

Welcome:

AMIE/MJO Discussions

Breakout

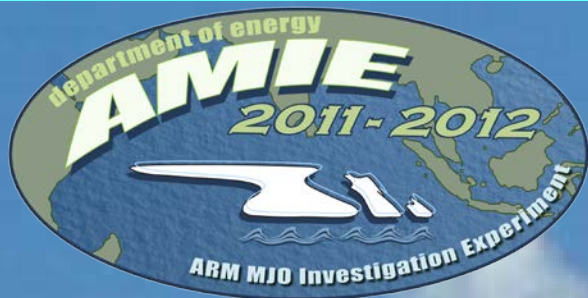
Wednesday March 14,
2:45 – 4:15 pm

Agenda

- **Welcome & AMIE overview (Chuck Long & Sally McFarlane)**
- **AMIE/DYNAMO Field Campaign: Achievement and Beyond (Chidong Zhang)**
- **Scanning Radar Observations on Addu Atoll (Bob Houze & Courtney Schumacher)**
- **DYNAMO/CINDY/AMIE sounding network: Performance and Plans for Quality Control (Paul Ciesielski)**
- **Satellite retrievals for AMI-Gan and AMIE-Manus (Pat Minnis)**
- **Discussion: Collaborative observational and modeling studies (Samson Hagos, Lead)**

Evening session

- **6:30 – 7:30**
- **Breakout room 3, Washington A**
- **AMIE/DYNAMO Observation-Modeling Integration**
- **Specify fields derived from observations that can be used directly in model validation**
- **Plus Bob Houze further radar examples of evolution of cloud system organization, and hydrometeor details with S-band**



AMIE: Overview and Preliminary Examples

Chuck Long and Sally McFarlane

<http://campaign.arm.gov/amie/>



Project Timeline

OCT NOV DEC JAN FEB MAR APR

EOP

AMIE-Gan (AMF2), SMART-R, AMIE-Manus, Darwin

IOP

S-PolKa, RV Revelle, RV Sagar-Kenya (plus EOP observations)

SOP

RV Mirai, RV Revelle, (plus IOP and EOP observations)

The AMIE-Gan AMF2 deployment was suspended on Feb 9, 2012 due to civil unrest in the Maldives.

AMIE-Manus continues normally.

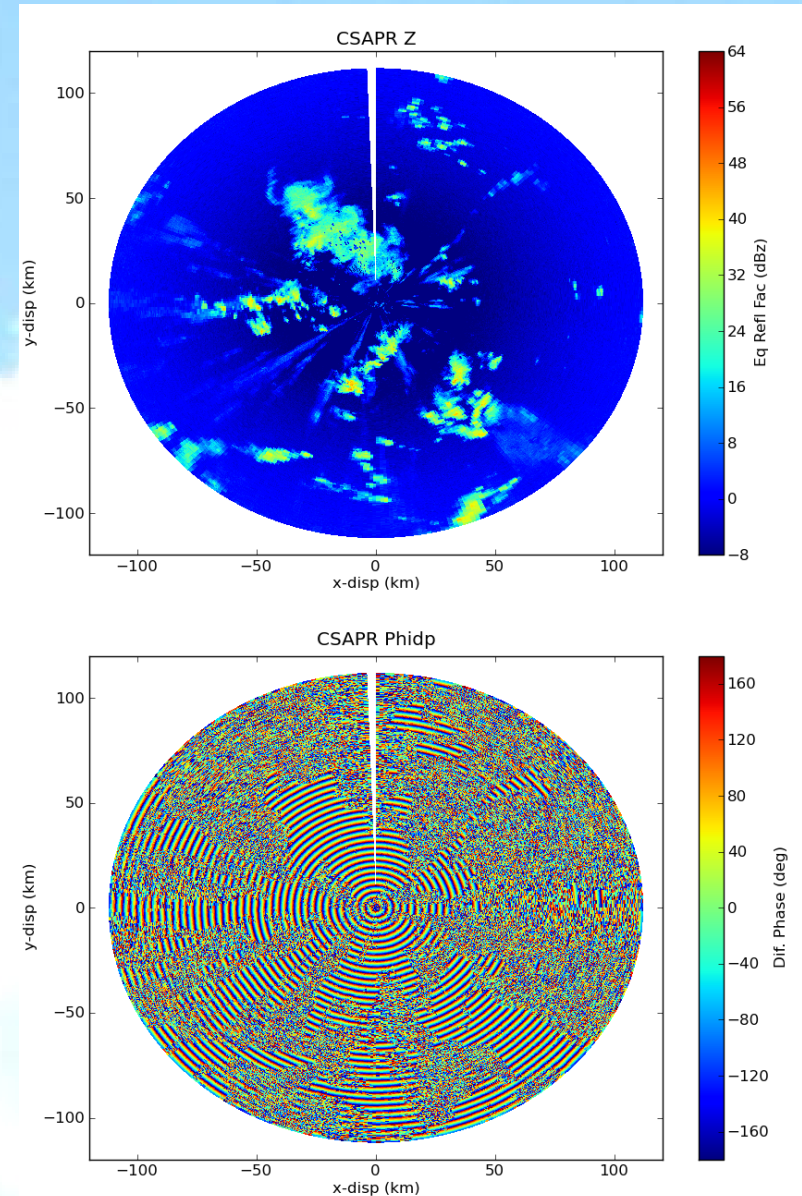
Significant Instrument Issues

- **X/Ka SACR**
 - Failure at both sites
- **Gan HSRL**
 - Damage in shipping, control computer
- **Gan Wind Profiler**
 - Late delivery from vendor
- **Manus C-SAPR**
 - Scanning failure on Dec. 8, 2011
 - Propagation phase issues

Were deployed for the first time during AMIE and the remote conditions made trouble-shooting and ordering of replacement parts difficult.

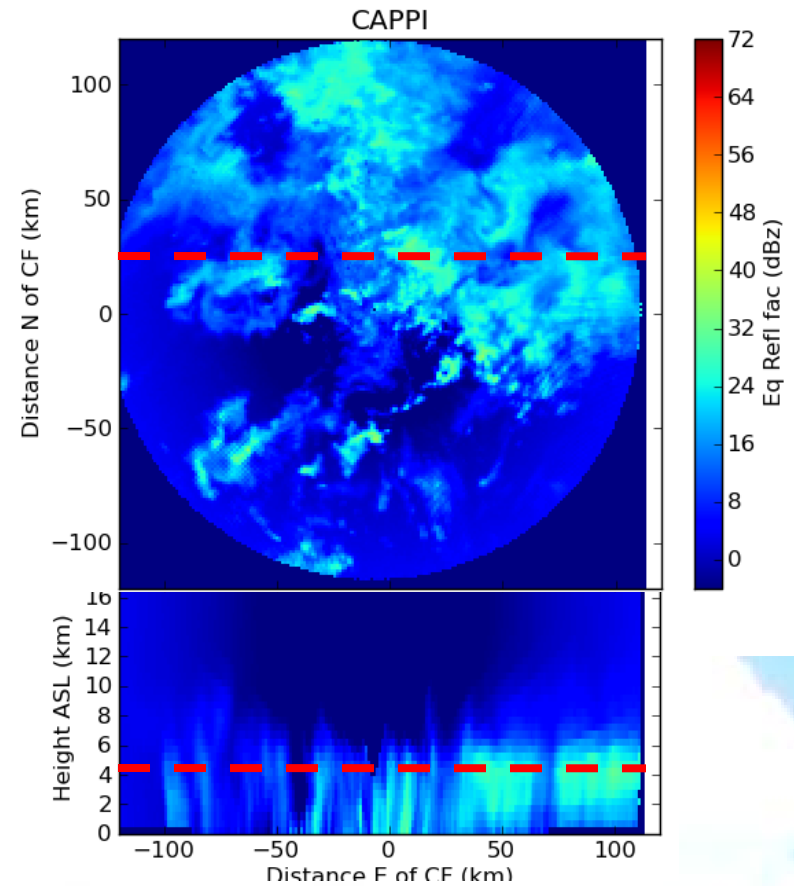
State of CSAPR data during AMIE Manus

- The C-Band radar at Manus island is a unique installation providing new insights into the three dimensional structure of equatorial precipitation.
- There are issues with the propagation phase from the CSAPR. For data purposes this means the radar should be considered as a non-polarimetric Doppler radar.
- This makes rainfall retrievals and DSD retrievals very difficult and very large uncertainty on the output.
- What is useful is the uncorrected reflectivity and radial velocity.
- In addition to the raw data two VAPS will be available by May: Corrected Moments in Antenna Coordinates (CMAC) and Mapped Moments to a Cartesian Grid (MMCG).

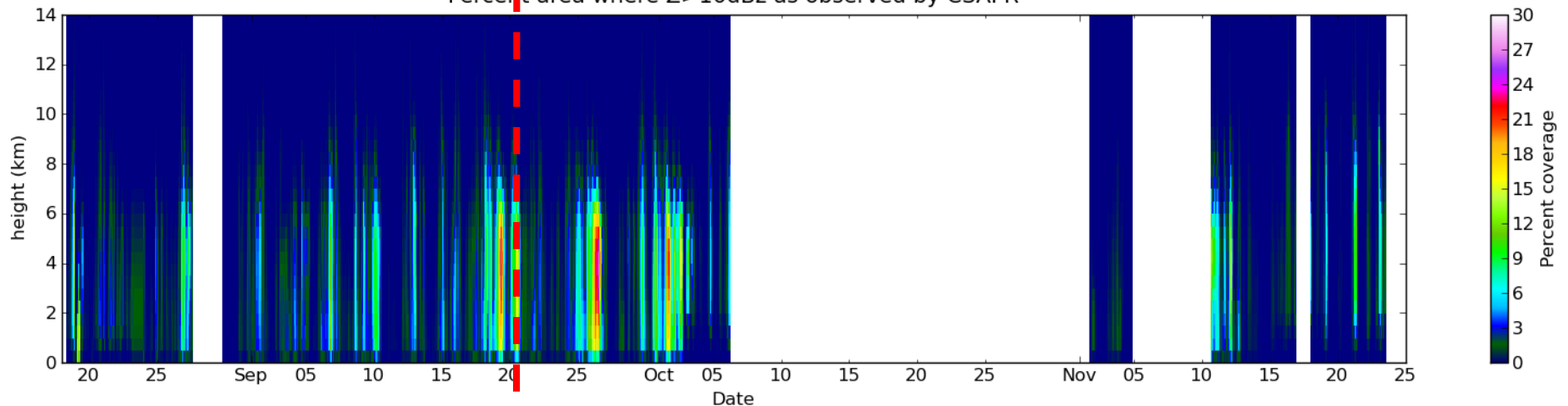


MMCG

- Moments Mapped onto a Cartesian Grid with the CF at the origin.
- For the Manus CSAPR the resolution is 1x1x0.5km (x,y,z) and the bounds are 240x240x17km.
- Processing is mainly complete, need to document and release.
- Data availability is spotty as shown below. Last data received was from December 8th (still assessing quality from November 25th to December 8th).

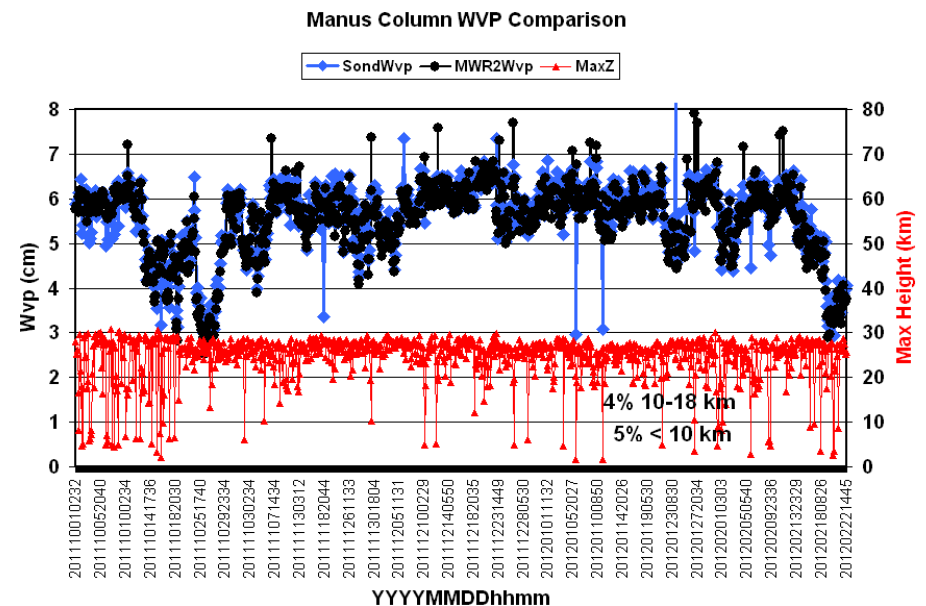
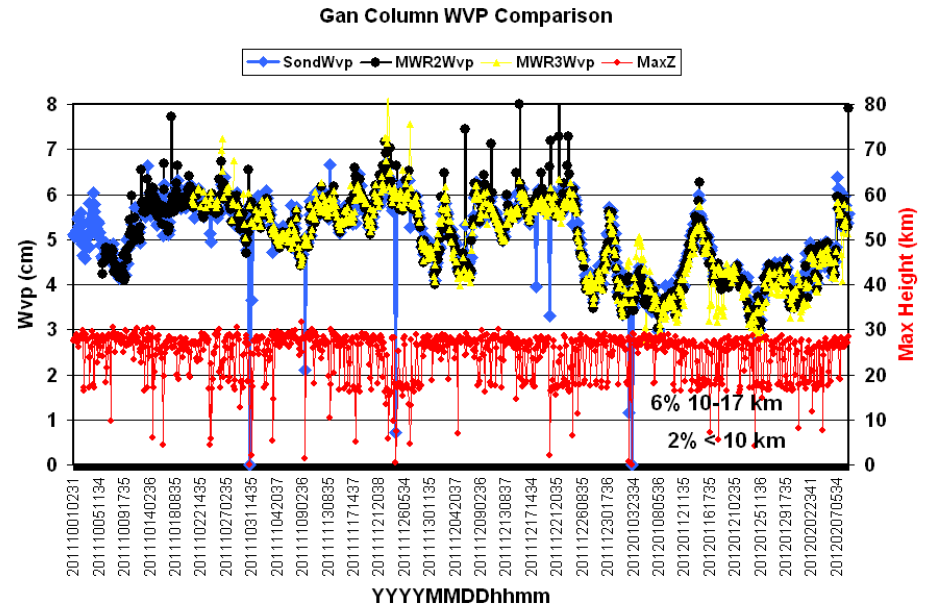


Percent area where Z>10dBz as observed by CSAPR



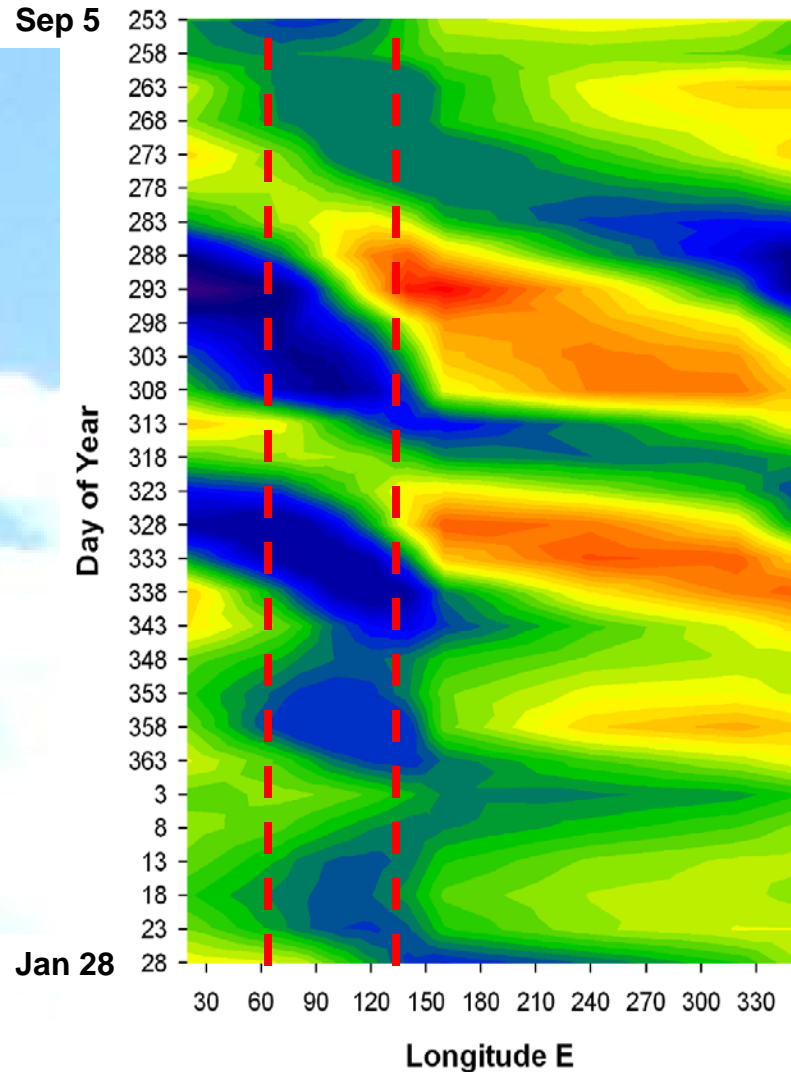
Significant success as well!

- Grueling 8/day sonde schedule for 6 months
- Gan had 99% of possible sondes, with 80% of possible “good” [$<400\text{mb}$, T and Td OK]
- Through Feb 22 Manus had 92% possible sondes, with 82% of possible “good”
 - No relaunch for Manus

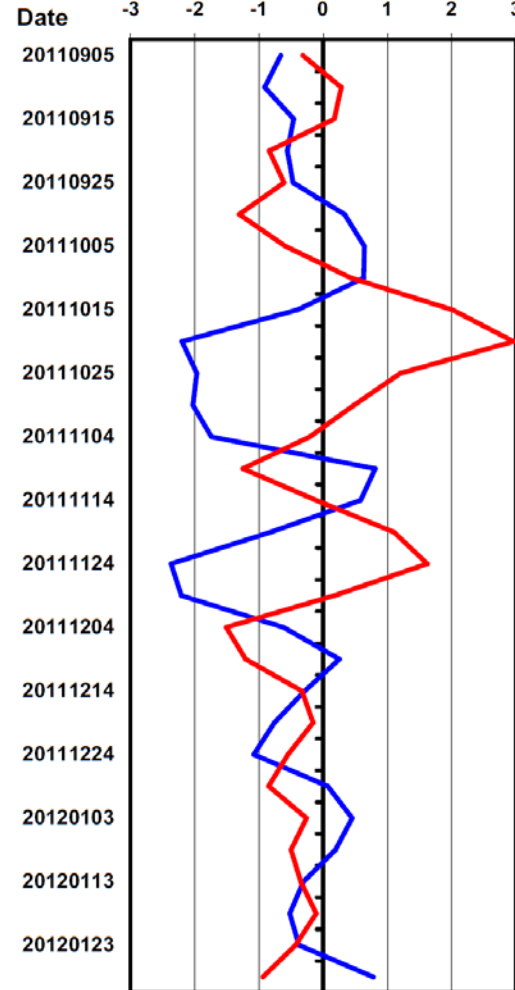


MJO Events

MJO Index, Sept 2011 - Jan 2012



Gan and Manus MJO Index, Sept 2011 - Jan 2012



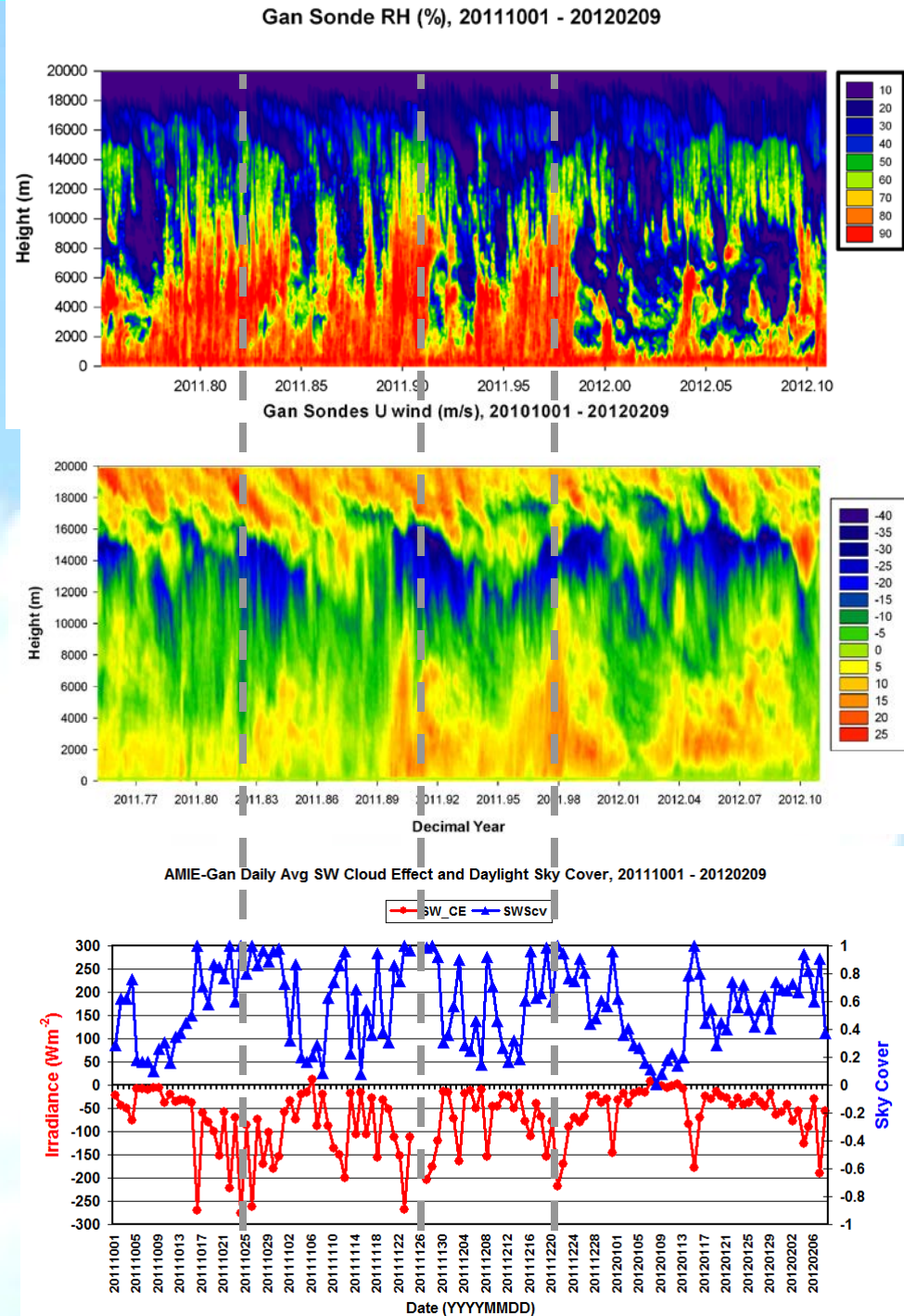
**Periodicity
30-40 days**

**Gan-Manus
propagation
~ 10 days**

- **Gan centered on about Oct 30, Nov 30, late Dec**
- **Manus centered on about Sept 30, Nov 9, and Dec 9**

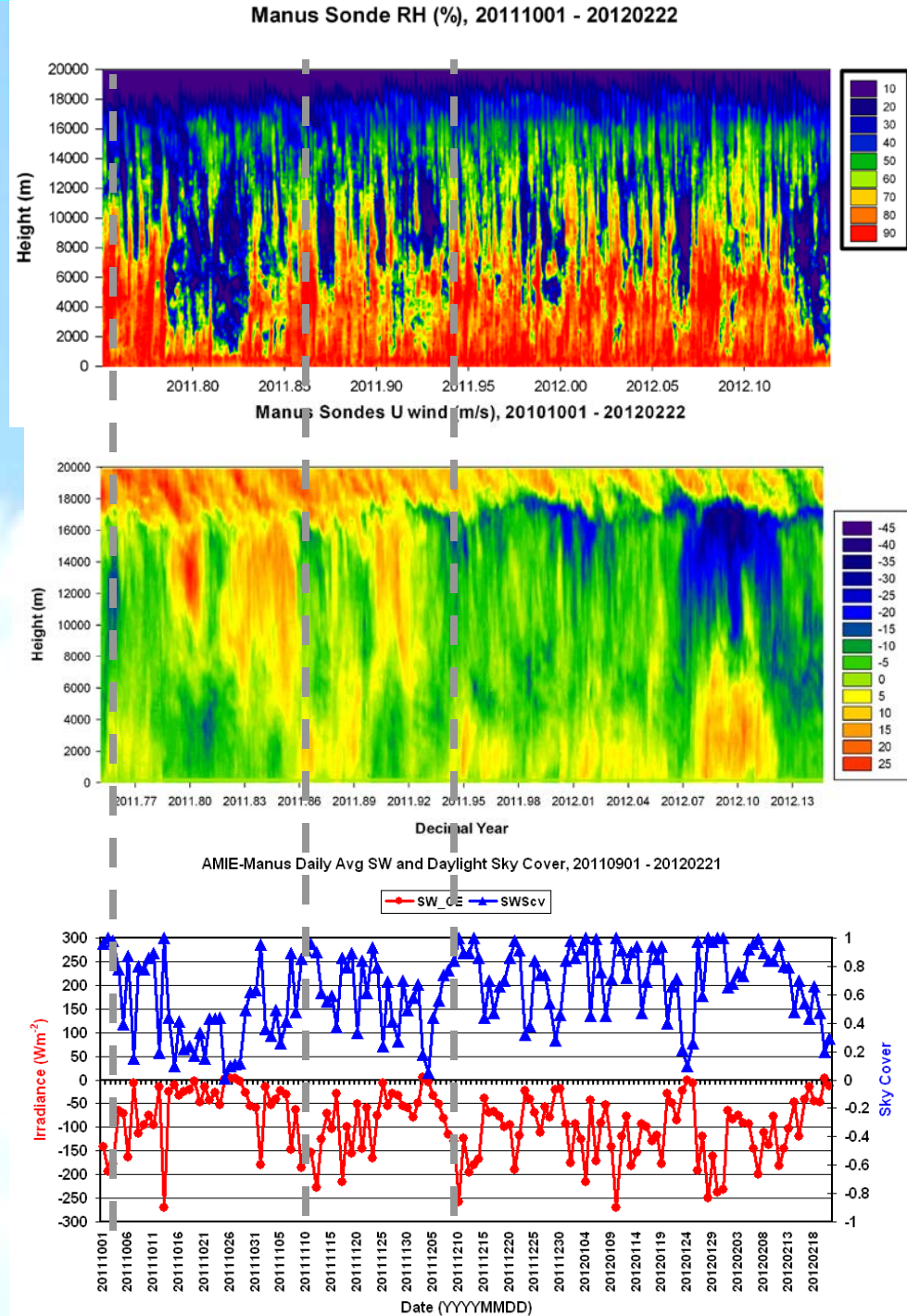
Gan Events

- First 2 Gan events stronger, last weaker
- Significant mid level moistening
- Increased low level westerlies, upper easterlies
- Nearly overcast skies, greater SW cloud effect



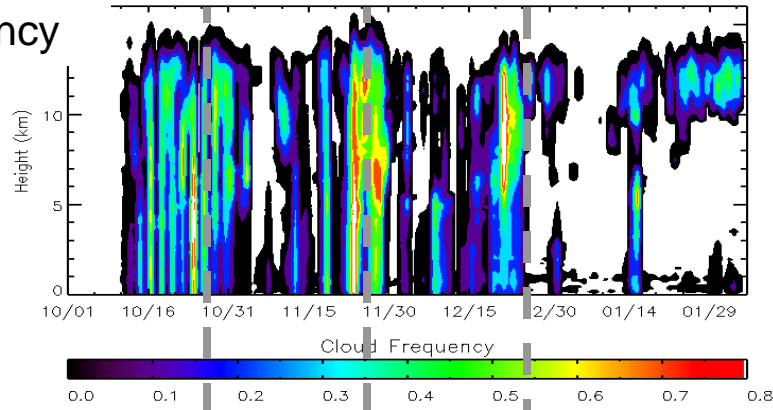
Manus Events

- All Manus events weaker, imbedded in La Nina conditions
- Significant mid level moistening
- Increased low level westerlies, upper easterlies, less than Gan
- Nearly overcast skies, greater SW cloud effect

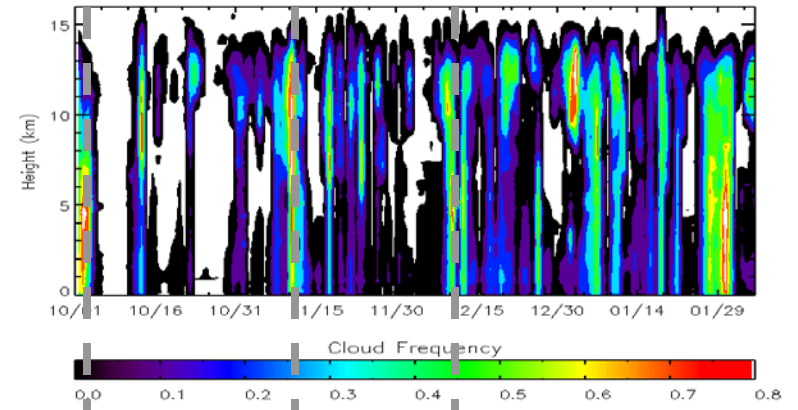


Gan

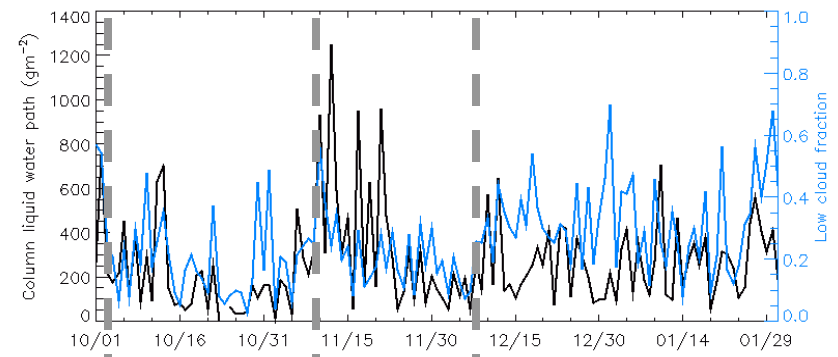
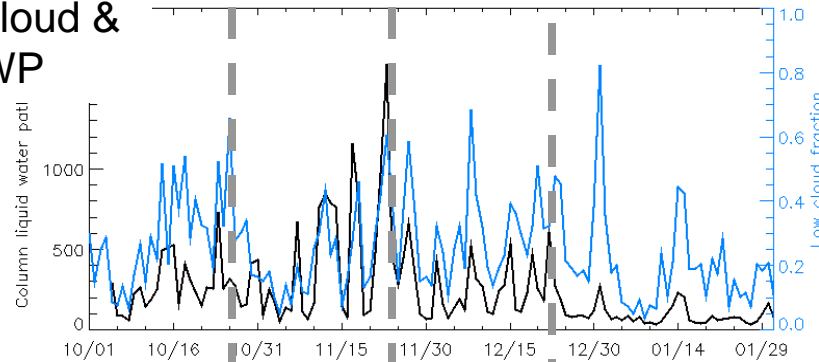
KAZR Cloud Frequency



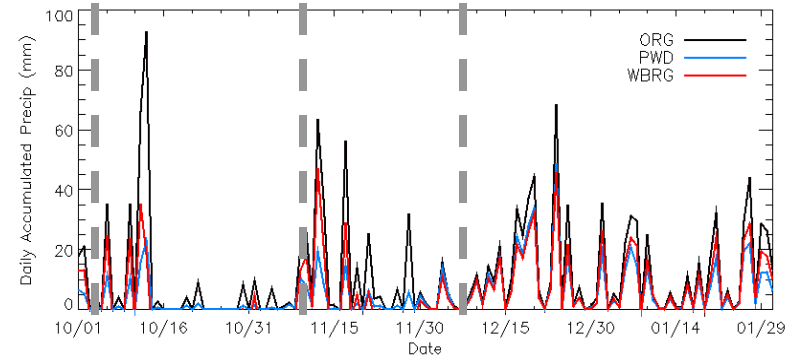
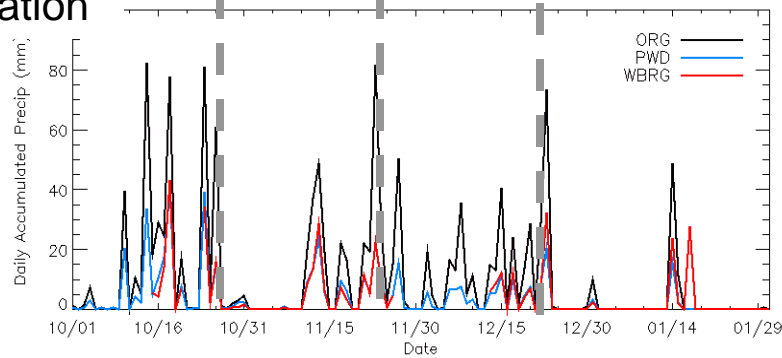
Manus



Low Cloud & LWP

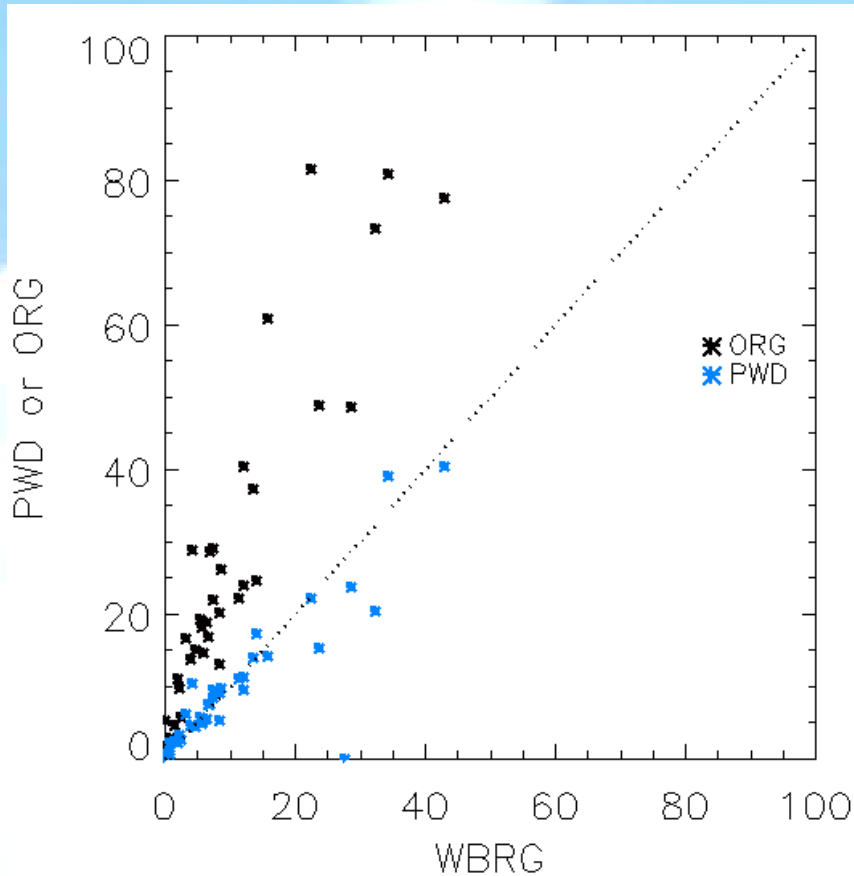


Precipitation

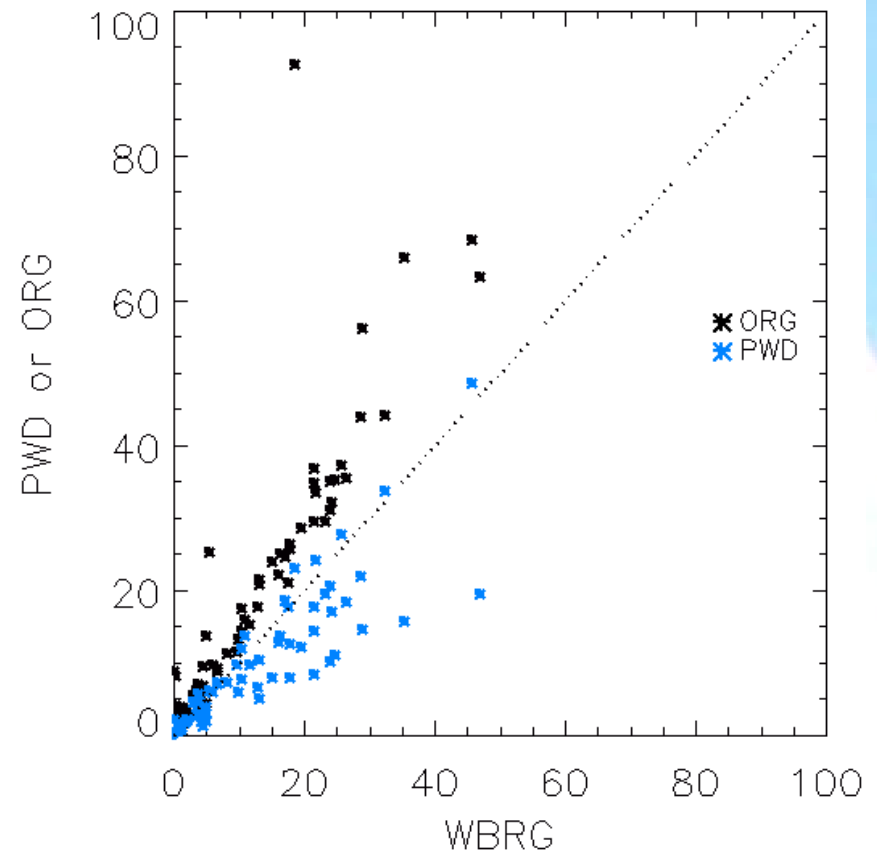


Daily Accumulated Precip

Gan



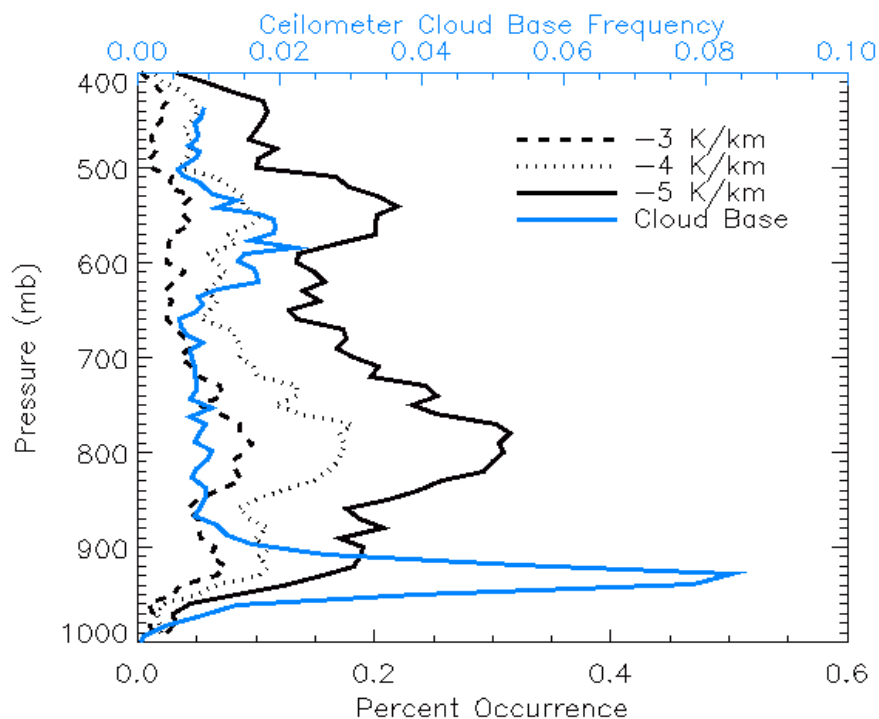
Manus



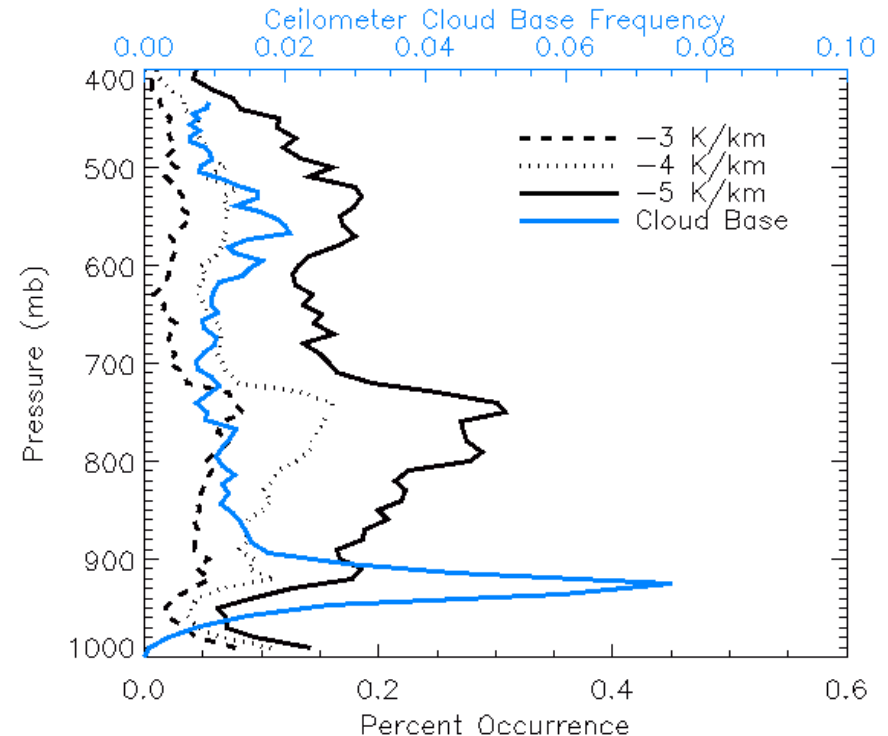
- Optical Rain Gauge (ORG) significantly higher than PWD or WBRG at Gan; somewhat higher at Manus

Cloud Fraction & Stability

Gan



Manus



- Frequent low and mid-level cloud bases at both sites
- Mid-level stable layers slightly more pronounced at Gan

The background of the slide is a clear, bright blue sky filled with large, soft, white cumulus clouds. The clouds are scattered across the frame, with some appearing more prominent than others. The overall lighting is bright and natural, suggesting a sunny day.

Following are Extra



AMIE Hypotheses

- **AMIE-Gan:**

- Deep convection can be organized into an MJO convective envelope only when the moist layer has become sufficiently deep over a region of the MJO scale
- Specific convective population at different stages are essential to MJO initiation
- Upper ocean processes play essential roles in MJO initiation in the Indian Ocean

- **AMIE-Manus**

- Surface energy fluxes drive the MJO (thus the weakening over the maritime Continent)
- Heating and drying by convection stabilize the atmosphere and dampen longer-term variability; the trailing stratiform anvil region cools and moistens the lower troposphere via rain evaporation
- “Recharge-discharge” mechanism; the dry free atmosphere is moistened by shallow convection, allowing transitioning to the disturbed phase of the MJO

AMIE-Gan Sites



AMIE-Manus Sites

