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# Tropical Cyclone Positioning

## The Process

1. Use available Vis, IR, Microwave, AScat, Radar, Obs

USE **ALL** SOURCES OF INFORMATION

2. Combine these positions and compare with expected position from previous fixes and forecast location to get an estimate at the required analysis time.

If required make adjustments to previous fixes.

3. Determine uncertainty and movement.

From Dvorak (1985):

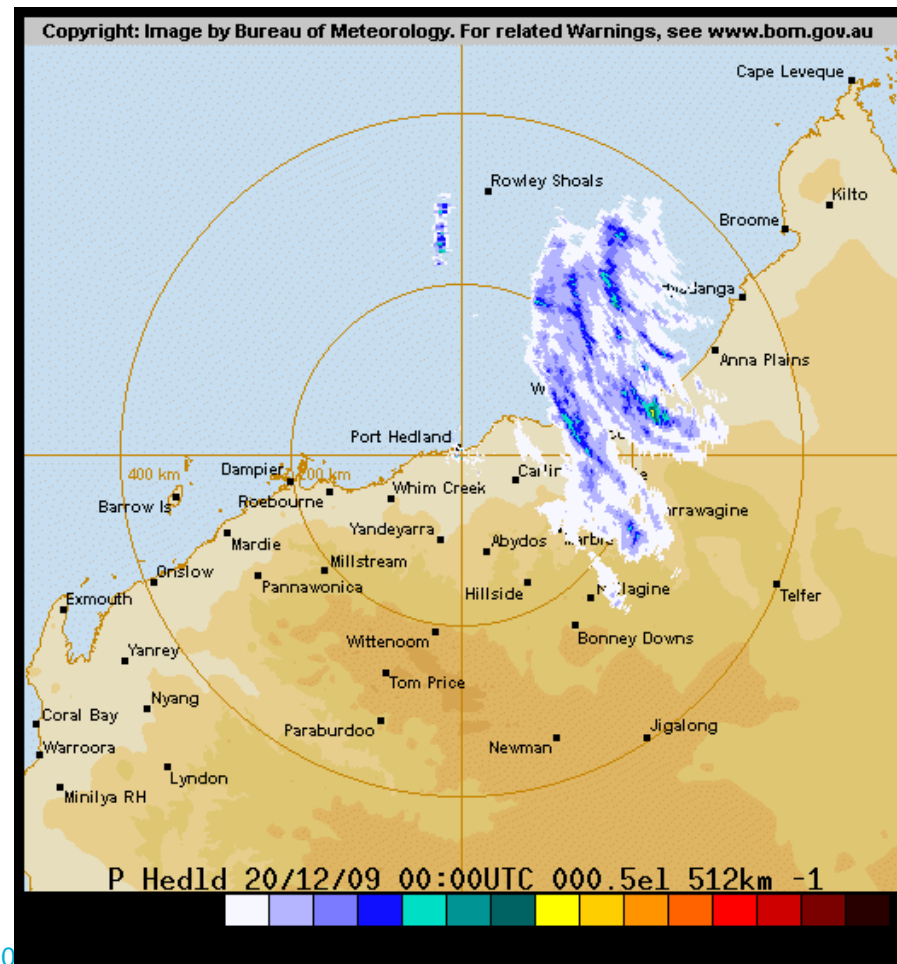
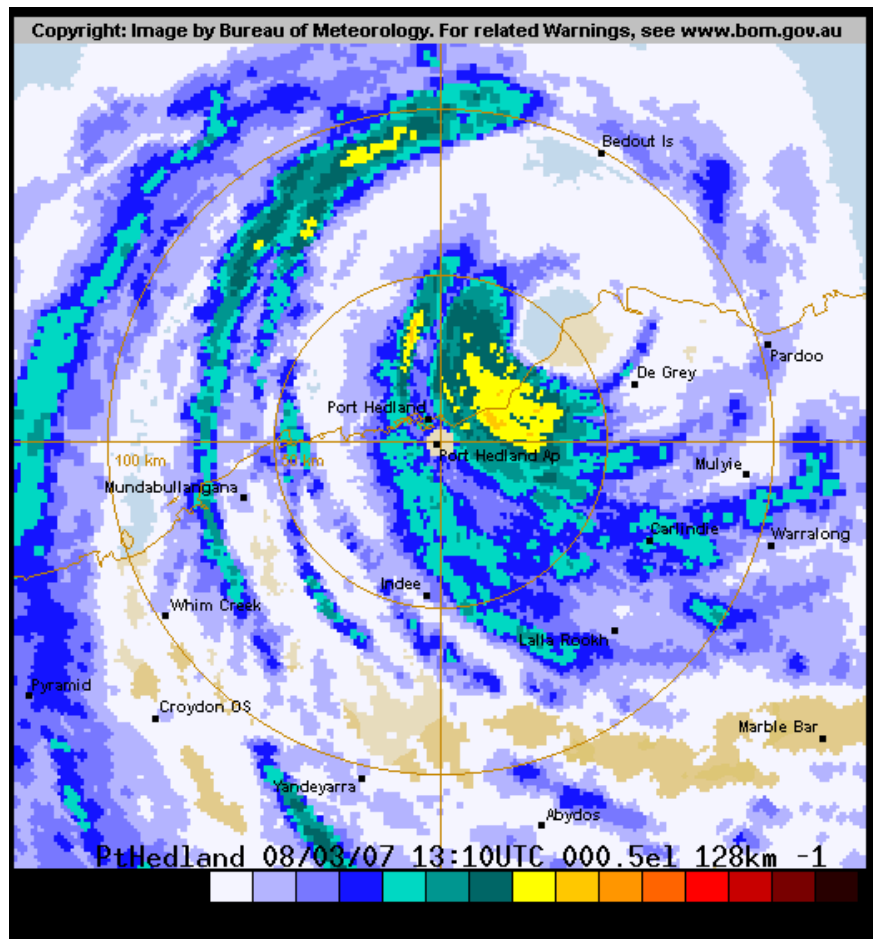
“The cloud system center is defined as the focal point of all the curved lines or bands of the cloud system.

It can also be thought of as the point toward which the curved lines merge or spiral.”



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# Can be Easy – well defined circulation on radar



[http://www.wa.bom.gov.au/sect\\_info/sevwx/tc/seas0910/AU0910](http://www.wa.bom.gov.au/sect_info/sevwx/tc/seas0910/AU0910)

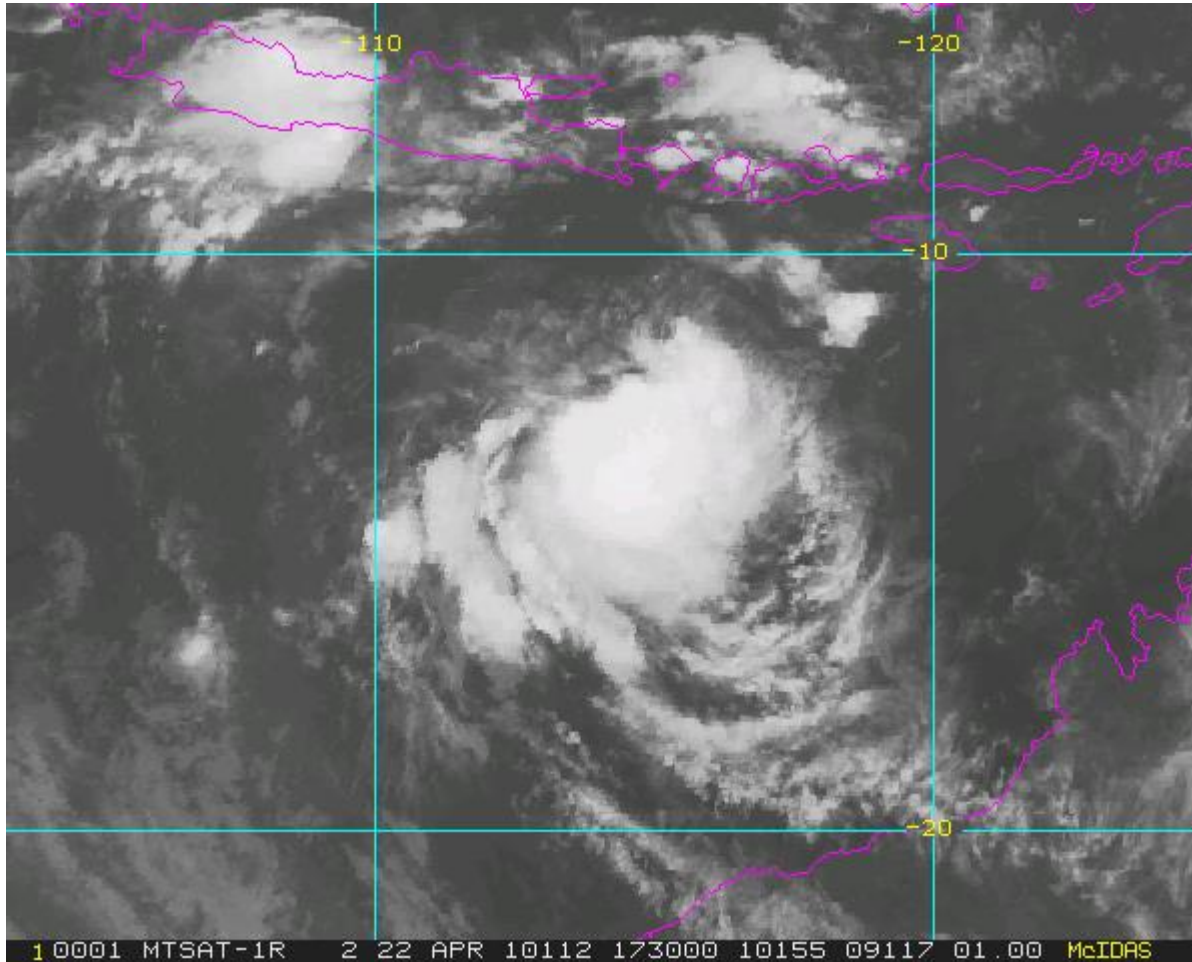
Accuracy (Uncertainty)  $\pm 10\text{nm}$



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# Or Difficult – blob on IR (at night)

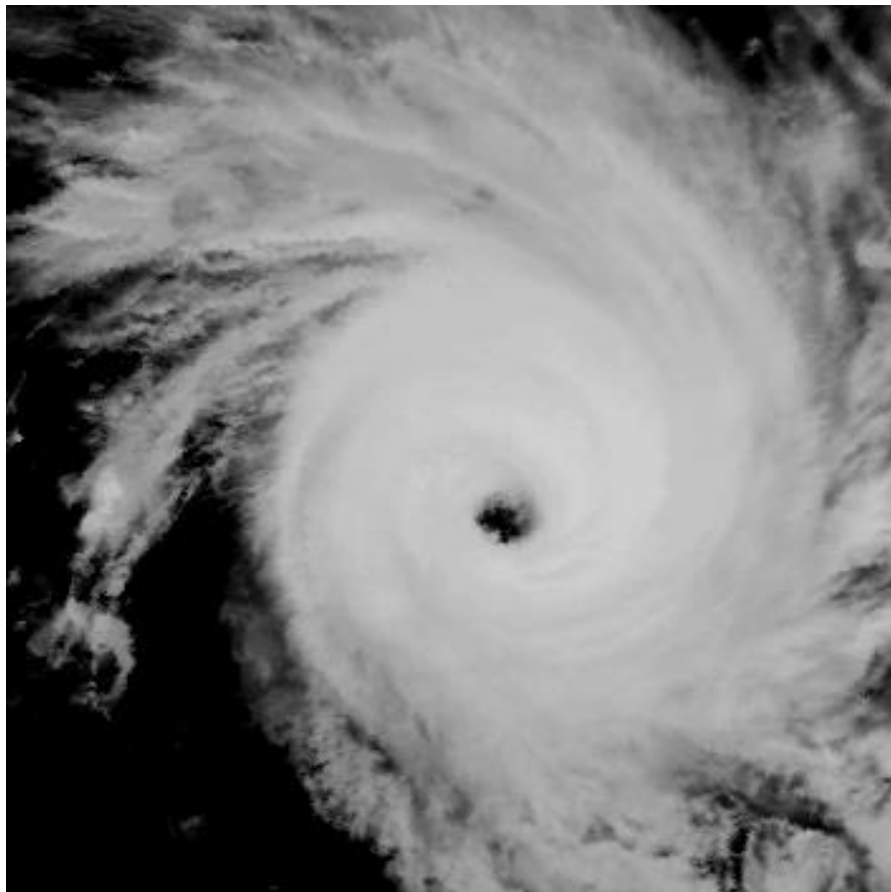


Uncertainty >30nm



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# Exposed Low Level Circulation Centre (LLCC)



Eye pattern Accuracy ~10nm

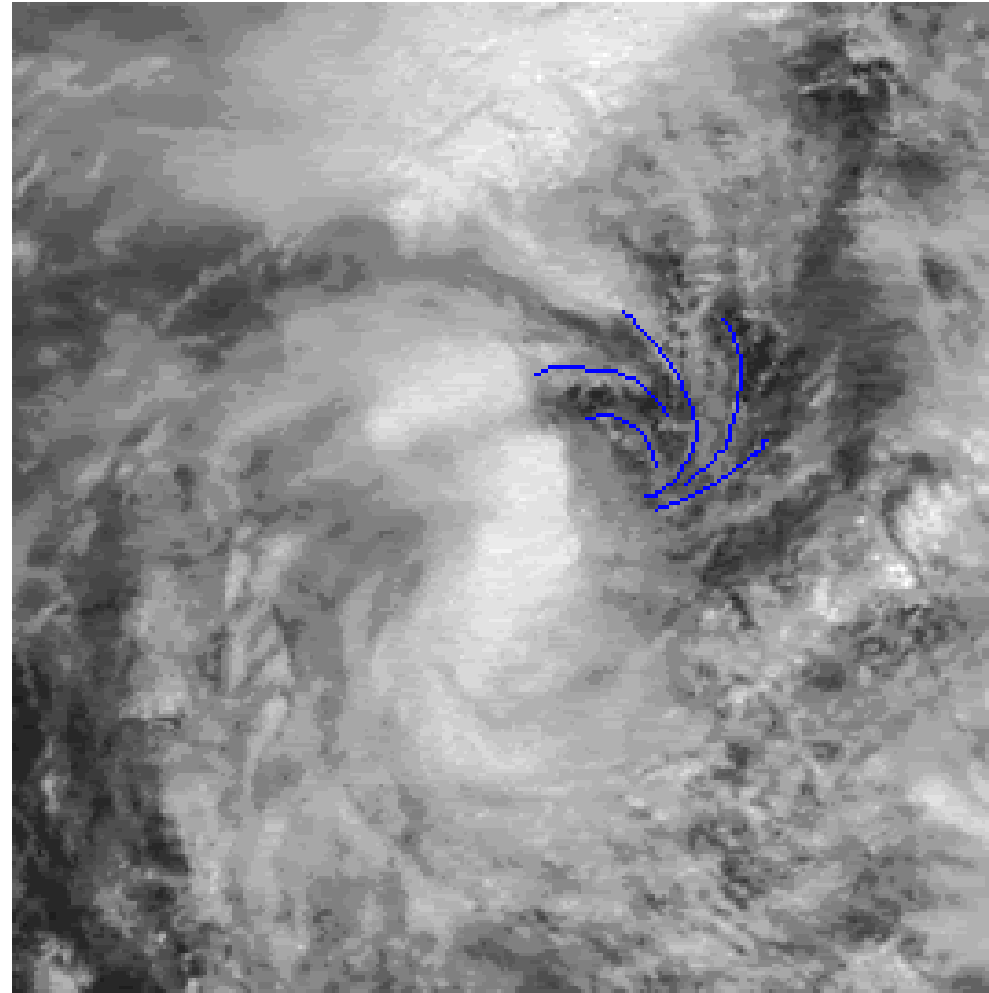


Shear pattern Accuracy ~10nm

# Exposed Low Level Circulation Centre (LLCC)

Partial Exposure  
Vis better than IR  
Where is the centre?

What is the shear?

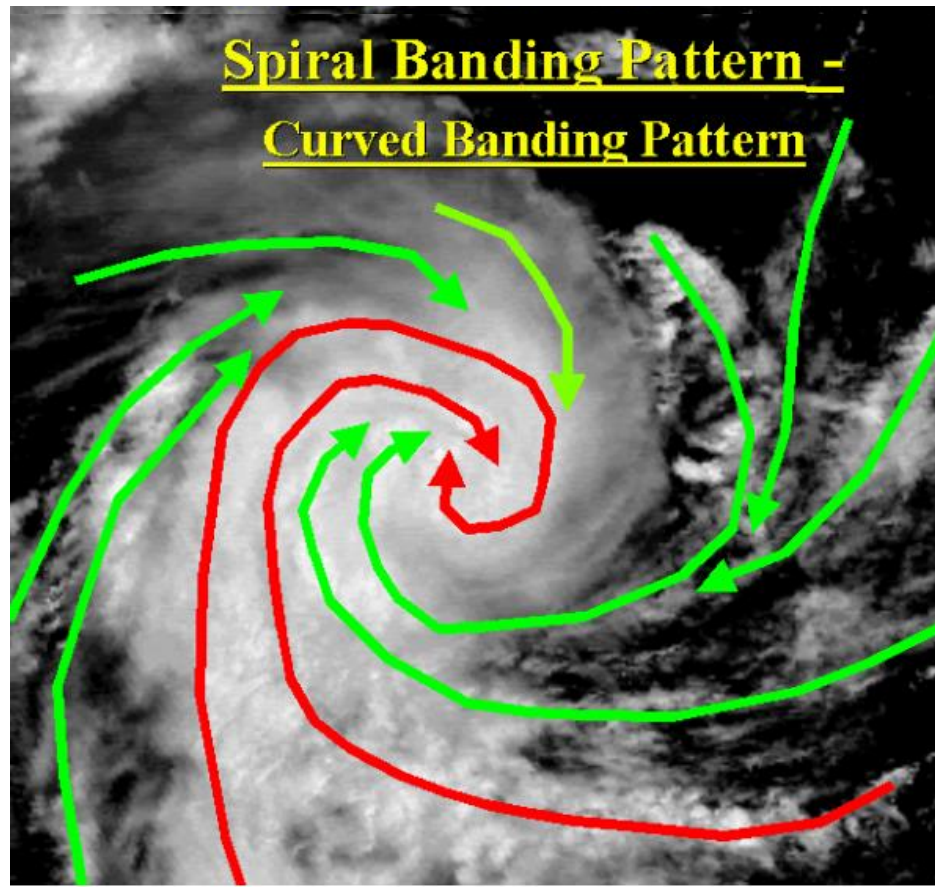




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# Following the cloud line or band curvature



Southern  
Hemisphere  
Example

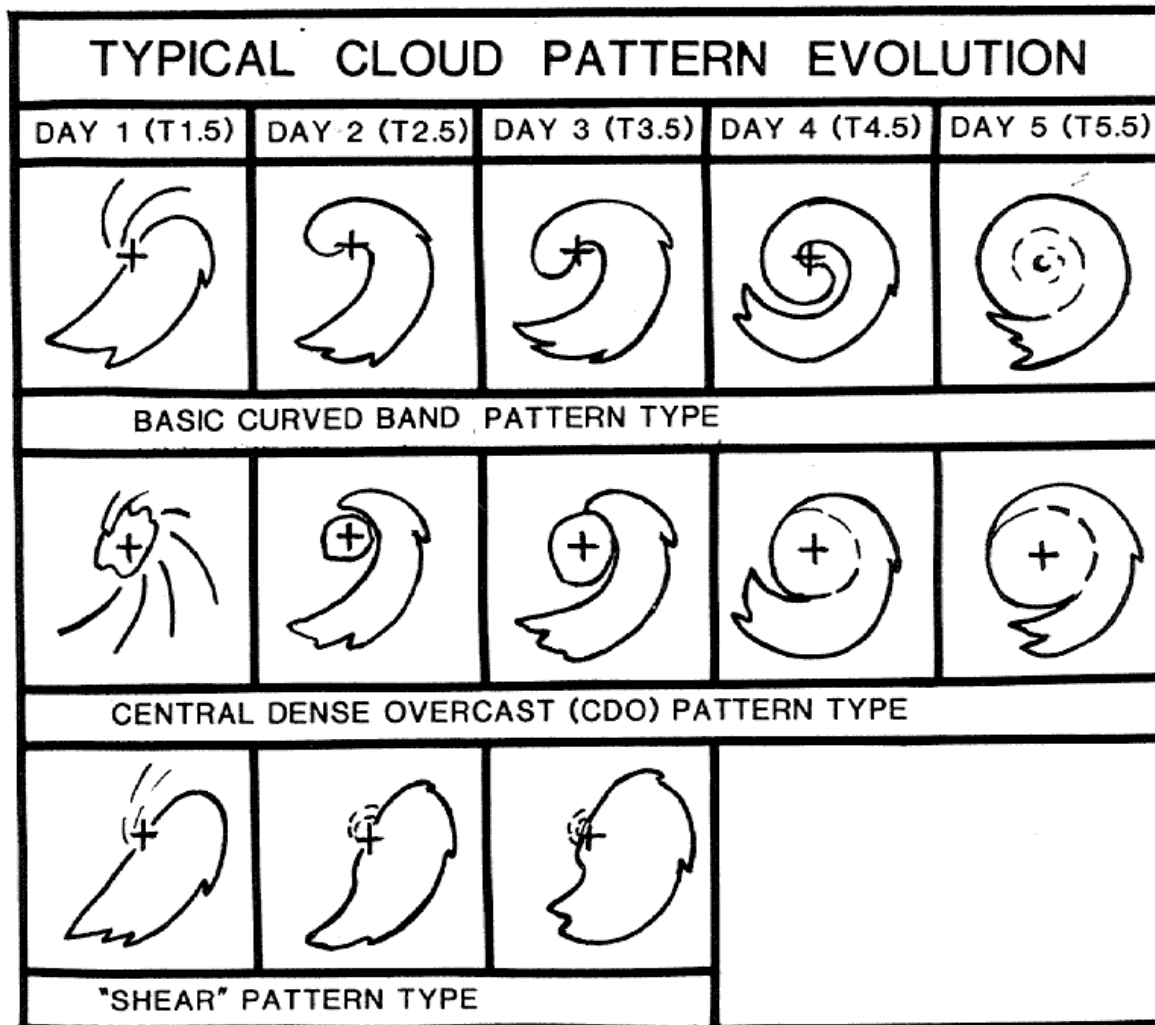




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# Modelled Cloud Centre



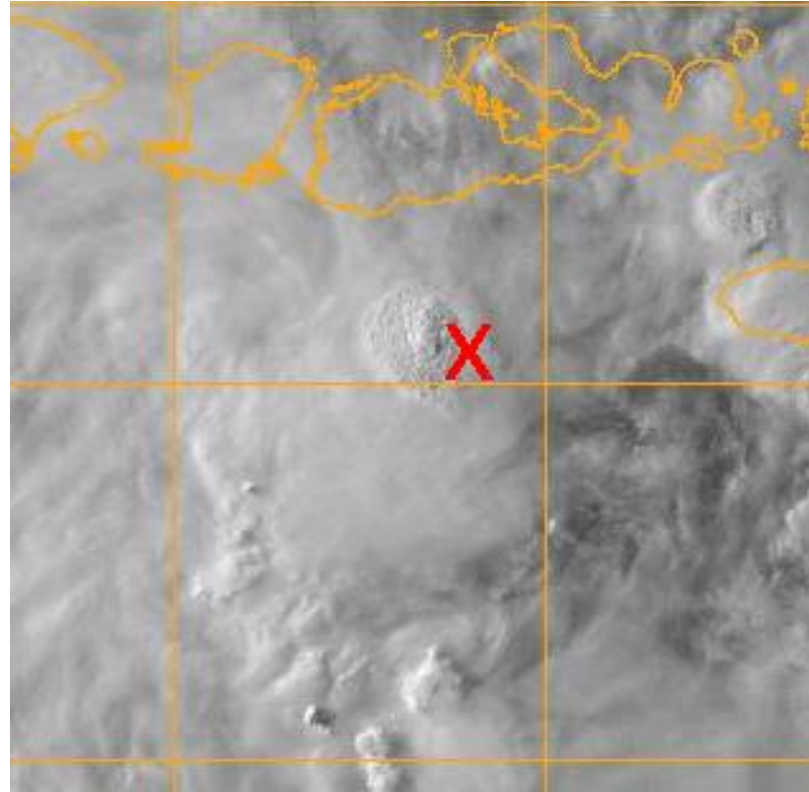
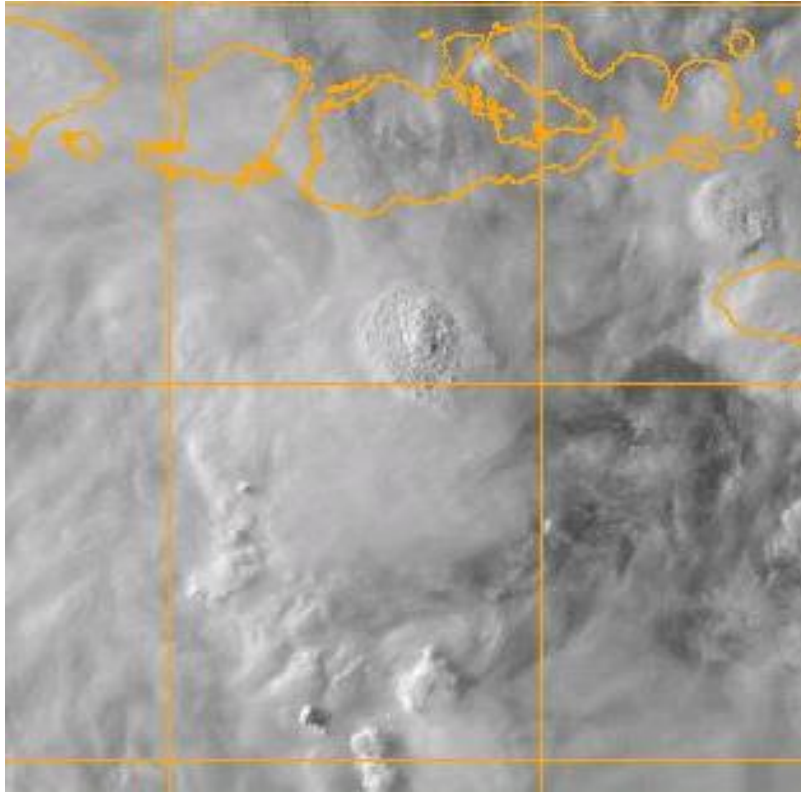


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# Overshooting tops: where is the centre?

Must consider shear : moderate easterly



TC Sean 2010 Southern Hemisphere

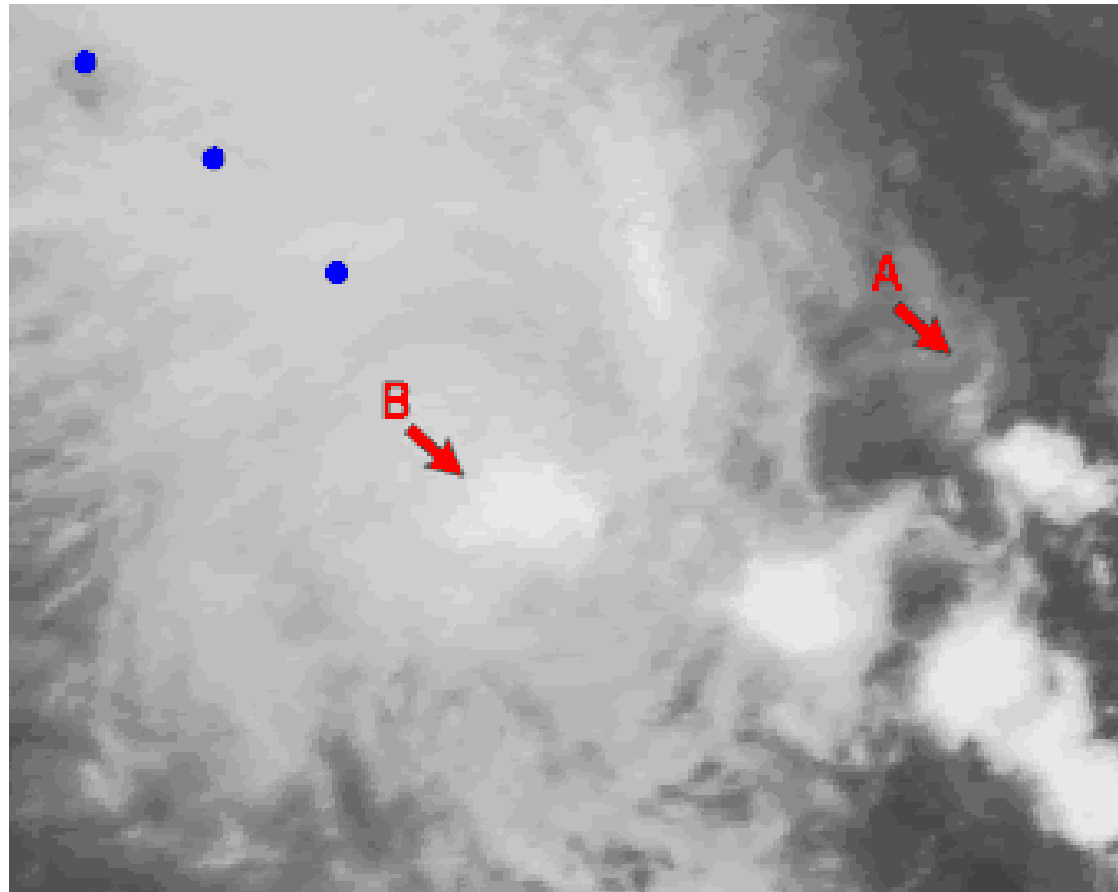




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# Compare Centre location with forecast



Southern Hemisphere Example

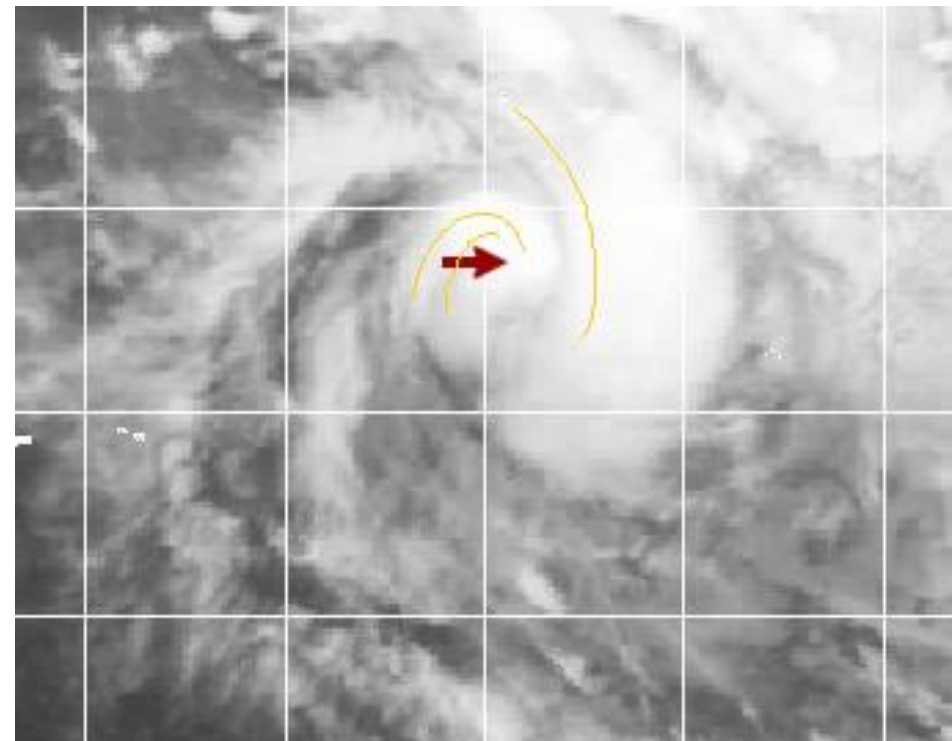
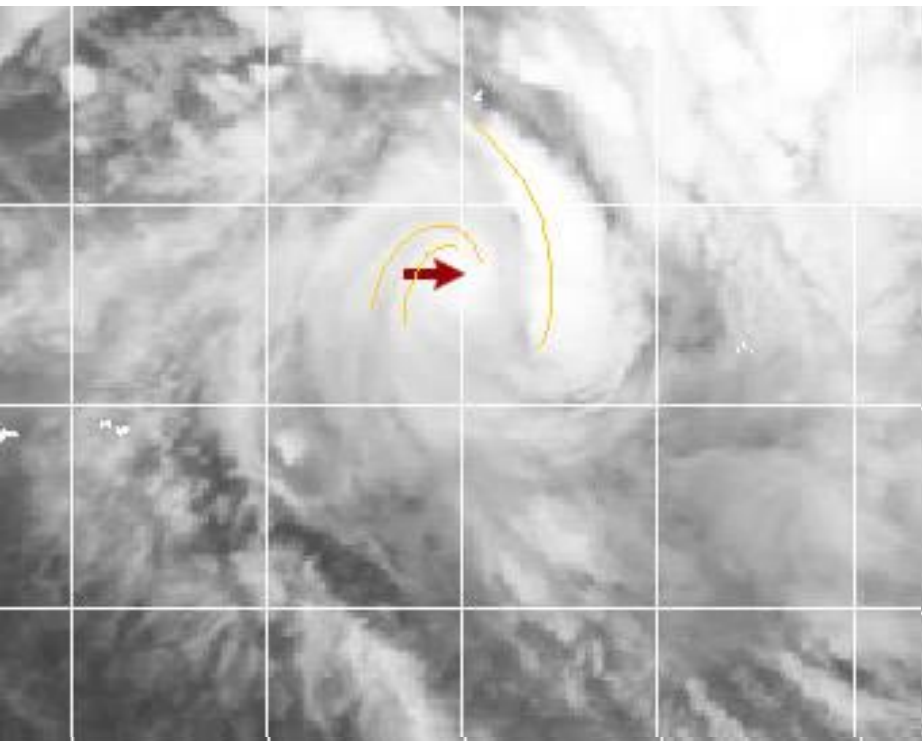


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# Compare Centre location with previous location

(Use animation)

three hours later



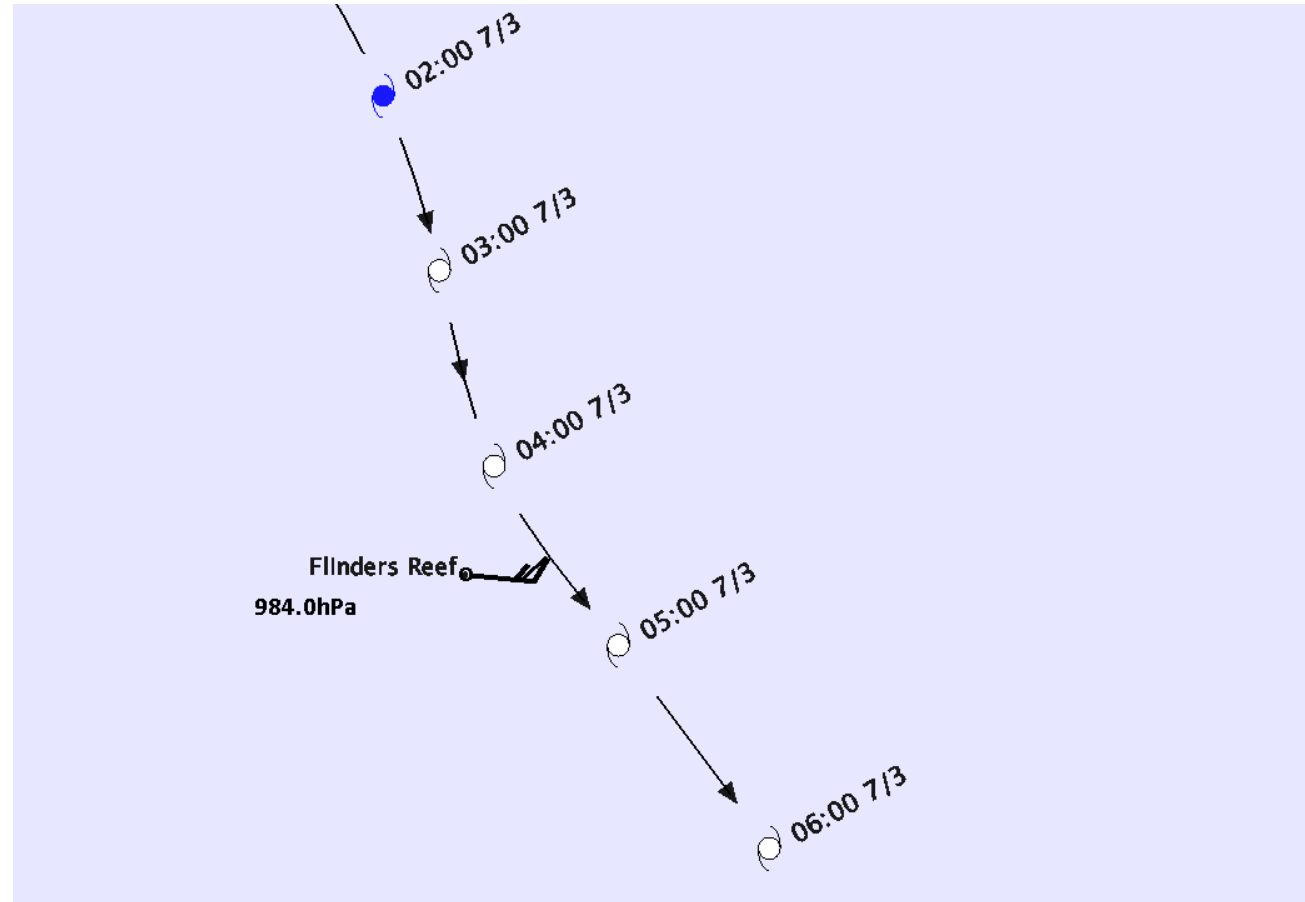
Southern Hemisphere Examples



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# Observations

Change in  
winds &  
pressures



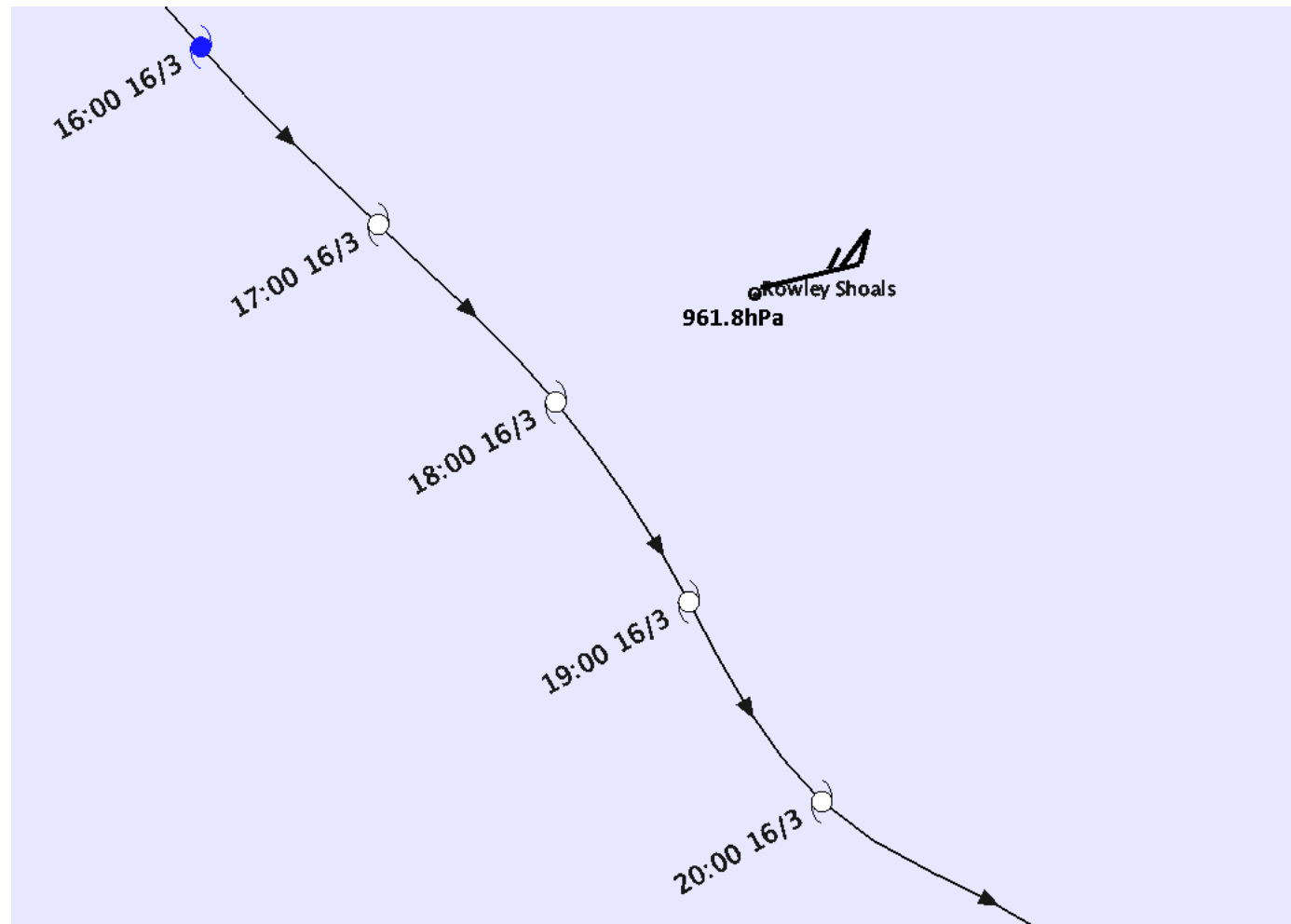
Hamish March 2009



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# Observations

Change in  
winds &  
pressures



Lua March 2012



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# Uncertainty and movement

## 1. Analysis fix accuracy

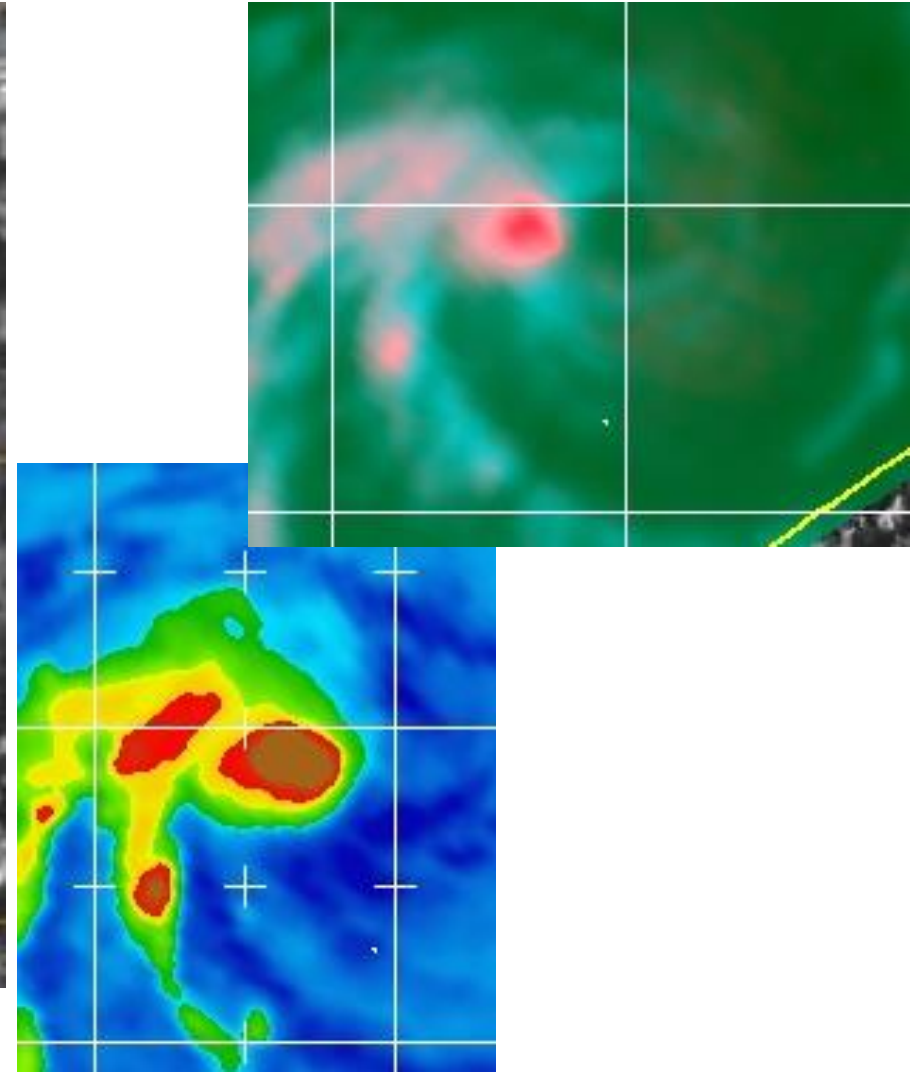
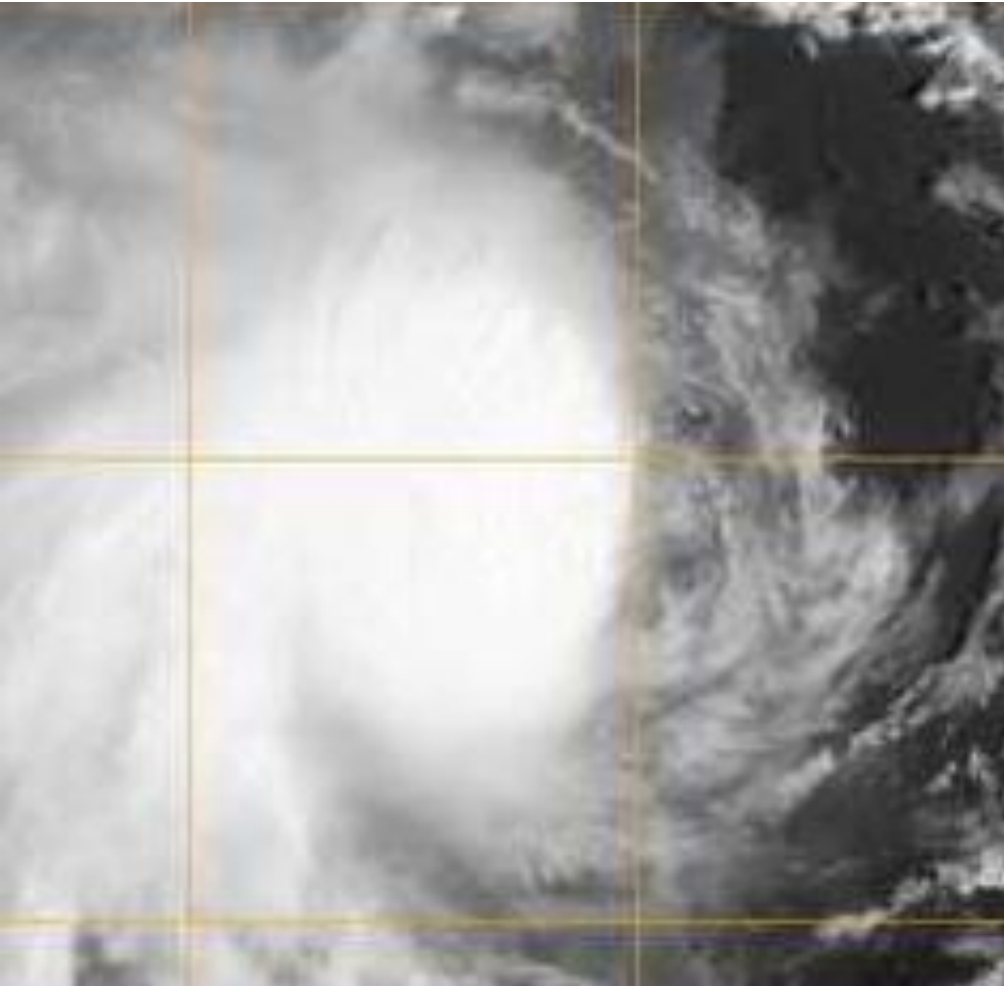
Position Code Number (PCN)	Suggested Analysis Fix Accuracy (nm)	
eye visible on radar	5-10	Good
eye visible on satellite	15	
well-defined circulation	15-20	
(radar or 37GHz microwave)		
well-defined circulation (satellite)	20-25	Fair
well-defined circulation (surface)	25-30	
poorly-defined circulation (radar)	30-40	
poorly-defined circulation (satellite)	30-65	Poor
poorly-defined circulation (surface)	40-65	

Also consider:

- Speed of movement – fast moving TCs have a higher uncertainty than a slow moving one.
- Parallax for systems distant from satellite position (140°E MTSAT) or distant from radar or on microwave.
- Differences between LLCC and higher centre for tilted vortex when viewing mid-high cloud/convection.
- Time of images relative to analysis time especially for fast moving systems.
- Resolution and timeliness of microwave imagery and potential satellite navigation error.

# Exercises: Marcia

## Where would you put the centre? What other information would help?



Southern Hemisphere example

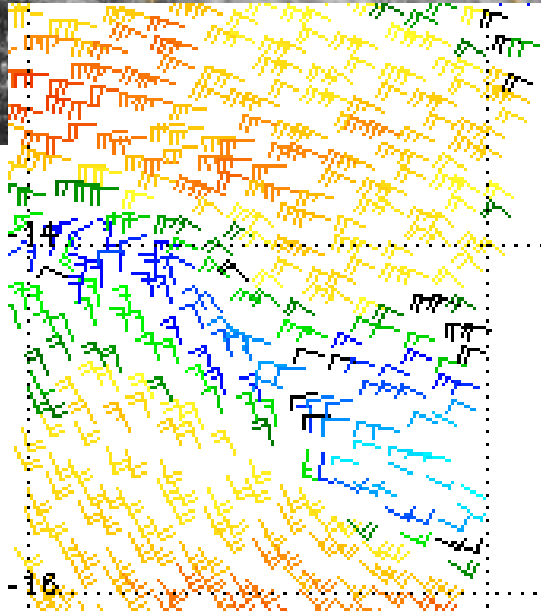
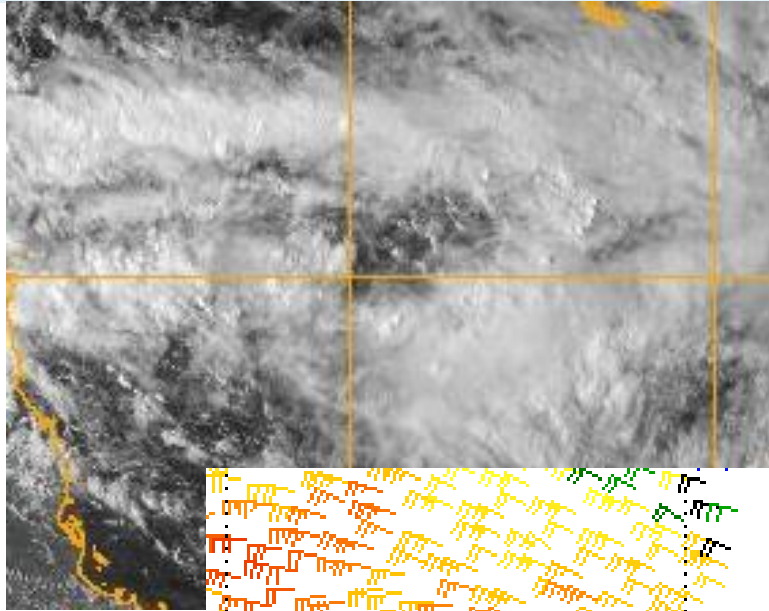


# Exercises: Marcia

Where would you put the centre?  
What other information would help?



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Southern Hemisphere  
example

