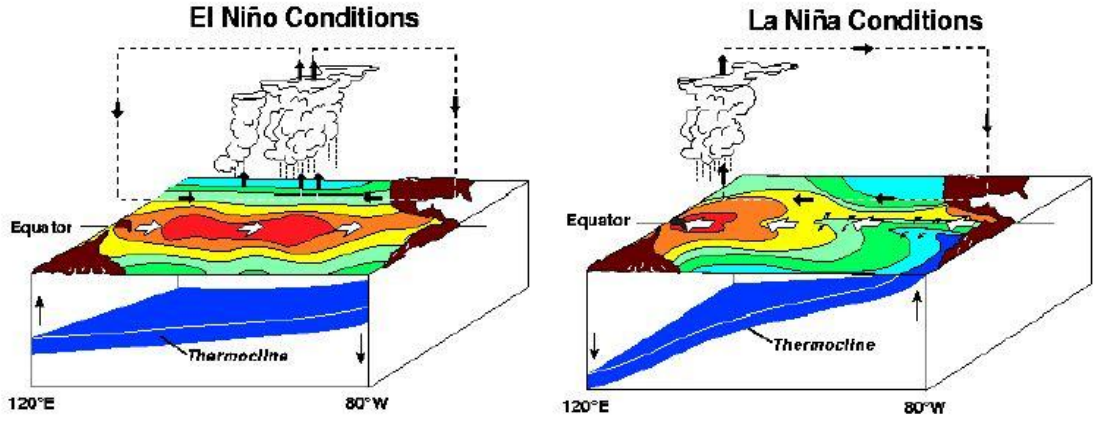
Beck's Weather Brief

There are two major parts – some background on Southern Ocean depressions, mostly taken from Adrienne Cahallan's MSc dissertation "The Structure of the Southern Ocean Storm Track" (University of Reading, 2003), and then a rundown on current conditions. Any websites used are referenced at the end. Hope it's useful – all comments, questions and abuse are welcome.

El Nino

Broadly speaking this is a naturally occurring cycle which affects the waters of the tropical Pacific (*Figure 1)*. The position of the "warm pool" of water strongly affects precipitation, and strongly affects global weather patterns.

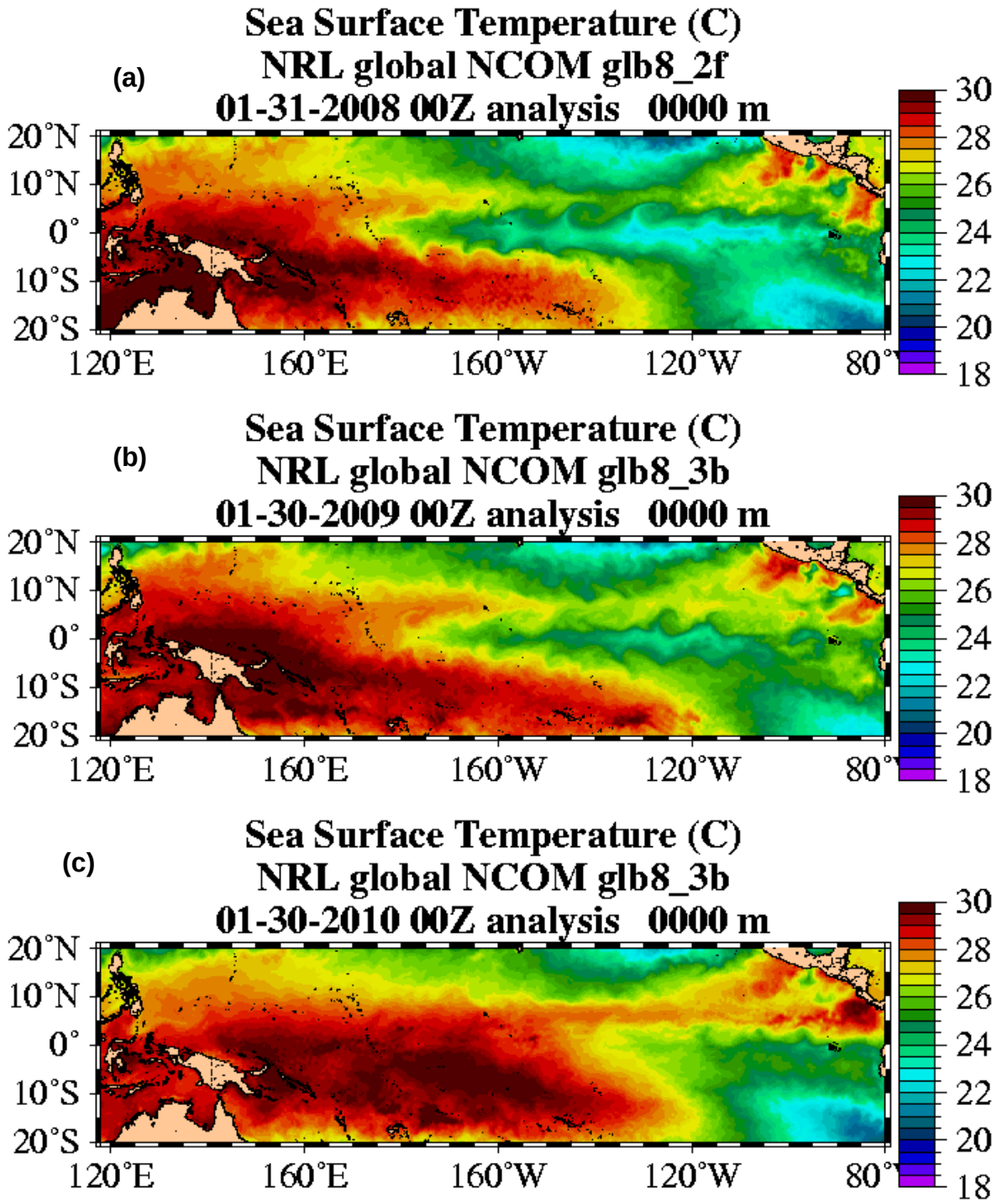


(Fig 1: schematic of El Nino and La Nina conditions)

There are generally seen to be six stages of El Nino:

(i) Year 1, March to June: sea surface temperature (SST) changes are seen in the equatorial Indian Ocean;
(ii) Year1 to 2, December to February (**this is where the cycle is thought to be now)**: east Pacific equatorial SST's increasing;
(iii) Year 2, March to June: significant warming of central and east Pacific SST's with a lowering of mean sea level pressures (MSLP) over the southeast Pacific;
(iv) Year 2, July to December: peak of El Nino, with maximum SST and MSLP anomalies;
(v) Year 3, January: SST's in eastern equatorial Pacific start to decline;
(vi) Year 3, May to August: no anomalies still present.

Looking at the SST's at the end of January over the last 3 years (*Figure 2)*, it can be seen that we appear to be at stage (ii), with the eastern equatorial SST's starting to increase as warm water pushes across the Pacific.

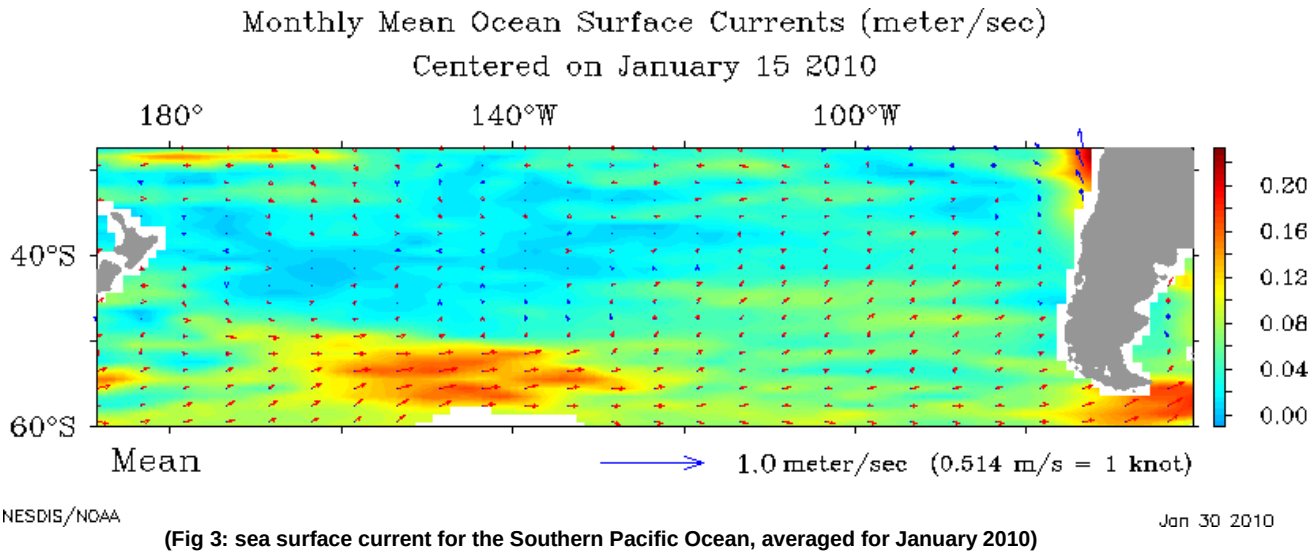


(Fig 2: SST's in the equatorial Pacific. (a) January 30th 2008; (b) January 30th 2009; (c) January 30th 2010)

The Southern Ocean Storm Track

This somewhat forbidding name is the general path of depressions around the Southern Ocean. It is approximately co-located with the Antarctic Circumpolar Current (ACC) and the sub-polar jet stream (just as in the Northern Hemisphere the passage of lows across the UK generally follows the jet stream).

ACC: this is located at approximately 50°S, and flows at anywhere up to 4 knots, but generally less than that (*Figure 3)*.



(Fig 3: sea surface current for the Southern Pacific Ocean, averaged for January 2010)

Sub-polar jets: these are strong upper troposphere jet streams, usually seen at around 200 to 300 mbar levels, and strongly indicative of depression paths. In the Southern Pacific Ocean in January and February this is usually quite weak, and in El Nino years it disappears almost entirely to be replaced with a Western Pacific subtropical jet (medium strength at about 60 knots) around 30°S between 180° and 120°W.

Surface Winds: these are at their least (on average) at this time of year and are reduced by El Nino. From 180°W to 120°W their maximum average along 45°S to 50°S is 14 to 16 kts, rising to 16 to 20 kts from 120°W to the Drake Passage. Incidentally they are significantly stronger (by 5 kts on average) in the southern Indian Ocean, which explains why the yachts had such a rough time coming across.

Depression Formation: this is the busiest time of year, but the vast majority start south of 50°S. The generation of lows is assisted by katabatic flow off the Antarctic continent, and the Bellingshausen Sea just west of the Antarctic peninsula is an area to watch as you approach it. Not that you have a lot of choice in the matter by the time you get there, mind.

Present and Just Past Conditions

The 500 mbar picture: the Australian BOM have a good set of archives, which is where these recent images come from. The jet stream, and hence the storm track, can be thought of as the middle of the most rapidly changing part of the 500 mbar surface. Basically, look for the centre of the contours which show the steepest gradient.

The surface picture: if you look at the 500 mbar plots (*Figure 4)* and compare them to the MSLP plots *(Figure 5)* you can see that the centre of the surface lows are generally a few degrees south of the centre of the steepest part of the 500 mbar surface, i.e. the sub-polar jet stream. This means that as you dip south to go through the Drake Passage you are likely to have to pass quite close to the centre of one of these lows if there happens to be one there at the same time as you. The good news is that it's mid-summer and the jet stream is at its least, so the depressions should not be at their most energetic. Before you get there, though, you should be able to stay north of the depressions and so at least have the wind coming from the right direction.

Forecast Conditions

The 500 mbar heights and the corresponding MSLP forecasts for January 31st, February 2nd,4th and 6th are shown (*Figures 6,7,8 and 9)*. These show that the conditions described above will carry on with roughly the same pattern.

Websites

Current:

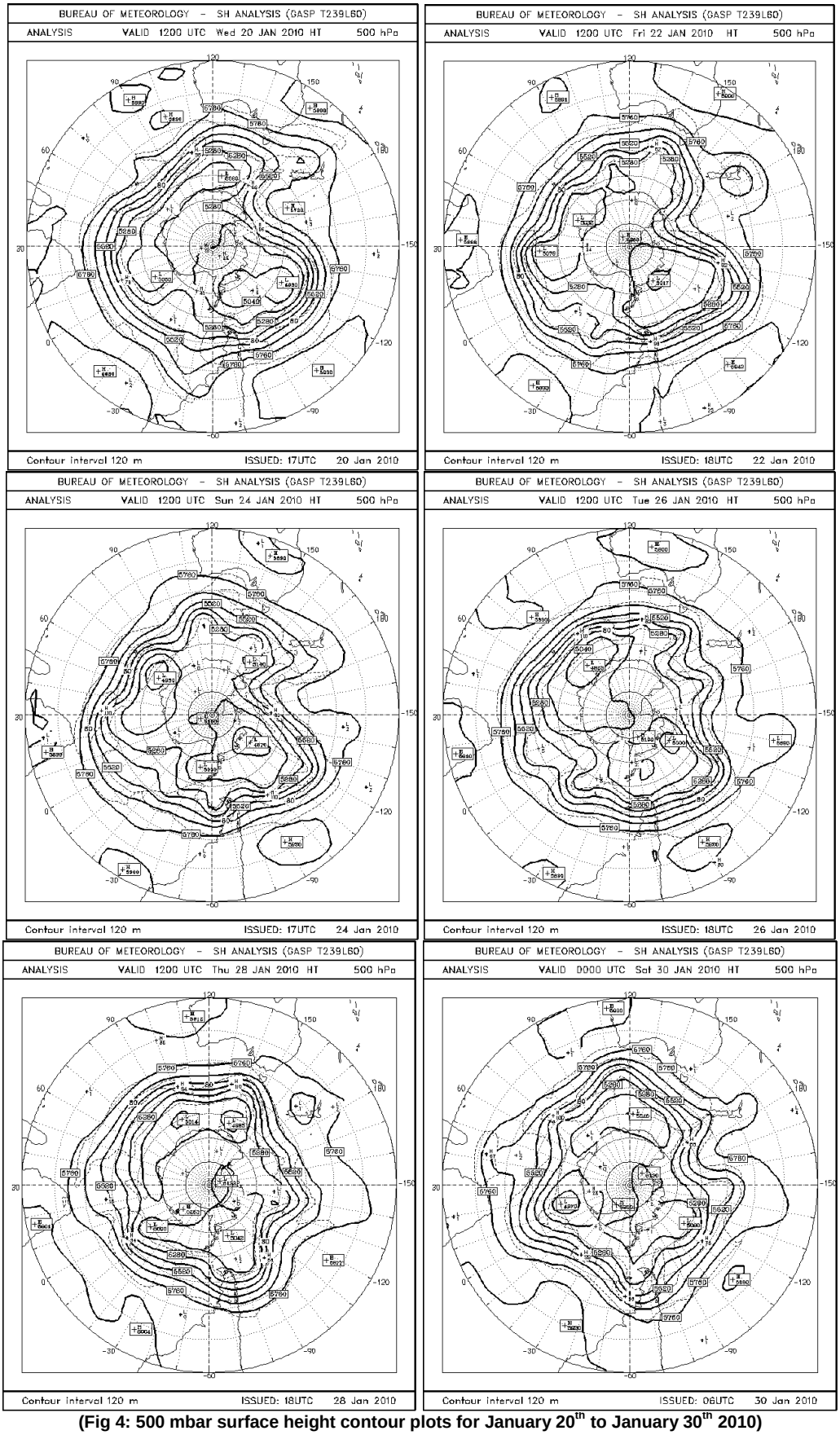
http://www.oscar.noaa.gov/datadisplay/index.html

http://www7320.nrlssc.navy.mil/global_ncom/

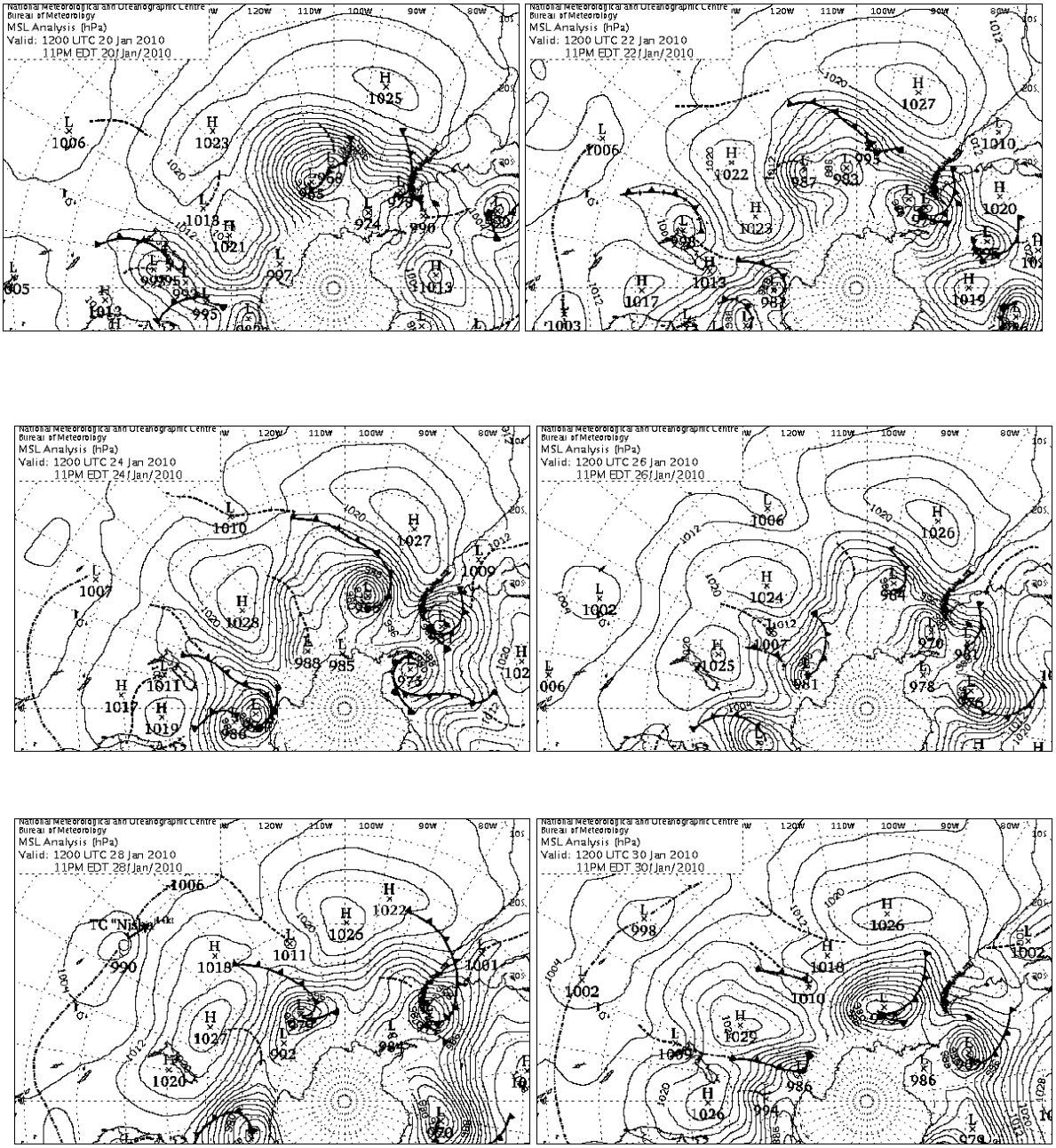
Meteorology:

https://www.fnmoc.navy.mil/wxmap_cgi/index.html

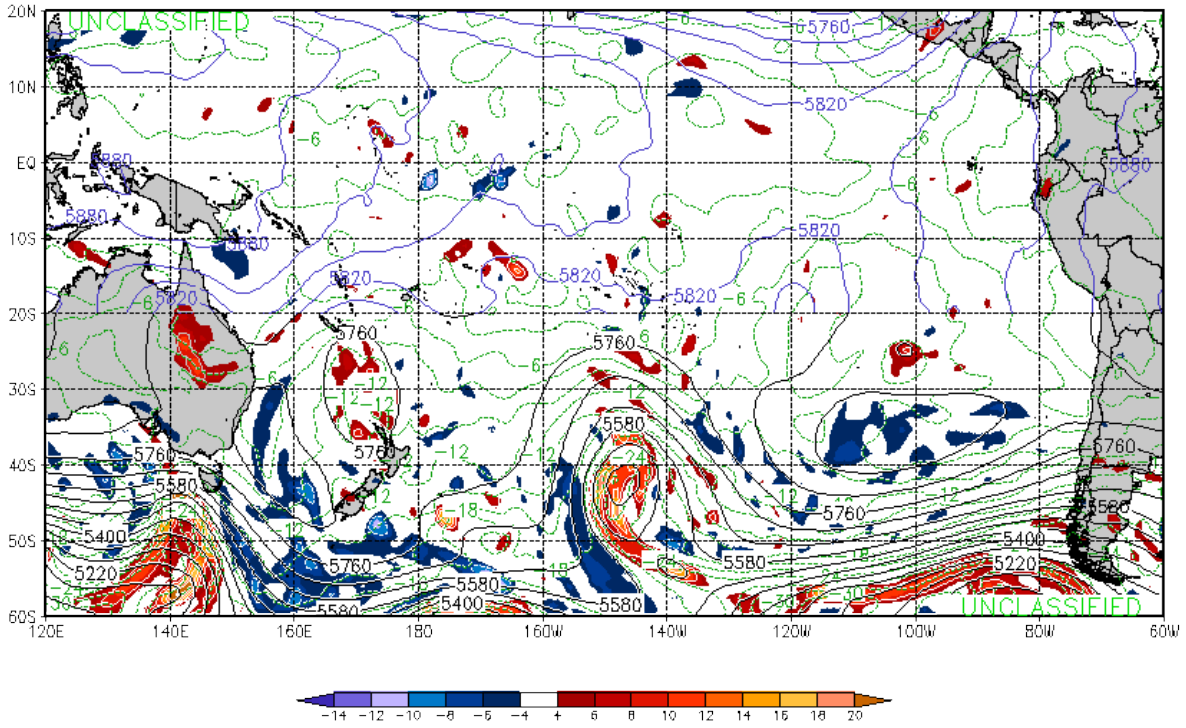
http://www.bom.gov.au/weather/global/index.shtml

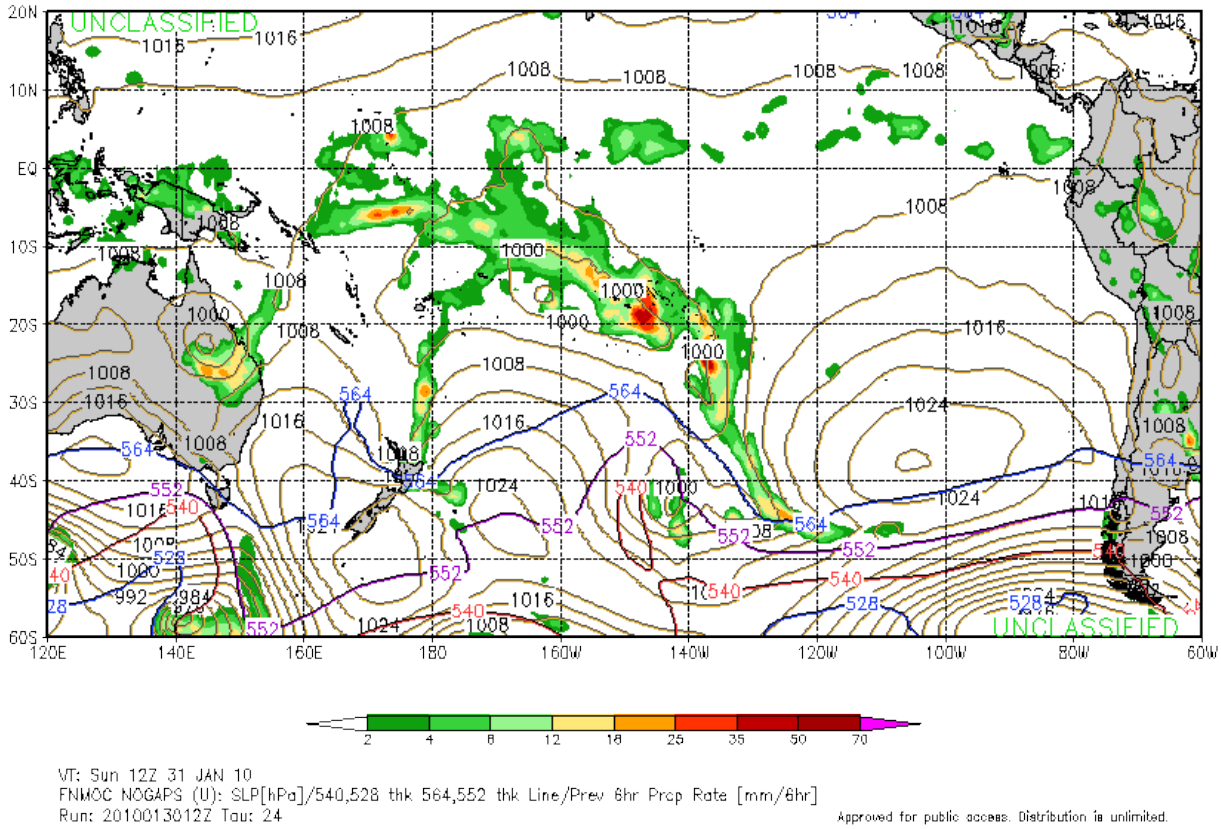


(Fig 4: 500 mbar surface height contour plots for January 20th to January 30th 2010)

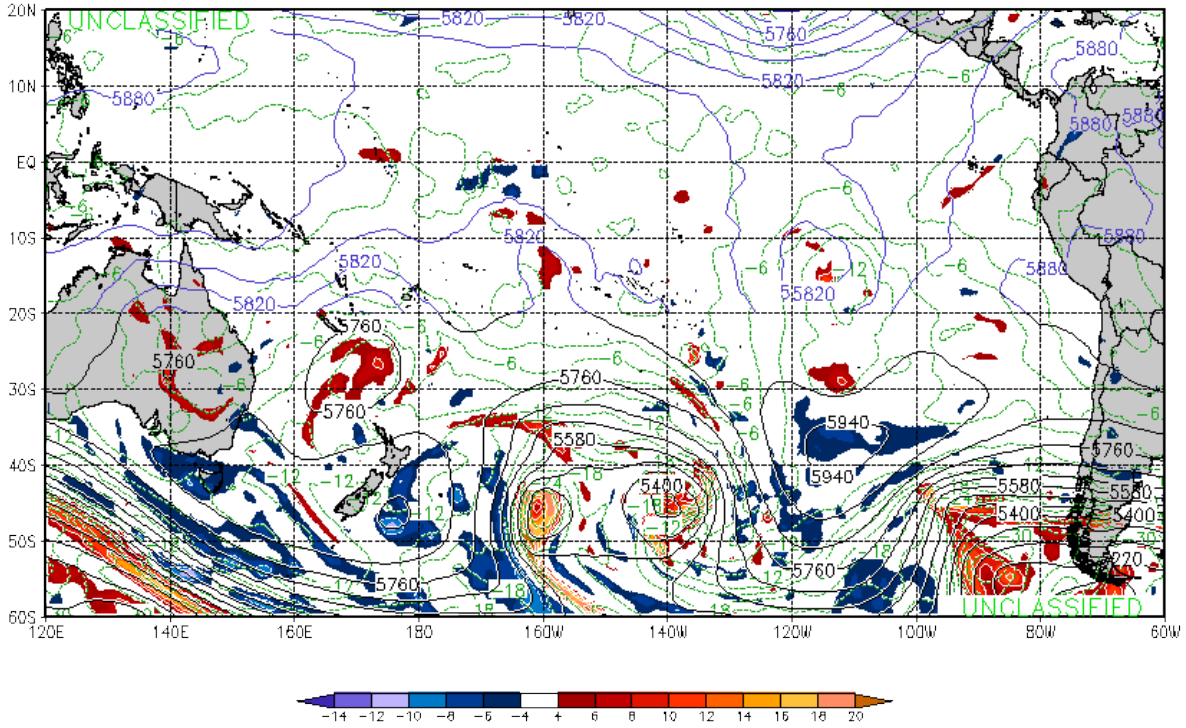


(Fig 5: MSLP for January 20th to January 30th 2010)



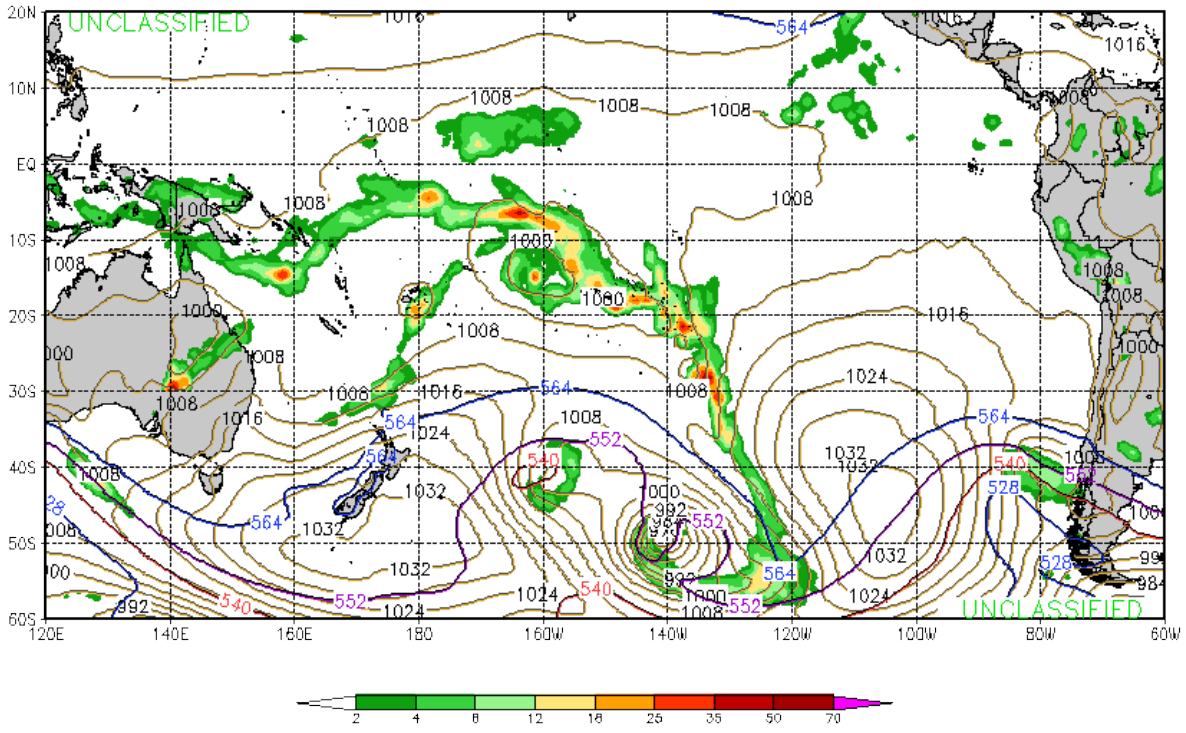


(Fig 6: 500 mbar and MSLP forecast for January 31st 2010)



VT: Tue 00Z 02 FEB 10
FNMOC NOGAPS (U): 500mb Heights / Rel Vort / T [°C]
Run: 2010013012Z Tau: 60

Approved for public access. Distribution is unlimited.



VT: Tue 12Z 02 FEB 10
FNMOC NOGAPS (U): SLP[hPa]/540,528 thk 564,552 thk Line/Prev 6hr Prcp Rate [mm/6hr]
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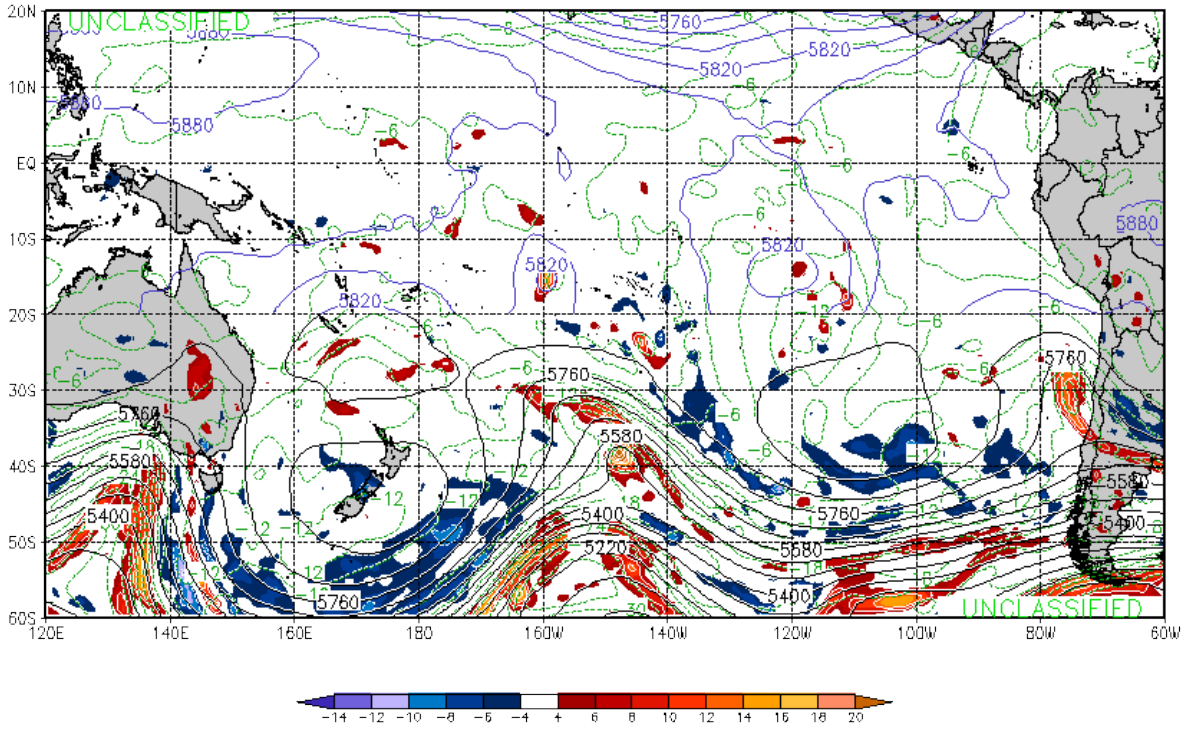
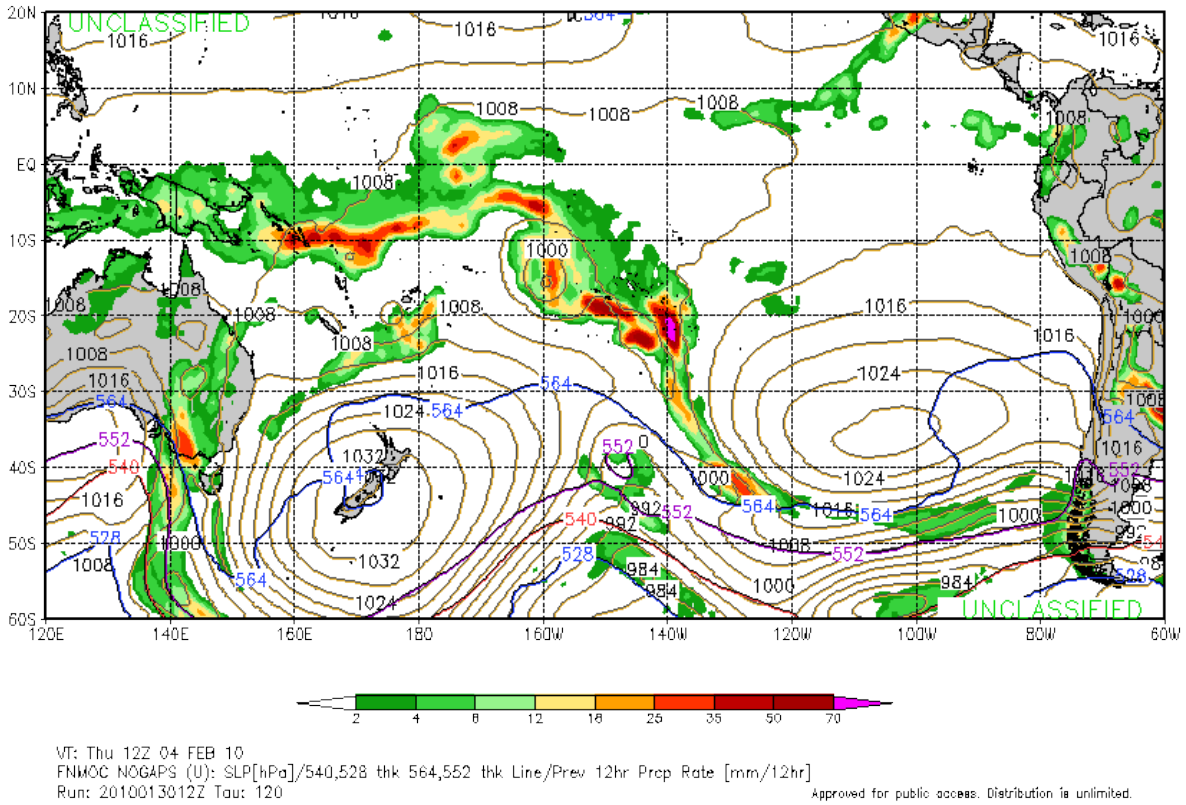
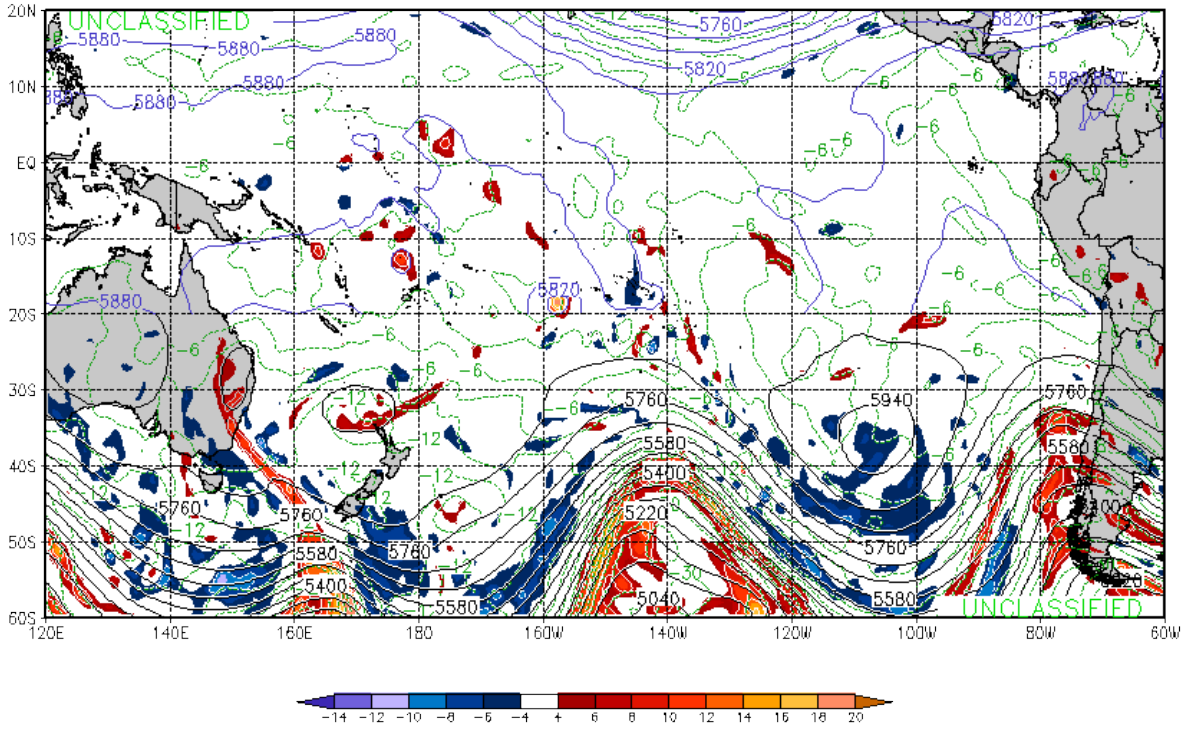
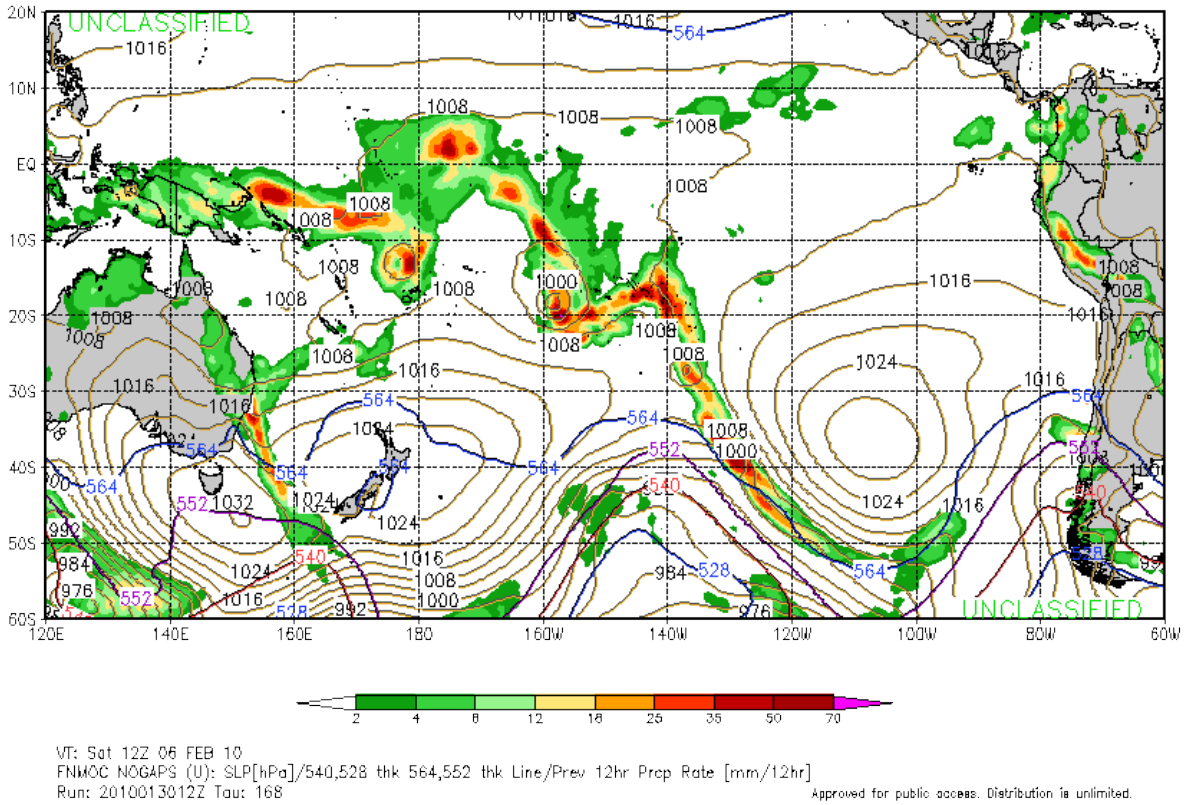
(Fig 7: 500 mbar and MSLP forecast for February 2nd 2010)





(Fig 8: 500 mbar and MSLP forecast for February 4th 2010)





(Fig 9: 500 mbar and MSLP forecast for February 6th 2010)