

UN-SPIDER WORKSHOP

Building Upon Regional Space-Based Solutions for
Disaster Management and Emergency Response.
September 16 to 19, Holiday Inn, Suva.

Understanding Current Needs

Climate Variability Associated with El Niño
Southern Oscillation (ENSO) in the South
West Pacific

September 17, 2008

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Outline

- ▶ Overview of Fiji Meteorological Service
- ▶ ENSO Phenomena
- ▶ Extremes of ENSO
- ▶ Periodicity and Predictability of Extremes
- ▶ Impacts on Regional Scale Climate Patterns
- ▶ Applications of GIS in Climatology



Overview of FMS

- ▶ Government Department
Essential Service Provider
- ▶ National Weather Forecasting Centre and Climate Services
Division as output divisions
- ▶ Regional Specialized Meteorological Centre for Tropical
Cyclones in SWP
- ▶ Tropical Cyclone Warning Centre
- ▶ South West Pacific (SWP) Marine – vast area
- ▶ Aviation Services for SWP Island countries

ENSO Phenomena

El Niño Southern Oscillation (ENSO) is the Phenomena involving the interaction between Ocean, land and atmosphere.

- ▶ **El Niño** is a Spanish term meaning 'Christ Child' or 'Boy Child'.

The name was given by Peruvian fishermen to describe the appearance of warm ocean current off the South American Coast, adjacent to Peru and Ecuador around Christmas.

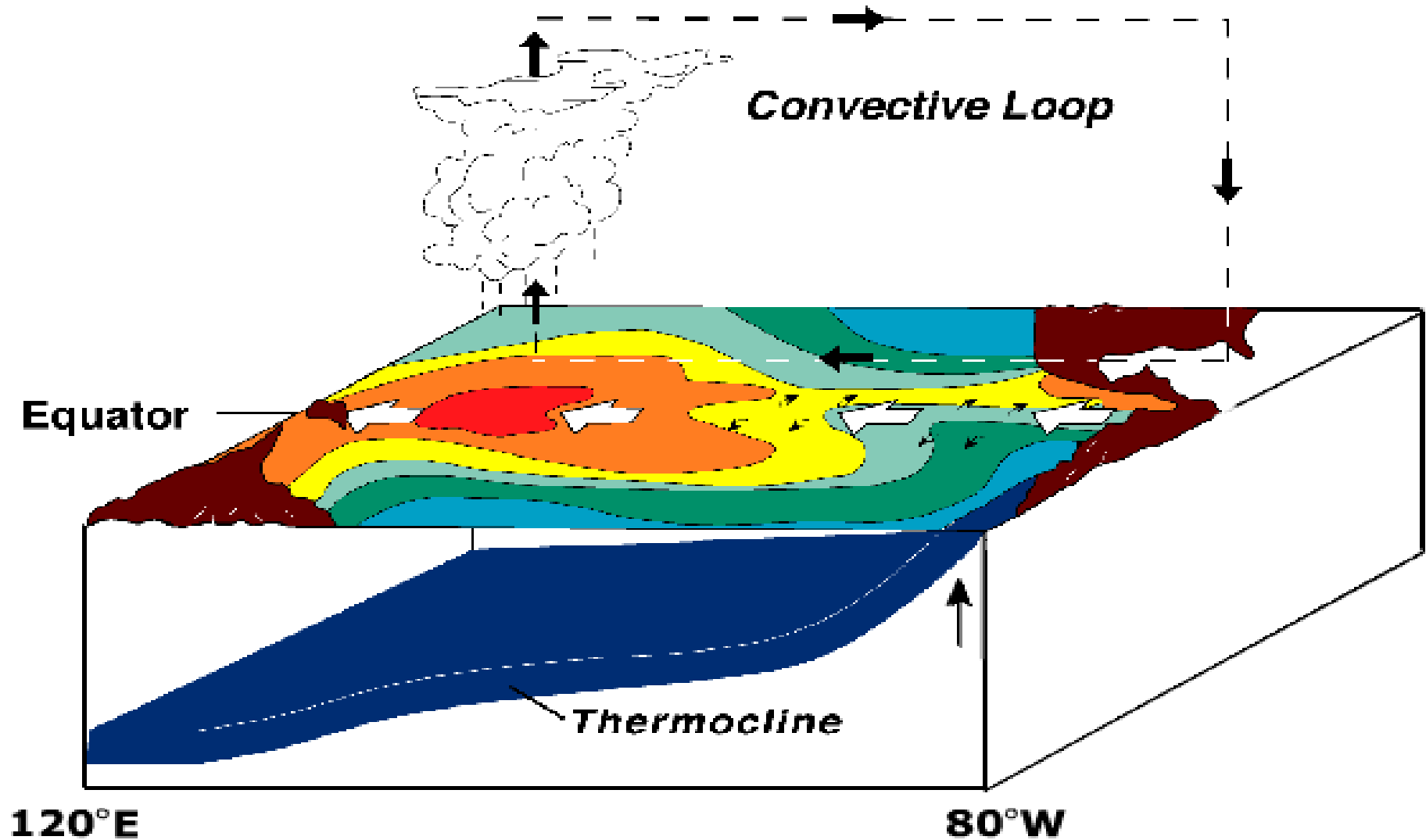
ENSO Phenomena

Southern Oscillation

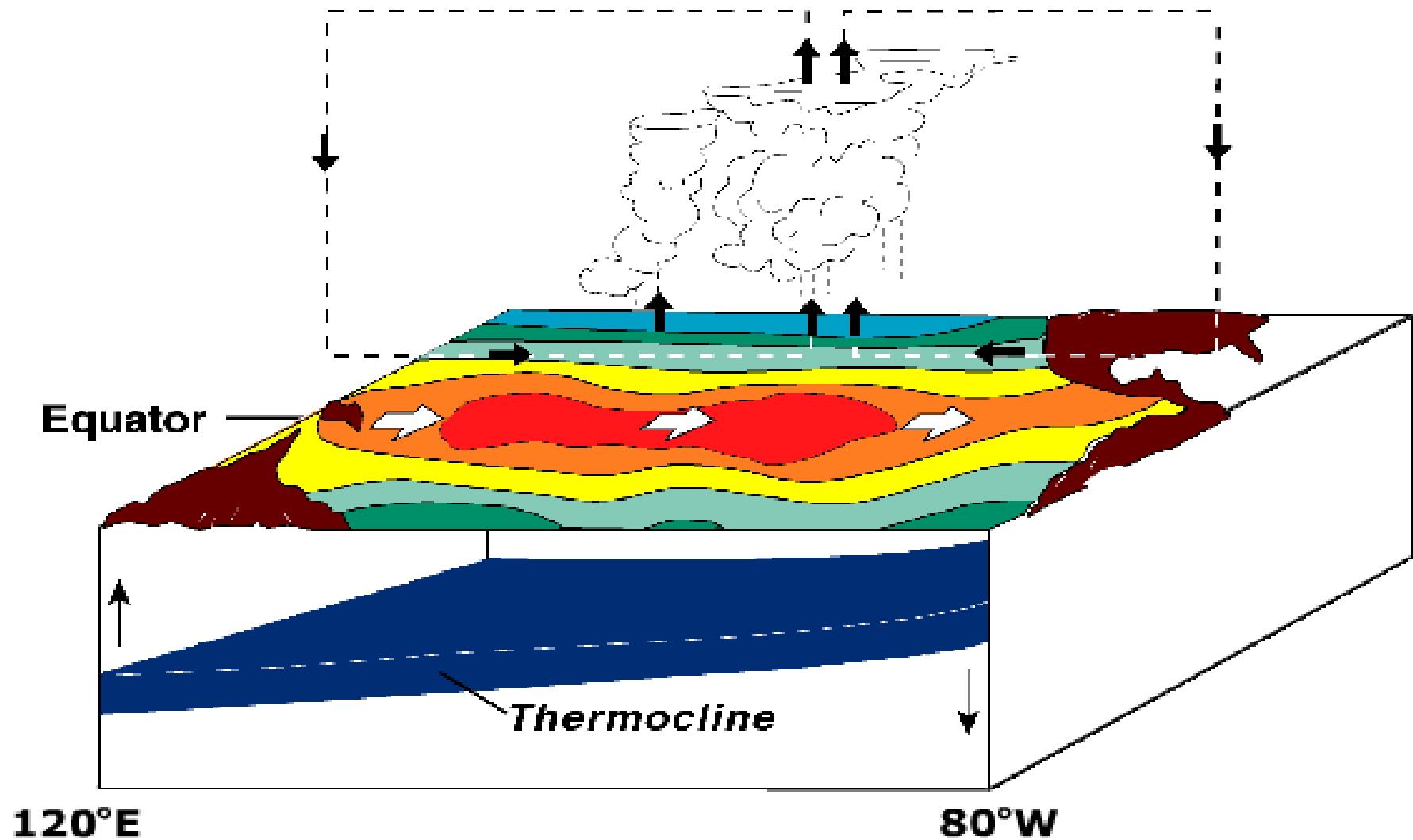
- ▶ The shift back and forth of the atmospheric mass and pressure patterns along the equator is known as Southern Oscillation.
- ▶ The oscillation is irregular and normally occurs every 2 to 7 years.
- ▶ Southern Oscillation has a strong influence on cloud cover, temperature, humidity, and evaporation, rainfall, number of wet days and the frequency of cyclones.
- ▶ Since El Niño is closely linked to Southern Oscillation, they are collectively called El Niño-Southern Oscillation (ENSO).

ENSO Phenomena

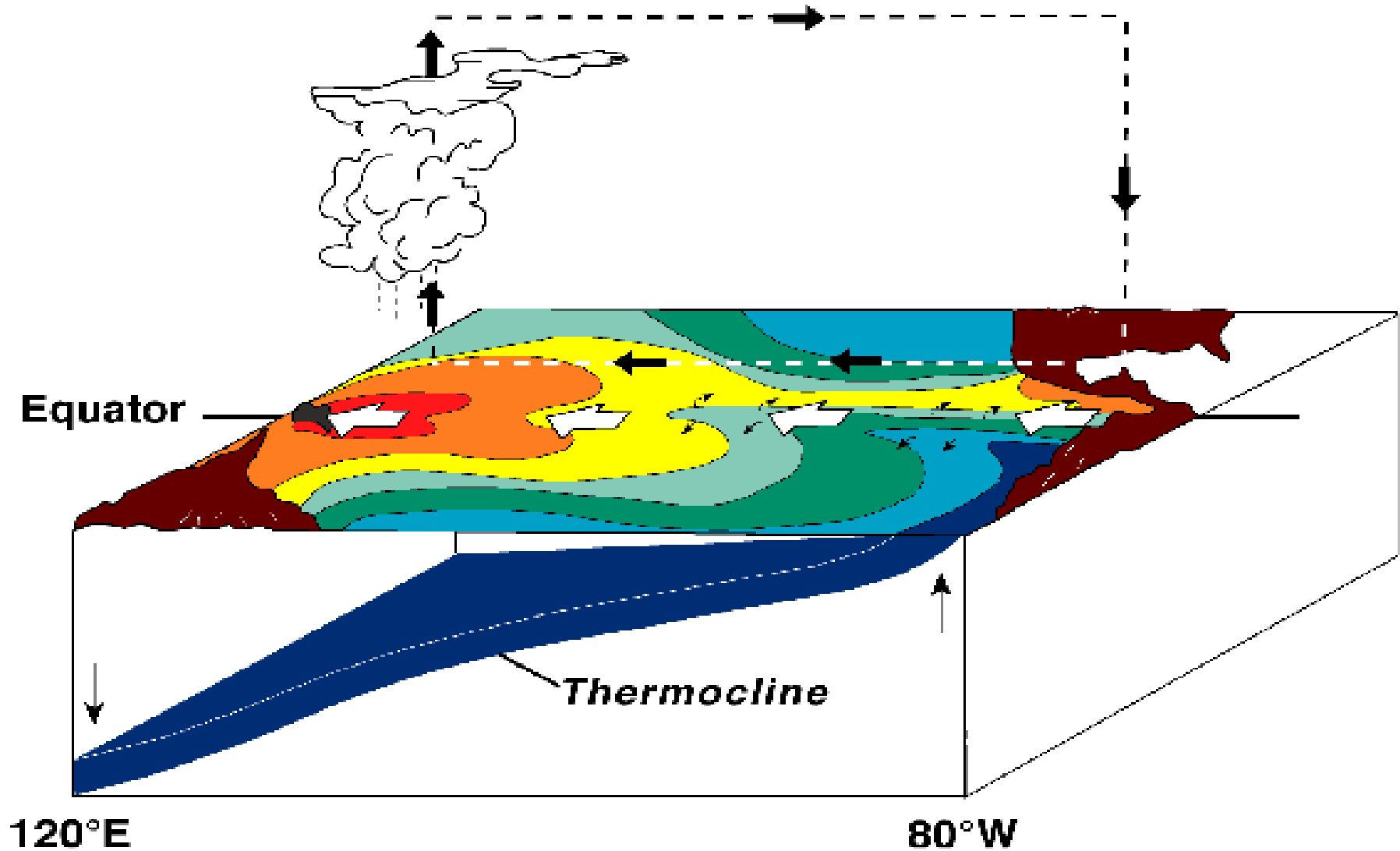
Normal Conditions



Extremes of ENSO – **El Nino**



Extremes of ENSO – **La Nina**



Periodicity and Predictability

- ▶ Normally occurs every 2-7 years
- ▶ 4 years on average
- ▶ Can be predicted 6 months in advance with reasonable confidence

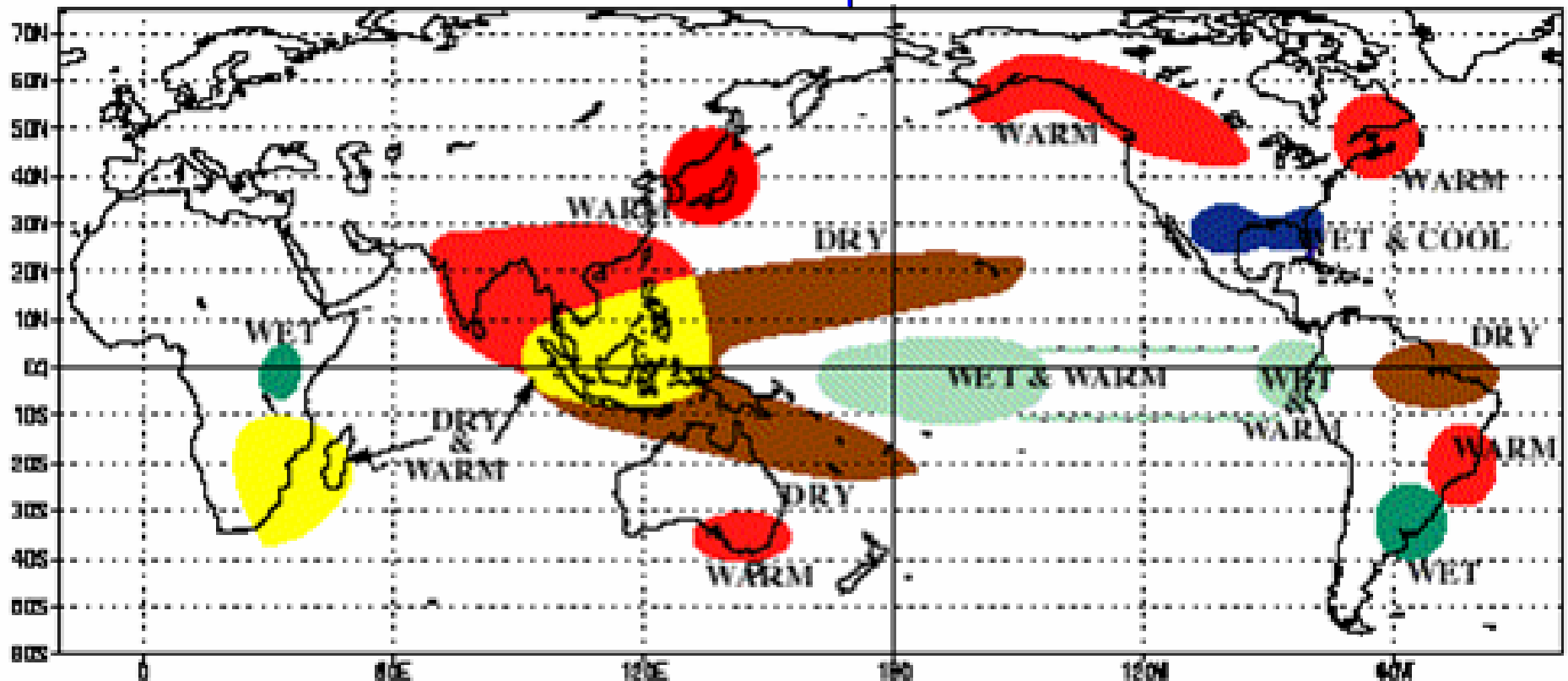
Impacts on Regional Scale Climate Patterns

El Niño Impact

Seasonal Variation - Summer

WARM EPISODE RELATIONSHIPS DECEMBER - FEBRUARY

Rainfall and Temperature

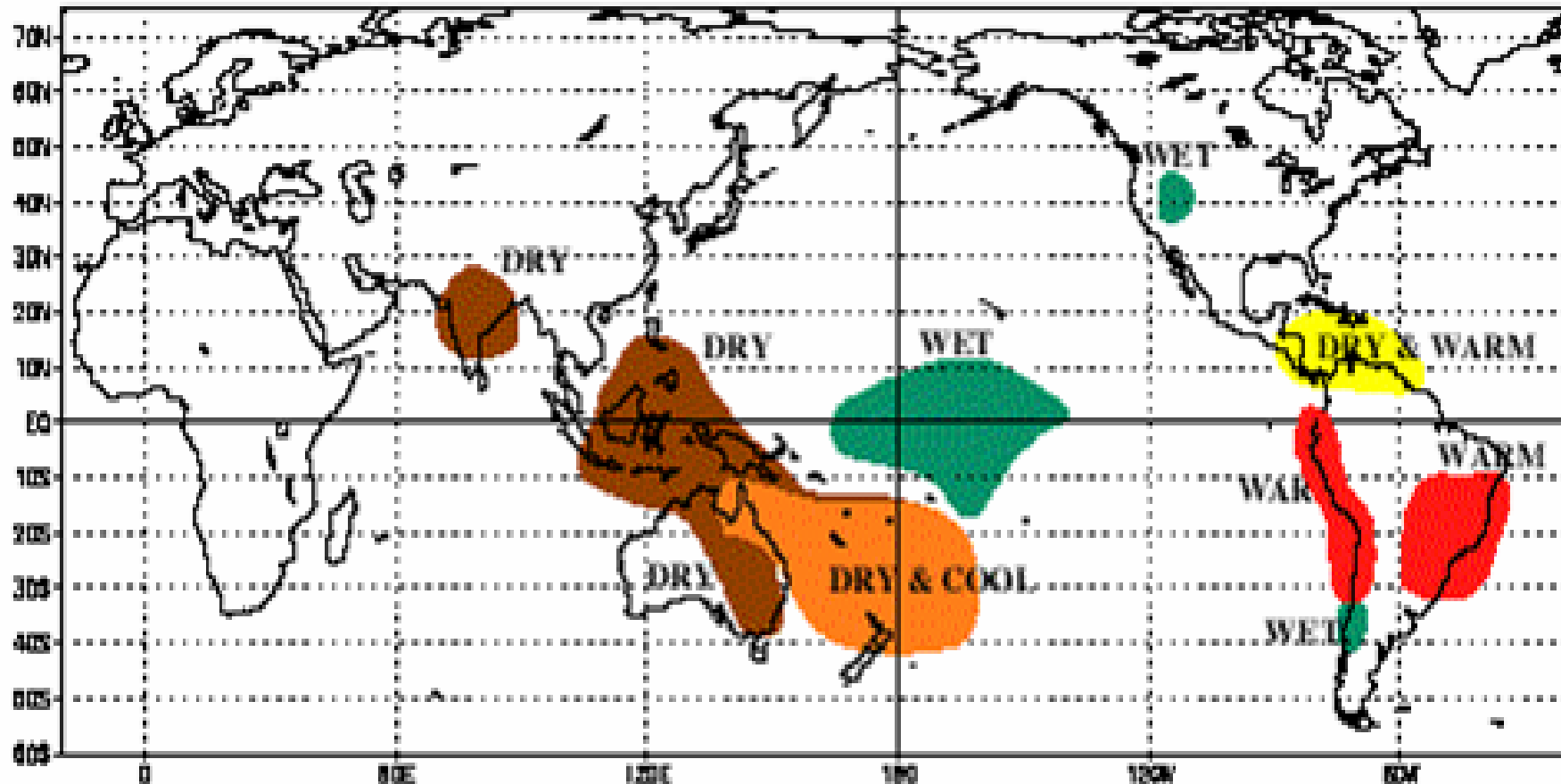


El Niño Impact

Seasonal Variation - Winter

WARM EPISODE RELATIONSHIPS JUNE - AUGUST

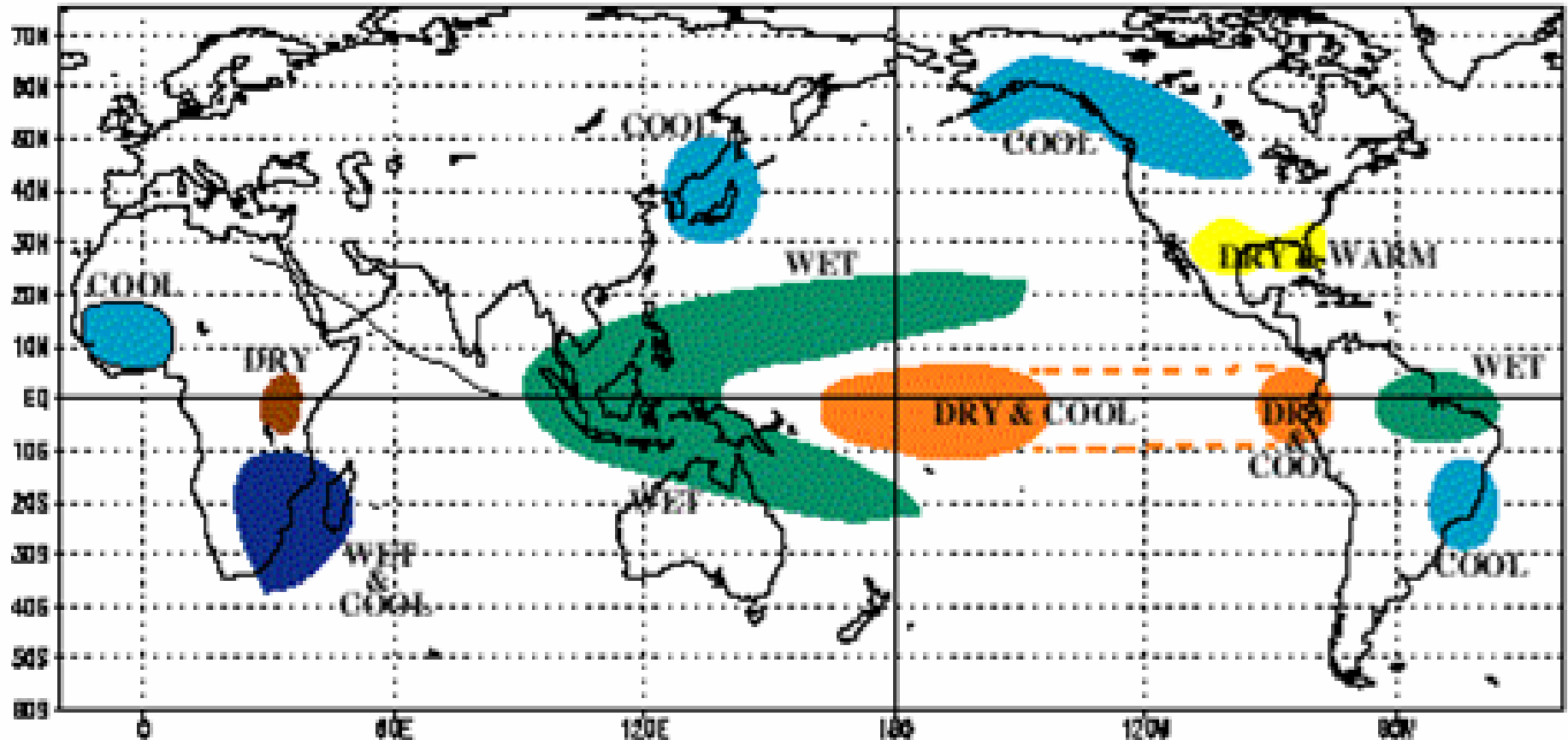
Rainfall and Temperature



La Nina Impact

Seasonal Variation - Summer

COLD EPISODE RELATIONSHIPS DECEMBER - FEBRUARY
Rainfall and Temperature

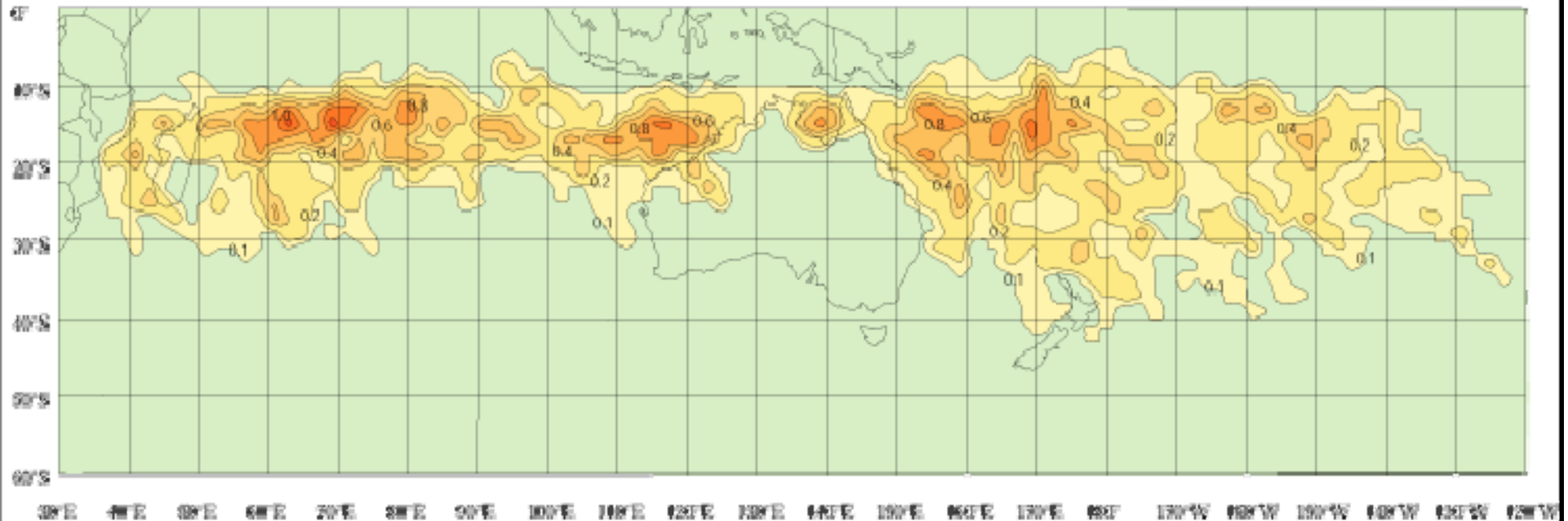


El Niño Impact Tropical Cyclones

Average annual number of tropical cyclones - El Niño years



Australian Government
Bureau of Meteorology



Number of tropical cyclones

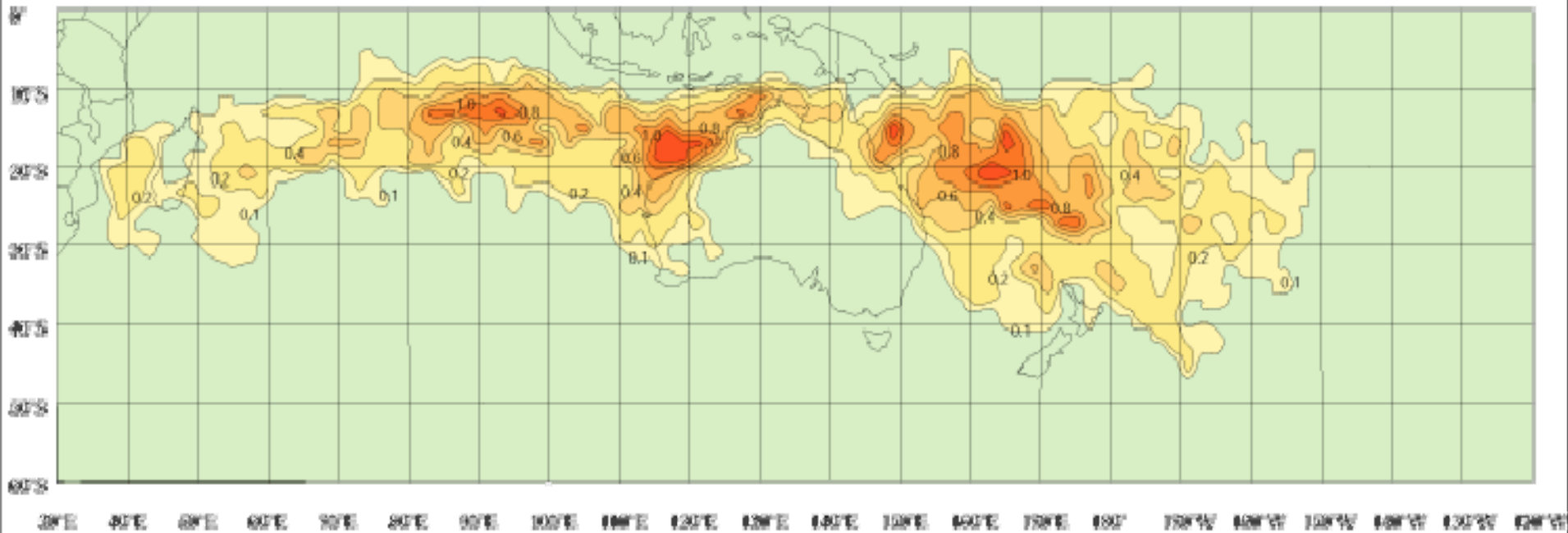
0.1 0.2 0.4 0.6 0.8 1.0 1.2



Based on a 2 x 2 degree resolution
gridded analysis using 30 years of
data (1980/81 to 2009/10 tropical
cyclone seasons).
© Commonwealth of Australia 2007

La Nina Impact Tropical Cyclones

Average annual number of tropical cyclones - La Nifia years



Based on a 2 x 2 degree resolution gridded analysis using 30 years of data (1980/81 to 2009/10 tropical cyclone seasons).
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ENSO Impacts

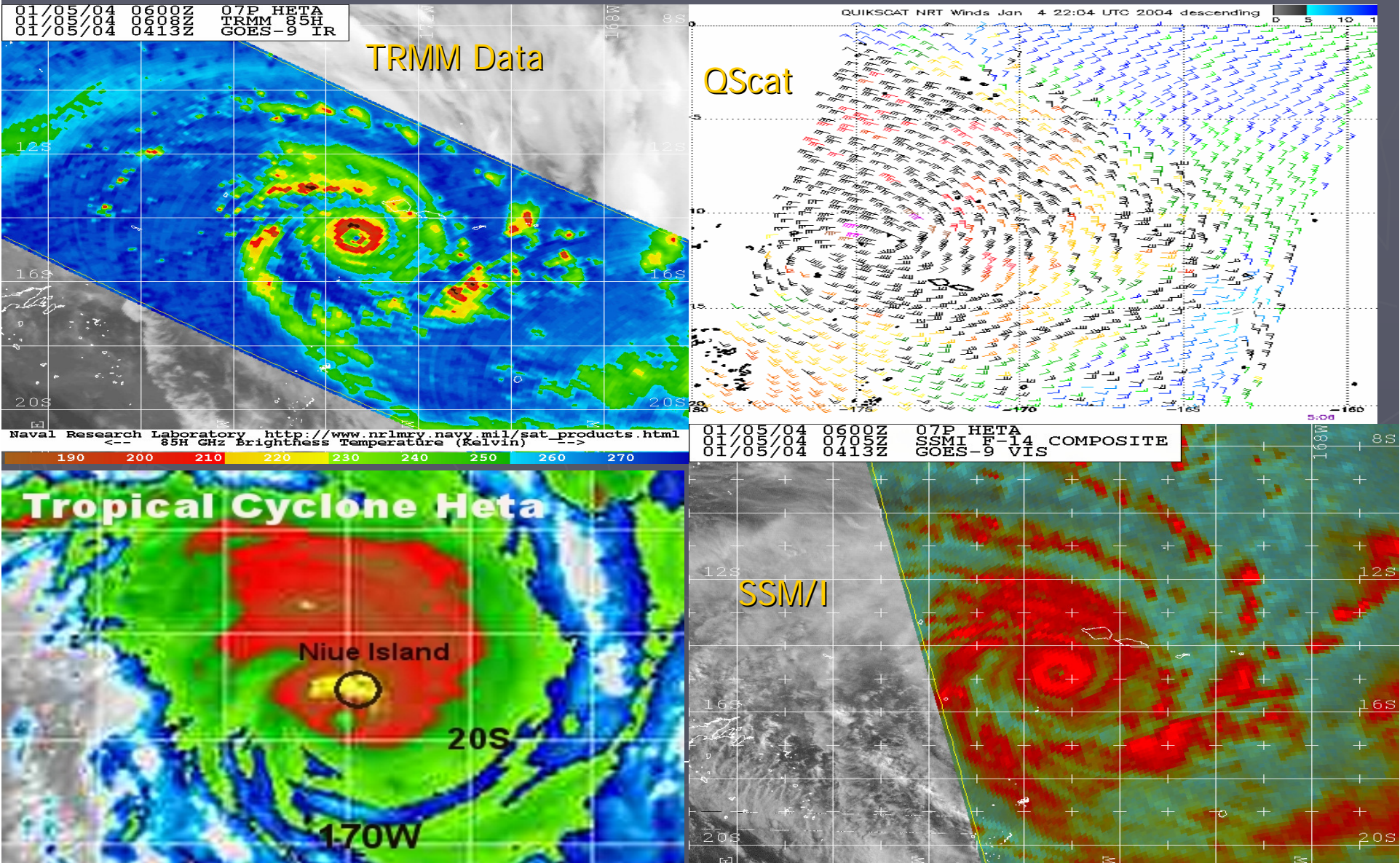
Sea Level

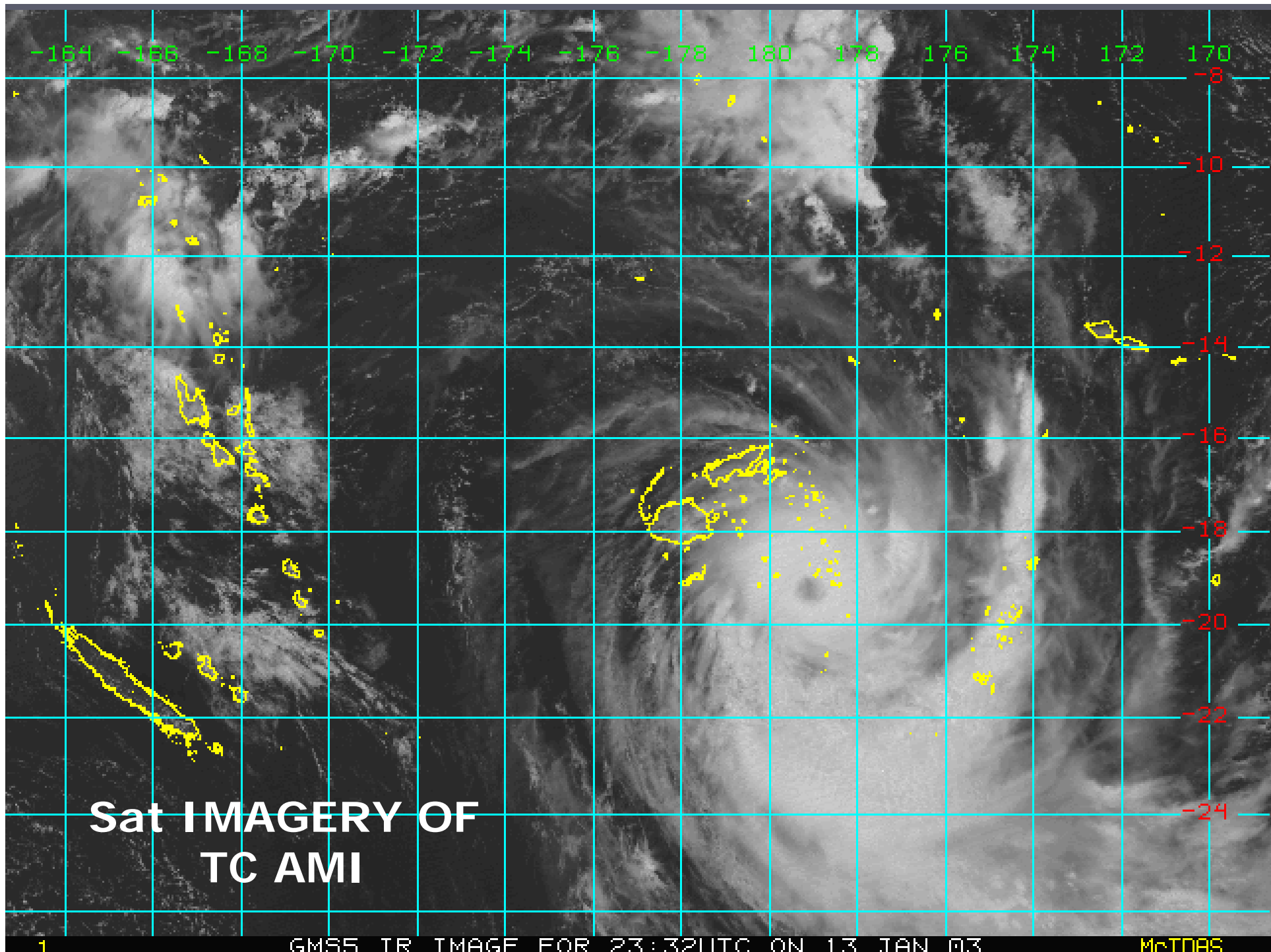


Decreased
Sea Level in
the SW Pacific
during El Niño

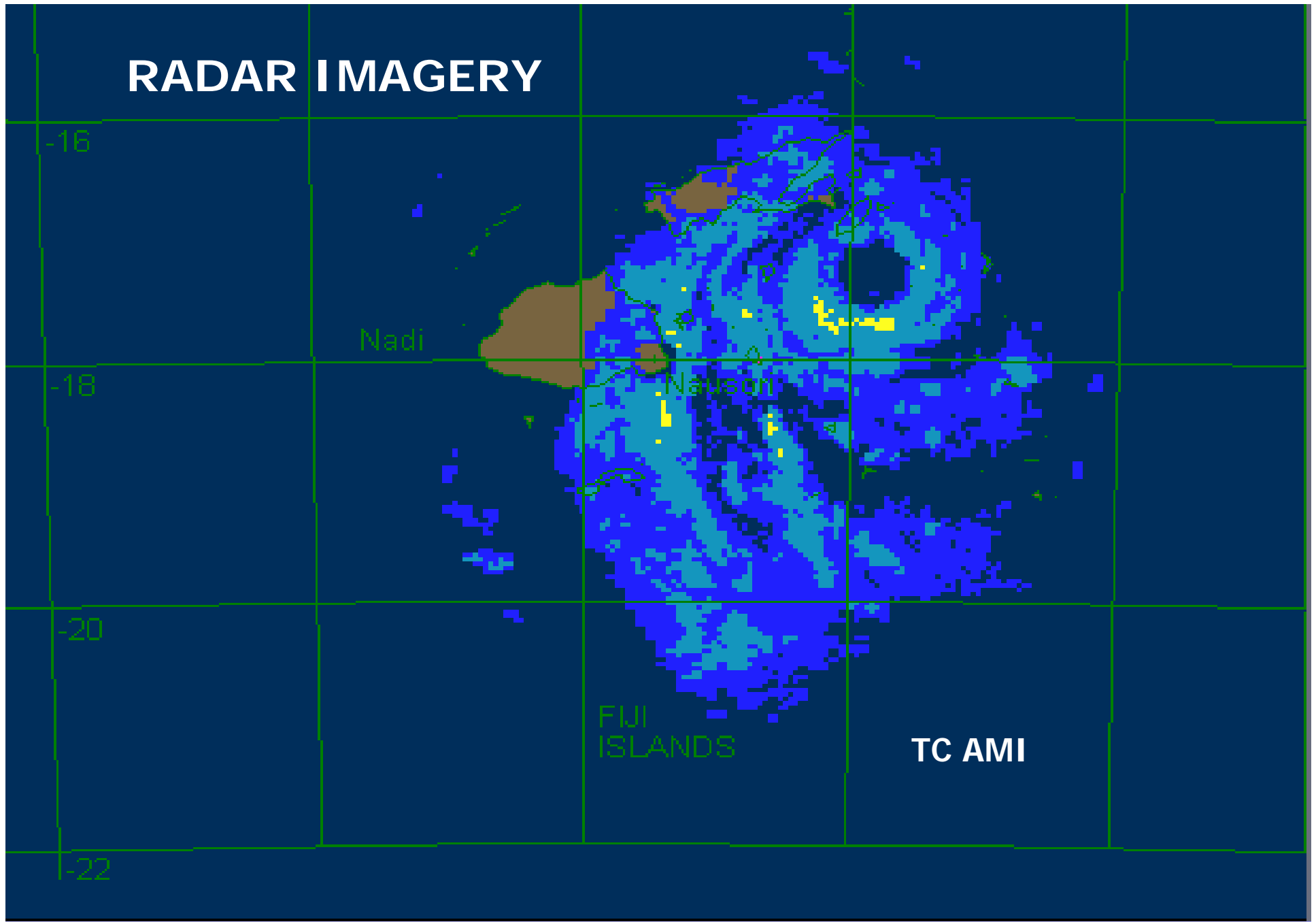
Increased
Sea Level in
the SW
Pacific during
La Niña

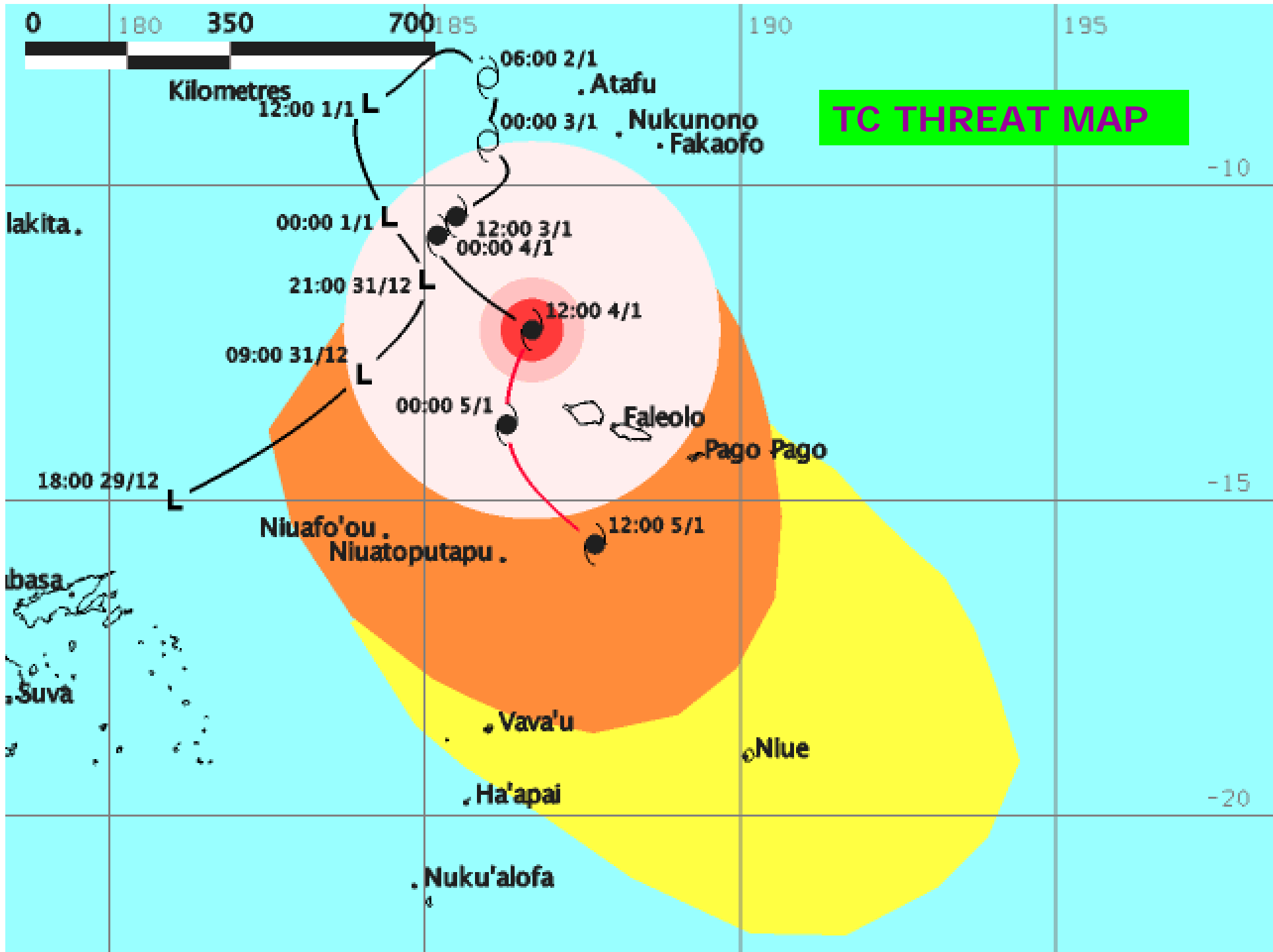
Remote Sensing - TC Heta Jan 05/0600Z





RADAR IMAGERY





Constraints

Some constraints include

Cost

RS data, GIS software and computing hardware are still expensive for SIDS

Man-power and Training

Organisations providing critical information to disaster managers lacks GIS specialist with present staff only have basic GIS training.

Expectation

- ▶ Customised GIS applications to Meteorology
- ▶ Hydro-meteorological hazard risk maps using historical information using GIS
(flood, drought and tropical cyclone)
- ▶ Hydro-meteorological hazard risk maps based on IPCC FAR projected changes for vulnerability assessment
- ▶ Capacity building within NHMS to apply and provide NDMO with relevant real time information of natural disaster risk for watch and response
- ▶ Communicating scientific and technical information to policy makers, social scientists and public

Thank You



Vinaka