Australian VLab Centre of Excellence Regional Focus Group meeting

20 July 2021

Weather and Forecast Discussion, 20th July 2021

Bodo Zeschke Australian VLab Centre of Excellence Point of Contact

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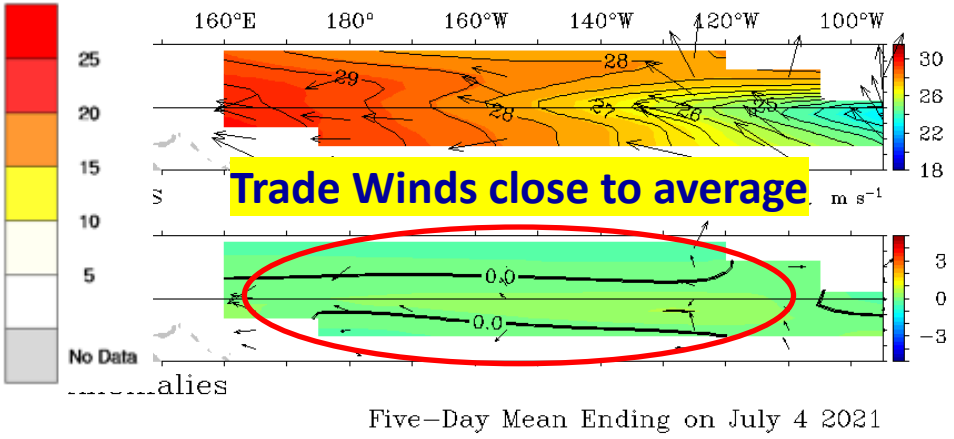
The Atmosphere: SOI, OLR, Trade Winds over the Pacific Ocean

Trade winds, Mean and Anomalies
5 day mean ending 4 July 2021



TAO/TRITON data

OLR anomalies – 7 days to 17th July 2021

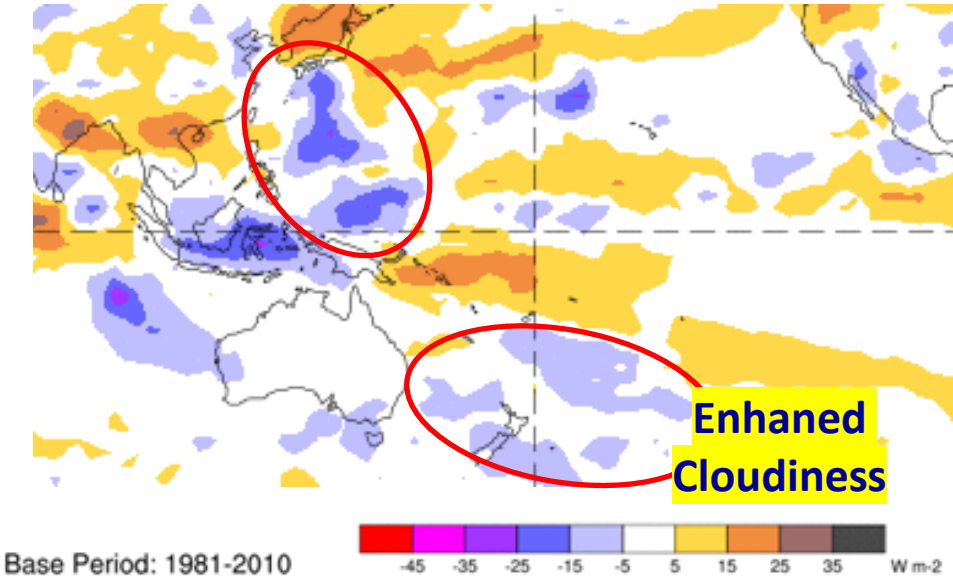
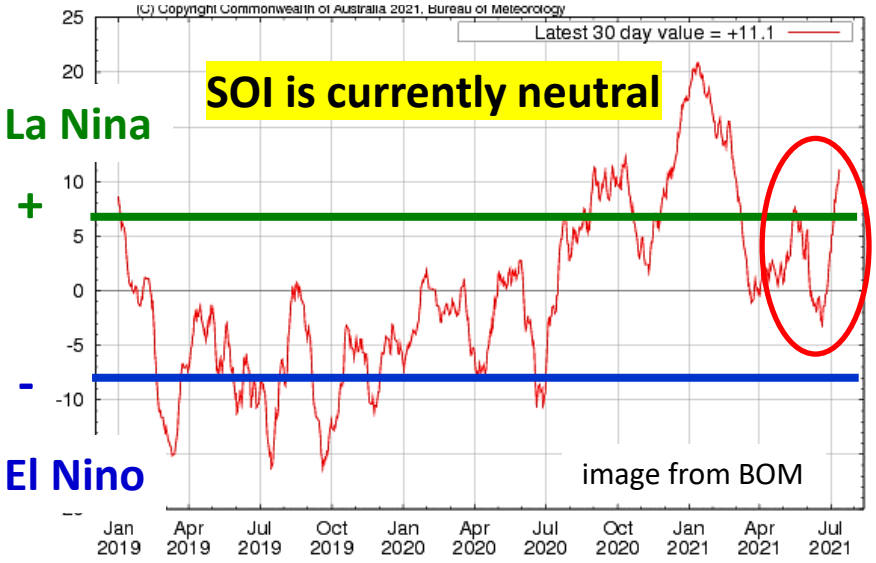


image from NOAA/ESRL/PSD

Southern Oscillation Index (30 day moving)



The current situation

- Atmospheric indicators persist at neutral levels.
- The Southern Oscillation Index (SOI) has briefly entered La Niña levels.

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General meteorological activity over the region

OLR anomalies – 30 days to 17th July 2021

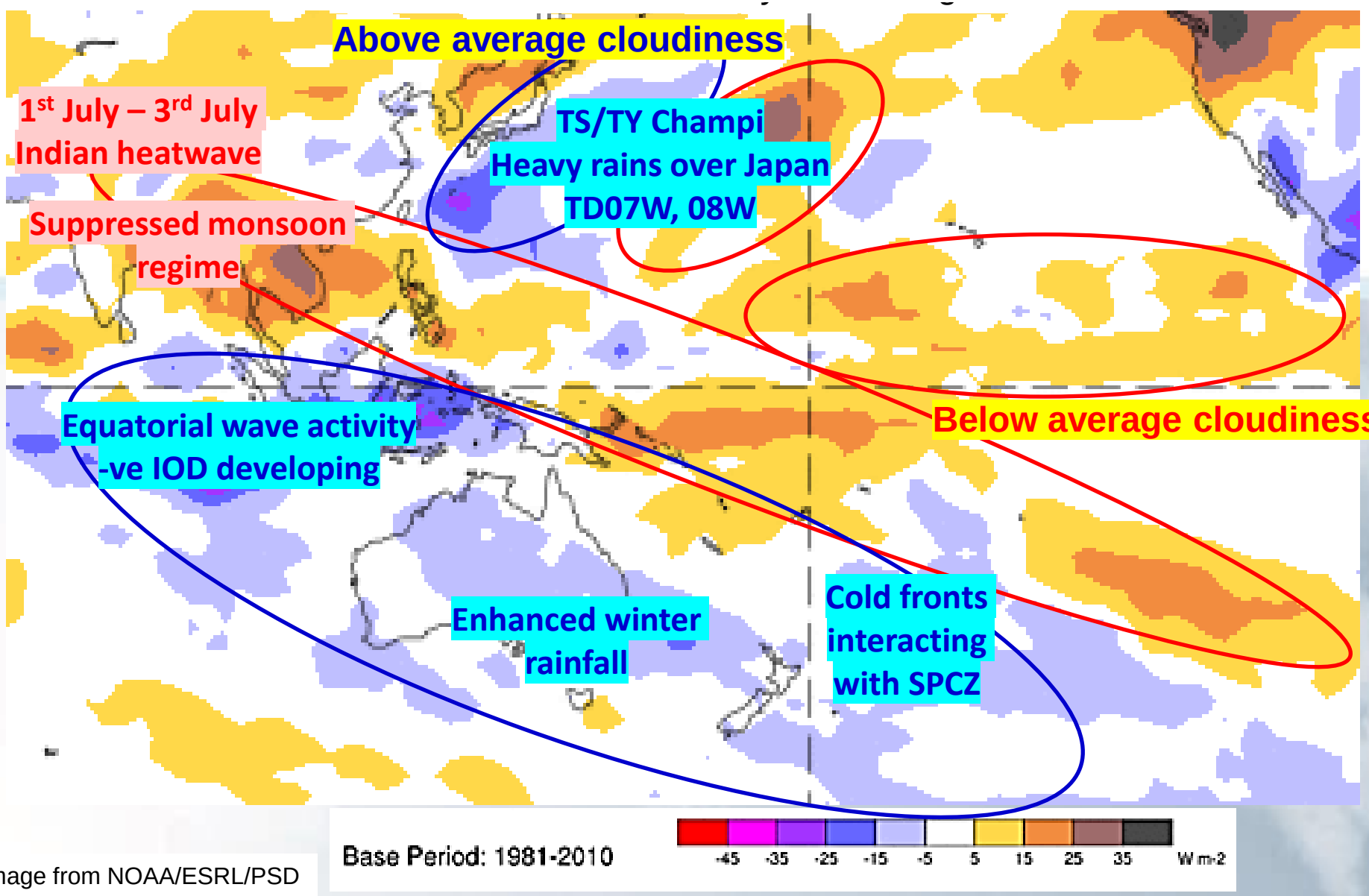

image from NOAA/ESRL/PSD

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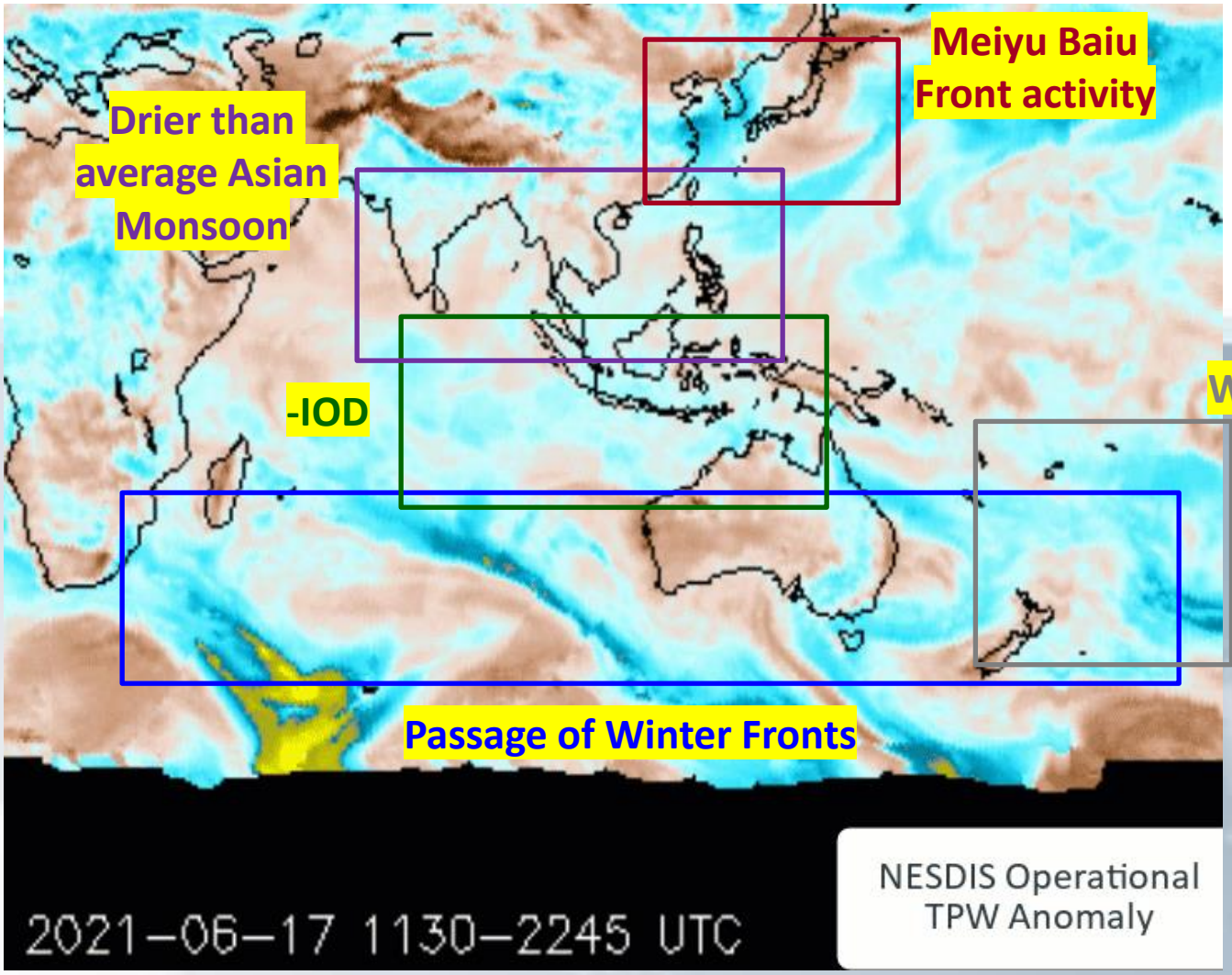
images courtesy NOAA OSPO

Animation: NESDIS Total Precipitable Water Anomalies

Daily data 18th June to 18th July 2021



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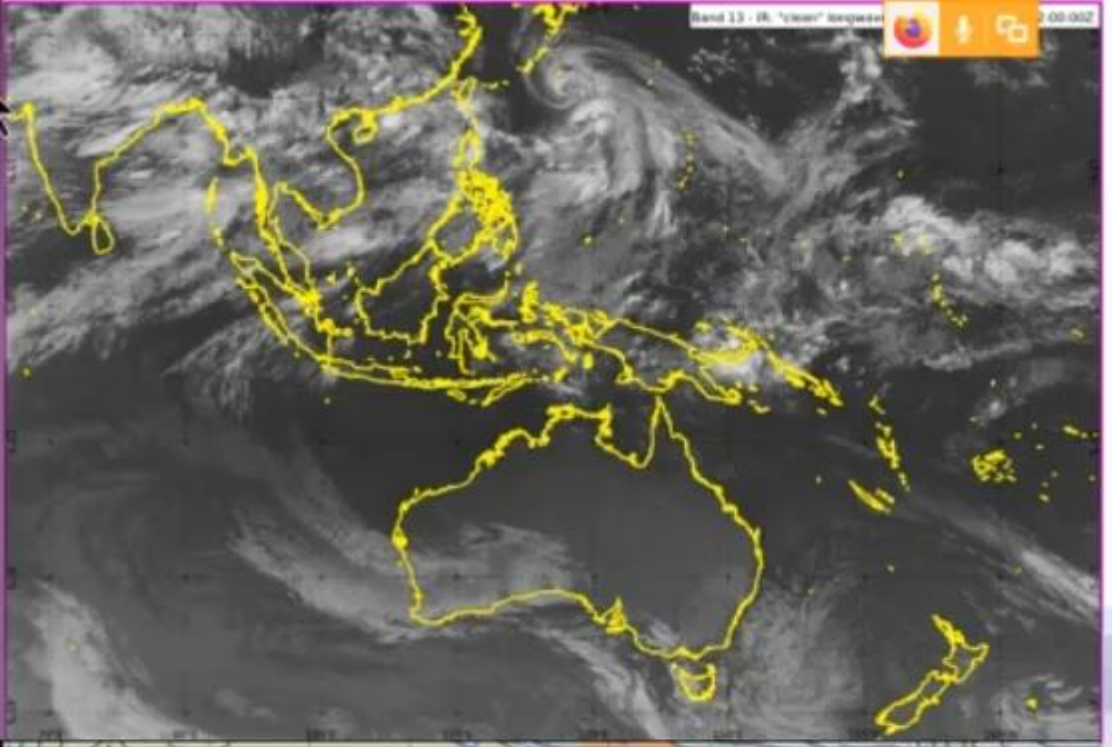
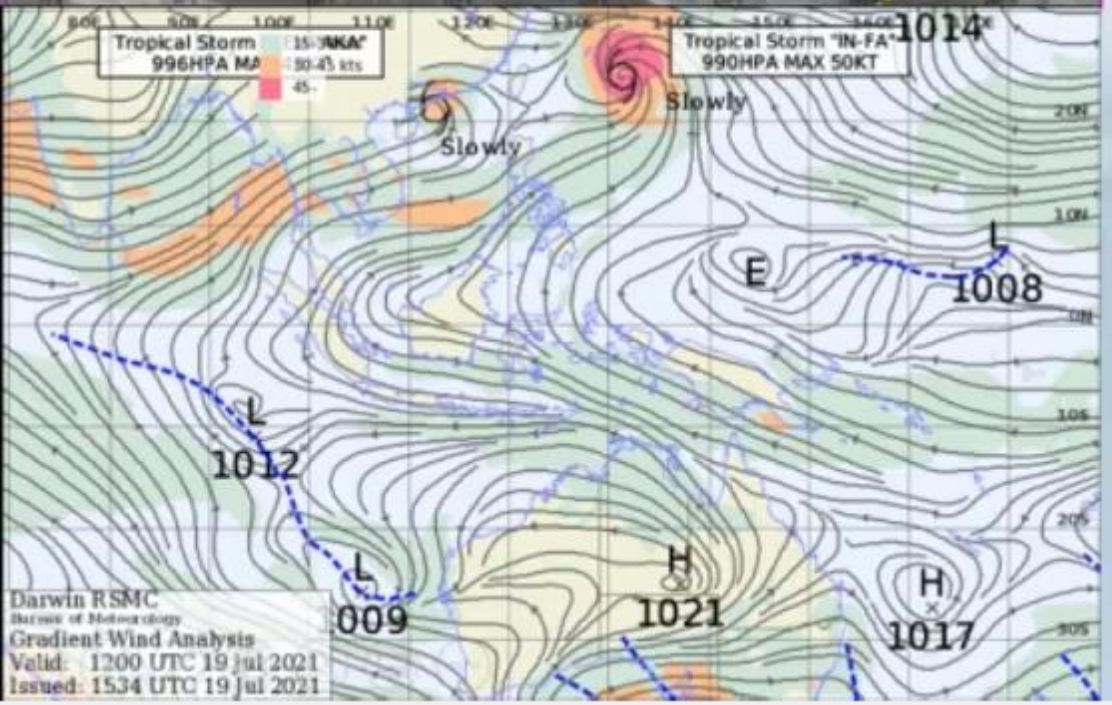


Image courtesy BOM/JMA

Infrared channel satellite image and Gradient Winds ,

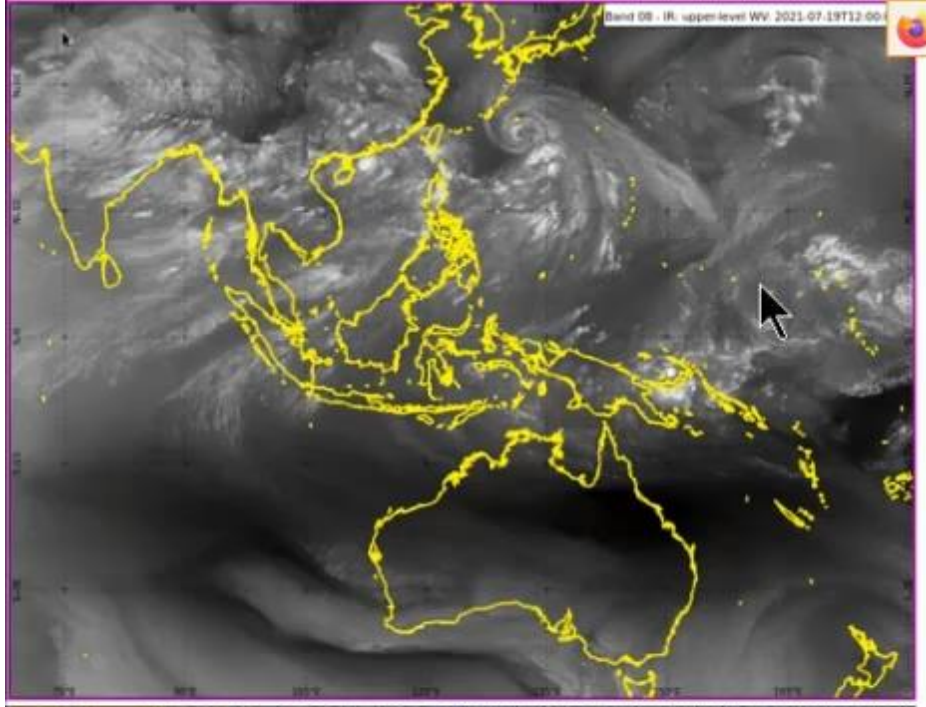
12UTC 19th July 2021

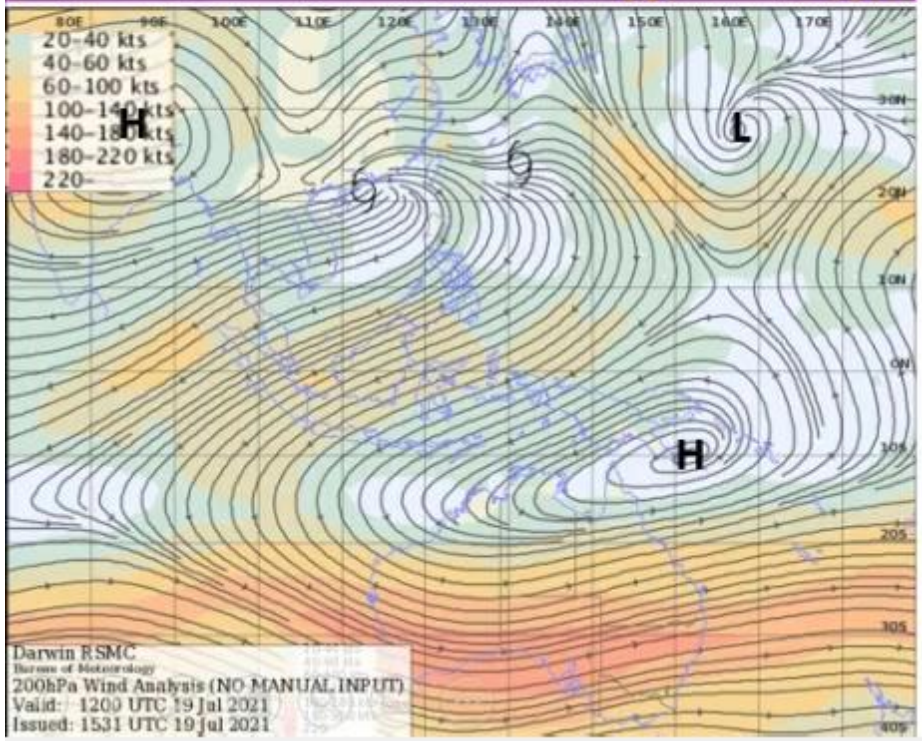


- Tropical Storm In-Fa expected to develop
- Tropical Storm Cempaka south of China expected to develop before landfall
- Active Asian SW monsoon Monsoon surges over the Bay of Bengal / Arabian Sea / South China Sea.
- Near Equatorial Trough over Central Pacific
- Trade Wind flow over most of SH tropics

Image courtesy BOM

courtesy BOM/JMA





Water Vapour channel satellite image and 200hPa Wind analysis, 12UT 19th July 2021

- Upper ridge over the Asian Southwest Monsoon and over TS In-Fa and TS Cempaka
- Good upper return flow out of the monsoon, TS In-Fa and TS Cempaka
- Upper divergence supporting convection over northern Pacific.
- Upper low over the north central Pacific.
- Upper ridge over northern Australia / Solomon Islands
- Subtropical Jet over southern Australia

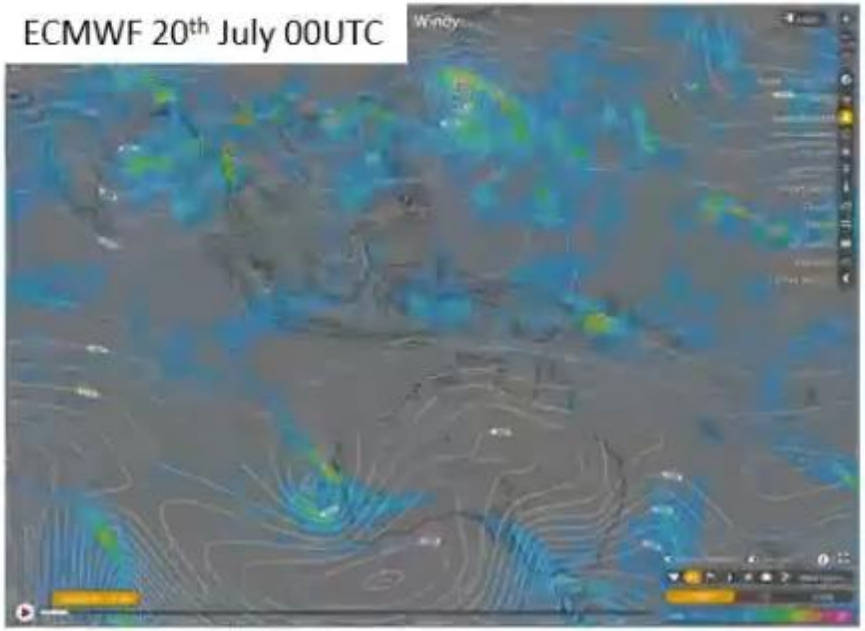
Image courtesy BOM

…some slides not shown…

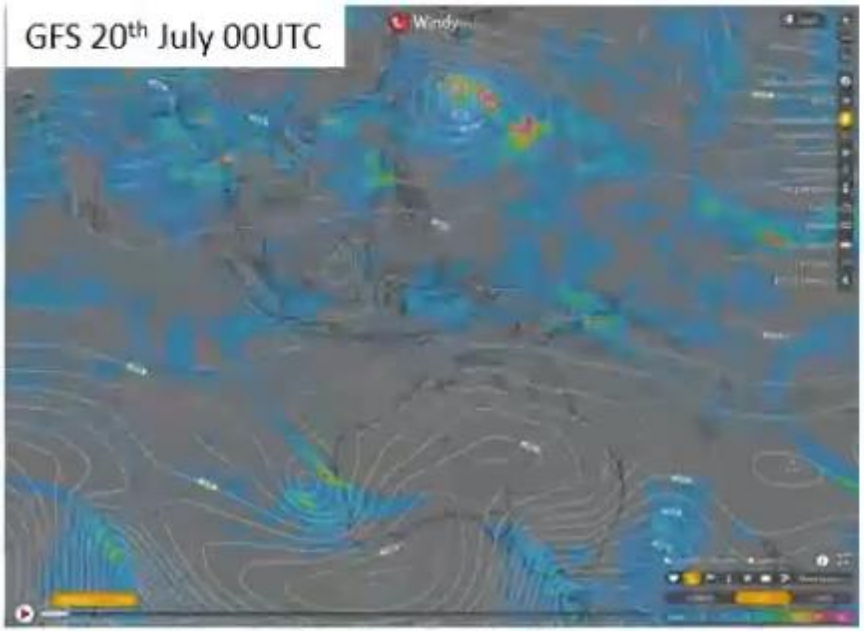
images from windy.com

MSLP and 3hour PPTN forecast (from Windy www.windy.com)

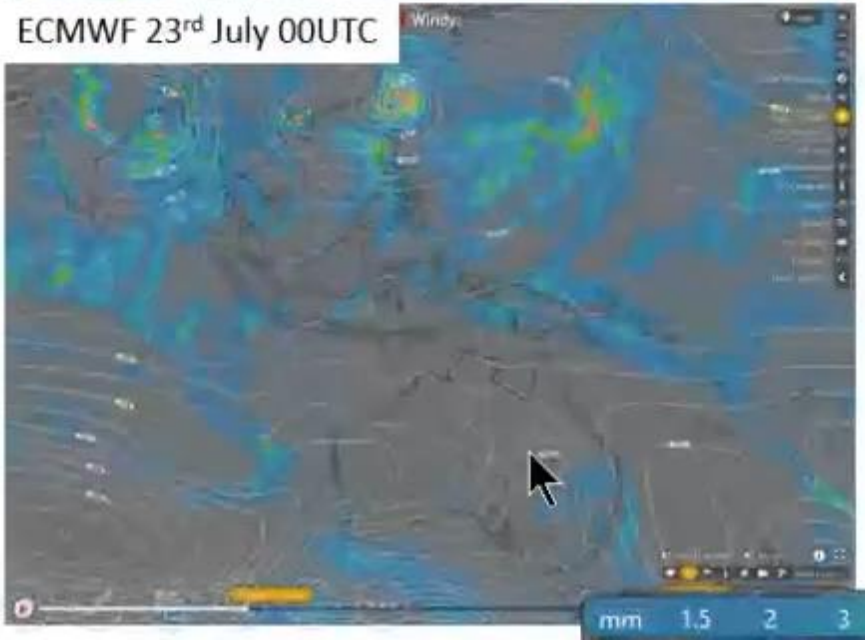
ECMWF 20th July 00UTC



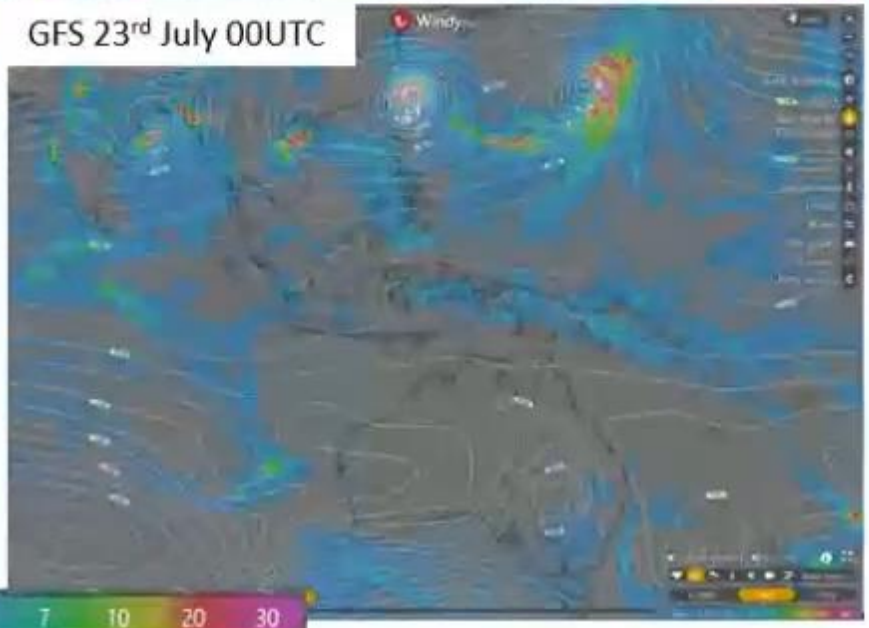
GFS 20th July 00UTC



ECMWF 23rd July 00UTC



GFS 23rd July 00UTC



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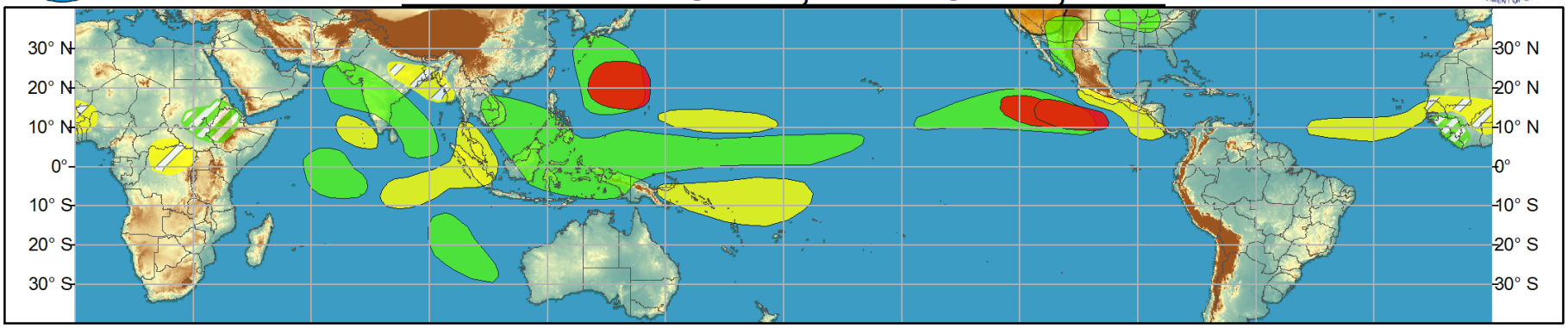
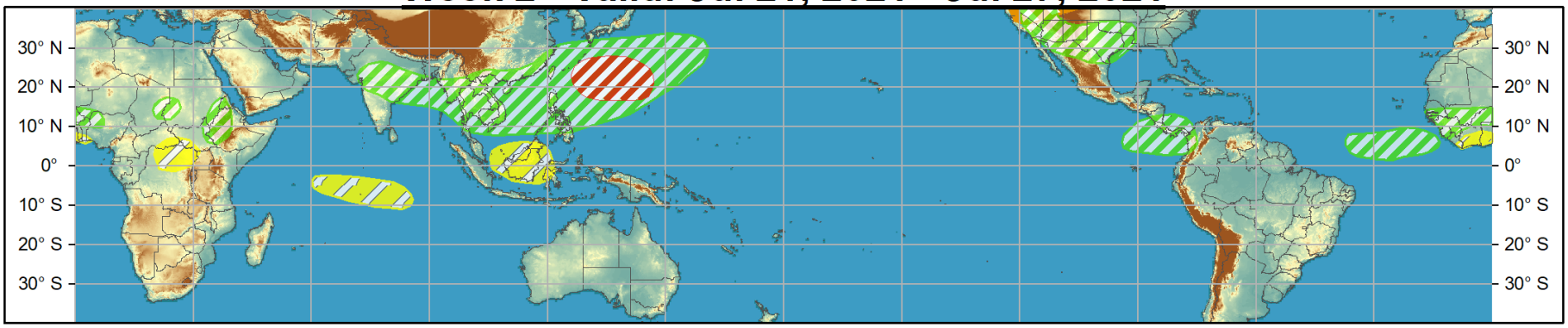
Global Tropics Hazards and Benefits Outlook - Climate Prediction Center

Week 1 - Valid: Jul 14, 2021 - Jul 20, 2021



Week 2 - Valid: Jul 21, 2021 - Jul 27, 2021



Produced: 07/13/2021

Forecaster: Novella

	Confidence: High	Confidence: Moderate	
Tropical Cyclone Formation			Development of a tropical cyclone (tropical depression - TD, or greater strength).
Above-average rainfall			Weekly total rainfall in the upper third of the historical range.
Below-average rainfall			Weekly total rainfall in the lower third of the historical range.
Above-normal temperatures			7-day mean temperatures in the upper third of the historical range.
Below-normal temperatures			7-day mean temperatures in the lower third of the historical range.

Product is updated once per week, except from 6/1 - 11/30 for the region from 120E to 0, 0 to 40N. The product targets broad scale conditions integrated over a 7-day period for US interests only. Consult your local responsible forecast agency.

中央氣象局 Central Weather Bureau

UNIVERSITY AT ALBANY State University of New York

EARTH SYSTEM SCIENCE INTERDISCIPLINARY CENTER ESSIC UNIVERSITY OF MARYLAND

Australian Government Bureau of Meteorology

cics.nc

NPS PRAESTANTIA PER SCIENTIAM

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The Bureau's prediction of an earlier Northern Rainfall Onset

Onset date occurs when the rainfall total reaches 50 mm since the 1st of September.

Due to:

- Possibility of developing La Nina
- Negative Indian Ocean Dipole

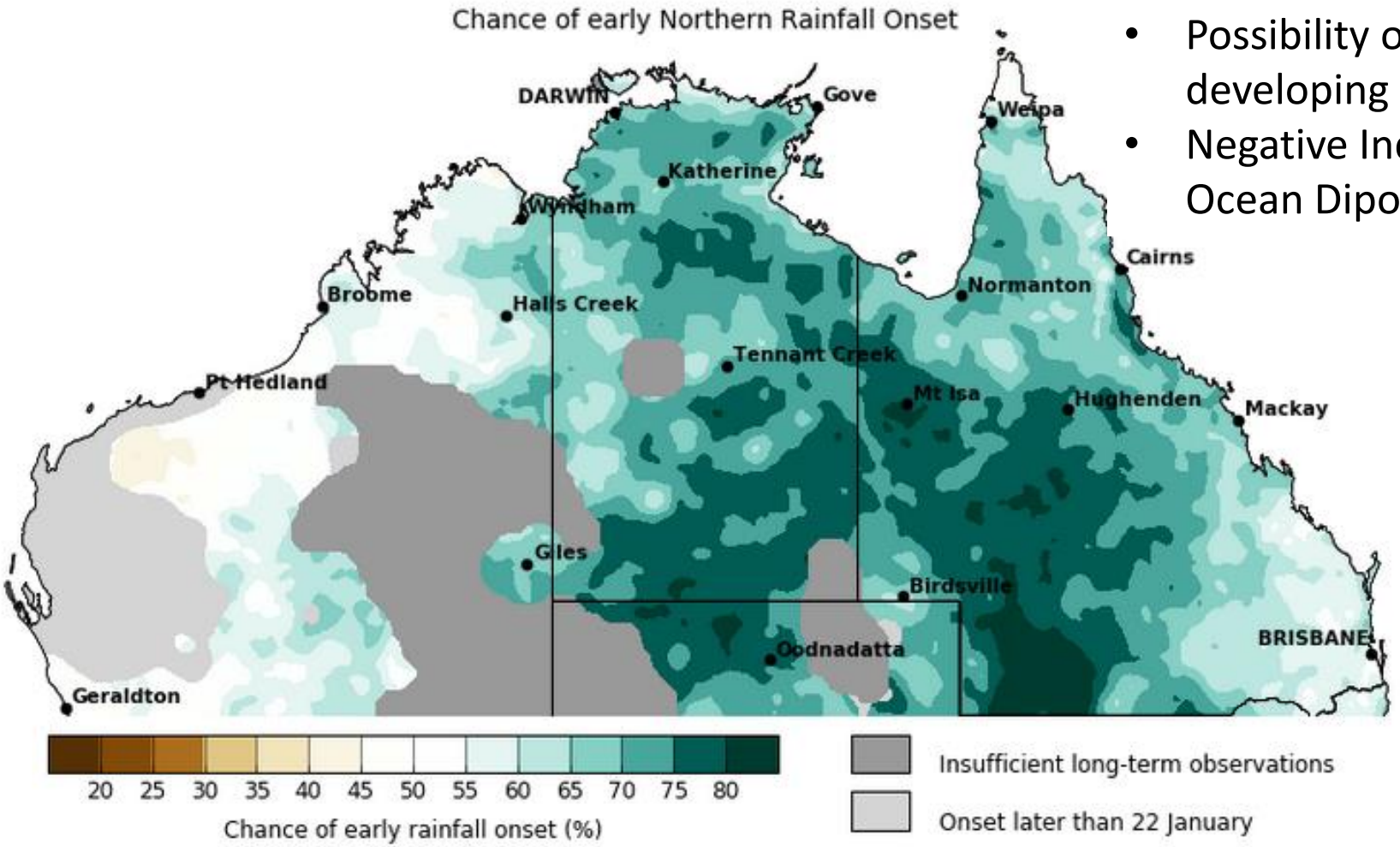
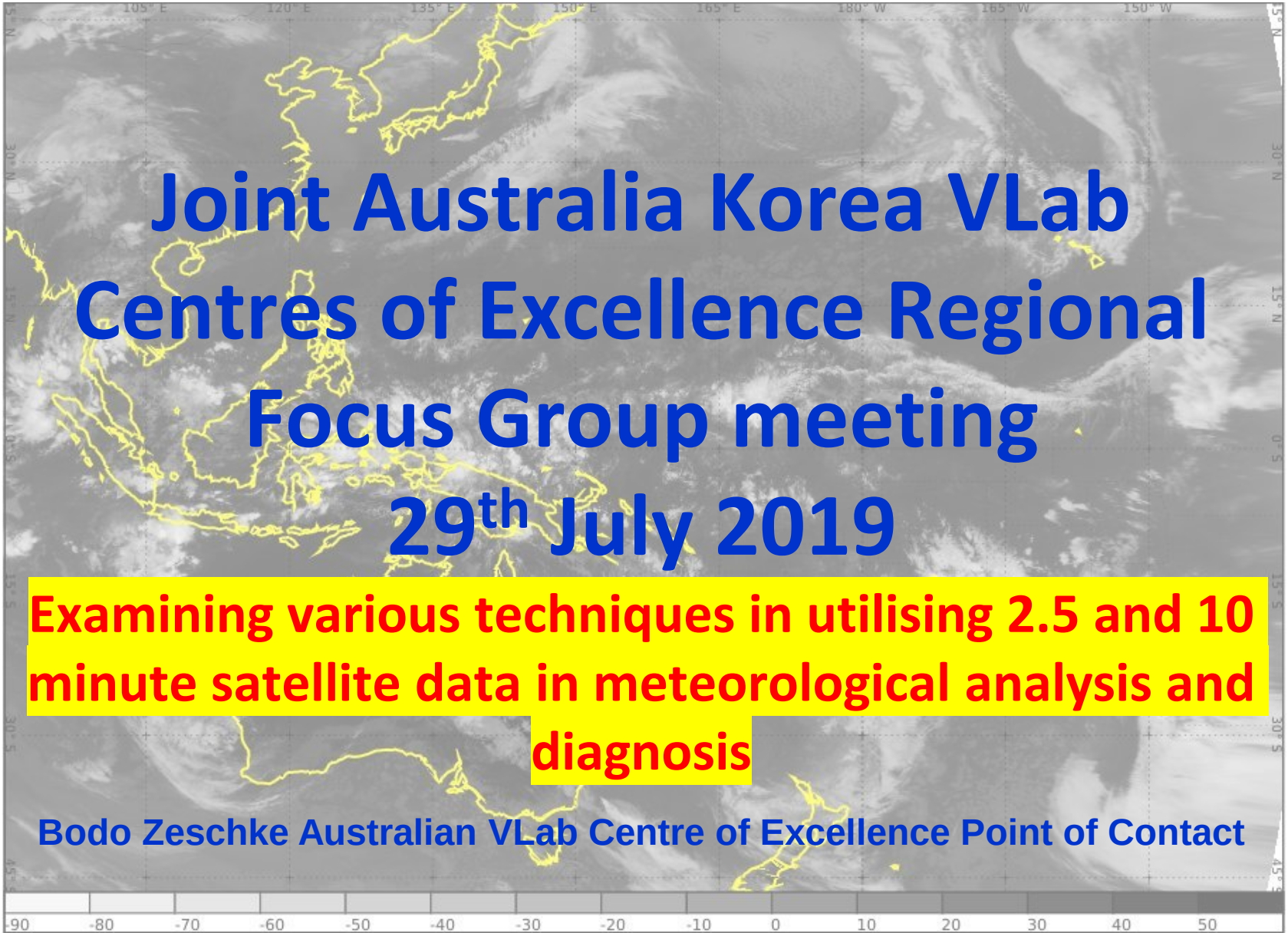


image from BOM

Model Run: 11/07/2021
Issued: 15/07/2021



Joint Australia Korea VLab Centres of Excellence Regional Focus Group meeting

29th July 2019

Examining various techniques in utilising 2.5 and 10 minute satellite data in meteorological analysis and diagnosis

Bodo Zeschke Australian VLab Centre of Excellence Point of Contact

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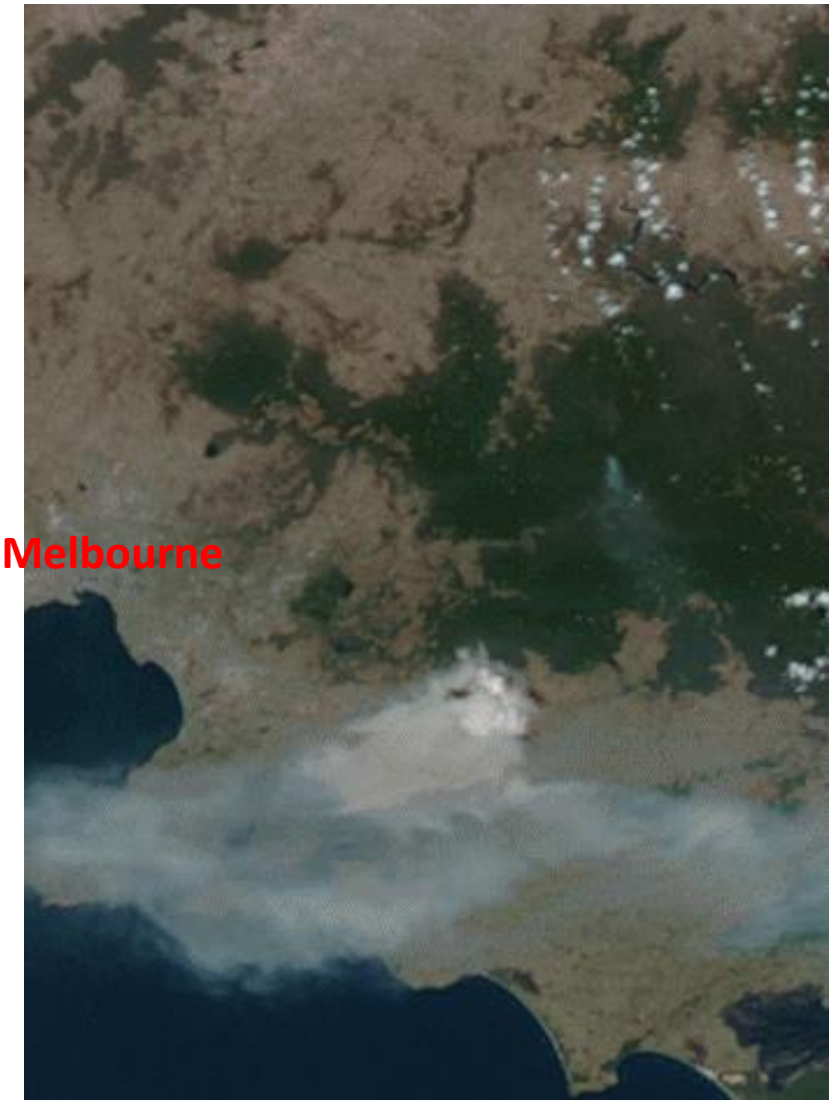
animations courtesy JMA/BOM

Animation 1: Himawari-8 2.5 minute and 10 minute data

rocking animation, various speeds, Bunyip fires 0300-0730UTC 2nd March 2019

2.5 minute, 10 frames per second (FPS)



10 minute, 2.5 frames per second (FPS)

Please start the Power Point Slide Show to activate the animation

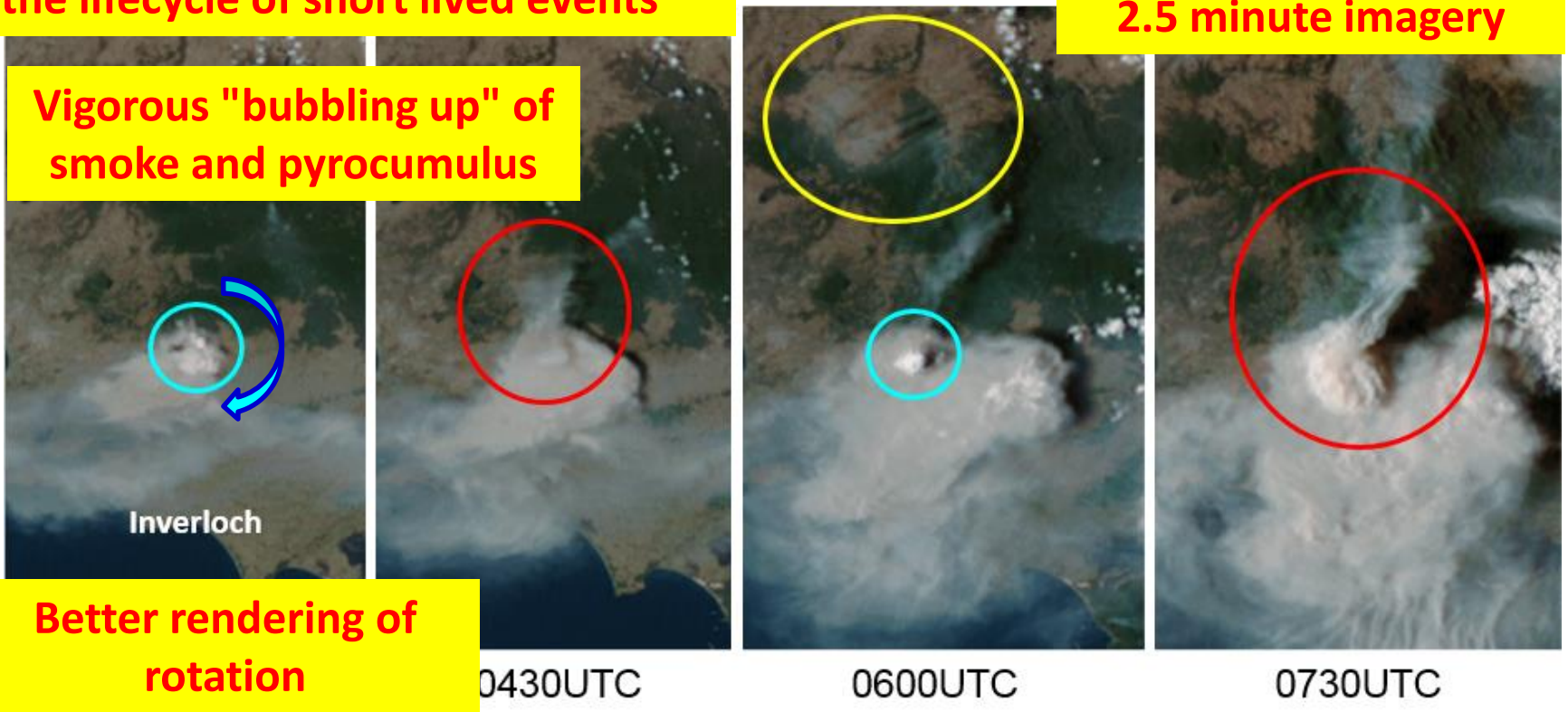
Monitoring fire intensity using 2.5 minute Himawari

est data

2.5 minute imagery - better capturing the lifecycle of short lived events

Subjective impact of 2.5 minute imagery

Vigorous "bubbling up" of smoke and pyrocumulus



Better rendering of rotation

Revealing short lived events in detail, e.g. episodes of fire "flare up" and injection of smoke to higher levels

Better monitoring of the mesoscale

Development of enhan o
within the blue circle, t f pyro cumulus cloud and
the injection of smoke a d yellow circle (image
courtesy JMA/BOM).

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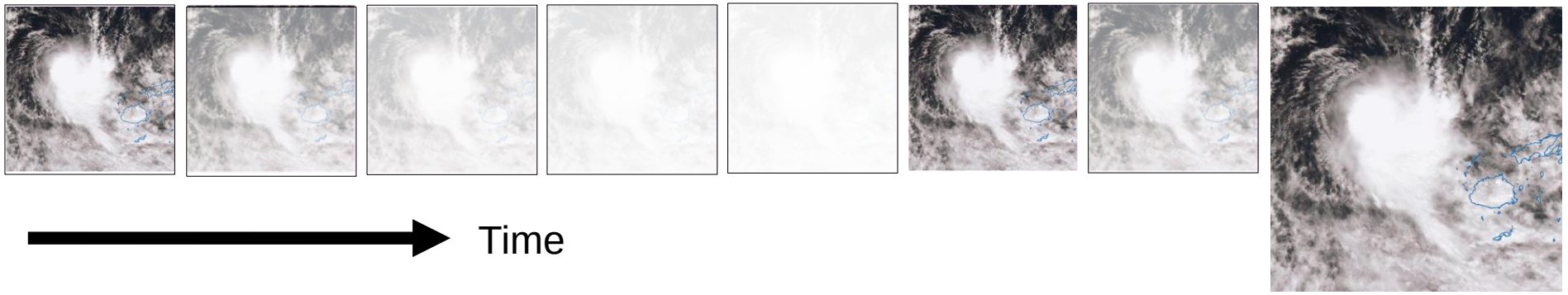
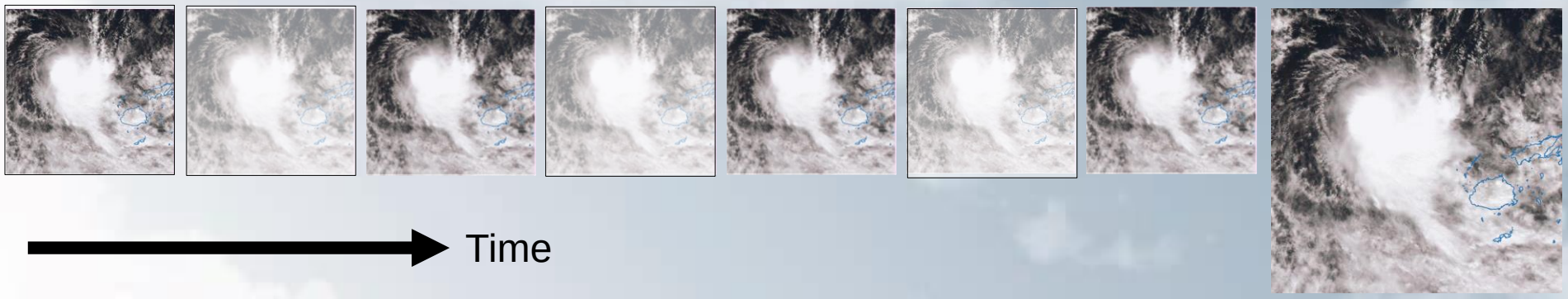
Persistence of vision



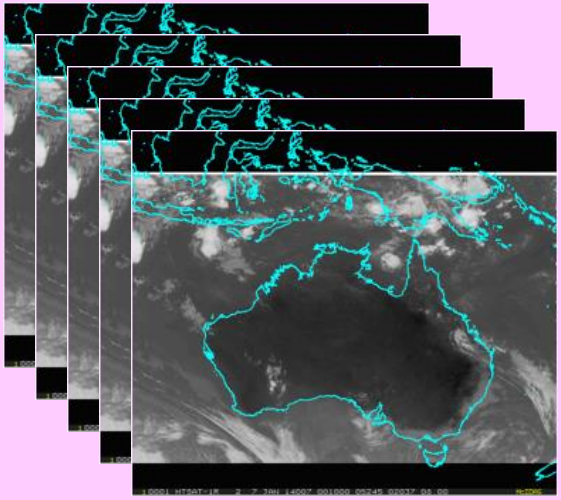
Above: slow animation, e.g. 2 FPS. Perception of an object fades with time.

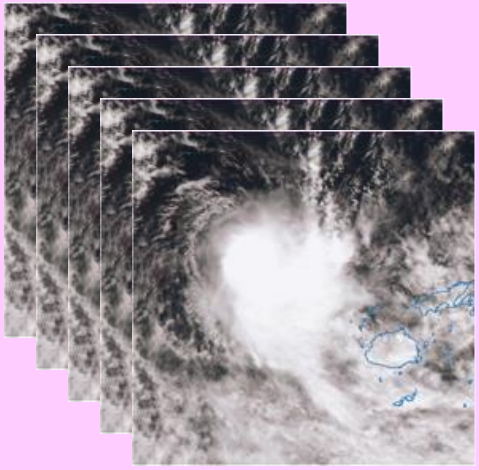


Above: fast animation, e.g. 15 FPS. Perception of an object fades with time but is refreshed by a new image. This creates the illusion of continuity/motion

Forecaster use of fast and normal satellite image animations during the shift.

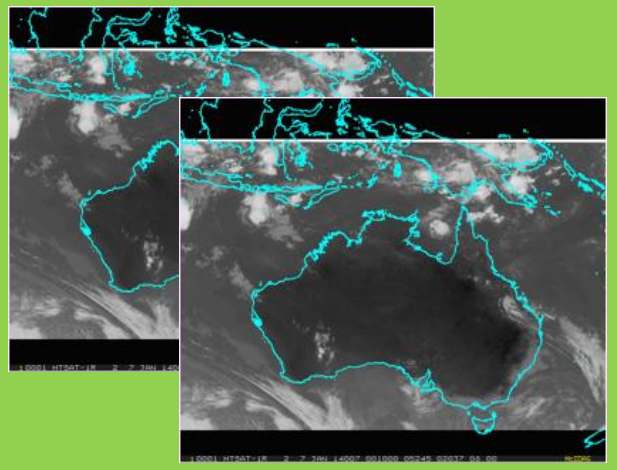
Rapid animation
(10 frames per second)

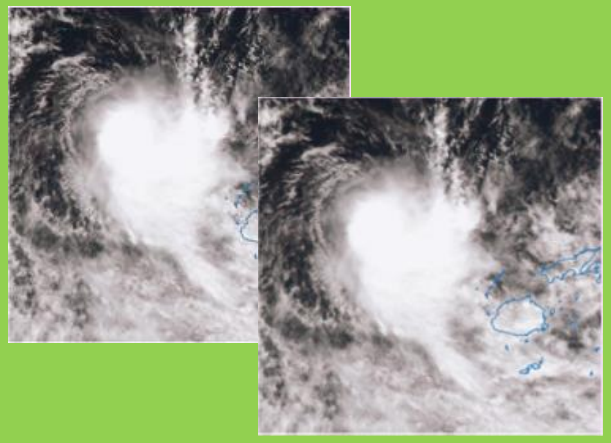




Familiarisation	
During the shift	
Handover	

Normal animation
(2 frames per second)





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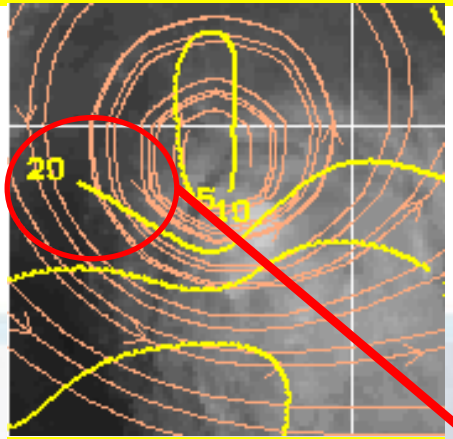
Please start the PowerPoint Slide Show to activate the animations

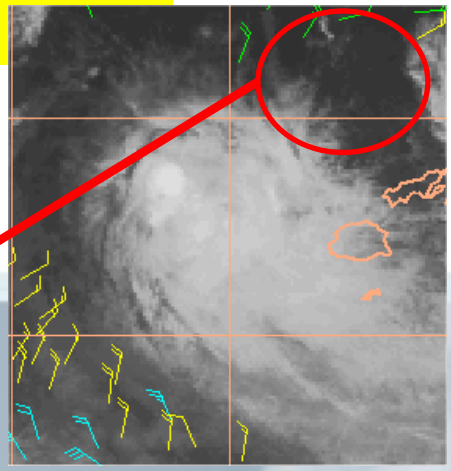
Animation 3: Low near Fiji, 17th October 2015

Better estimation of the system centre

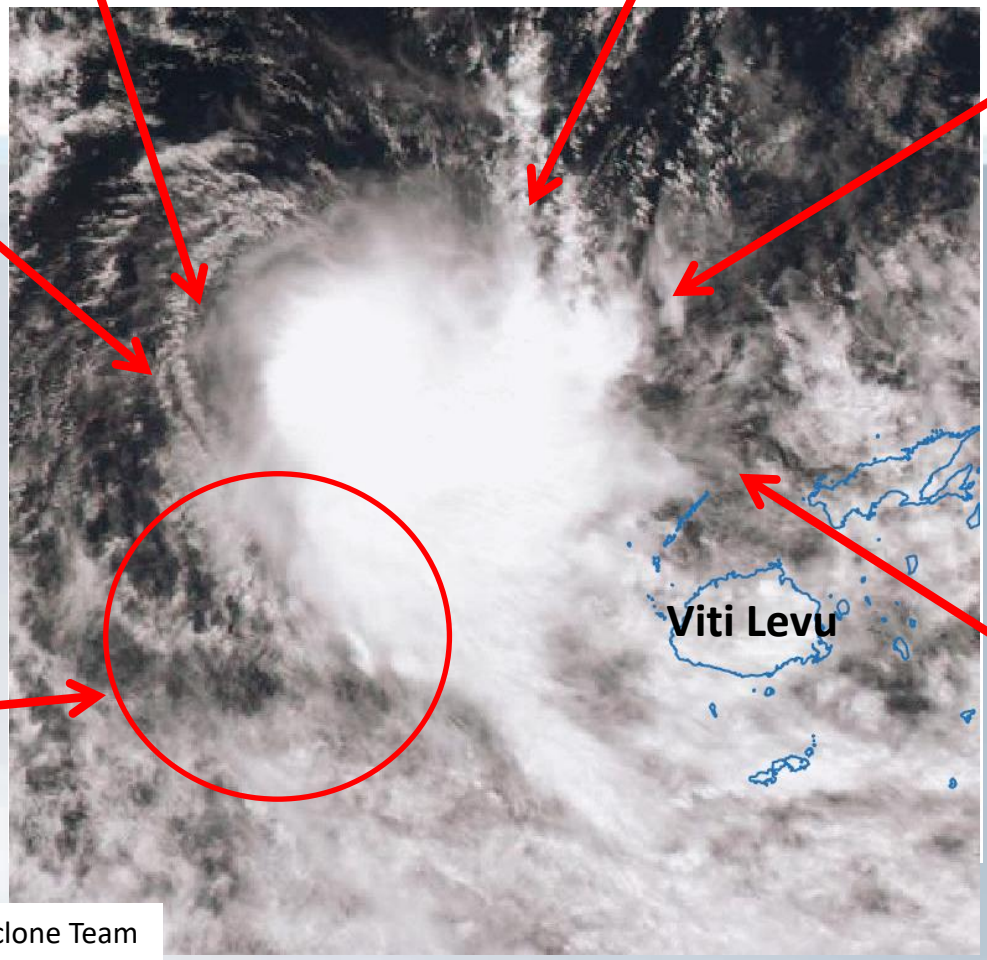


Confluent flow monitored better – possible convergence and origin of storms on the SE flank of system

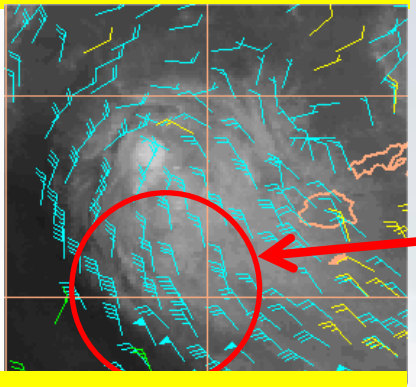
images courtesy CIMSS Tropical Cyclone Team



animation courtesy BOM/JMA

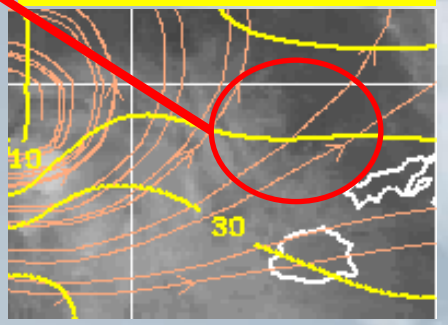


System moving into an area of increased shear



Upper level flow

Region of strong low-upper level atmospheric shear revealed



images courtesy CIMSS Tropical Cyclone Team

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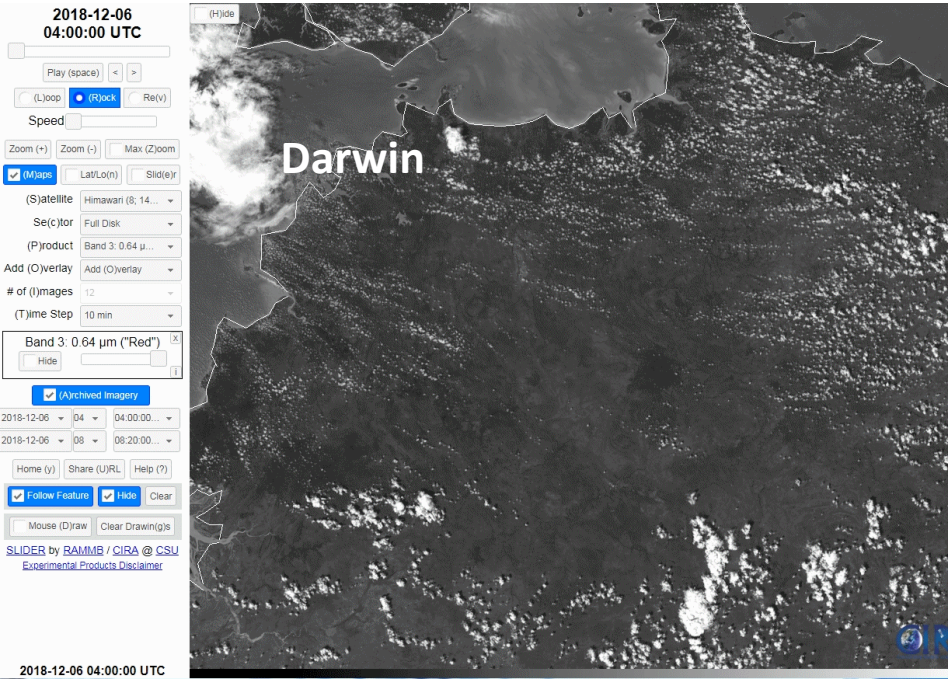
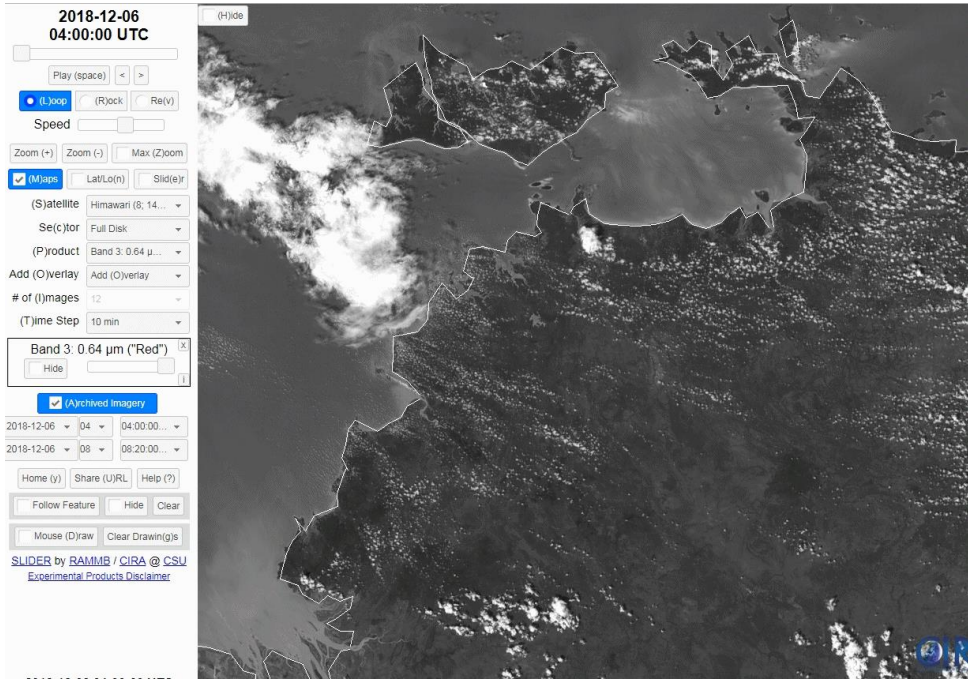
Animation 5: Storm relative and Earth relative animation

10 FPS Rocking animations of storms developing over the northwest Top End, Australia 0400 to 0820UTC 6th December 2018 using the RAMMB/CIRA SLIDER functionality



Storm relative motion



Earth relative motion

Please start the Power Point Slide Show to activate the animation

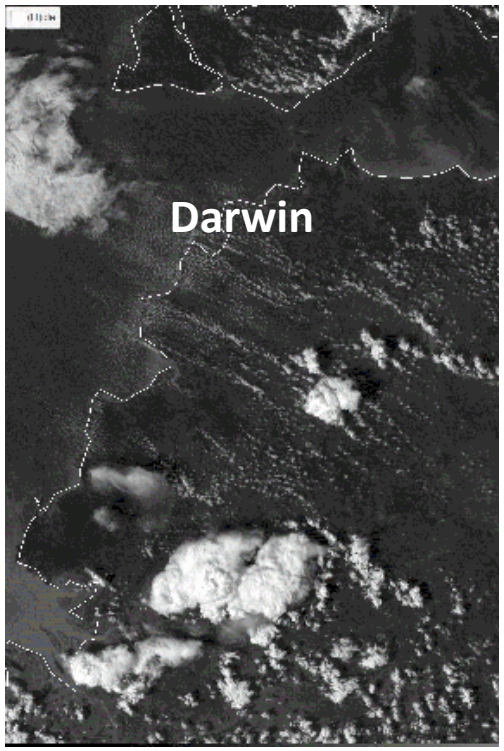
satellite animations courtesy JMA / CIRA RAMMB

Storm relative animation

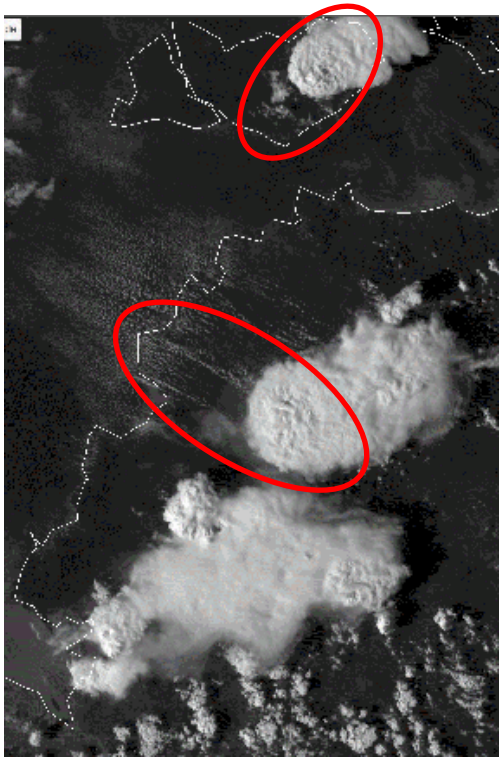
10 FPS Rocking animations of sto t Top End, Australia
0400 to 0820UTC 6th Decembe DER functionality

Storm propagating along the seabreeze front boundary

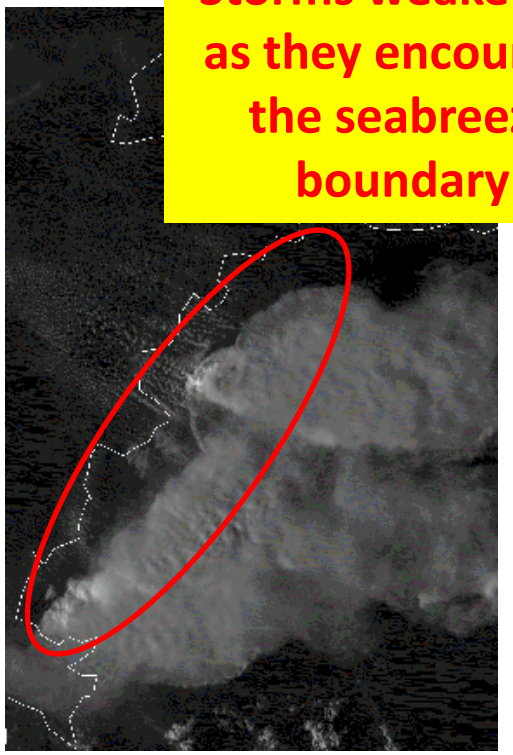
Storms weakening as they encounter the seabreeze boundary



0550UTC



0700UTC



0820UTC

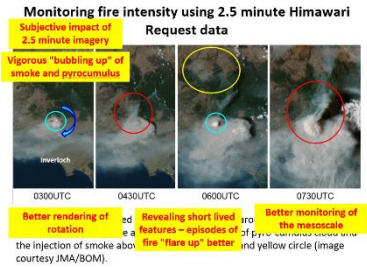
Storm propagating into a local convergence area, (a line of Cu)

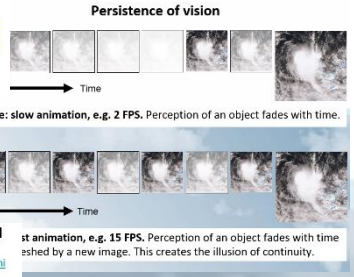
satellite animations courtesy JMA / CIRA RAMMB

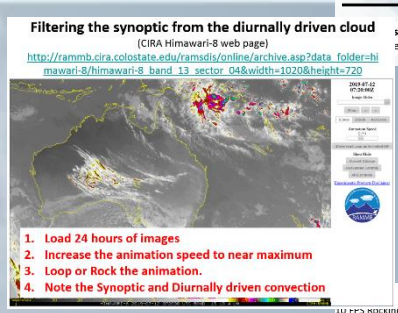
…some slides not shown…

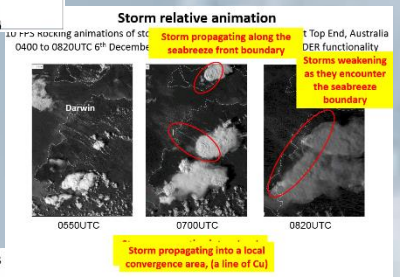
Summary: Various techniques in utilising 10 minute and 2.5 minute satellite data in meteorological analysis and diagnosis

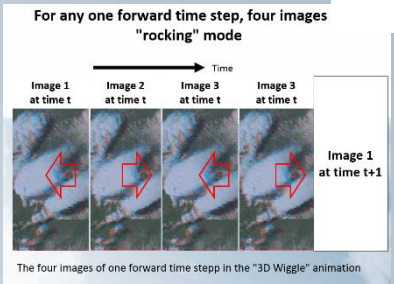
1. 10 minute vs 2.5 minute satellite data
2. Varying the animation speeds
3. Varying the animation mode, from "looping" to "rocking" motion. "
4. Varying the animation mode, from system centric to earth centric frame of reference
5. Varying the animation mode, rocking motion embedded within looping motion.











Joint Australia China VLab Centre of Excellence Regional Focus Group meeting 26 April 2022

A short case study of the Hector thunderstorm over northern Australia, utilising satellite data, other observations and high resolution NWP

Bodo Zeschke Australian VLab Centre of Excellence Point of Contact

…some slides not shown…

Introducing the Hector thunderstorm on the Tiwi Islands, Northern Territory of Australia

image courtesy Google Maps

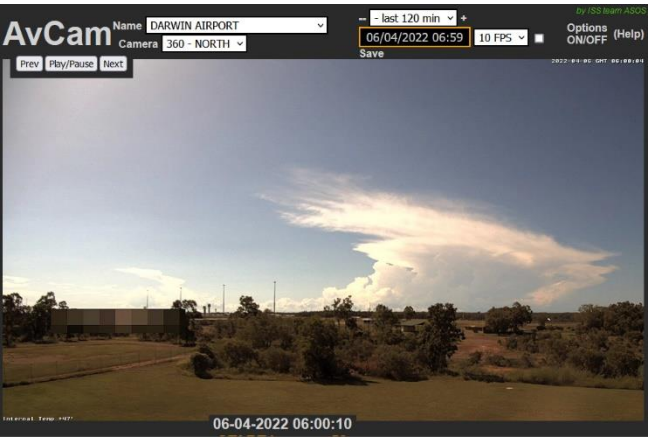
image courtesy http://ufam.nerc.ac.uk/

…some slides not shown…

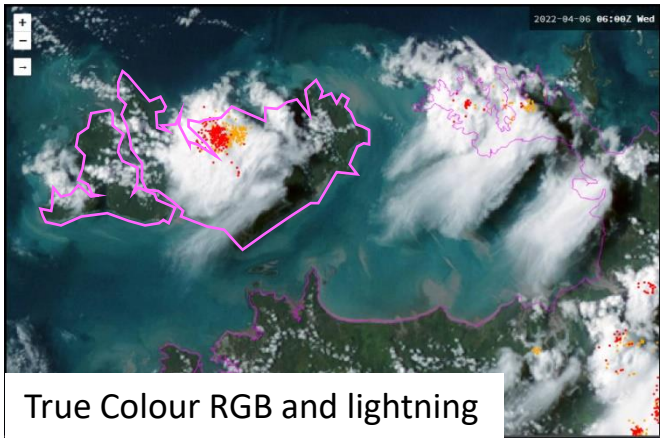
Analysing the case study using various data

satellite images courtesy JMA/BOM

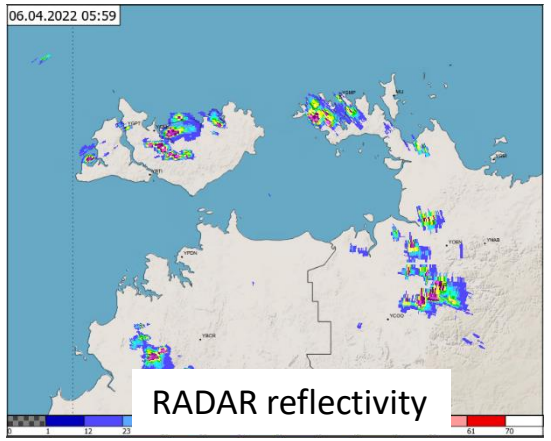
images courtesy BOM



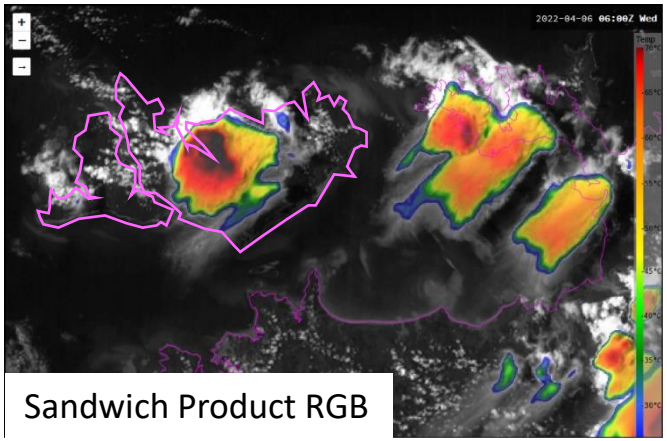
images courtesy BOM



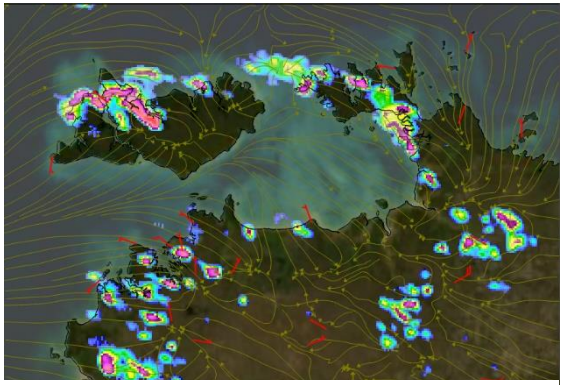
True Colour RGB and lightning



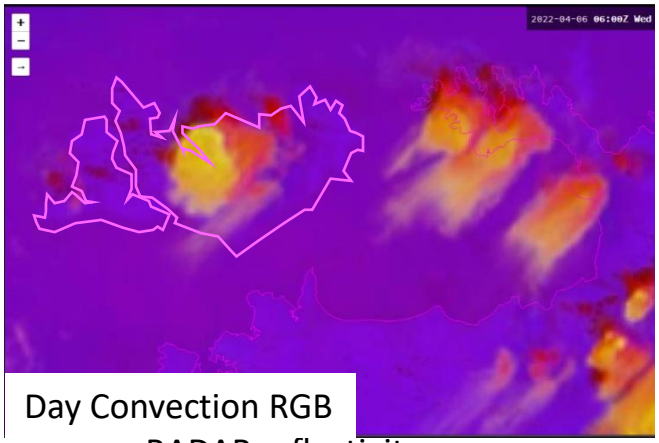
RADAR reflectivity



Sandwich Product RGB

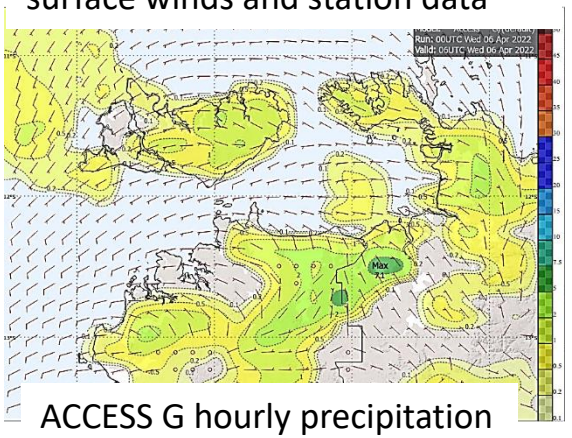


ACCESS C NWP Simulated RADAR surface winds and station data



Day Convection RGB

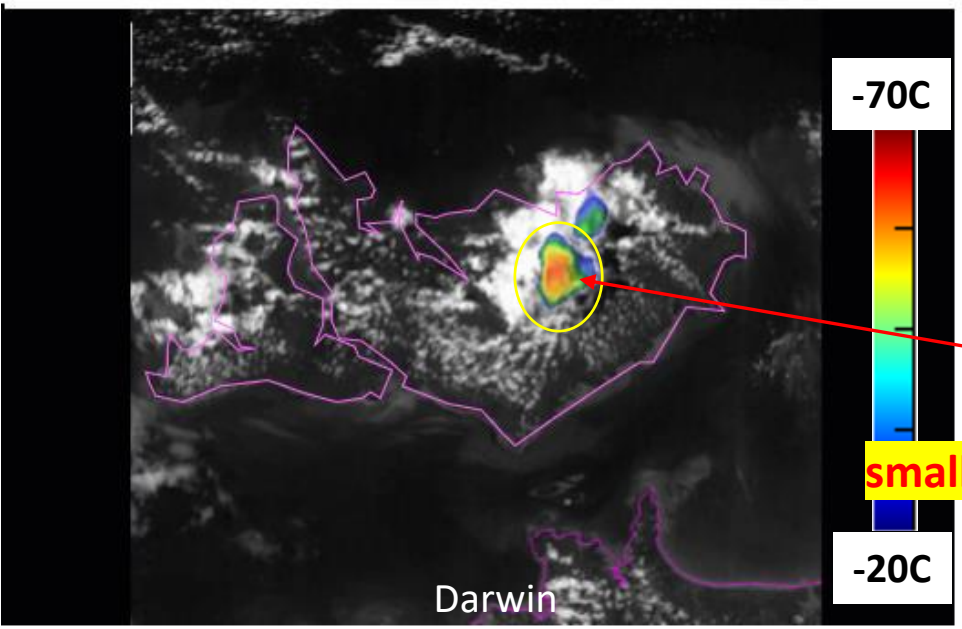
RADAR reflectivity



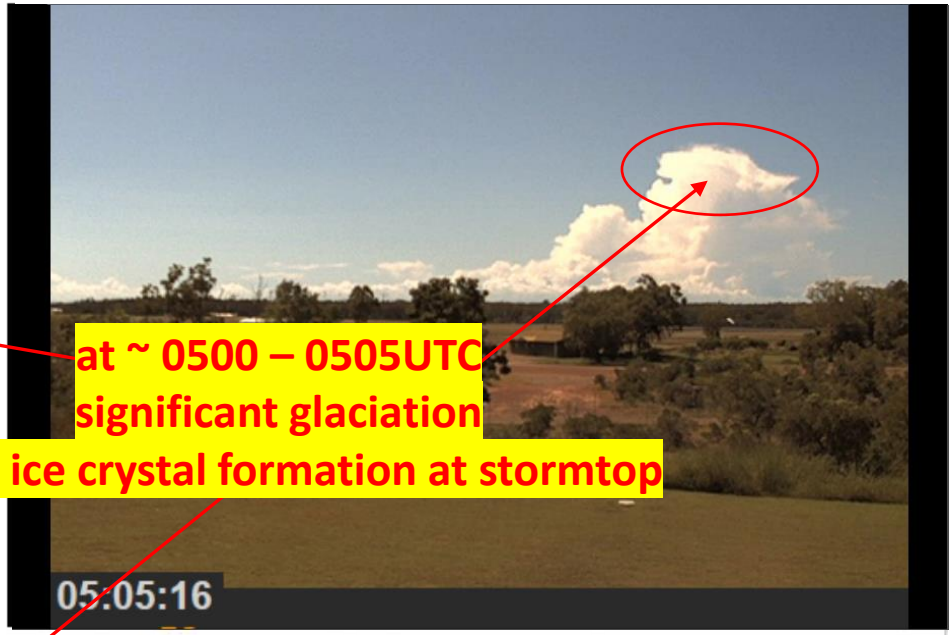
ACCESS G hourly precipitation

…some slides not shown…

Sandwich Product, to -20C (0500UTC)

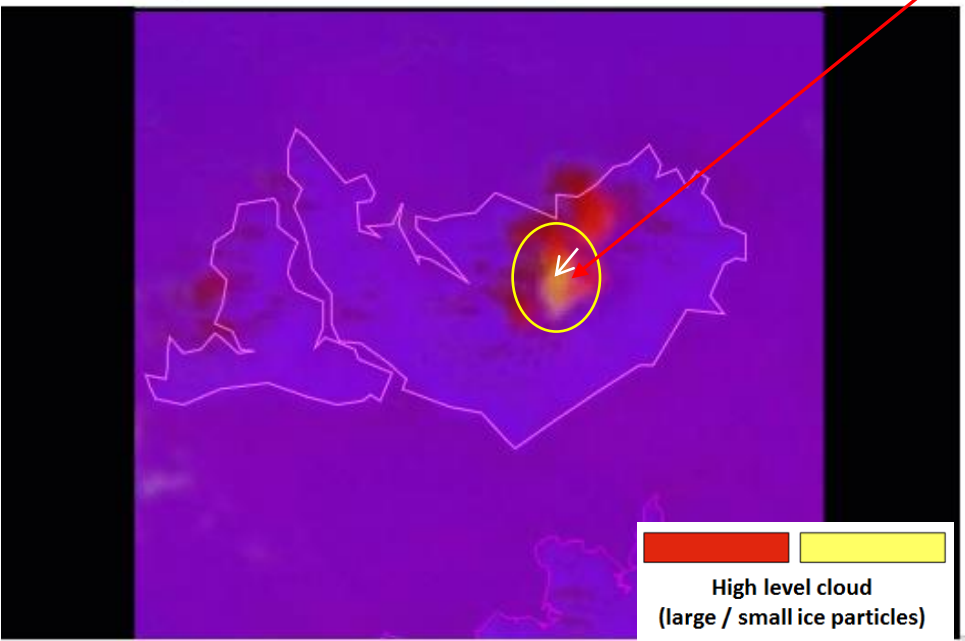


Darwin Airport AvCam webcam (0505UTC)

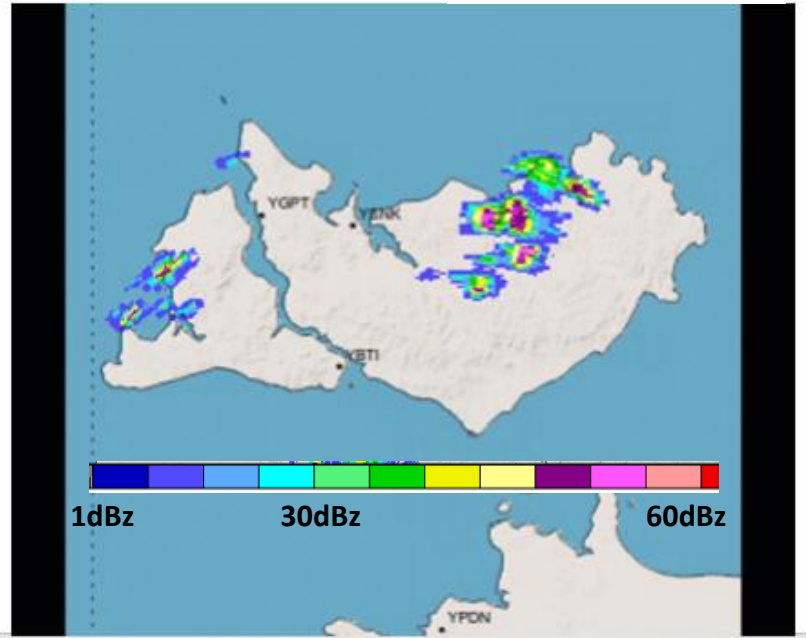


satellite images courtesy JMA/BOM, RADAR and AvCam courtesy BOM

Day Convection RGB (0500UTC)



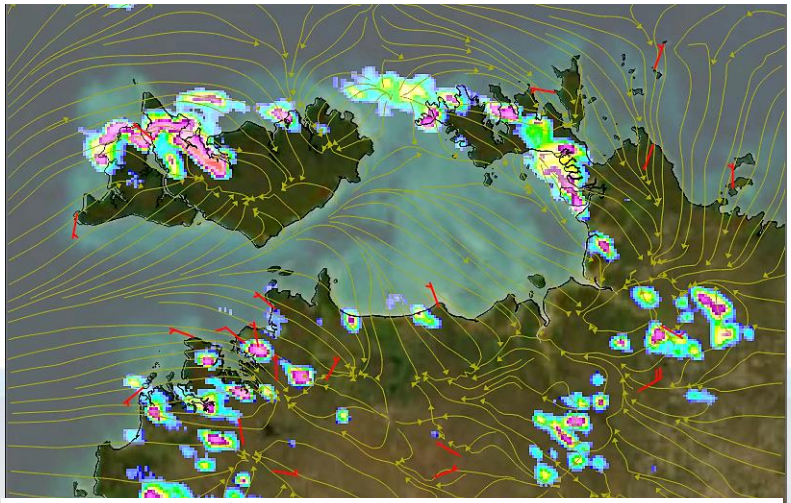
RADAR reflectivity (0505UTC)



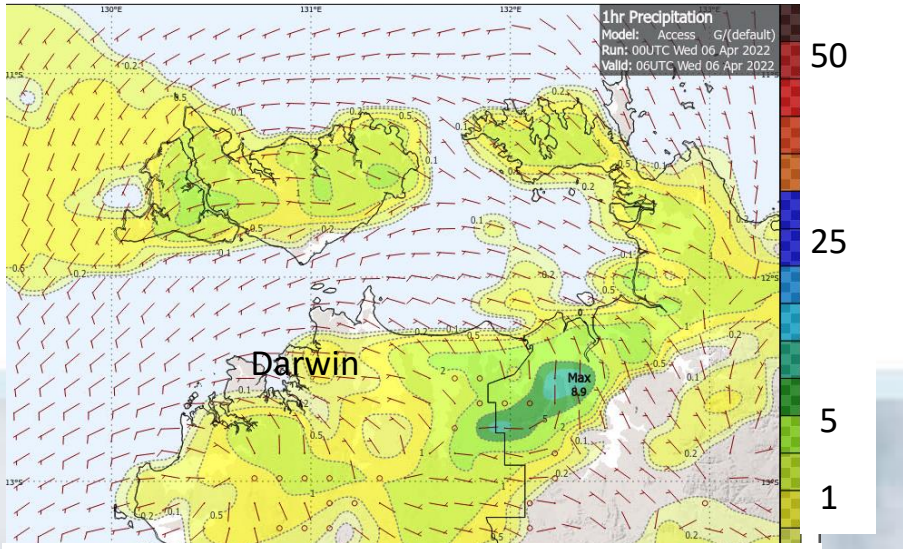
…some slides not shown…

Hector Storm, Northern Territory; ACCESS-C surface streamlines, synthetic RADAR compared to actual RADAR reflectivity and surface observations; **06UTC** 6th April 2022

images courtesy BOM

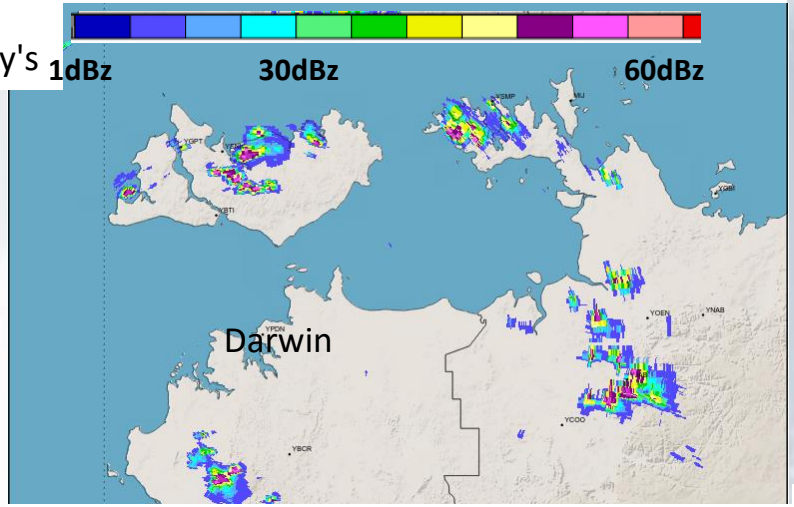


ACCESS-C synthetic RADAR, surface streamlines, station observations

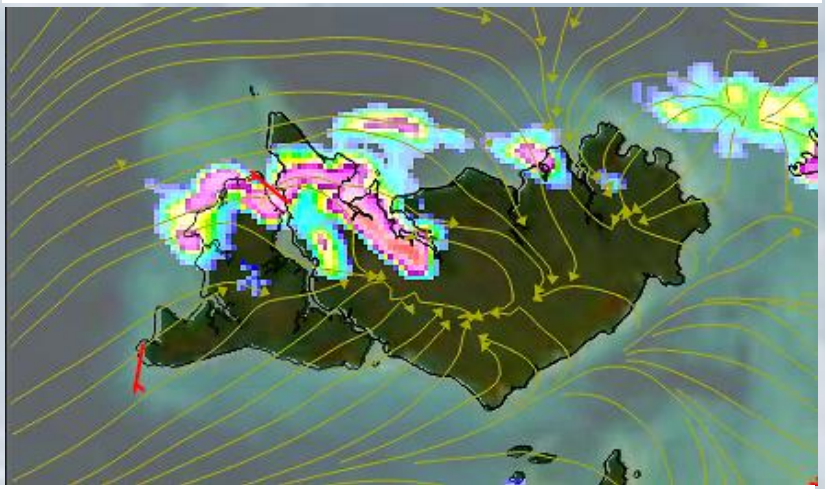


ACCESS-G hourly precipitation, surface winds

RADAR reflectivity's



Observed RADAR reflectivity's



ACCESS-C synthetic RADAR, surface streamlines, station observations, Tiwi Islands