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Two distinct Talks:

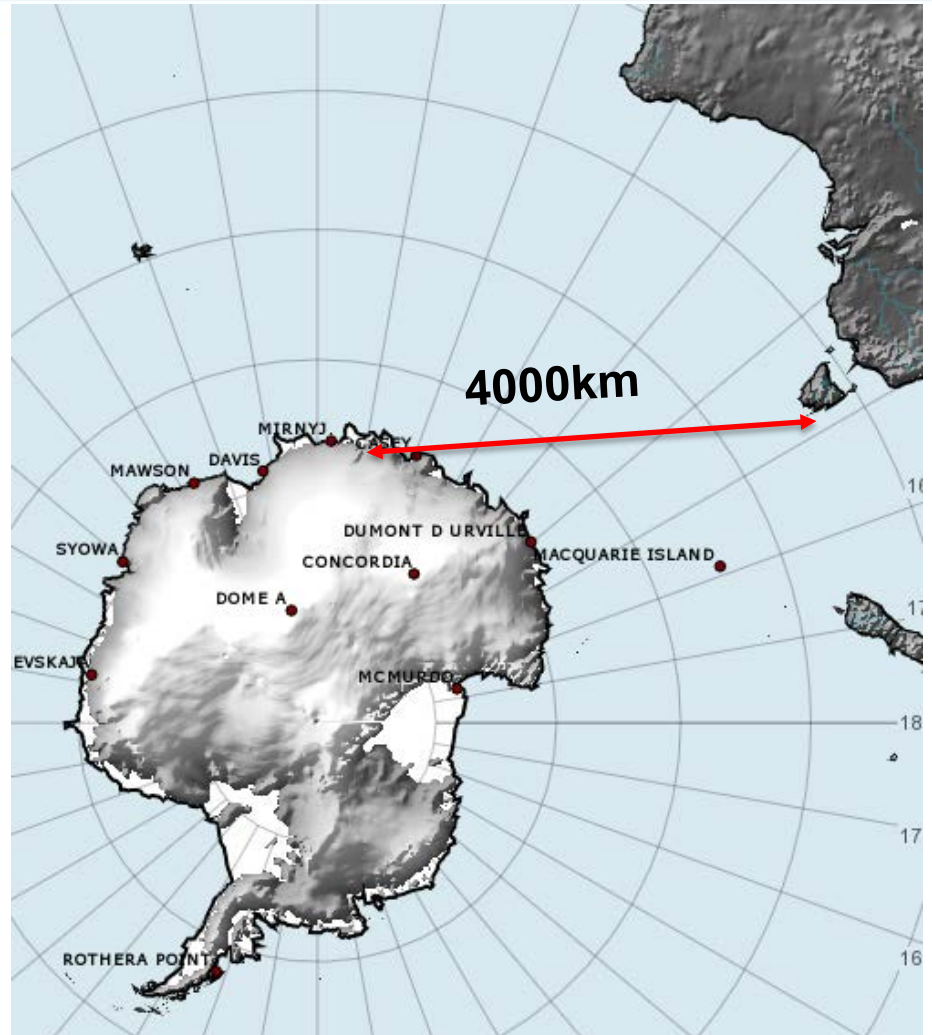
- Significant aviation weather climatology of Wilkins Ice runway (2 slides)
- A rather curious mixed Rain-Snow event at Davis Station (more than 1 slide)



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Wilkins Ice Runway Weather

67S/111E





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Wilkins Ice Runway Weather

67S/110E

2016-17 Season	FZFG Events	≥ 34 kts	vis < 4 km	days $<$ alternate
1 Nov- 13 Mar (133 days)	7 (in 90 days)	34 days (26%)	66 days 50 %	69 days 52 %





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The Curious Case of Freezing Rain at Davis Station, East Antarctica

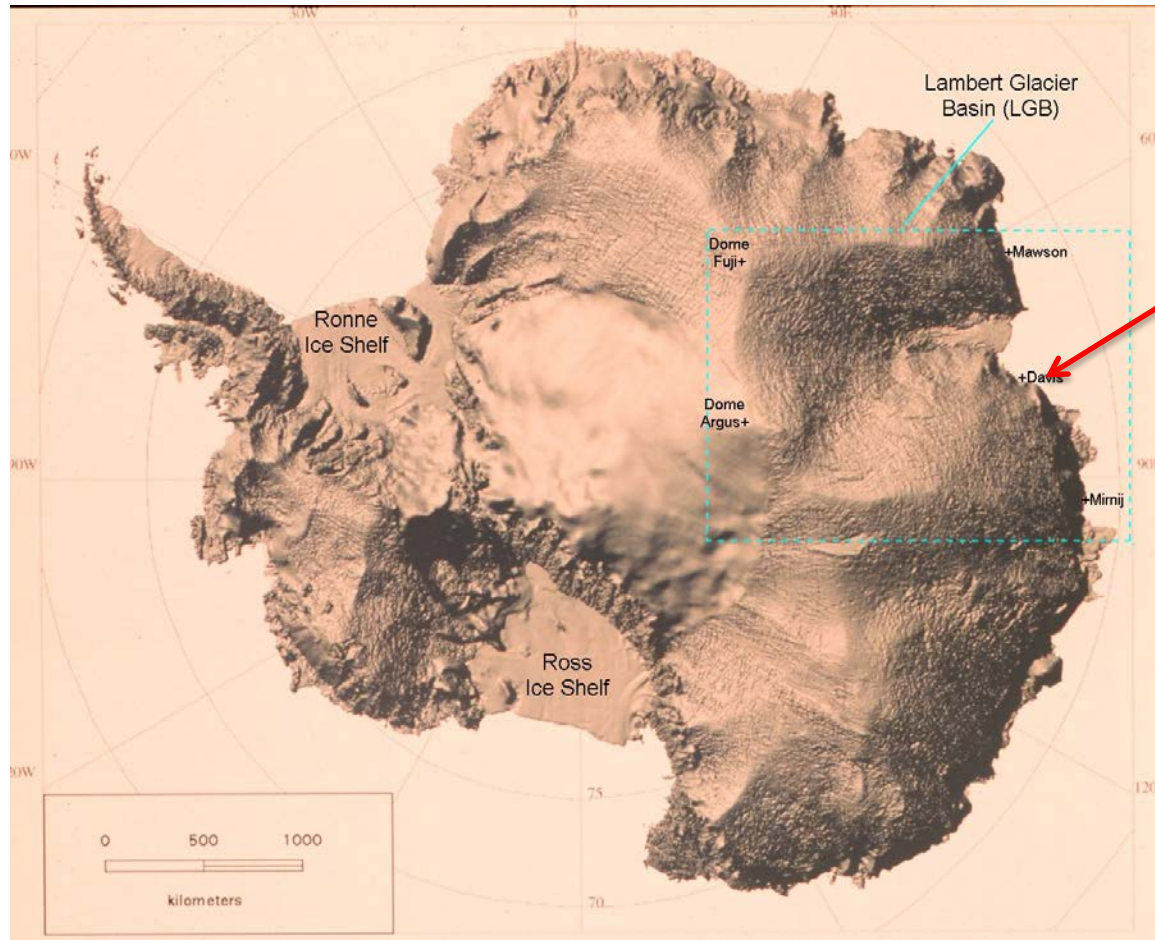


Photos courtesy of Dave Lomas (left) and James Maloney (right)



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Davis (69°S) at the Entrance to the Lambert Glacier Basin



Davis
69°S, 78°E



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-RASN = "Light Sleet" (mixed Rain and Snow)

SPECI DAVI 230900Z

05011KT 9999 **-RASN M04/M06** FEW012 OVC018



Photo courtesy of Barry Becker



Radiosonde Observations

10 hours prior (brown) and 2 hours after (black)

Model information for: DAVIS - 89571, valid Thu 23 Feb 12:00 UTC

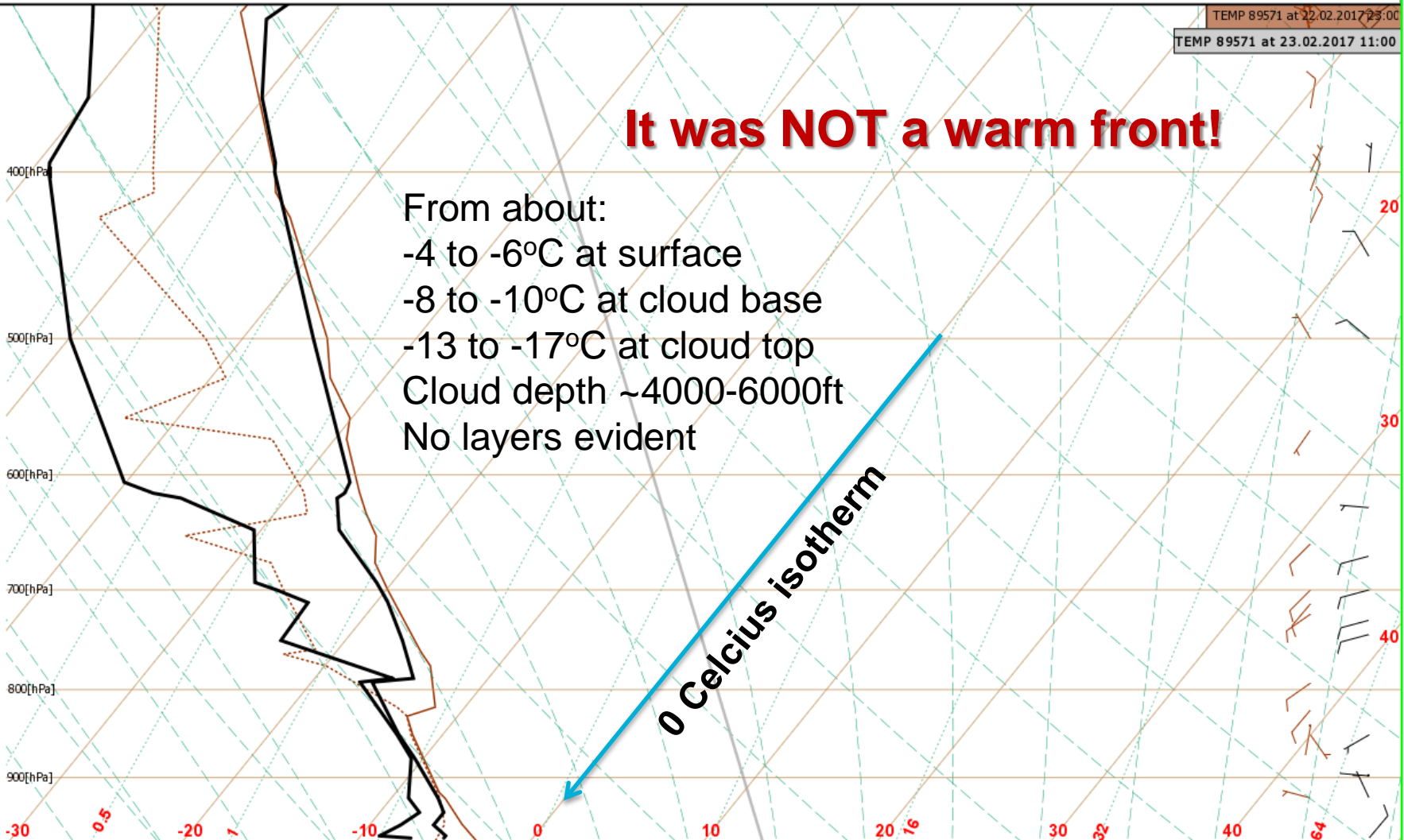
TEMP 89571 at 22.02.2017 23:00

TEMP 89571 at 23.02.2017 11:00

It was NOT a warm front!

From about:
-4 to -6°C at surface
-8 to -10°C at cloud base
-13 to -17°C at cloud top
Cloud depth ~4000-6000ft
No layers evident

0 Celcius isotherm





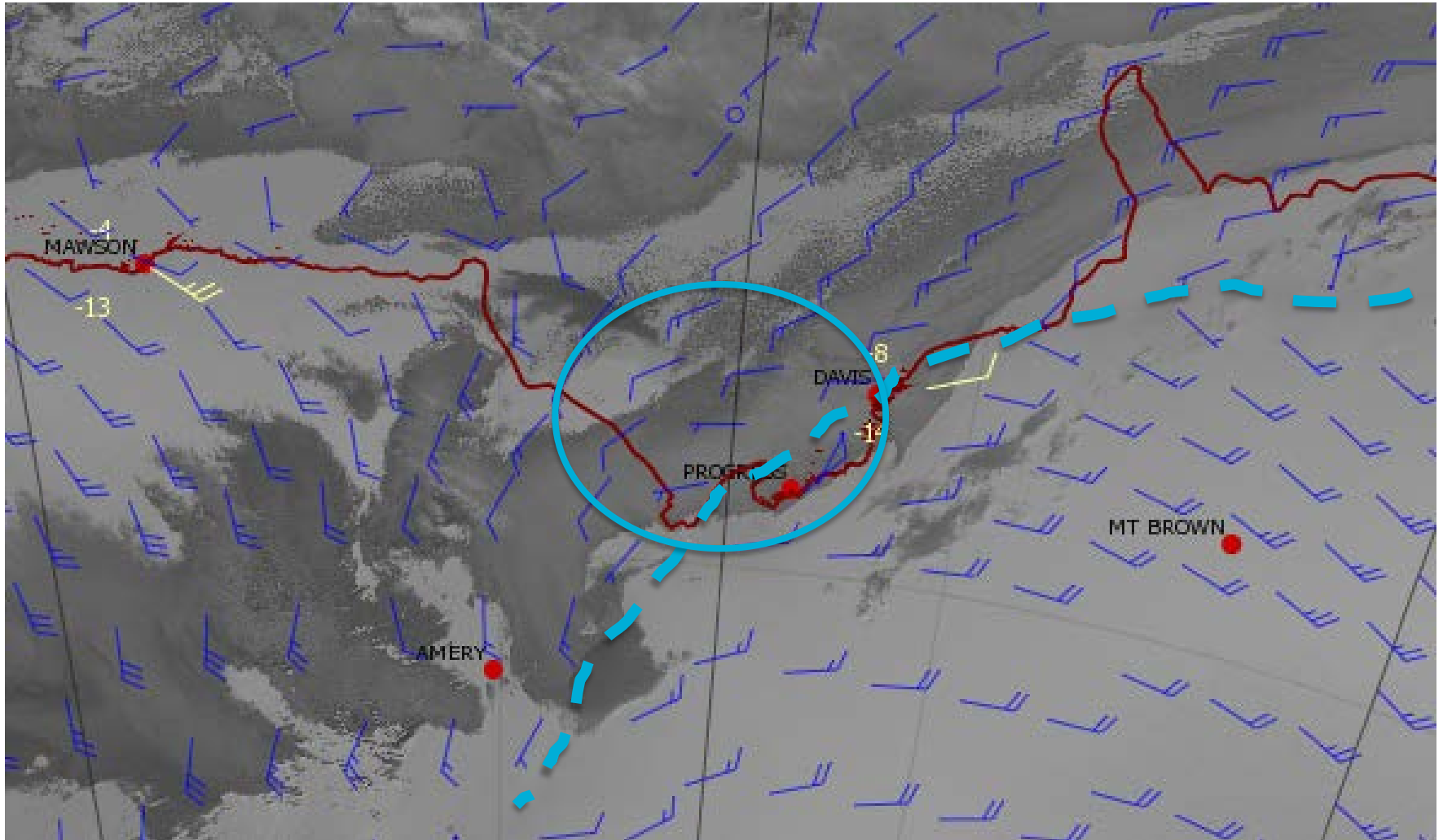
In Weather Observer Barry Becker's words:

- It had been overcast ~1800ft cloud base, with light snow showers for much of the day;
- It was soon after lunch;
- It was -4°C ;
- It turned to mixed snow and liquid droplets;
- These conditions lasted for around $\frac{1}{2}$ hour;
- The liquid droplets were a bit bigger than drizzle ($\sim 1\text{mm}$);
- There was a lot of rime afterward on the windward side of objects.



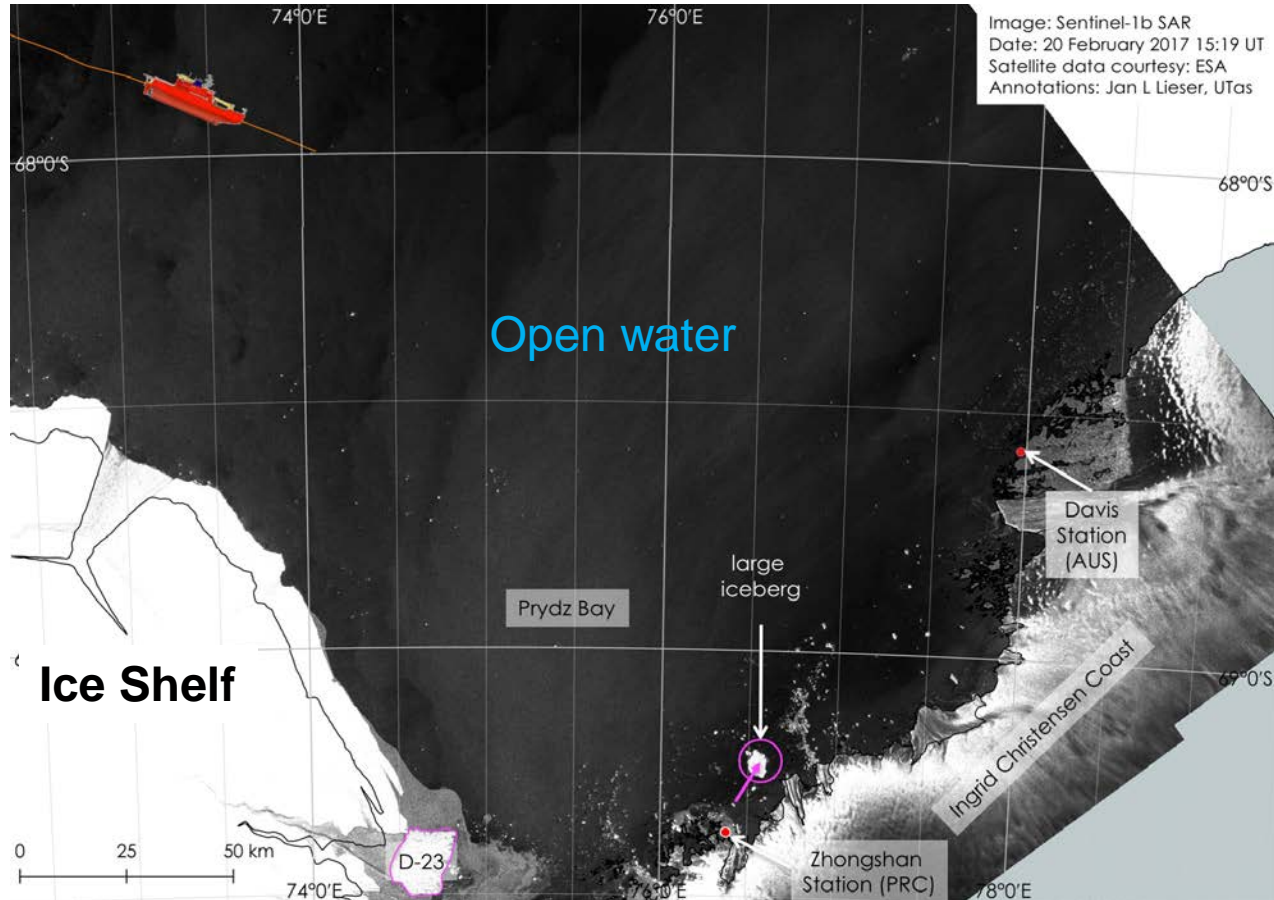
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Suomi NPP: 3.74um at 0842UTC with NWP surface wind overlay





Open water in Prydz Bay

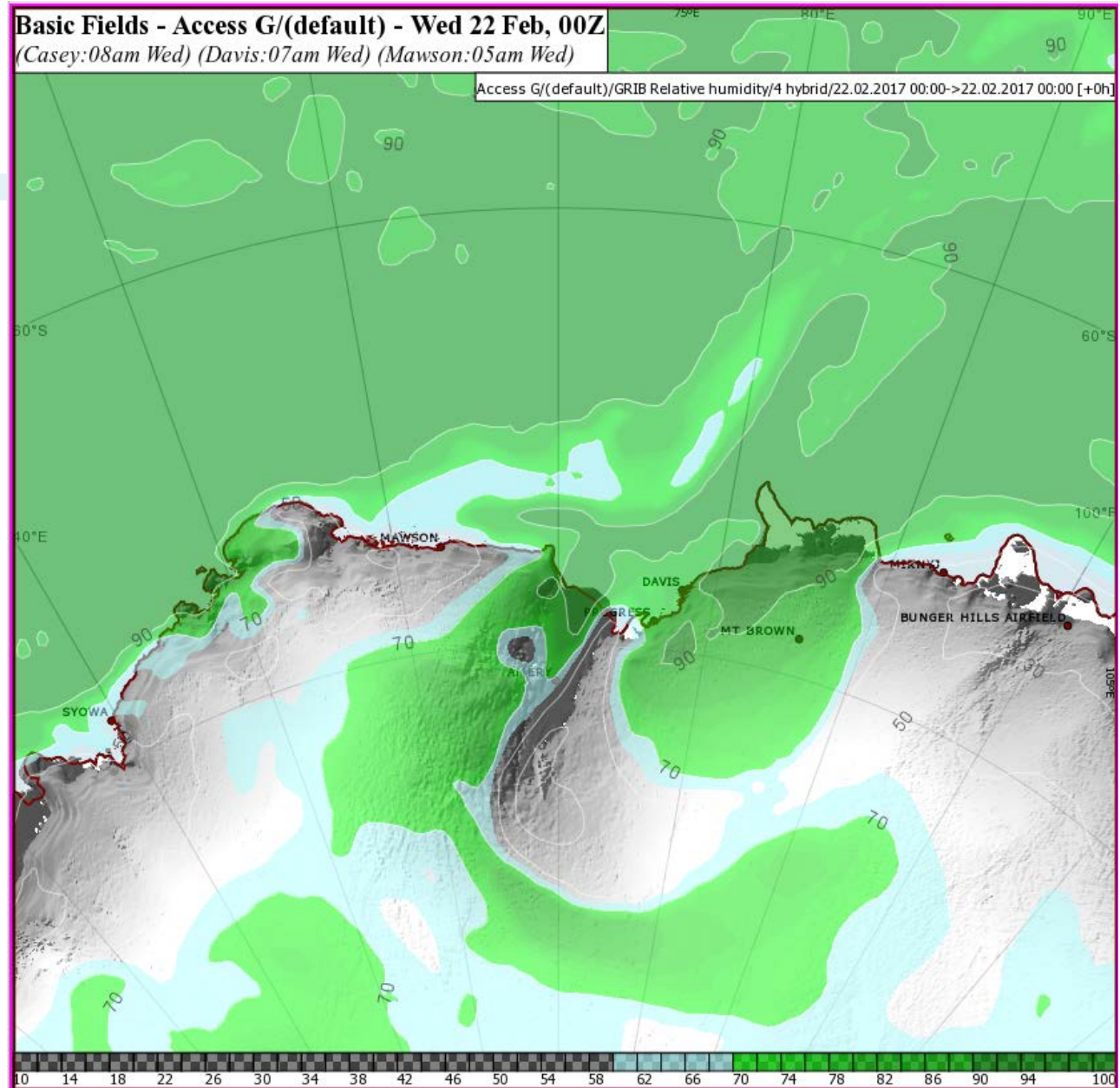


Sentinel-1b SAR scene, acquired 20/02/2017 and provided by PolarView.

Long Lived inland moisture



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Relative humidity
sequence from
-36hrs to event

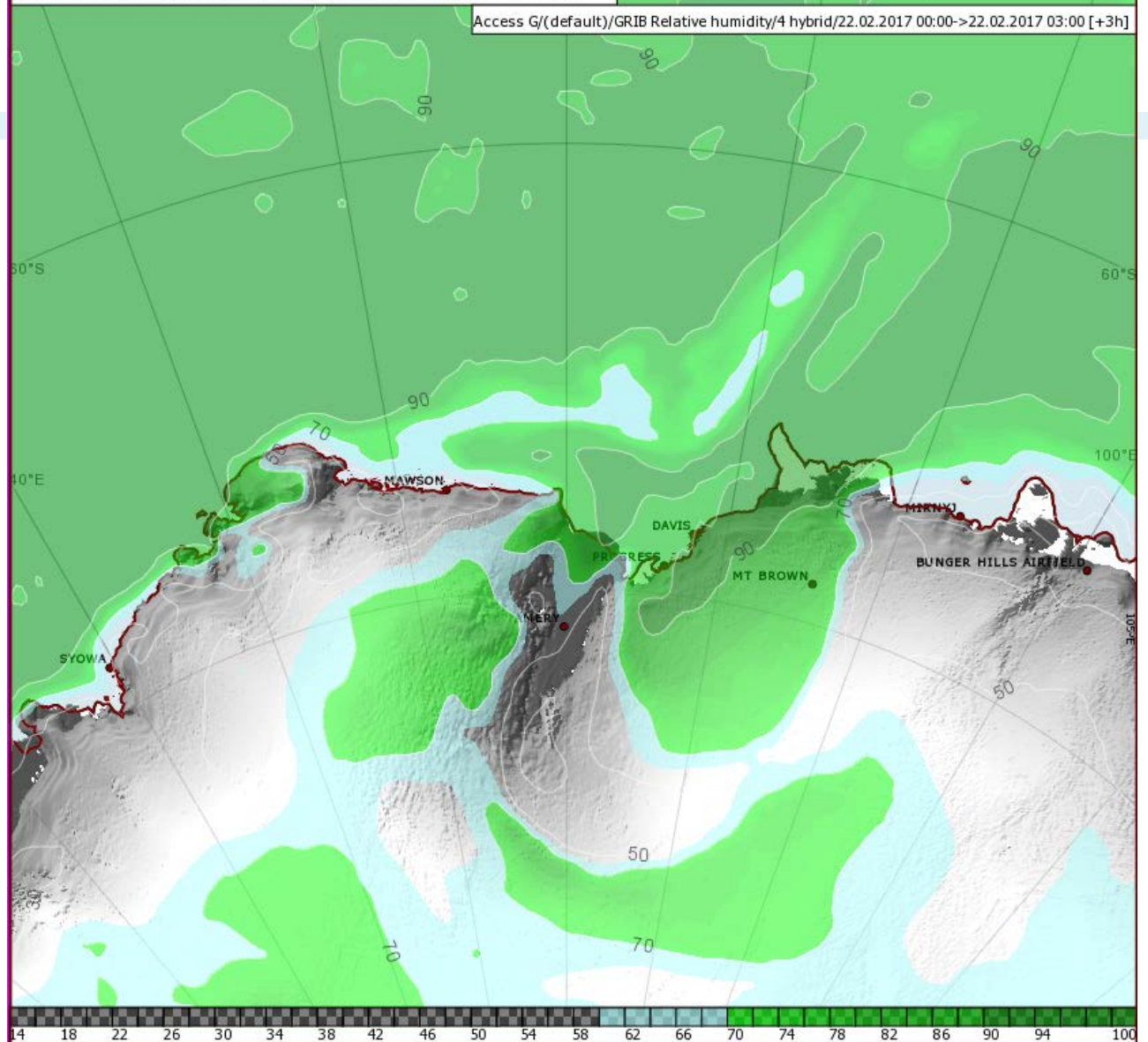
Sigma level 4 or
about 400ft AGL



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Basic Fields - Access G/(default) - Wed 22 Feb, 03Z
(Casey: 11am Wed) (Davis: 10am Wed) (Mawson: 08am Wed)

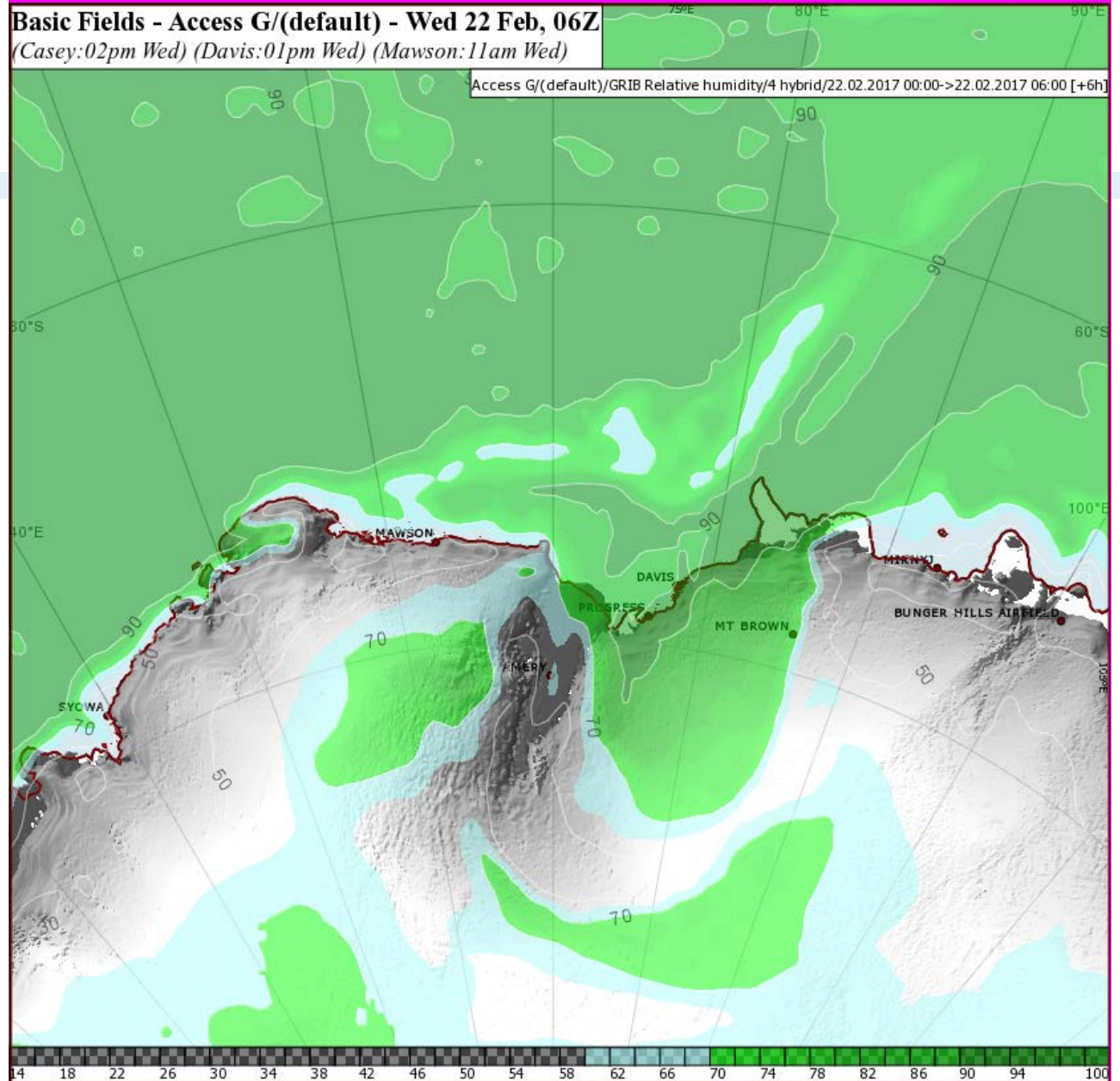
Access G/(default)/GRIB Relative humidity/4 hybrid/22.02.2017 00:00->22.02.2017 03:00 [+3h]





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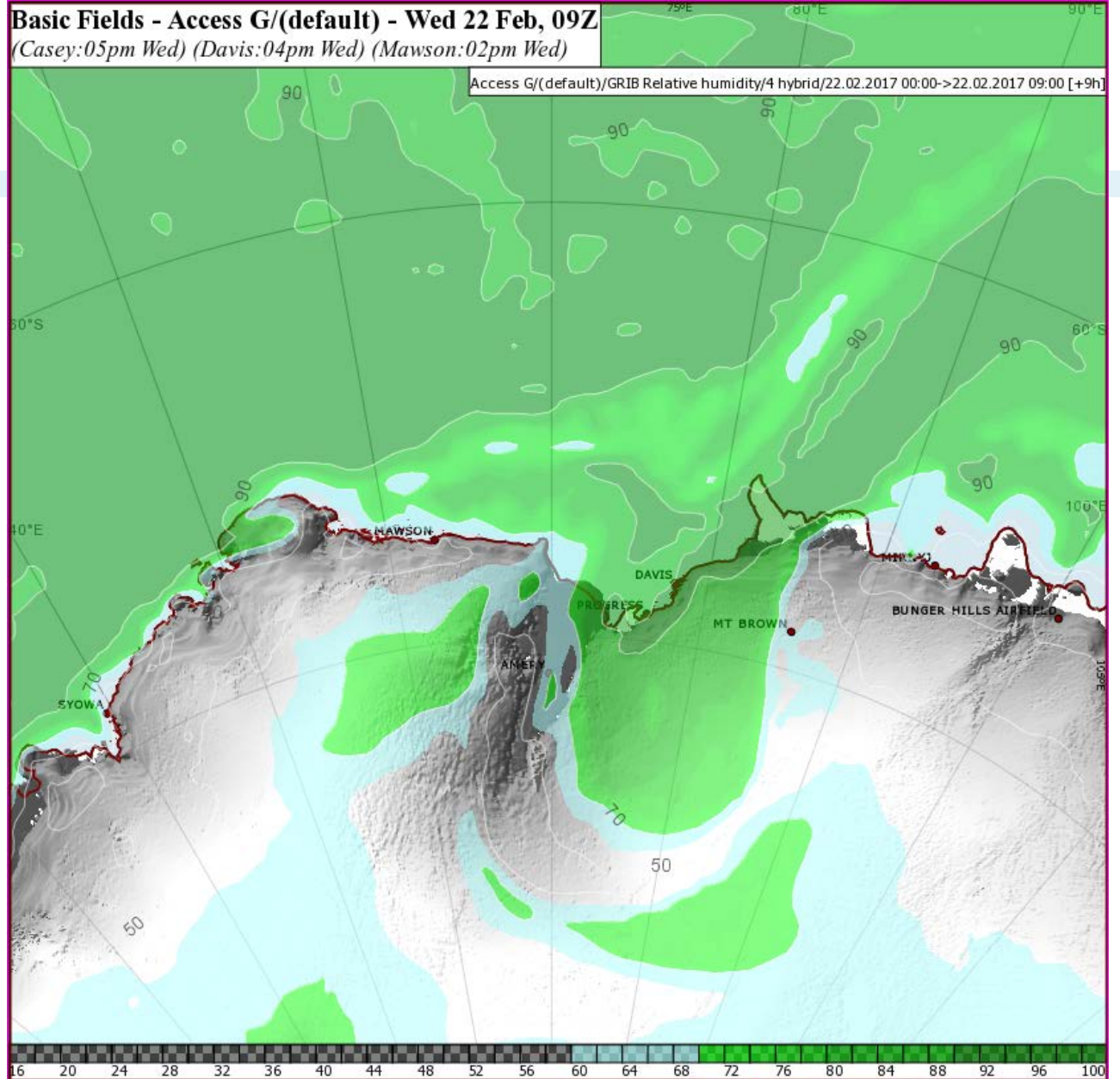
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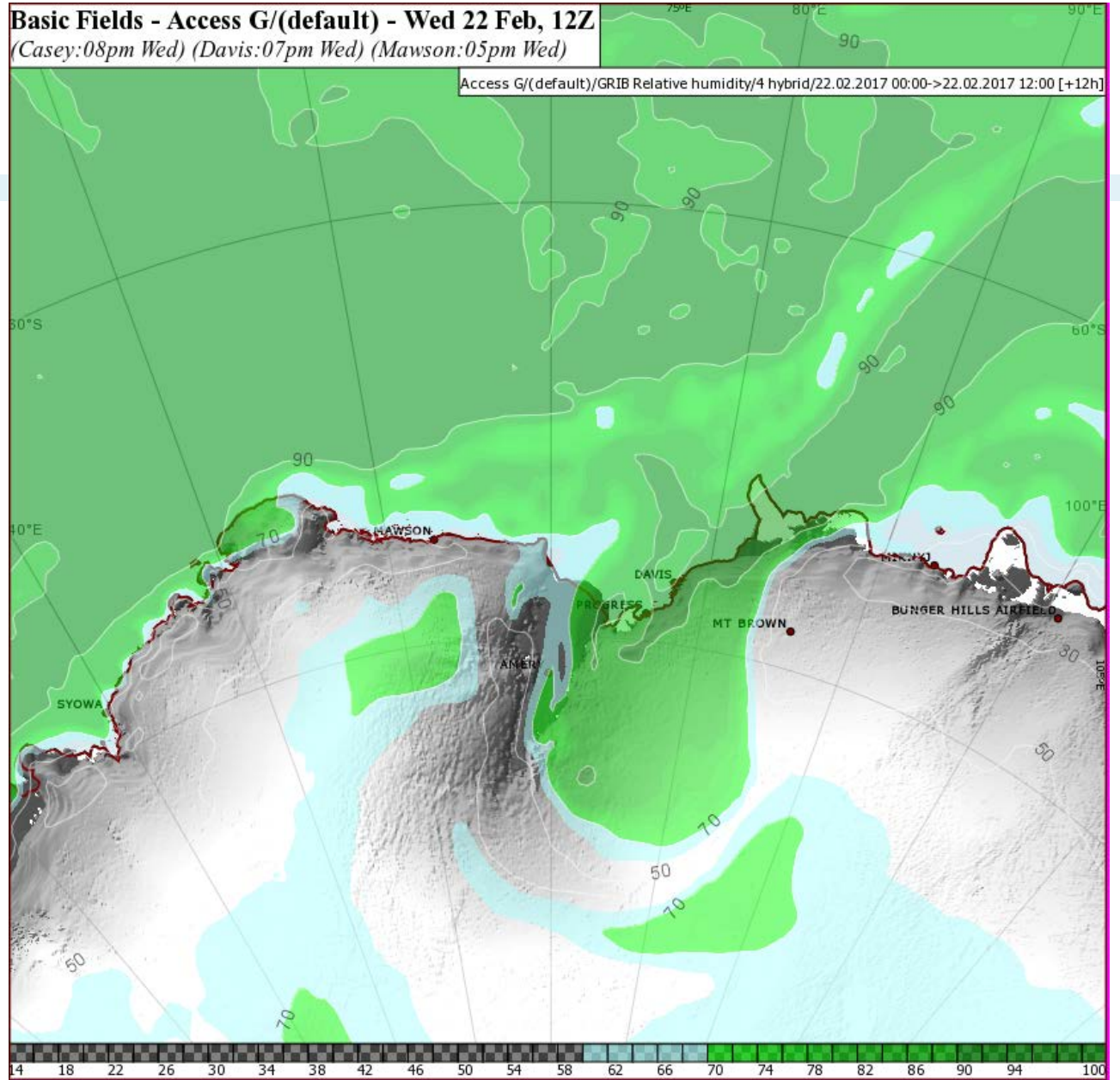




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Basic Fields - Access G/(default) - Wed 22 Feb, 12Z (Casey:08pm Wed) (Davis:07pm Wed) (Mawson:05pm Wed)

Access G/(default)/GRIB Relative humidity/4 hybrid/22.02.2017 00:00->22.02.2017 12:00 [+12h]

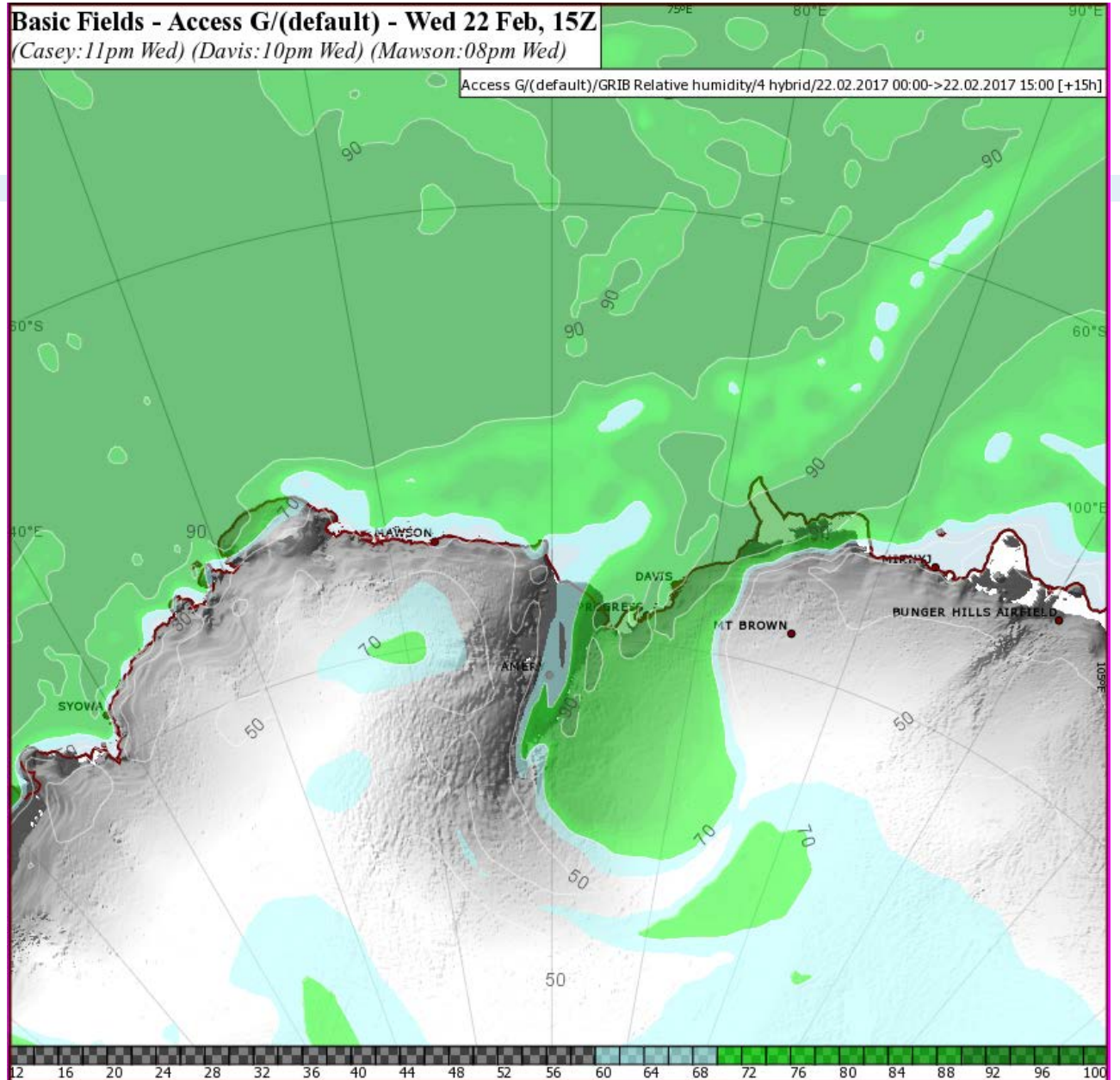




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Basic Fields - Access G/(default) - Wed 22 Feb, 15Z (Casey: 11pm Wed) (Davis: 10pm Wed) (Mawson: 08pm Wed)

Access G/(default)/GRIB Relative humidity/4 hybrid/22.02.2017 00:00->22.02.2017 15:00 [+15h]

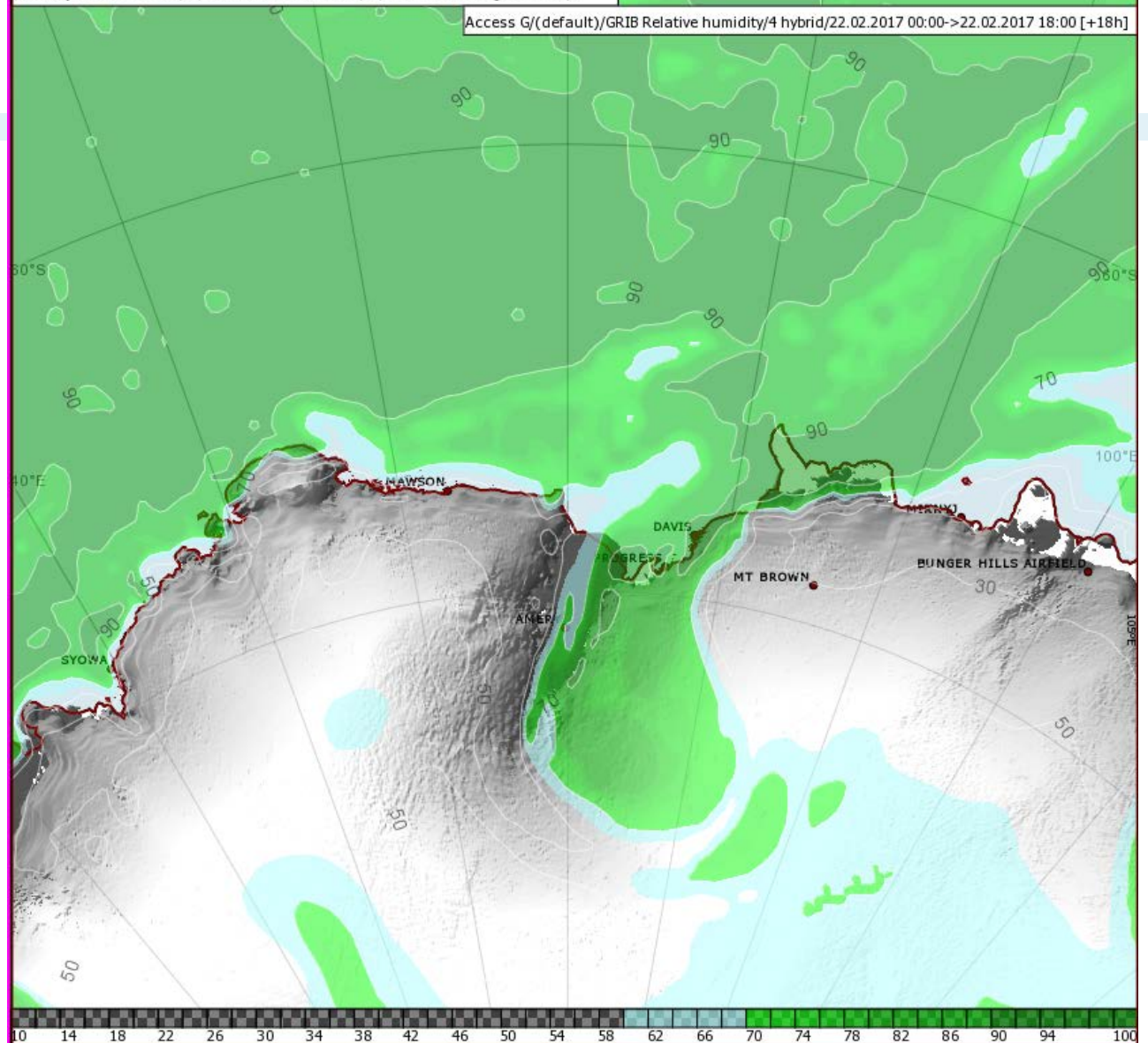




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Basic Fields - Access G/(default) - Wed 22 Feb, 18Z
(Casey:02am Thu) (Davis:01am Thu) (Mawson:11pm Wed)

Access G/(default)/GRIB Relative humidity/4 hybrid/22.02.2017 00:00->22.02.2017 18:00 [+18h]

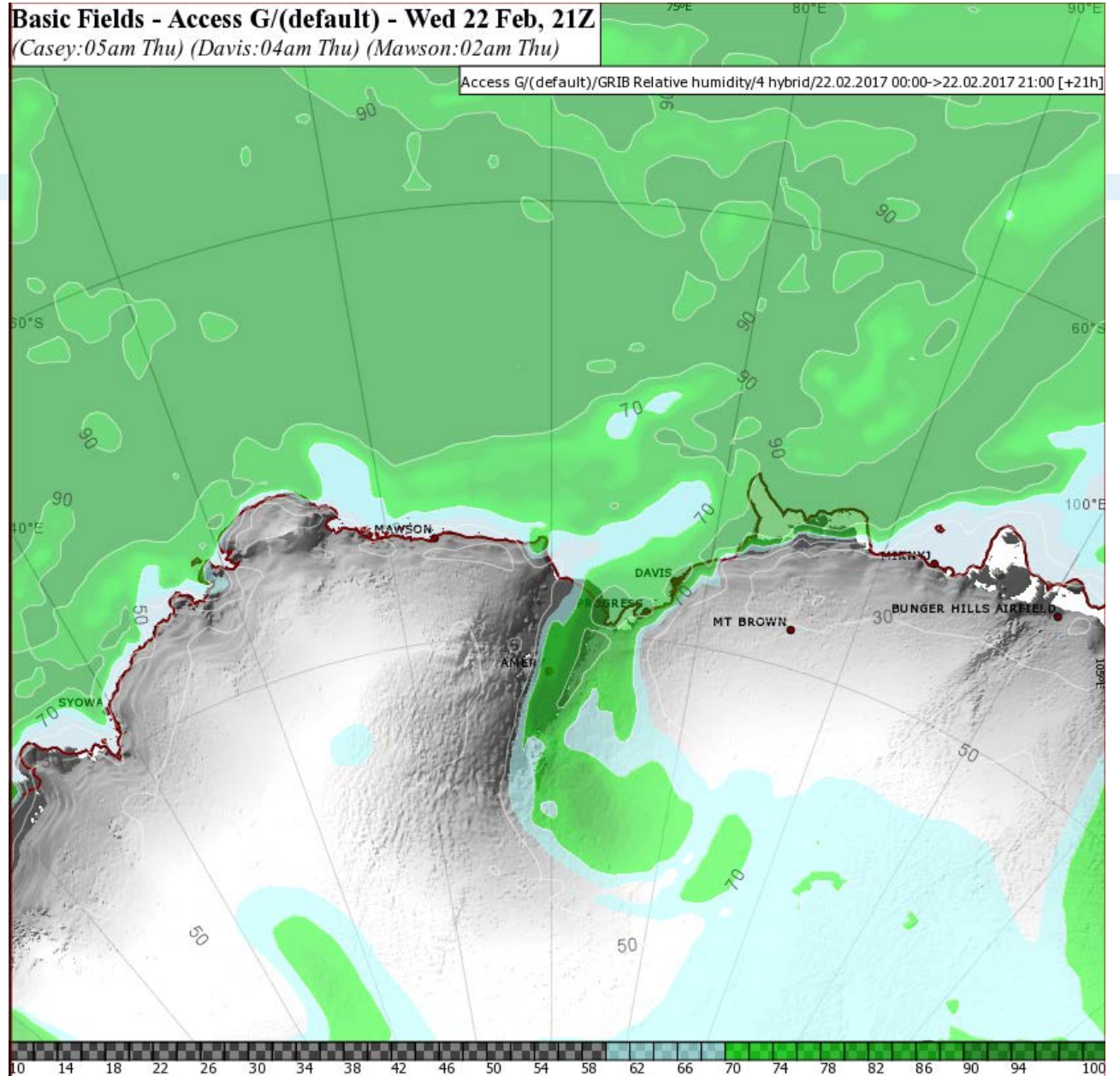




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Basic Fields - Access G/(default) - Wed 22 Feb, 21Z (Casey:05am Thu) (Davis:04am Thu) (Mawson:02am Thu)

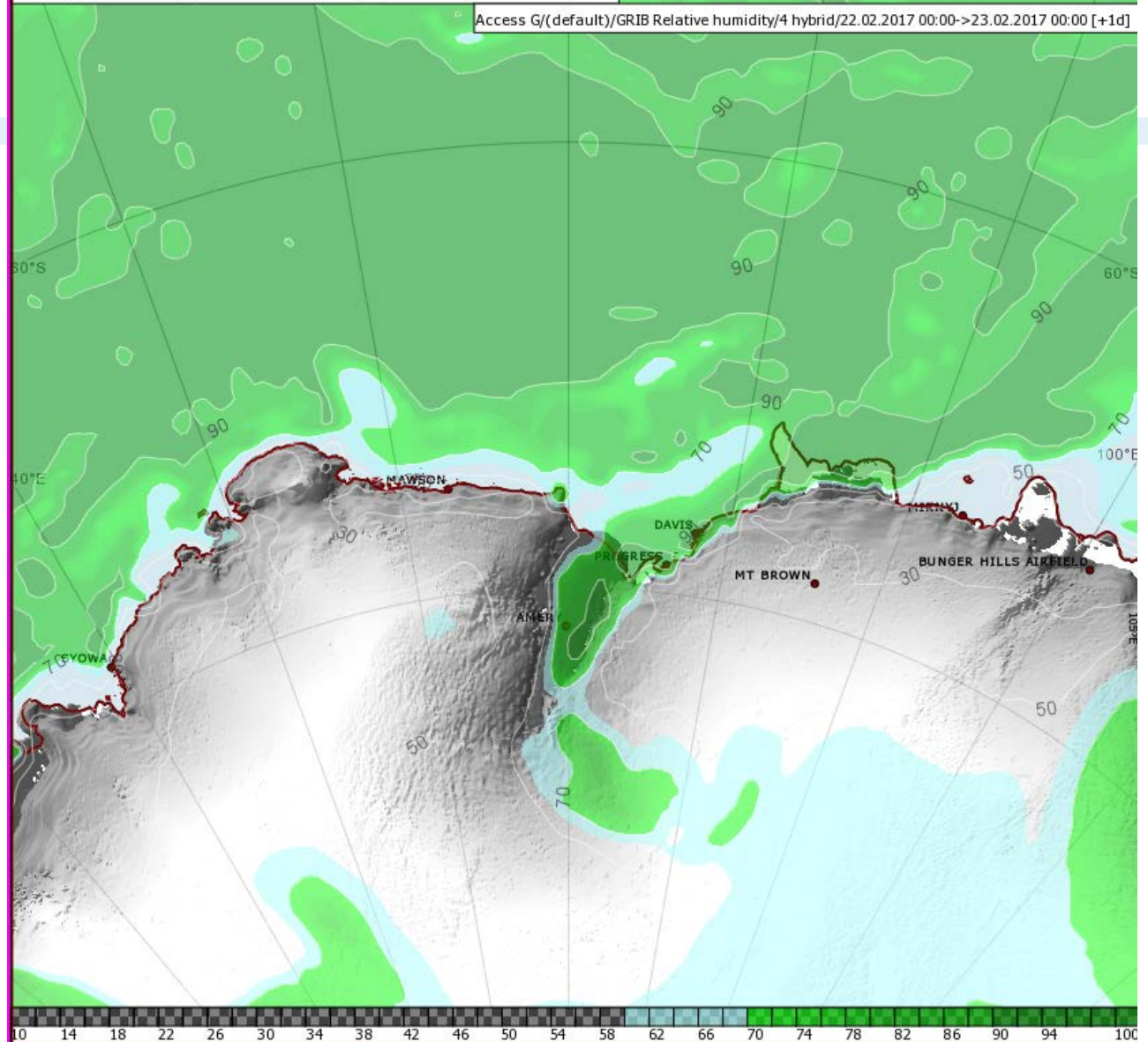
Access G/(default)/GRIB Relative humidity/4 hybrid/22.02.2017 00:00->22.02.2017 21:00 [+21h]





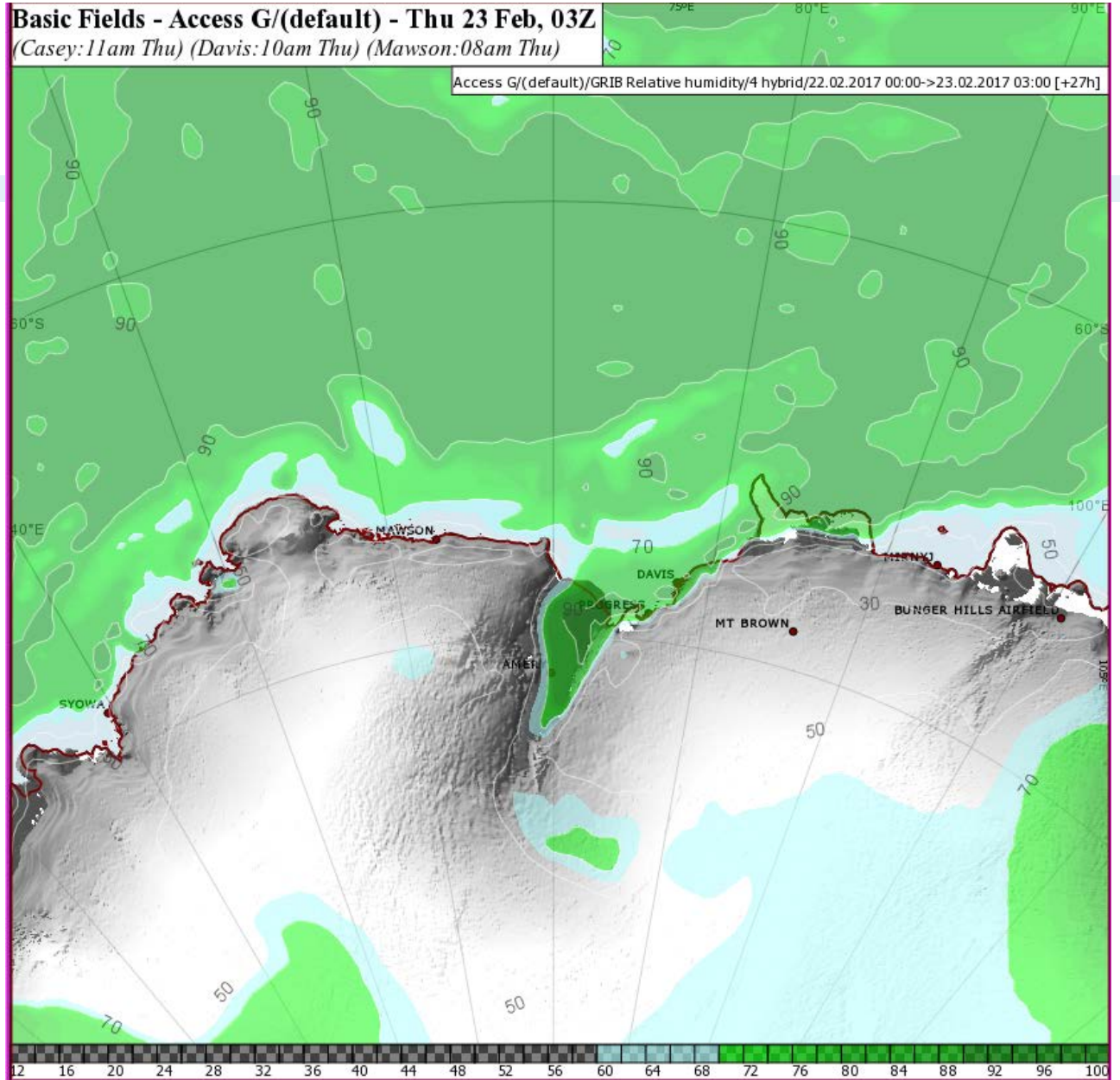
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Basic Fields - Access G/(default) - Thu 23 Feb, 00Z (Casey:08am Thu) (Davis:07am Thu) (Mawson:05am Thu)



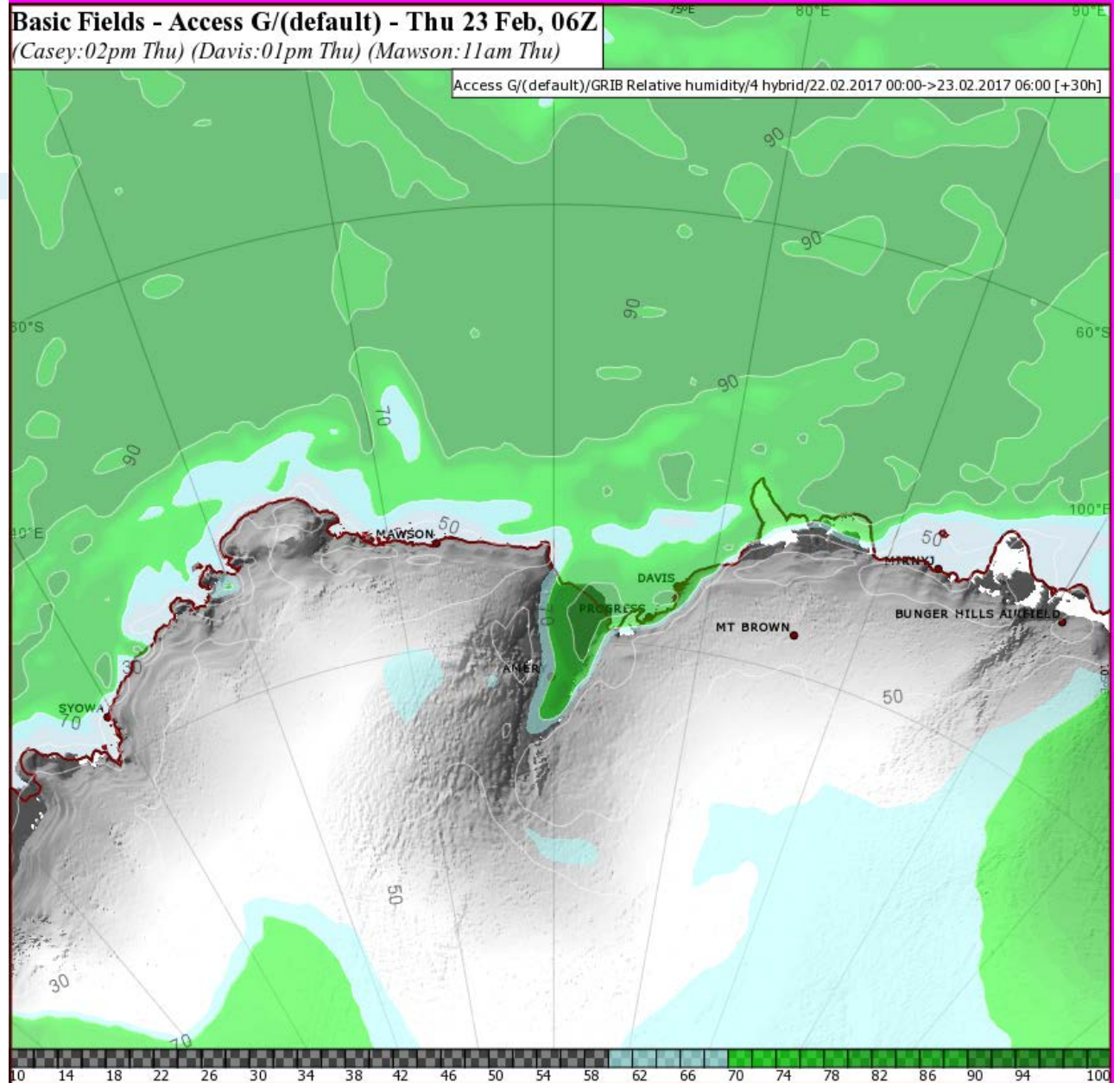


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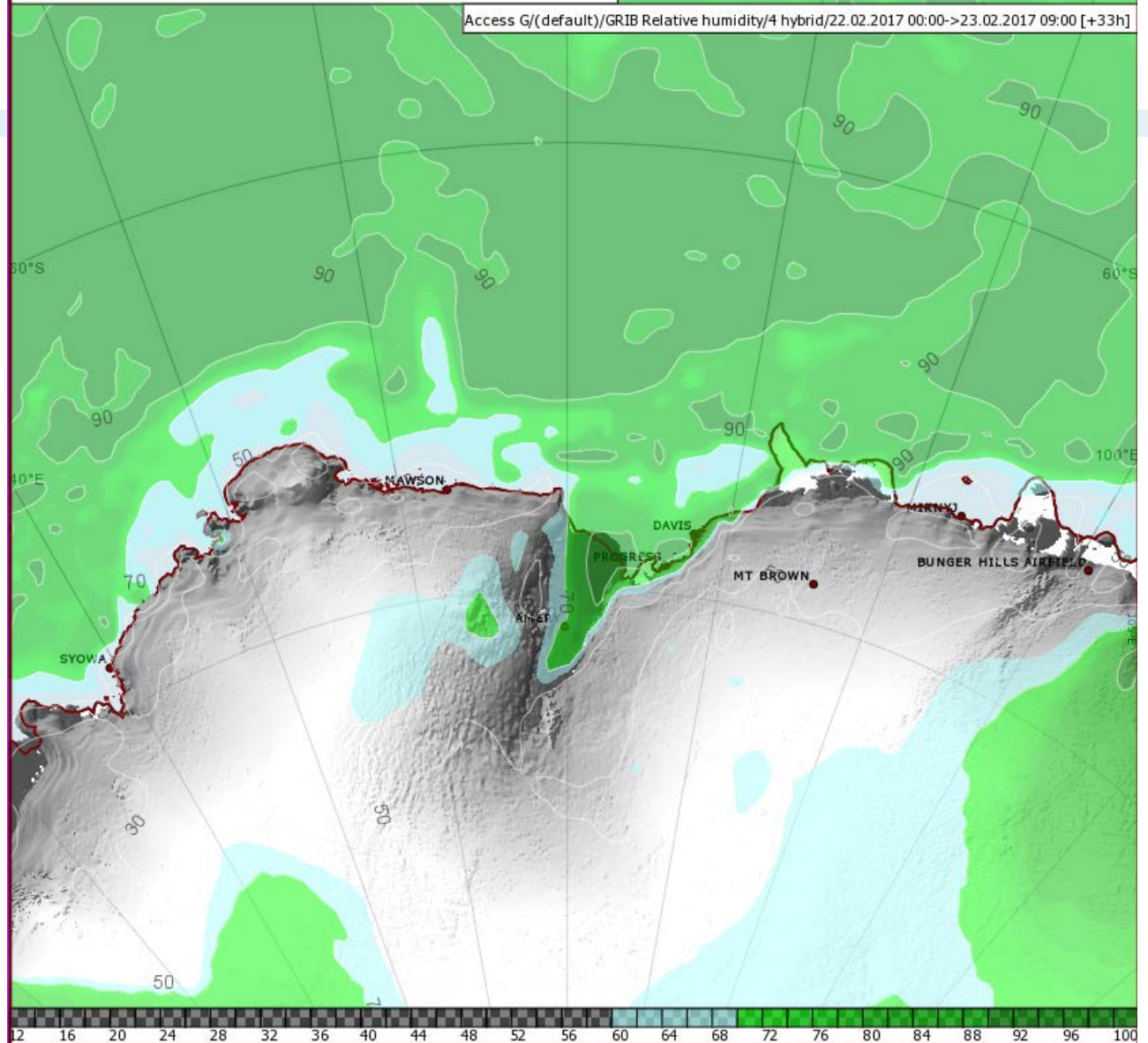




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Basic Fields - Access G/(default) - Thu 23 Feb, 09Z
(Casey:05pm Thu) (Davis:04pm Thu) (Mawson:02pm Thu)

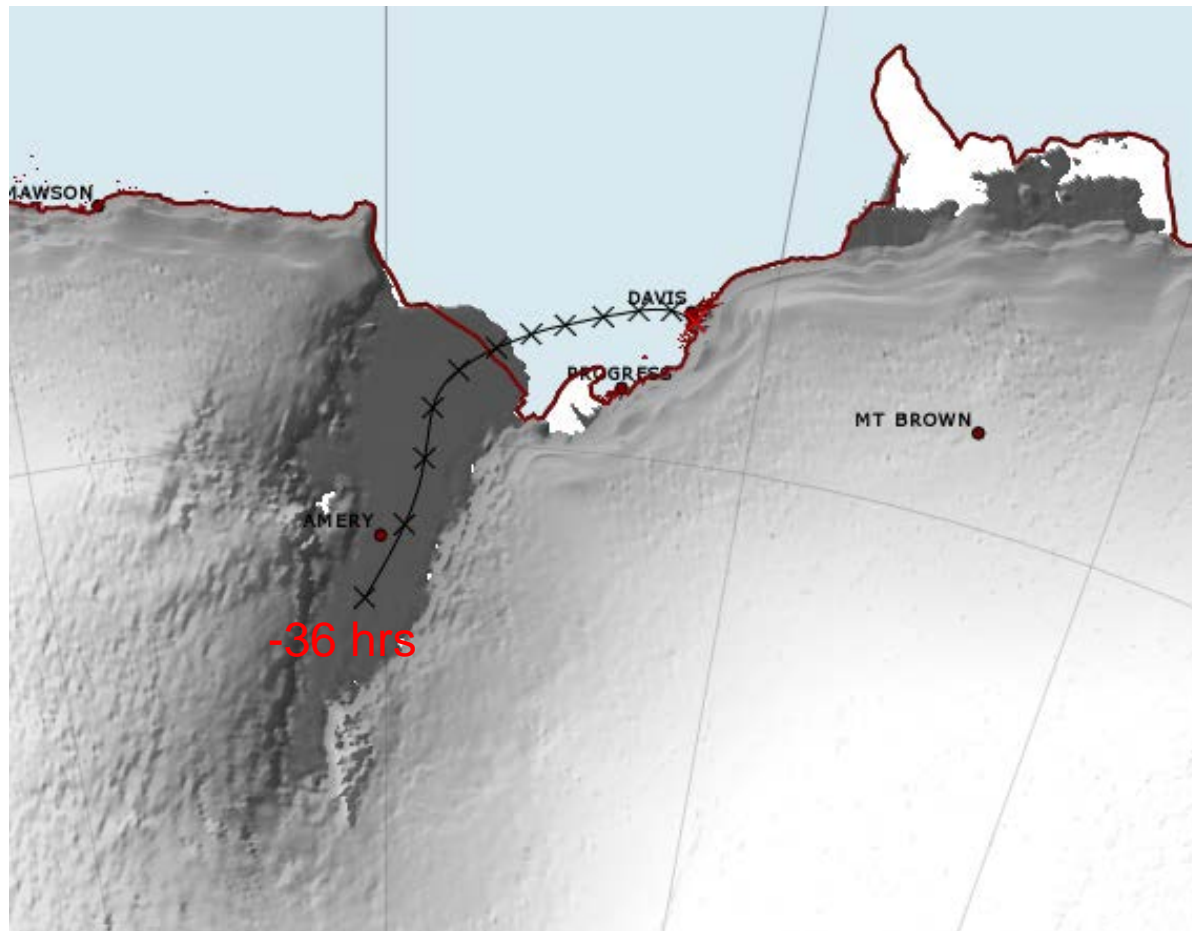
Access G/(default)/GRIB Relative humidity/4 hybrid/22.02.2017 00:00->23.02.2017 09:00 [+33h]





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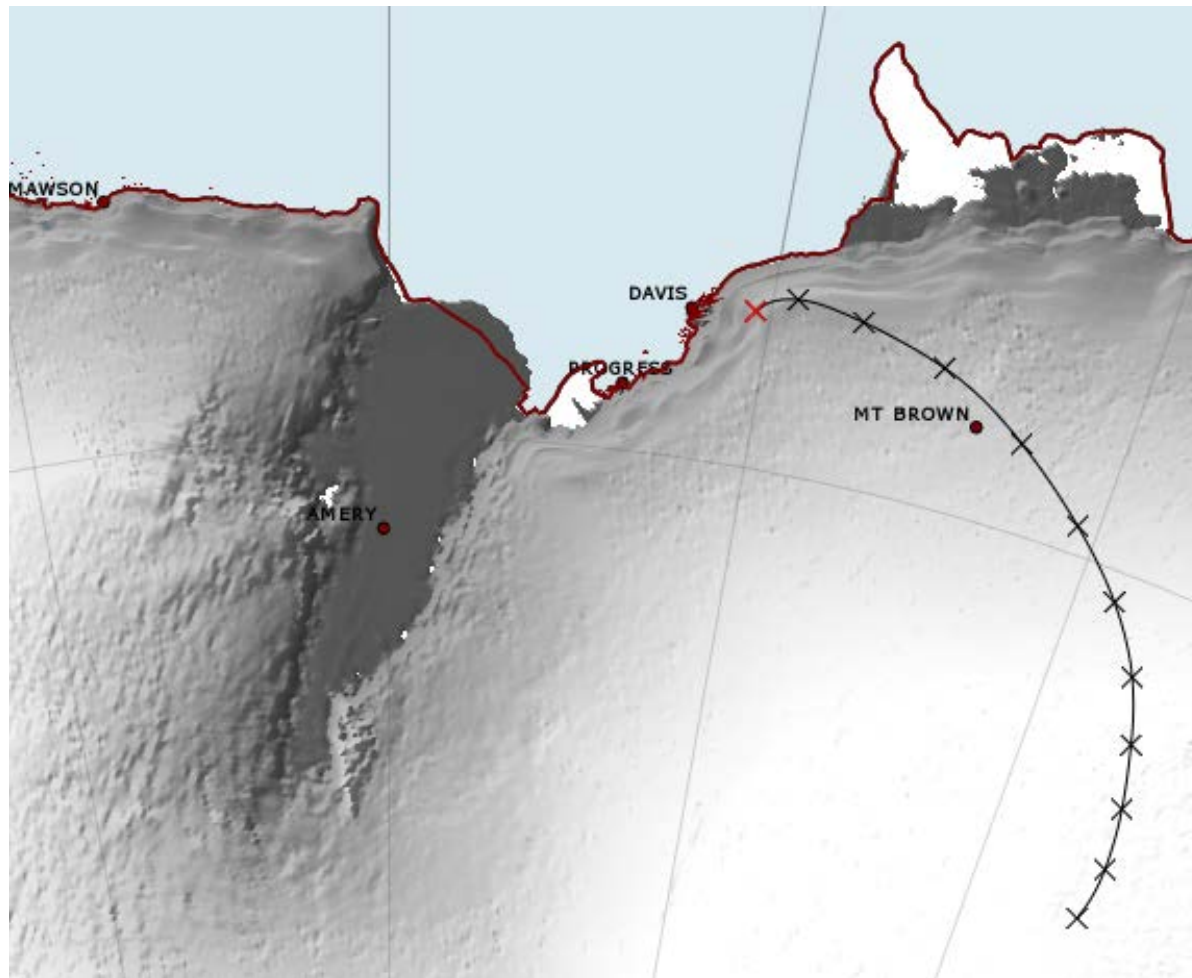
-36hr surface parcel trajectory (to just west of Davis)





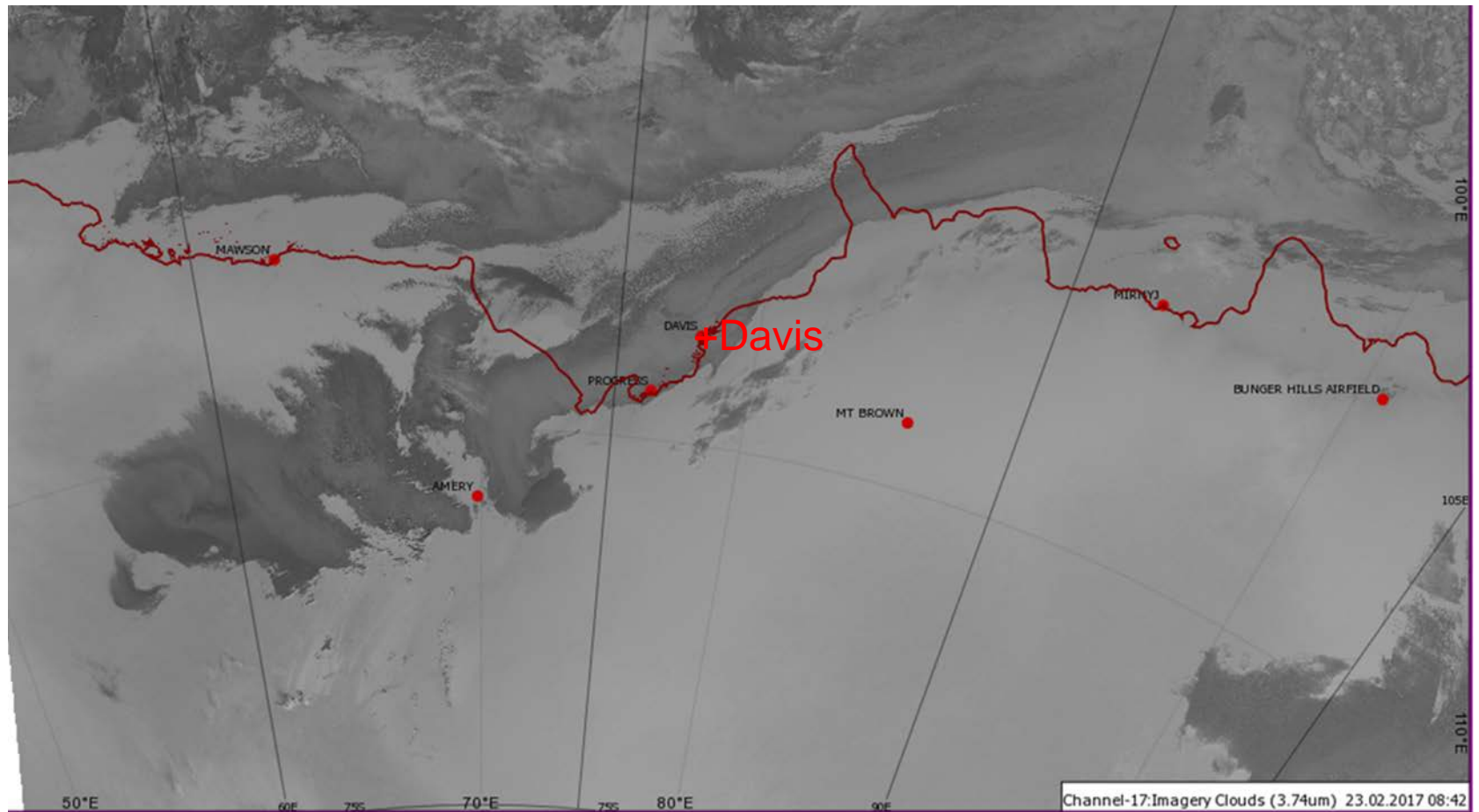
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-36hr surface parcel trajectory (to just East of Davis)





The inland cloud has similar characteristics at 3.74um as that at Davis





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Recap of the Facts

- The sub-zero Celcius cloud was long lived (days old) and had moved through a wide inland area without fully glaciating;
- There was nearby surface convergence over open water (ie. Davis was immediately east of a surface trough);
- Snow flakes and liquid drops 'a bit' larger than drizzle precipitated simultaneously from sub-zero Celcius stratocumulus:
 - -8°C at cloud base \approx 1800ft AGL
 - -16°C at cloud top \approx 6000-8000ft AGL
 - No dry layers



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Hmmmmmmmmmm?

- What cloud microphysical processes allowed the growing of liquid droplets in sub-zero Celsius stratocumulus to a size sufficient to precipitate, being mindful that the cloud had been (and was at the time) precipitating light snow showers?
 - Were available IN so low that Bergeron/Finlayson process was insufficient to inhibit supersaturation WRT water;
 - Supersaturation WRT water maintained from weak updraft;
 - IN development through Ice splintering (Hallett-Mossop) not favoured in this environment (ie colder than -10C)?
 - Did low shear and weak updraft (ie. low turbulence) allow vertical segregation of ice and liquid?



AMPS wrf – Davis Time series

BOM Davis: lat/lon = (-68.5800, 77.9700)

Grid Point (109, 237) lat/lon = (-68.6008, 77.9517)

**AMPS WRF Forecast Cycle:
2017-02-22 / 12 Z**

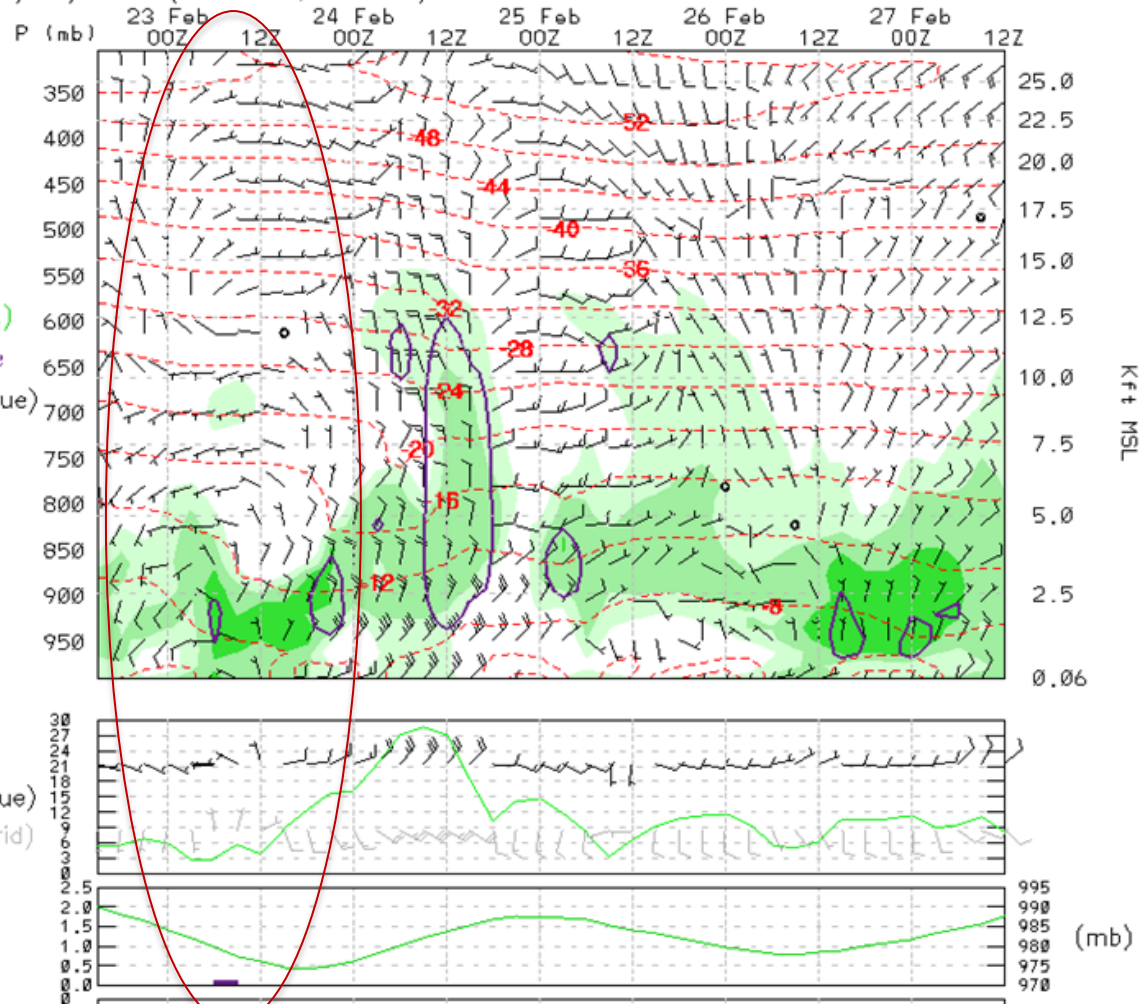
**Model Grid ΔX:
10.000 km**

Temperature (°C)
RH (% WRT liq. wat.)
Cloud/Precip Outline
Wind Barbs (kts) (true)

RH > 70%
RH > 80%
RH > 90%

Wind at 10 m
Wind Spd (kts)
Wind Barbs (true)
Wind Barbs (grid)

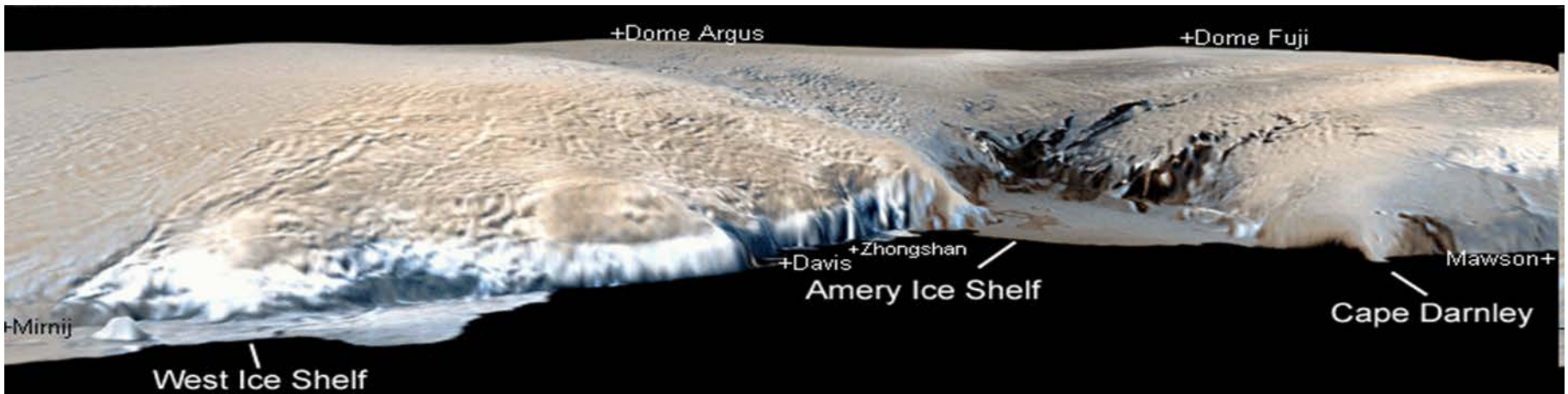
Precip (mm)
liq. equiv.
3-hr accum
Pressure (mb)





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Thank you



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