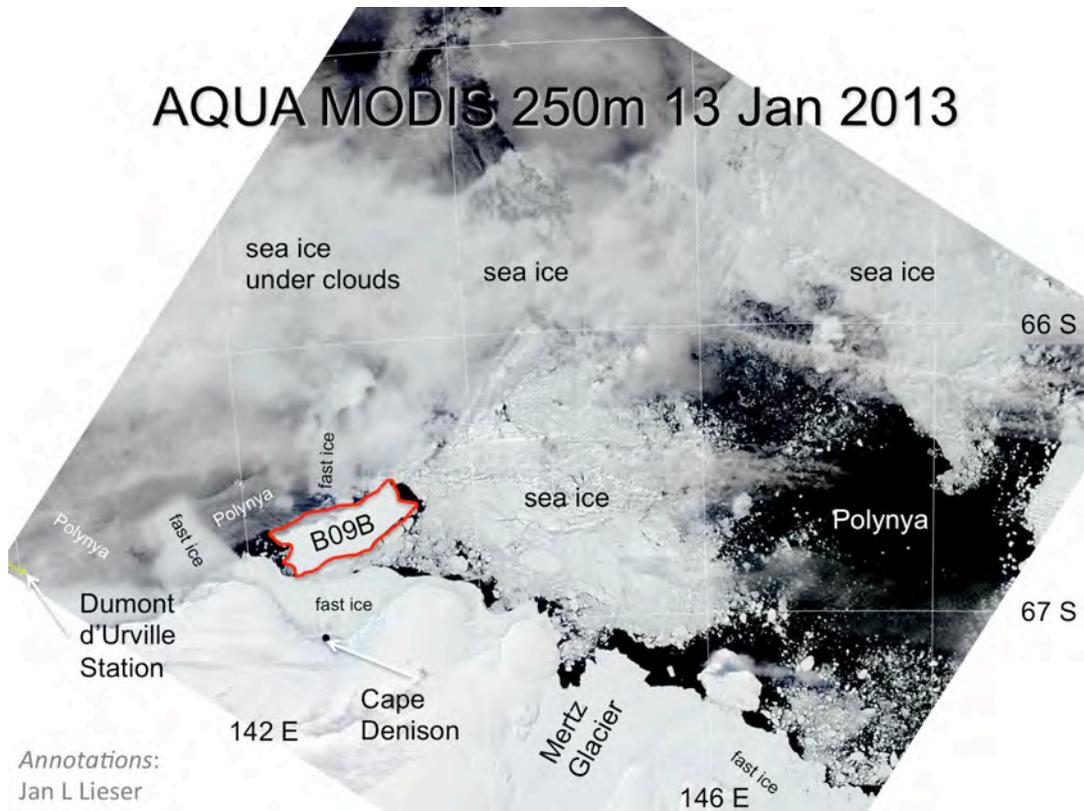


Figure 2: AQUA MODIS image, acquired 13/01/2013 and provided by NASA.

Sea Ice Report #04/2013

by the AAD/ACE CRC Sea Ice Group

24/01/2013

This report is concerned with the regions of stations Mawson and Davis and the Mertz Glacier.

- **Mawson Station**

The scene shown in Figure 1 is almost entirely obscured by clouds. The continental margin is indicated by the blue line. Fast ice to the east of Mawson Station appears to be retreating, but its current boundary is difficult to determine. The channel and polynya to the west of the station appears to have widened. MODIS imagery from 21/01/2013 shows the initial locations of these features quite well, and the current weather system is assumed to have a major influence. The pack ice to the north and west of the station is drifting in north-westerly direction and more fast ice to the west seems to have detached from the coast. However, the most recent station web cam images show Horseshoe Harbour still covered by sea ice.

- **Davis Station**

Eastern Prydz Bay is free of sea ice. The last remaining bits of sea ice in the area are to the north of Davis Station, a thin, decaying tongue of ice filaments between about 66° S and 81° E (iceberg D15) and 67° 10' S and 78° 30' E. Large, tabular icebergs are reported this week at 79° 56' E and 63° 25' S (C28A), and 76° 54' E and 66° 48' S (B09C).

- **Mertz Glacier**

The Mertz Glacier Region shows little sign of change over the last week, that's despite the fact that it was cloud covered recently. Iceberg B09B has wiggled anti-clockwise very slightly, and the northern tip of the fast ice tongue between B09B and Dumont d'Urville Station has disintegrated. However, Commonwealth Bay remains firmly packed with fast ice. Further to the east from there, sea ice remains largely as it was last week. The face of Mertz Glacier shows a small polynya, but between the sea ice to the north of the glacier and iceberg C15 is a thin region of more scattered sea ice. The large polynya to the north of 67° S between 146° E and about 149° E is separated from the open ocean in the north by a broad band of sea ice spanning about one degree in north-south direction, with a diffuse northern sea ice edge that shows many filaments. The orange double arrow in Figure 2 denotes an area of lighter ice concentration, which can still reach 100% occasionally though.

With best regards,

Jan, for the sea ice group.

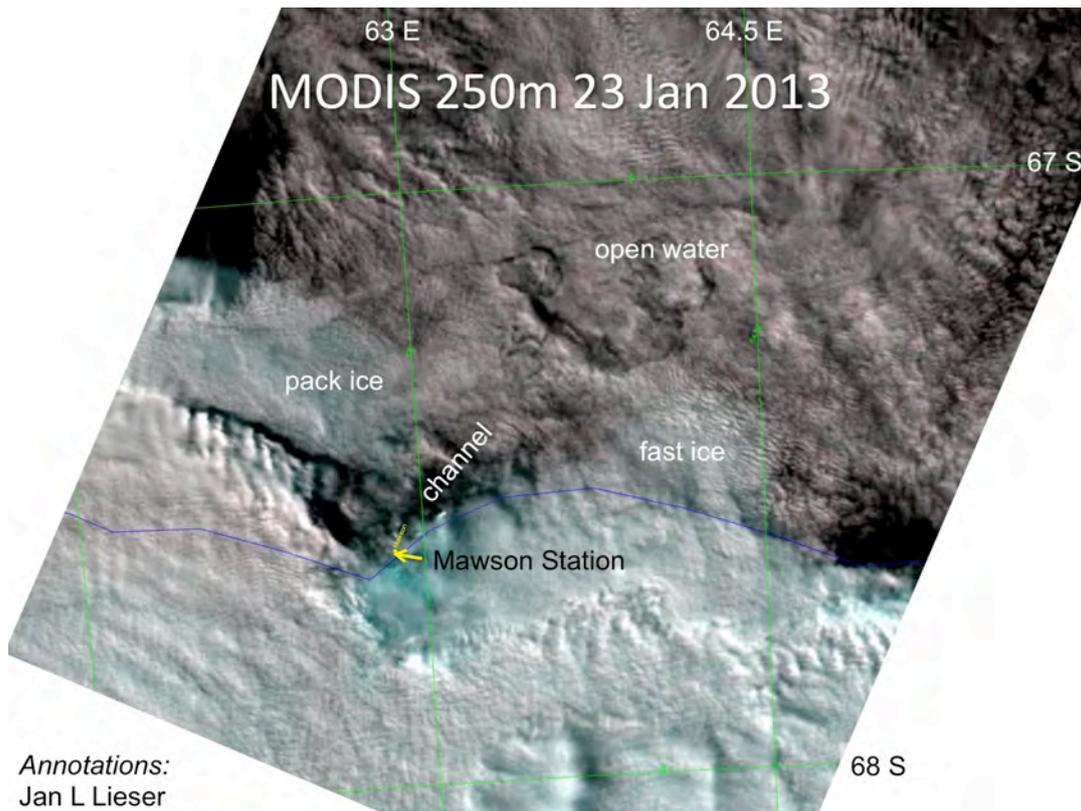


Figure 1: TERRA MODIS image, acquired 23/01/2013 and provided by NASA.

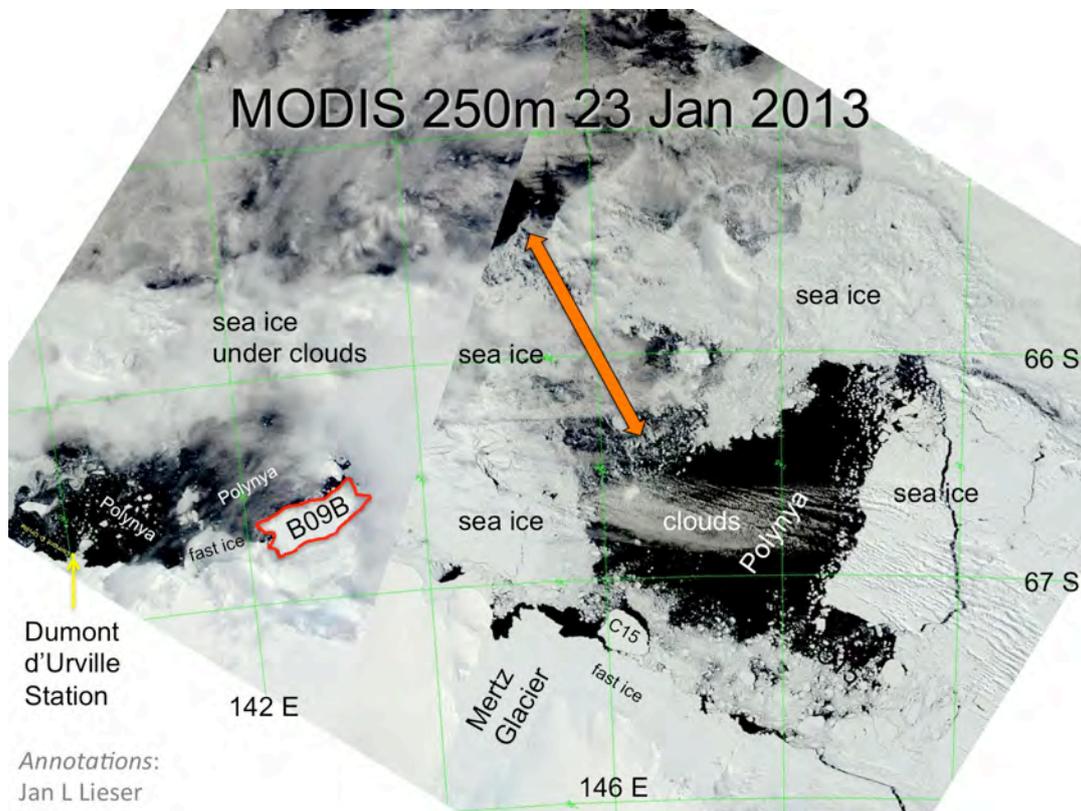


Figure 2: TERRA MODIS image, acquired 23/01/2013 and provided by NASA.

Sea Ice Report #05/2013

by the AAD/ACE CRC Sea Ice Group

31/01/2013

This report is concerned with the regions of stations Mawson and Davis, the Mertz Glacier, and off Oates Land Coast and the Balleny Islands.

- **Mawson Station**

Sea ice to the north of Mawson Station has cleared over the week, including the fast ice to the east along the coast (Figure 1). The now ex-fast ice is dispersing in the east, and smaller bands of sea ice are drifting past the station in the north. To the west of the station is still some fast ice and a bit of pack ice north of it. The last remaining sea ice at the station appears to be locked in Horseshoe Harbour, as evident from web cam imagery. There are only a few icebergs floating in the area, but they are smaller than the pixel-size/detection limit of the MODIS imagery.

- **Davis Station**

Only a few thinning sea ice filaments are present in eastern Prydz Bay, originating from sea ice coming around the northern end of iceberg D15 from the east. In its southwest drift, this sea ice is moved by small scale oceanic eddies, as evident in Figure 2. The thin red line in the Figure denotes the recent cruise track of *RSV Aurora Australis*.

- **Mertz Glacier**

The region to the north of Commonwealth Bay and Mertz Glacier was again cloud covered recently, but Figure 3 gives a good indication of current sea ice conditions. The locations of three Australian (AUS_x) and French (FRA_x) moorings are indicated by black dots and blue arrows. All those positions are covered by ice: AUS_1, _2, _3 and FRA_1 by sea ice; FRA_2 and _3 by iceberg B09B. Iceberg B09B has not moved significantly during the last week. The large polynya to the west of iceberg B09B is scattered with icebergs and some large sea ice floes. Commonwealth Bay remains covered by fast ice.

To the east from there, sea ice has moved slightly southward, even though it appears to show more signs of cracks and breaking floes. There is currently a very pronounced northern sea ice edge clearly detectable under thin clouds in Figure 3. Open water appears all along the coast between the eastern end of Commonwealth Bay and beyond iceberg C15, and the fast ice over there. However, a band of partly substantial sea ice concentration, mostly 90% to 100% spans from the ice edge in the north down south to about 67° S.

- **Oates Land Coast**

Figure 4 shows yesterday's SSMIS sea ice concentration map for the region off the coast of Oates Land and the Balleny Islands. The sea ice edge exhibits signs of contraction towards the continent over the

last week, but the shape of the edge remains quite constant. That is, to the west of 150° E the sea ice edge stays south of 65° S and meets 65° S at about 137° E again, while to the east of 150° E the sea ice edge stays north of 65° S and only follows a southeasterly direction below 65° S beyond about 162° E.

With best regards,

Jan, for the sea ice group.

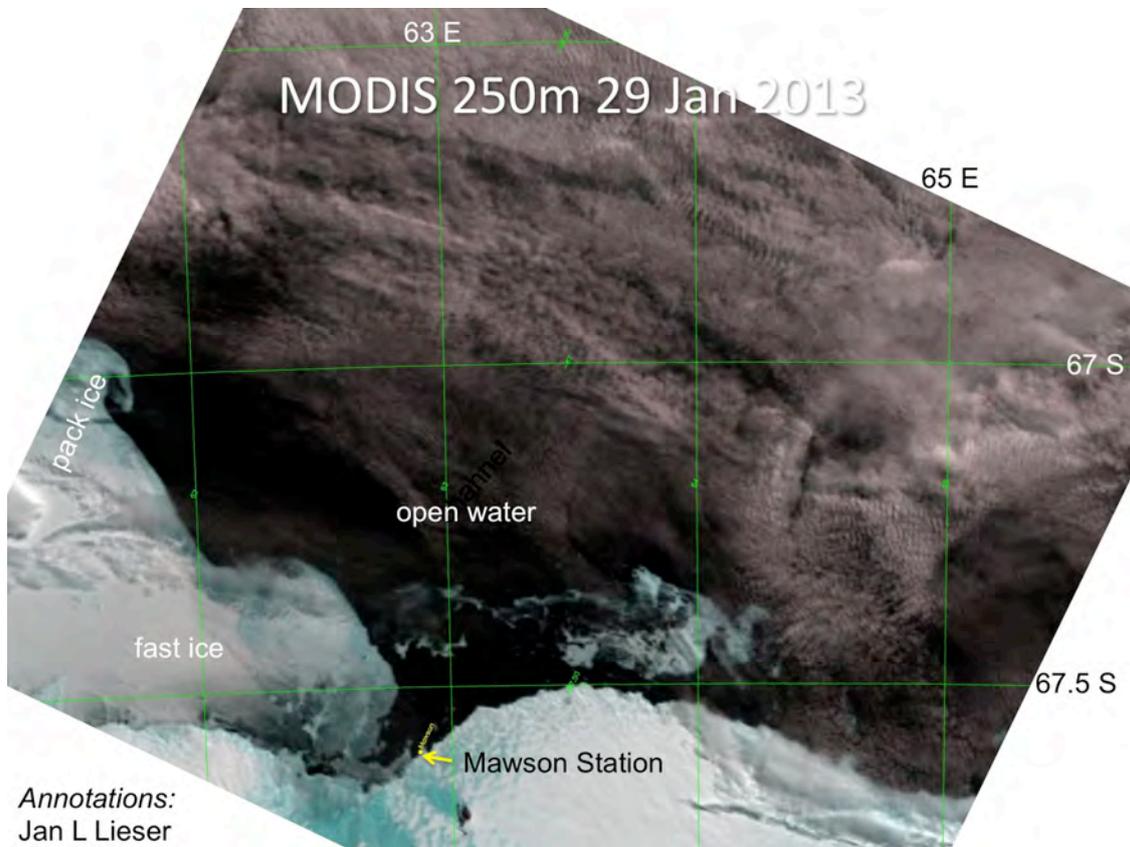


Figure 1: TERRA MODIS image, acquired 29/01/2013 and provided by NASA.

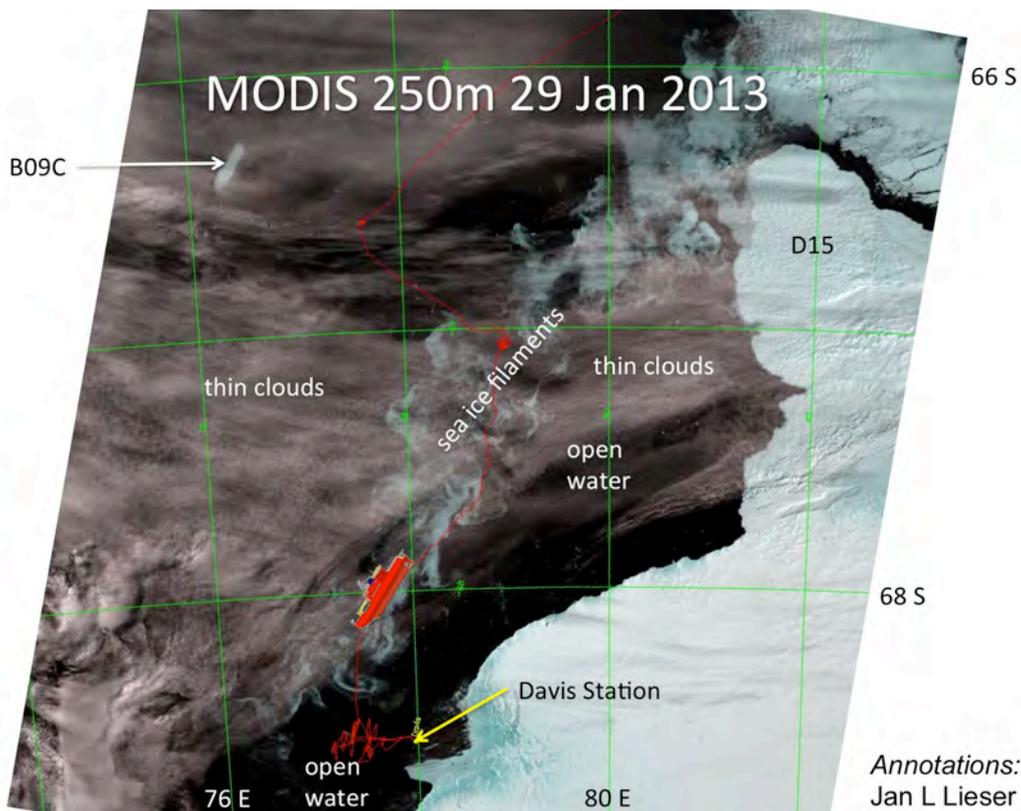


Figure 2: TERRA MODIS image, acquired 29/01/2013 and provided by NASA.

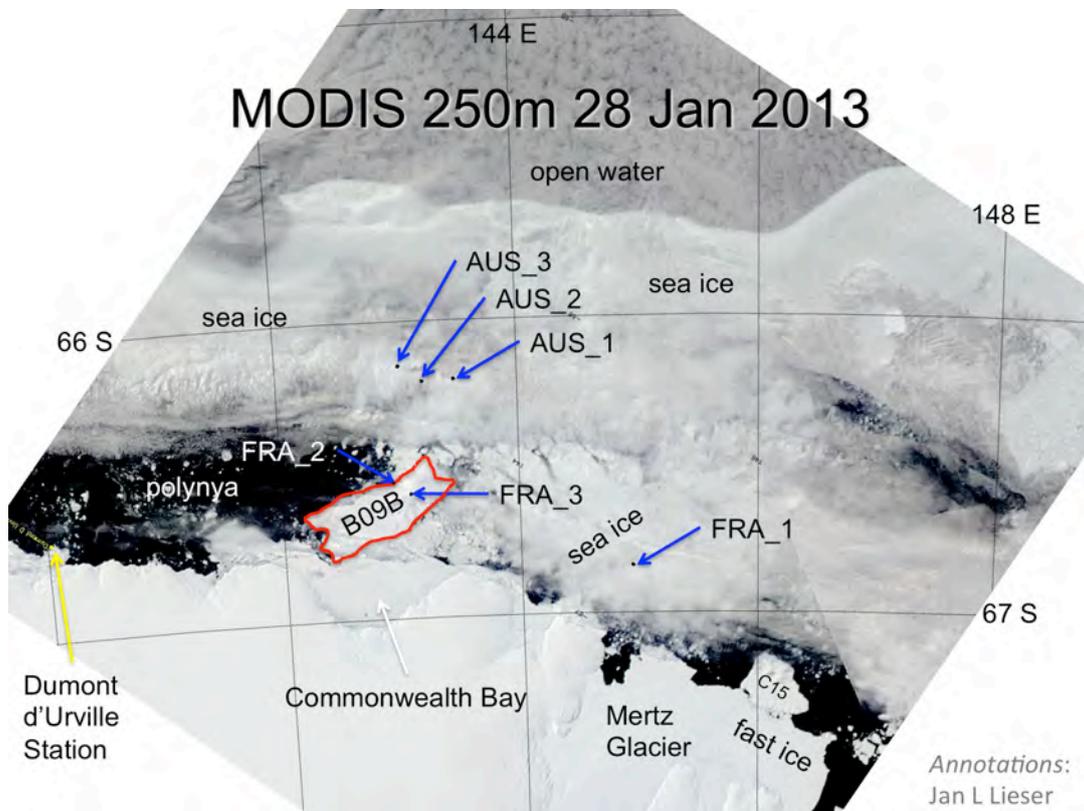


Figure 3: TERRA MODIS image, acquired 28/01/2013 and provided by NASA.

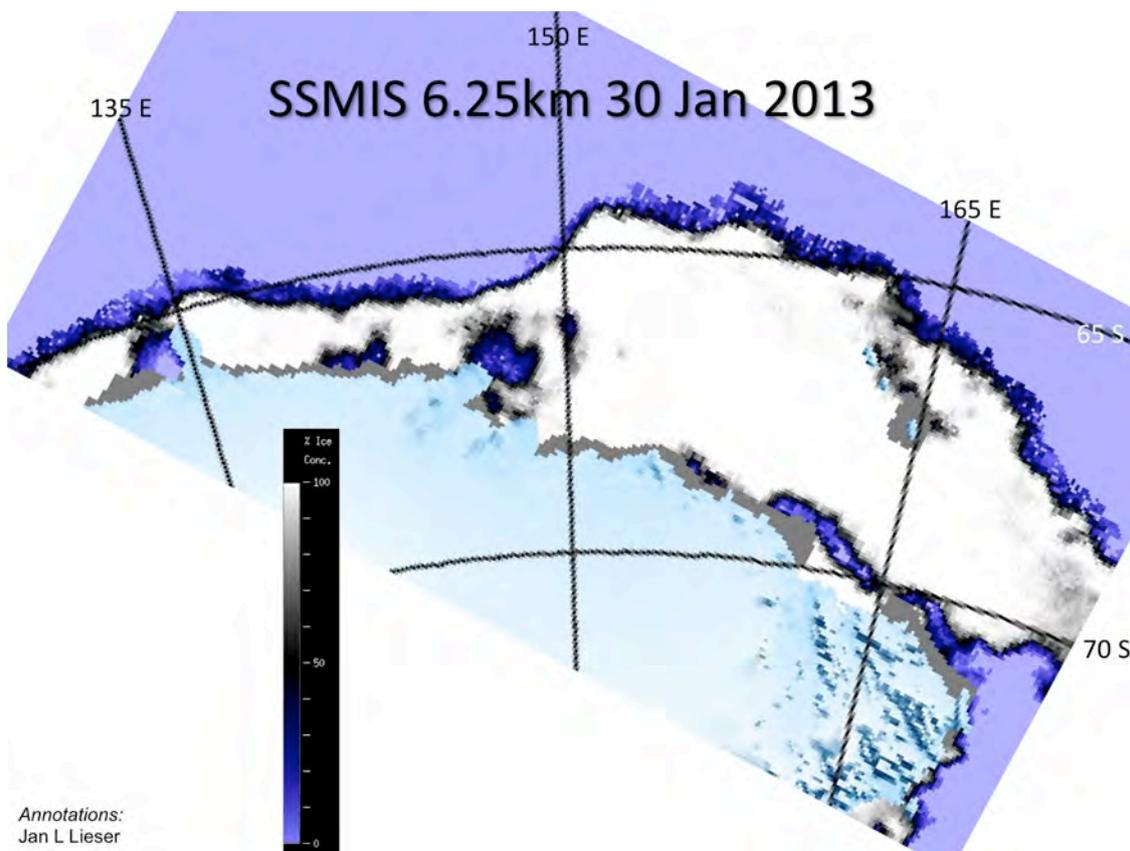


Figure 4: SSMIS image, acquired 30/01/2013 and provided by University Bremen.

Sea Ice Report #05a/2013

by the AAD/ACE CRC Sea Ice Group

04/02/2013

This update is concerned with the region between Dumont d'Urville Station and Mertz Glacier.

- **Dumont d'Urville Station**

Figure 1 shows the sea ice conditions between Dumont d'Urville Station and Mertz Glacier today. While the immediate vicinity of the station appears mostly sea ice free, there is still a large band of sea ice further north. Last week, the sea ice edge in the north was a well defined line, as mentioned in sea ice report #05/2013. Atmospheric conditions appear to have changed now and the sea ice edge shows much more signs of small scale oceanic eddies protruding northward. As well, the sea ice conditions between the ice edge and the polynya (opening to the north-east from the station) seem to be easing slightly. The extensive, dense pack in the north-west of Dumont d'Urville Station shows clearly cracks and openings visible even through the thin cloud cover. This area is marked 'loosening sea ice' in Figure 1. Also, the region of the Australian moorings AUS_1, AUS_2, and AUS_3 exhibits large cracks for two days now, even though the floes themselves can still be regarded as massive. The shortest distance between the open ocean in the north and the polynya leading toward Dumont d'Urville Station is now at about 142° 30' E, or just to the east of there.

- **Mertz Glacier**

To the east of Commonwealth Bay and Iceberg B09B and toward Mertz Glacier, sea ice conditions have also eased very slightly over the weekend. B09B has continued its slight anticlockwise movement, occupying more of position FRA_2 now, and the sea ice edge shows more undulations today. The face of Mertz Glacier appears to be free of sea ice, but the exact extent of the polynya at about 146° E is difficult to estimate based on the MODIS image (Figure 1). SSMIS data (Figure 2) suggests lower sea ice concentrations up to about 66° S to the north and east of Mertz Glacier. Note the landmask (grey and dark grey shaded area) applied to generate this product is not up to date and does not reflect the current shape of Mertz Glacier correctly.

With best regards,

Jan, for the sea ice group.

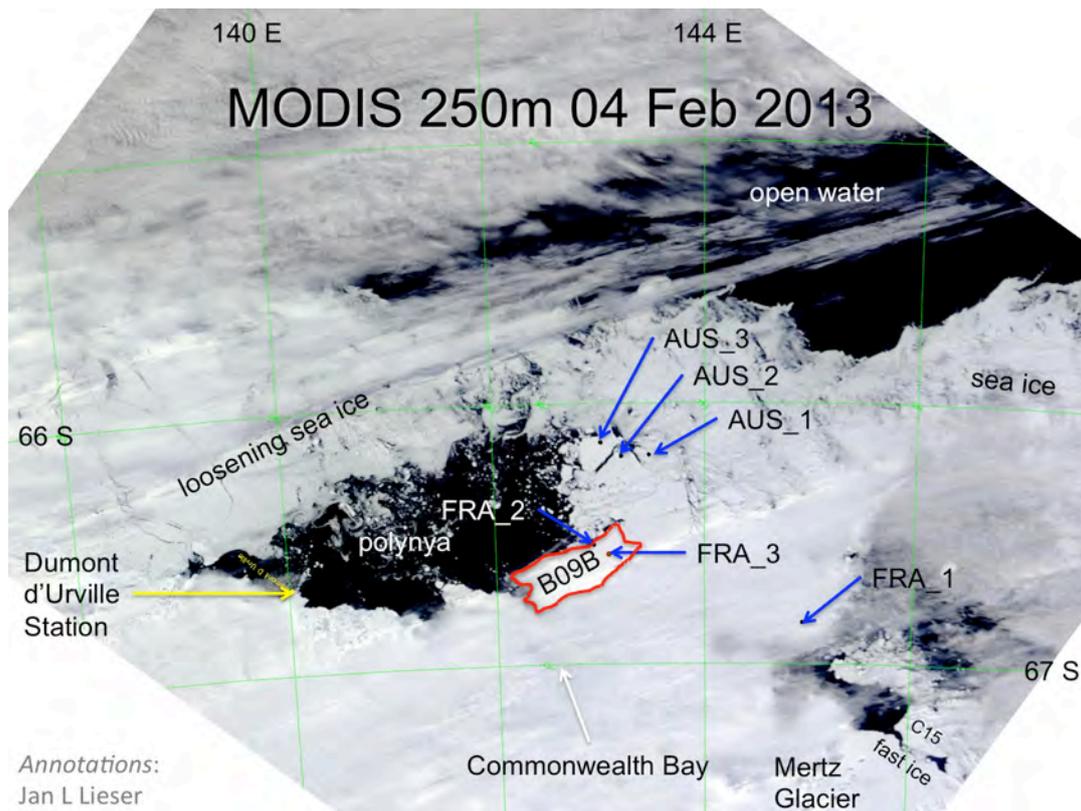


Figure 1: TERRA MODIS image, acquired 04/02/2013 and provided by NASA.

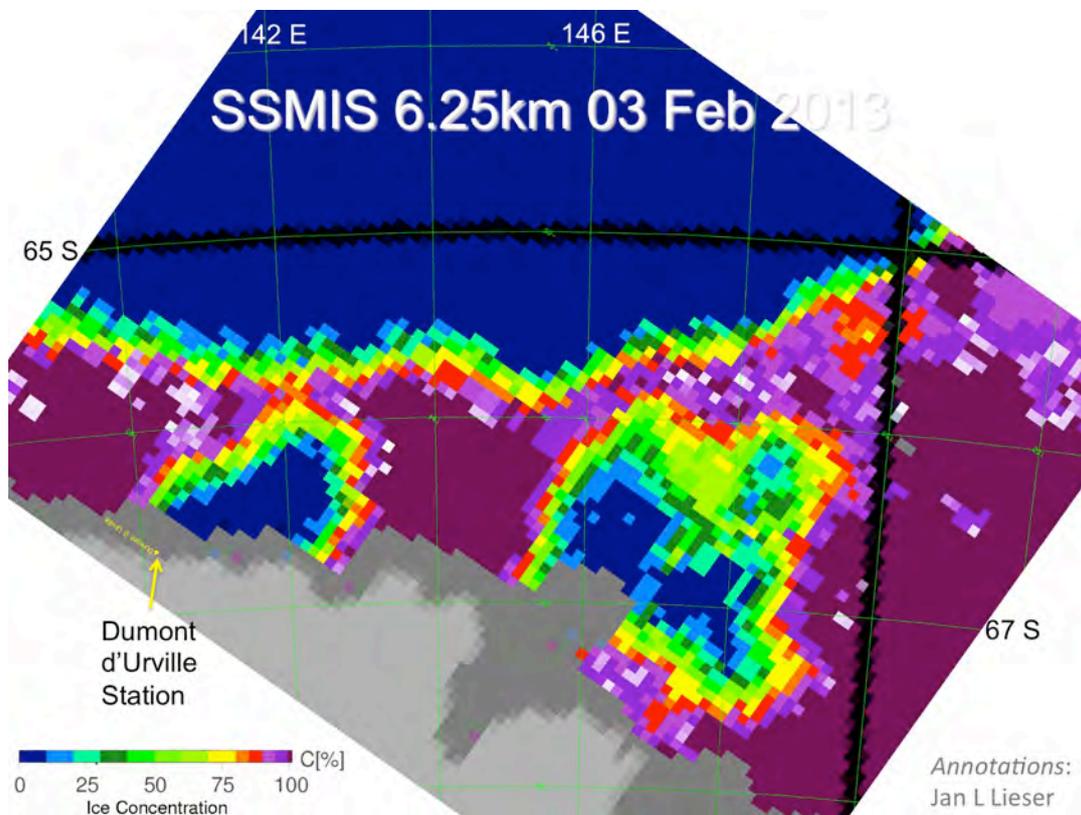


Figure 2: SSMIS image, acquired 03/02/2013 and provided by Polar View.

Sea Ice Report #06/2013

by the AAD/ACE CRC Sea Ice Group

07/02/2013

This report is concerned with the regions of Mawson Station, the Mertz Glacier, and off Oates Land Coast and the Balleny Islands.

- **Mawson Station**

Off Mawson Station, sea ice to the north and east has cleared over the past week. The last remaining sea ice is land fast at the moment and only to the west of 62° 20' E. Horseshoe Harbour is now also free of sea ice (with a little encouragement by *RSV Aurora Australis*). There are only a few icebergs floating in the area, but they are smaller than the pixel-size/detection limit of the MODIS imagery.

- **Mertz Glacier**

Sea ice conditions between Dumont d'Urville Station and the Mertz Glacier have not changed significantly recently. The sea ice edge is obscured by clouds (see Figure 1) but shows in general more signs of filaments and meanders. The central part of the area shown in Figure 1 between Commonwealth Bay and the Mertz Glacier is still covered by dense ice up to about 65° 40' S. The annotated polynyas in Figure 1 are widening slightly, but still some massive floes and icebergs are scattered around.

- **Oates Land Coast**

Off the coast of Oates Land and the Balleny Islands, the sea ice edge appears a little more fuzzy these days, see Figure 2 for reference. Some features of the sea ice edge meandered eastward over the past few days, most likely following oceanic surface eddies. The region northeast of the Balleny Islands exhibits slightly reduced sea ice concentrations, however the actual sea ice edge (that is: less than 15% ice concentration per unit area) is further north from there.

With best regards,

Jan, for the sea ice group.

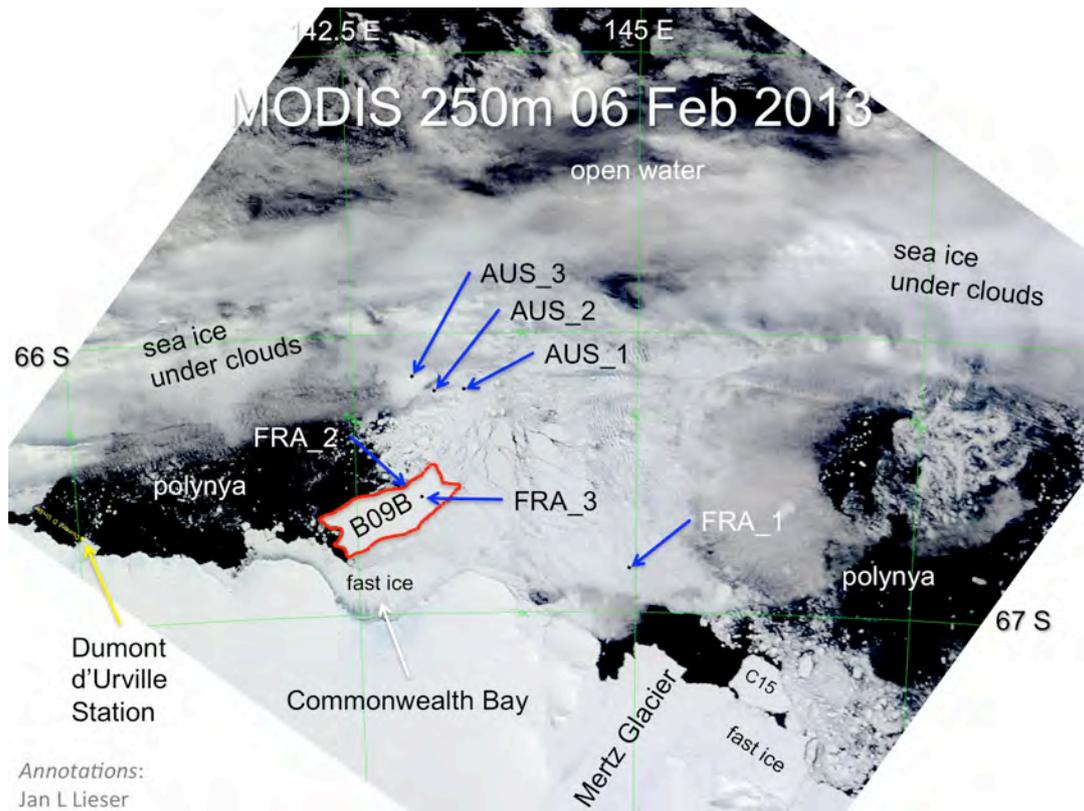


Figure 1: TERRA MODIS image, acquired 06/02/2013 and provided by NASA.

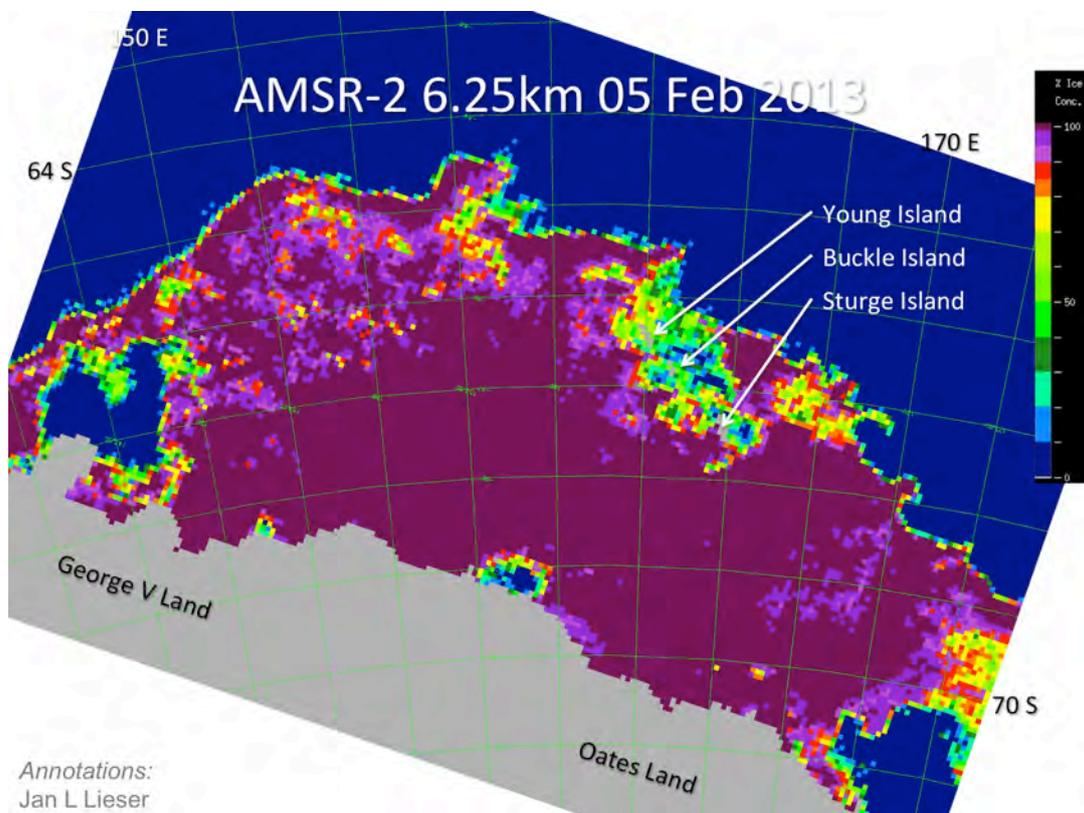


Figure 2: AMSR-2 image, acquired 05/02/2013 and provided by University Bremen.

Sea Ice Report #07/2013

by the AAD/ACE CRC Sea Ice Group

14/02/2013

This report is concerned with the regions off the Mertz Glacier, and off Oates Land Coast and the Balleny Islands.

- **Mertz Glacier**

Figure 1 shows the sea ice conditions between Dumont d'Urville Station and the Mertz Glacier. During the last week, the general sea ice drift south of 66° S has been westward. This resulted in a widening of the polynya to the north of Mertz Glacier and mooring position FRA_1 is now clear of sea ice. All other annotated mooring positions are still covered by ice; yesterday's MODIS image (Figure 1) suggests that position AUS_3 is currently covered by a large piece of former glacier, but it seems small enough to not have a name.

The Mertz Glacier polynya is now separated from the open ocean in the north only by a narrow band of sea ice, annotated 'sea ice under clouds' to the east of 145° E. This band appears only a few tens of miles wide in imagery from earlier this week and shows many undulations and filaments. Close to the shore, fast ice to the east of iceberg C15 shows signs of break up and the pieces are drifting north and west passing the face of Mertz Glacier.

On the up-drift side of Iceberg B09B, that is to the east of the berg, sea ice appears slightly more compacted recently. The polynya to the west of 142° 30' E stretching towards Dumont d'Urville Station is, as well as the Mertz polynya, separated from the open ocean by a broken band of sea ice, again under clouds in Figure 1. This band however stretches more than a degree in latitude, but shows the same signs of undulations and filaments.

- **Oates Land Coast**

The sea ice edge in this region has not shown dramatic changes in the past week, if at all, extended slightly northward. But the filament features protruding north from the edge have moved eastward. For example, the little hook-like protrusion of sea ice located in Figure 2 at about 160° E just south of 64° S, has moved east as a feature about one degree of longitude in the last seven days. The region north-east of the Balleny Islands is mostly clear of sea ice now.

With best regards,

Jan, for the sea ice group.

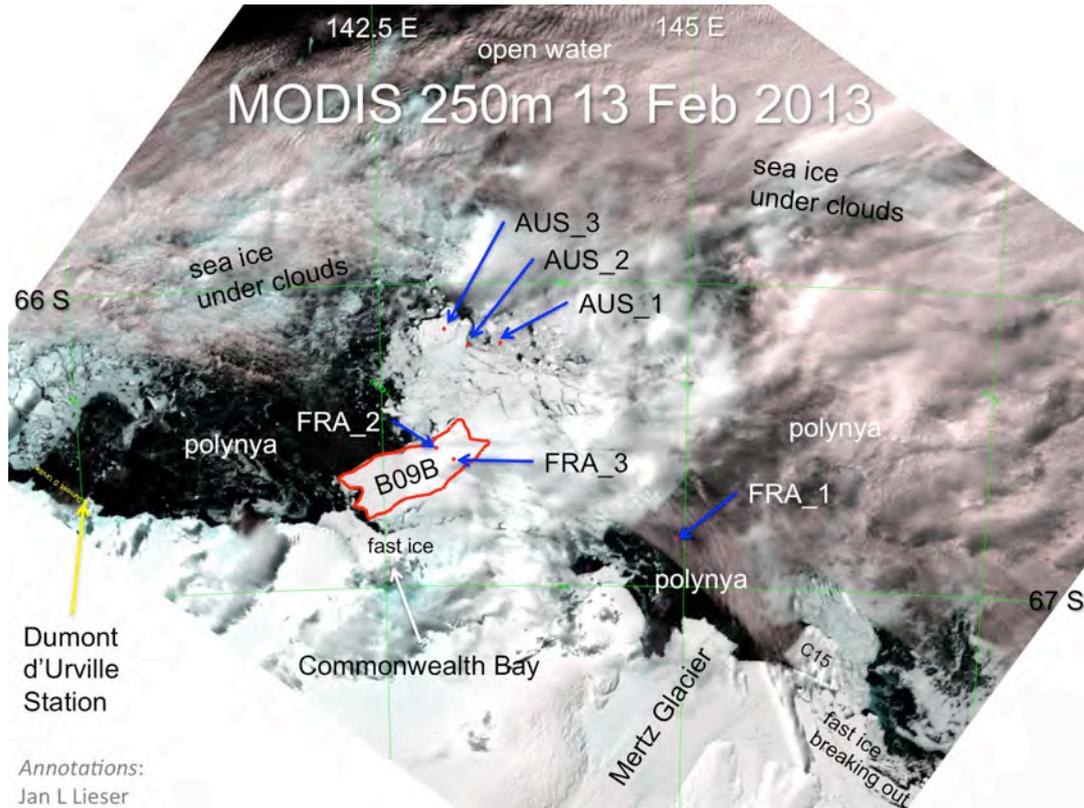


Figure 1: AQUA MODIS image, acquired 13/02/2013 and provided by NASA.

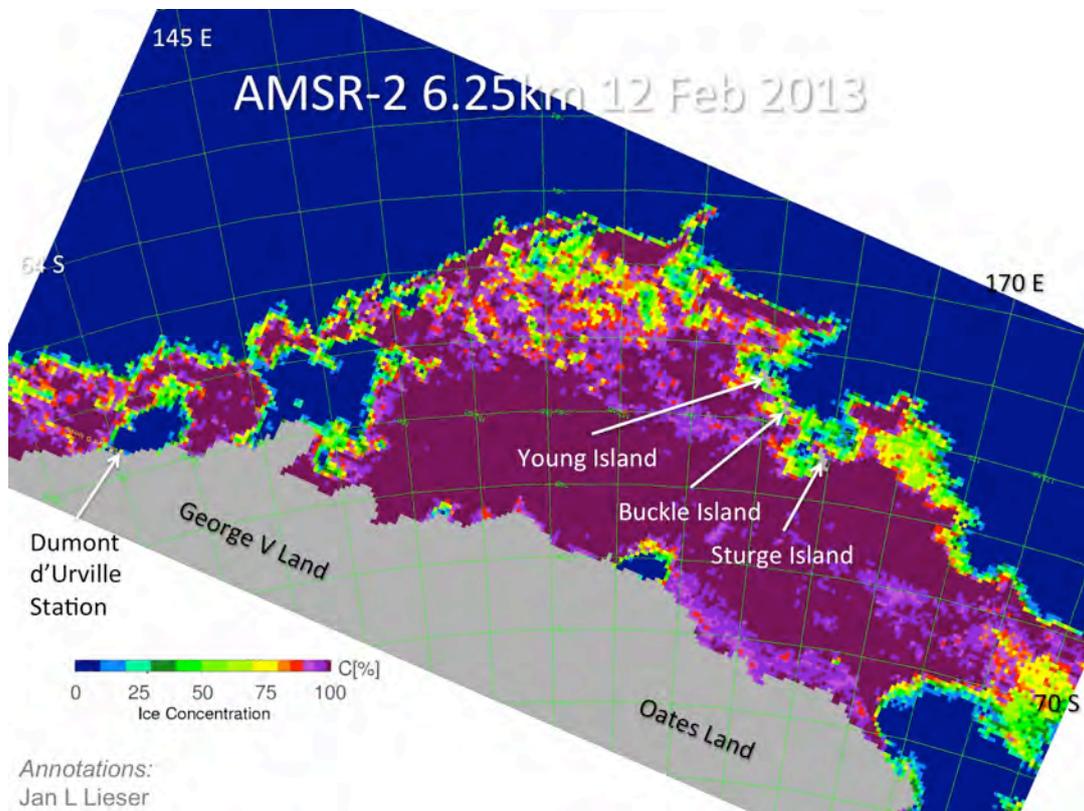


Figure 2: AMSR-2 image, acquired 12/02/2013 and provided by University Bremen.

Sea Ice Report #07a/2013

by the AAD/ACE CRC Sea Ice Group

18/02/2013

This report provides an update on the regions off the Mertz Glacier, and off Oates Land Coast and the Balleny Islands.

- **Mertz Glacier**

A high resolution MODIS image is reproduced in Figure 1, and the region is also included in the western part of Figure 2.

Sea ice conditions have slightly changed over the last few days. The polynya to the north and east of Mertz Glacier has expanded a little more, but at the same time shows signs of new ice formation in front of Mertz Glacier and also further north. The mixture of new and old sea ice is advected north and west closer to the coast, and adds to the sea ice piled up to the east of Iceberg B09B. While north of 65° 30' S, the mix shows many undulations and filaments and generally more of an eastward drift. All annotated mooring positions are again covered by ice, but FRA_1 possibly only by pancakes.

- **Oates Land coast**

Between 148° E and 170° E, the sea ice edge is much more diffuse and shows more filaments reaching further north, with some sea ice extending north of 64° S, at about 156° E and 160° E. The marginal sea ice zone has widened significantly, and the Balleny Islands appear to be surrounded by sea ice a little more.

With best regards,

Jan, for the sea ice group.

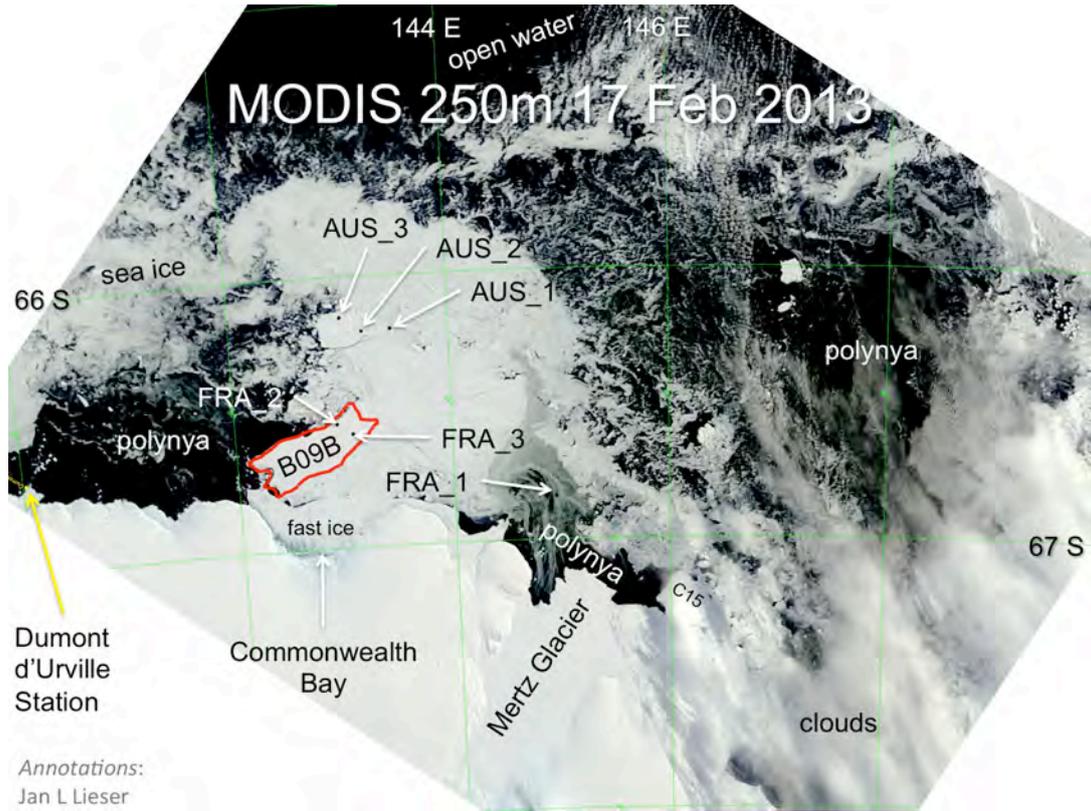


Figure 1: TERRA MODIS image, acquired 17/02/2013 and provided by NASA.

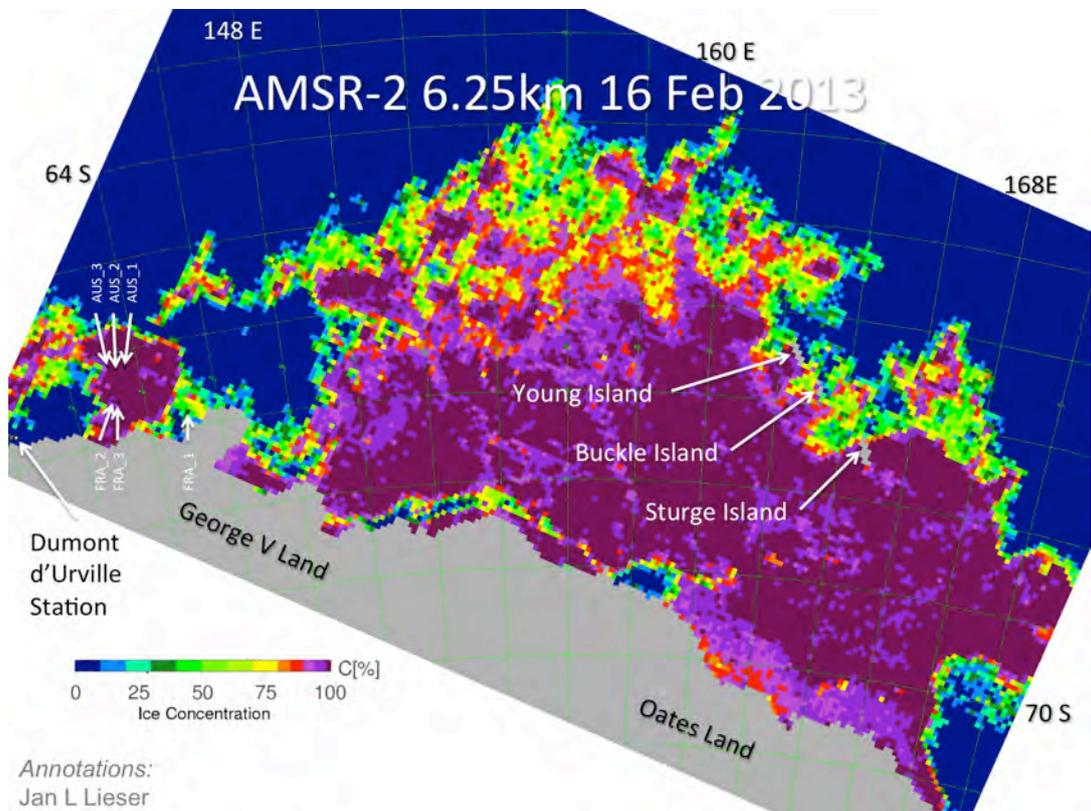


Figure 2: AMSR-2 image, acquired 16/02/2013 and provided by University Bremen.

Sea Ice Report #08/2013

by the AAD/ACE CRC Sea Ice Group

21/02/2013

This report is concerned with the regions off the Mertz Glacier, and off Oates Land Coast and the Balleny Islands.

- **Mertz Glacier**

Sea ice formation has begun in earnest between Dumont d'Urville Station and the Mertz Glacier, and beyond. This is clearly visible in the last, relatively cloud free scene, from MODIS instrument (see Figure 1). All low sea ice concentration areas (annotated 'polynya' and 'sea ice formation' in Figure 1) show significant signs of sea ice being formed *in-situ* and expanding north.

Yesterday's sea ice concentration chart (see the western end of Figure 2 for the region of interest here) shows the ice edge and filaments of sea ice north of 65° S at 146° E and elsewhere. The polynya between Dumont d'Urville Station and Iceberg B09B is separated from the open ocean by a thickening band of high sea ice concentration that reaches 100% between 65° 40' S and 66° S. This area also features a few large, tabular icebergs that have a pronounced influence on the sea ice drift.

All annotated mooring positions (AUS_1, AUS_2, AUS_3, and FRA_1, FRA_2, FRA_3) are still covered by ice.

- **Oates Land Coast**

The sea ice edge between 135° E and 175° E is constantly expanding north. In Figure 2, the sea ice edge appears quite fuzzy between 150° E and 165° E, but is progressing northwards as autumn now sets in. The Balleny Islands are fully surrounded by sea ice.

With best regards,

Jan, for the sea ice group.

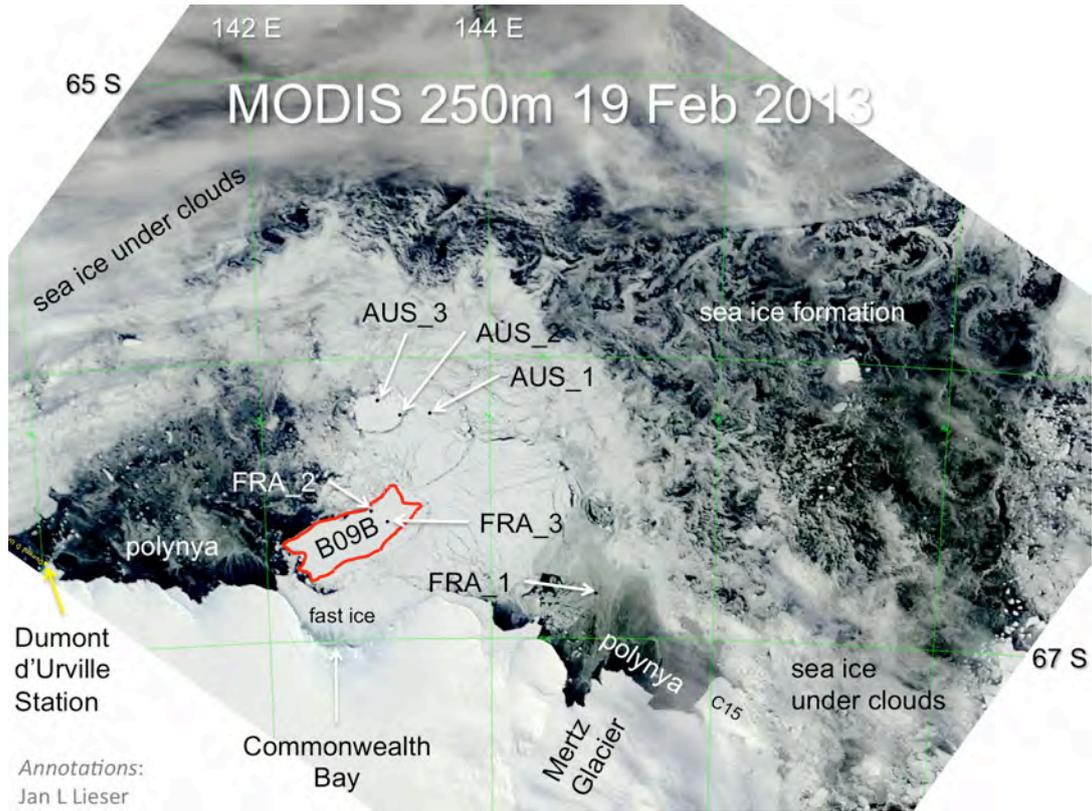


Figure 1: TERRA MODIS image, acquired 19/02/2013 and provided by NASA.

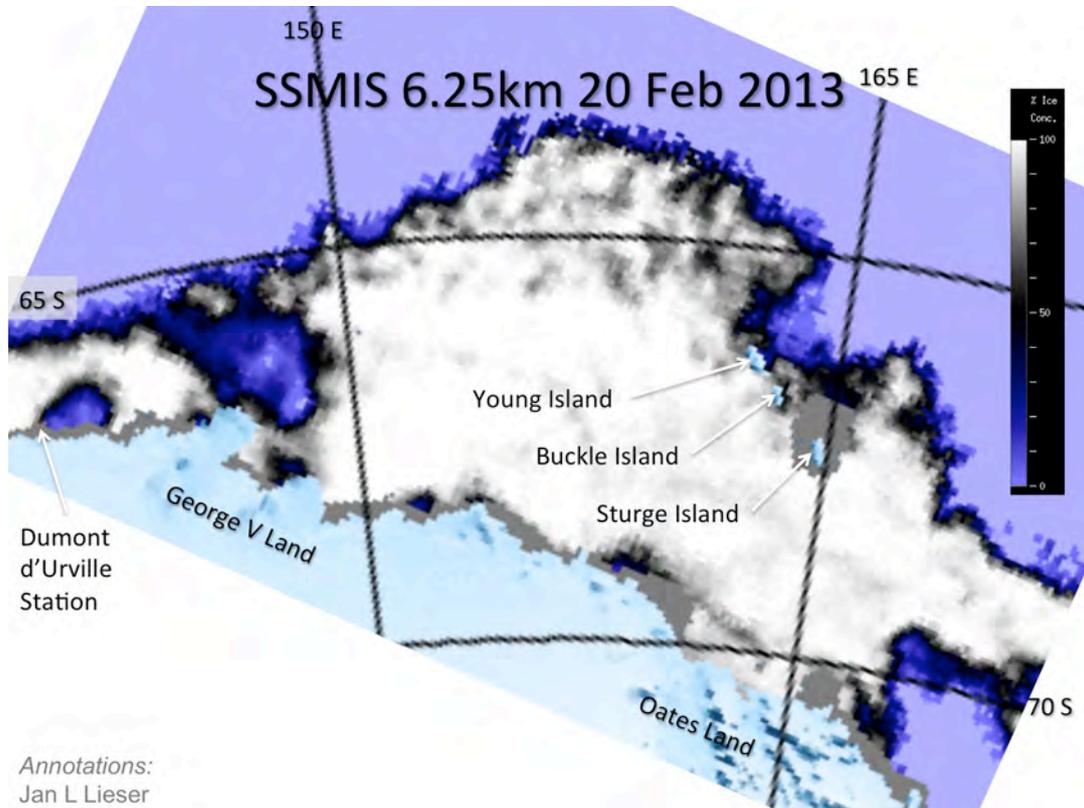


Figure 2: SSMIS image, acquired 20/02/2013 and provided by University Bremen.

Sea Ice Report #09/2013

by the AAD/ACE CRC Sea Ice Group

28/02/2013

This report is concerned with the regions off the Mertz Glacier, and off Oates Land Coast and the Balleny Islands.

- **Mertz Glacier**

Figure 1 shows the region off the Mertz Glacier mostly cloud free, two days ago. Signs of sea ice formation are visible throughout the whole scene, but at the same time the two polynyas between Dumont d'Urville Station and B09B, and off the Mertz Glacier appear well maintained. Sea ice is compacting in the region, as evident from recent microwave data (see the western part of Figure 2). There is one area of lower sea ice concentration at about 148° E, reaching south to about 66° 50' S, where a predominantly north-south oriented series of larger icebergs to the east of that area (marked with an orange line in Figure 1) appears to be holding sea ice in its westward drift for the moment.

Sea ice to the north and east of Commonwealth Bay and Iceberg B09B appears largely unchanged, if not compacting.

- **Oates Land coast**

A microwave sea ice concentration chart for 26/02/12 is shown in Figure 2. Over the past week, sea ice has compacted and expanded slightly northward, most clearly to the east of 163° E. The Balleny Islands are now fully enclosed by sea ice.

With best regards,

Jan, for the sea ice group.

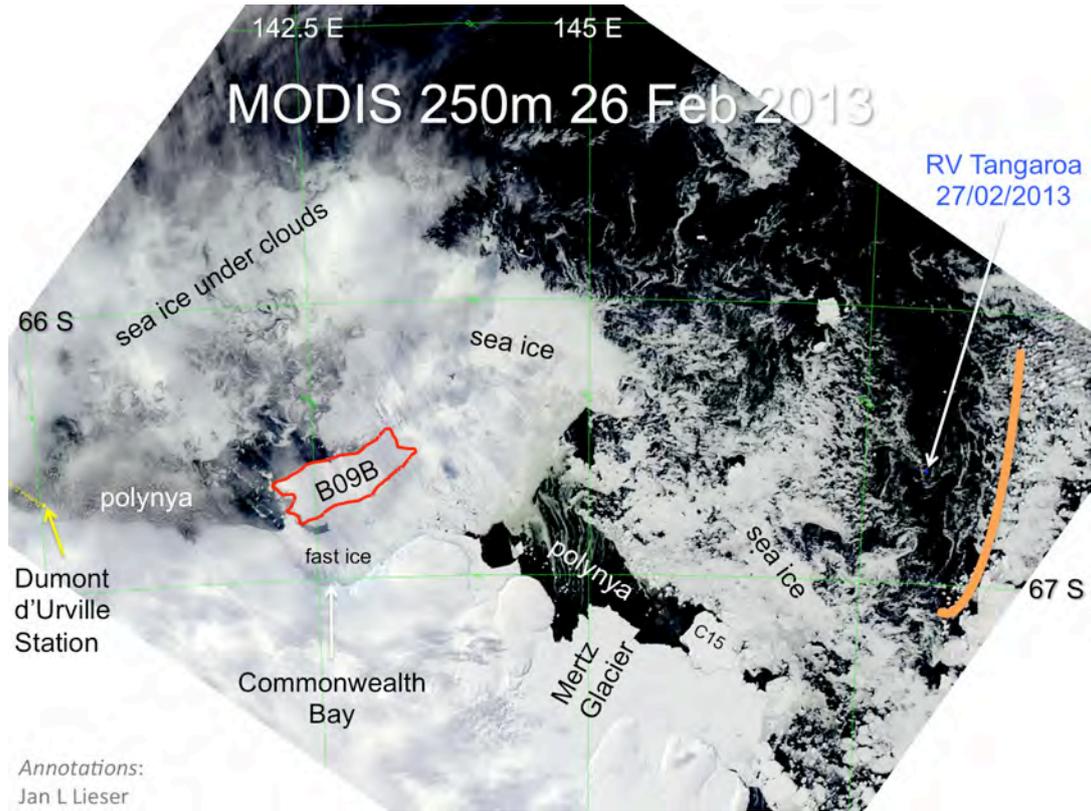


Figure 1: AQUA MODIS image, acquired 26/02/2013 and provided by NASA.

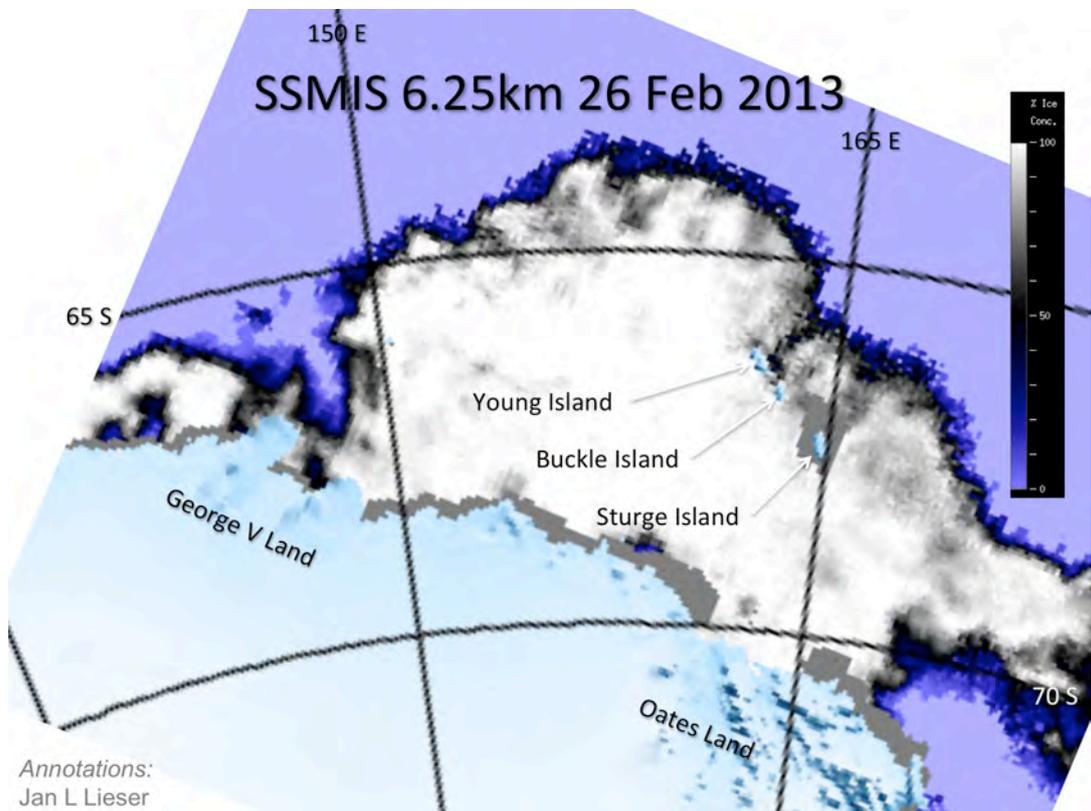


Figure 2: SSMIS image, acquired 26/02/2013 and provided by University Bremen.

Sea Ice Report #10/2013

by the AAD/ACE CRC Sea Ice Group

07/03/2013

This report is concerned with the regions off the Mertz Glacier, and off Oates Land Coast and the Balleny Islands.

- **Mertz Glacier**

The region between Dumont d'Urville Station and the Mertz Glacier two days ago is shown in Figure 1. The open ocean in the north is largely obscured by cumulus clouds, but the sea ice zone and continent are cloud free. Sea ice formation in the polynya regions off the Mertz Glacier and between Dumont d'Urville Station and Commonwealth Bay is well under way. The sea ice is compacting in general and expanding north, while the polynya activity appears to be well maintained.

The fast ice in Commonwealth Bay seems to be unaffected by the summer season, and B09B remains firmly resting just north of the bay.

- **Oates Land Coast**

Figure 2 shows a microwave sea ice concentration chart for 05/03/12. Sea ice has compacted in the central sea ice zone and expanded northward steadily. The sea ice edge presents itself slightly diffuse currently, and reaches beyond 63° 30' S at times.

With best regards,

Jan, for the sea ice group.

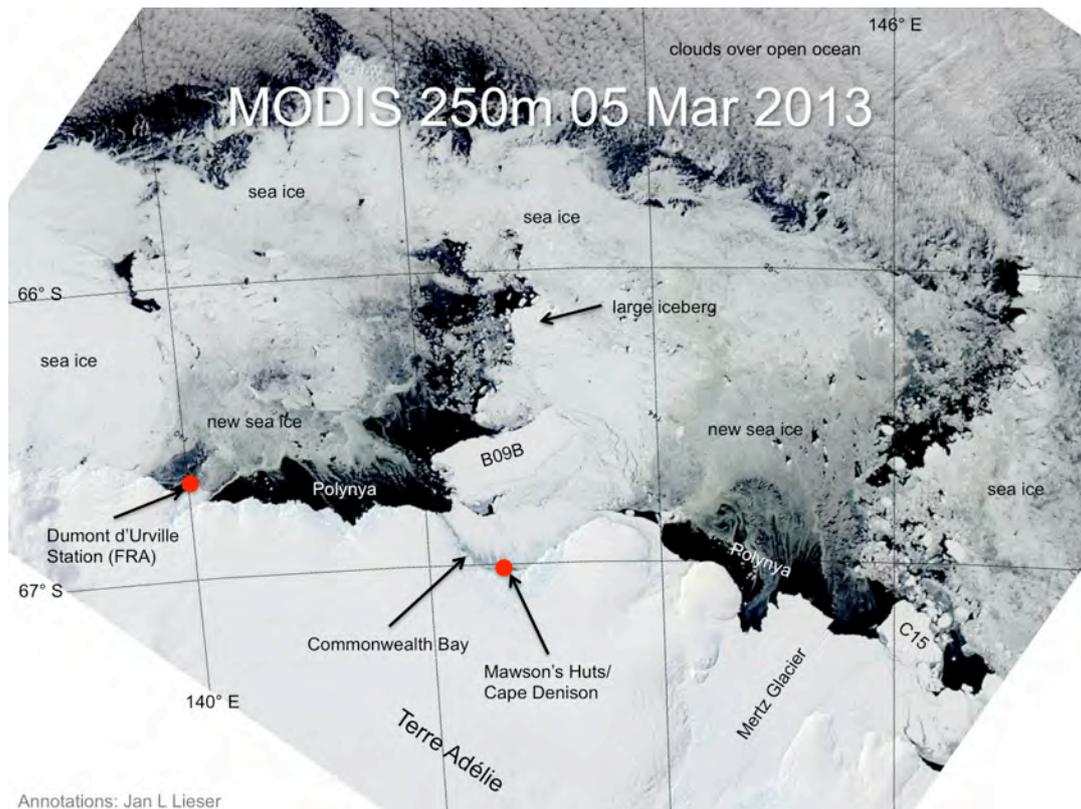


Figure 1: AQUA MODIS image, acquired 05/03/2013 and provided by NASA.

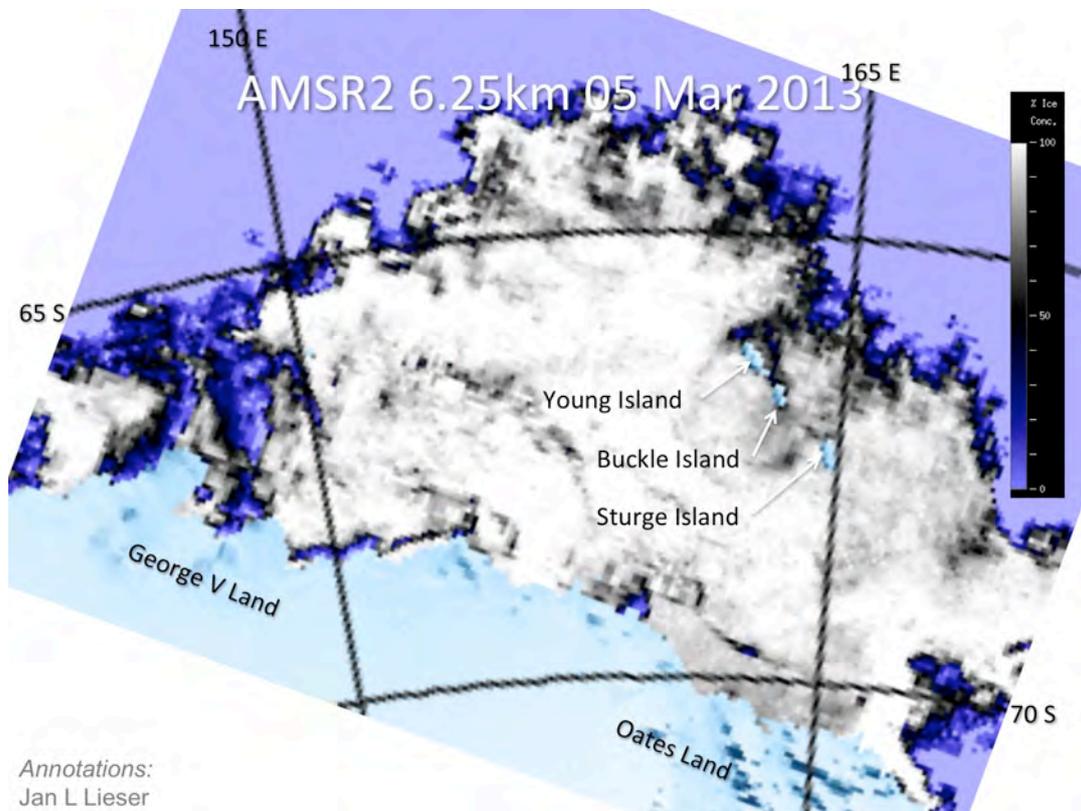


Figure 2: AMSR-2 image, acquired 05/03/2013 and provided by University Bremen.

The Sea Ice Group:

Jan L Lieser



Dr Jan Lieser is a meteorologist and marine glaciologist in the Cryosphere Program of the Antarctic Climate & Ecosystems CRC. Jan's research interest is airborne imaging techniques using digital aerial photography and scanning LiDAR to estimate sea ice thickness. This information is used to check remote sensing data collected by satellites like ICESat and CryoSat-2, which are used by other Antarctic research programs. Jan has researched *in-situ* polar meteorological observations and sea ice geophysical properties, as well as numerical modelling of Arctic sea ice and Antarctic sub-glacial 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 the Arctic Ocean and Antarctica.

Robert A Massom



With more than 30 years experience in a broad spectrum of polar-related research, Dr Rob Massom has worked extensively both in Arctic (1980-1992) and Antarctic (1986-present) research. His current research interests include changes in Antarctic sea ice and polar oceans and their physical and ecological significance, and bipolar comparisons; the impact of modes of large-scale anomalous atmospheric circulation and extreme events on sea ice properties and ecology; remote sensing of sea ice and its validation; snow cover on sea ice (characteristics and impacts); sea ice as a habitat; and interactions between the Antarctic Ice Sheet and sea ice (including ice-shelf breakup processes). Rob has participated on three Arctic and ten Antarctic major international multi-disciplinary sea-ice research field studies.

Petra Heil



Dr Petra Heil works as a senior research scientist within the Climate Processes and Change Program of the Australian Antarctic Division, and the Cryosphere Program of the Antarctic Climate & Ecosystems CRC. Her research concerns physical sea-ice processes, which she investigates using *in-situ* or remotely sensed information and numerical modelling. Her current research interests include the investigation of sea-ice drift and deformation; sea-ice modelling (stand-alone and coupled codes, decadal modelling and short-term forecasting); fast-ice studies, including mixed-layer processes; spatio-temporal variability in Antarctic and Arctic sea ice, and their interaction with polar oceans and atmosphere; and polar atmospheric processes. She has participated on several Antarctic and Arctic major multi-disciplinary sea-ice and marine-science research field campaigns, and wintered at Davis Station working on a multi-disciplinary fast-ice study.



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