Update on CINDY2011/DYNAMO Field Program

Cooperative Indian Ocean Experiment on Intraseasonal Variability (CINDY) in the Year 2011

Dynamics of the Madden-Julian Oscillation (DYNAMO)

Multi-national participation: Australia, India, Indonesia, Japan, Kenya, Maldives, France, Seychelles, UK, US

Overarching proposition: The physical and dynamical processes key to MJO initiation are closely connected to the unique features of the tropical Indian Ocean (e.g., monsoon flows, thermocline ridge, Wyrtki jets) and must be adequately understood using local observations.

Goal: Expedite our understanding of MJO initiation processes and efforts to improve simulation and prediction of the MJO

Objectives:
– Collect observations (*field campaign*)
– Establish empirical statistics; prepare data for model constraints, validation, and evaluation (*analysis*)
– Test hypotheses; identify model deficiencies; provide better physical basis for model improvement (*modeling*)
– Develop prediction indices for MJO initiation; benchmark improvement in MJO prediction (*forecast*)

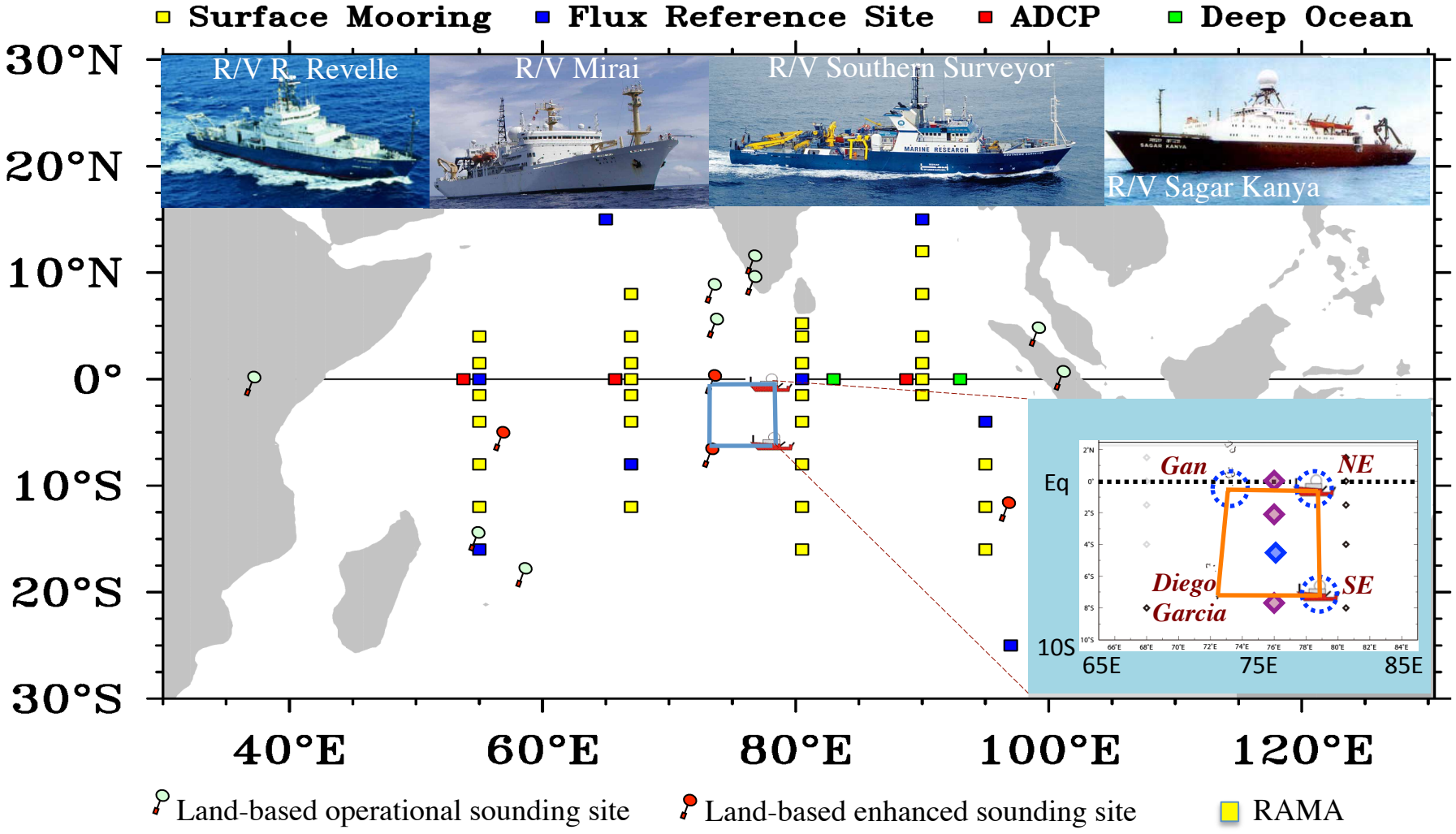
Hypotheses: Three essential factors for MJO initiation

I. Interaction between convection and its environmental moisture
II. Distinct roles of different types of convective clouds at each MJO initiation stage
III. Upper ocean processes and air-sea interaction

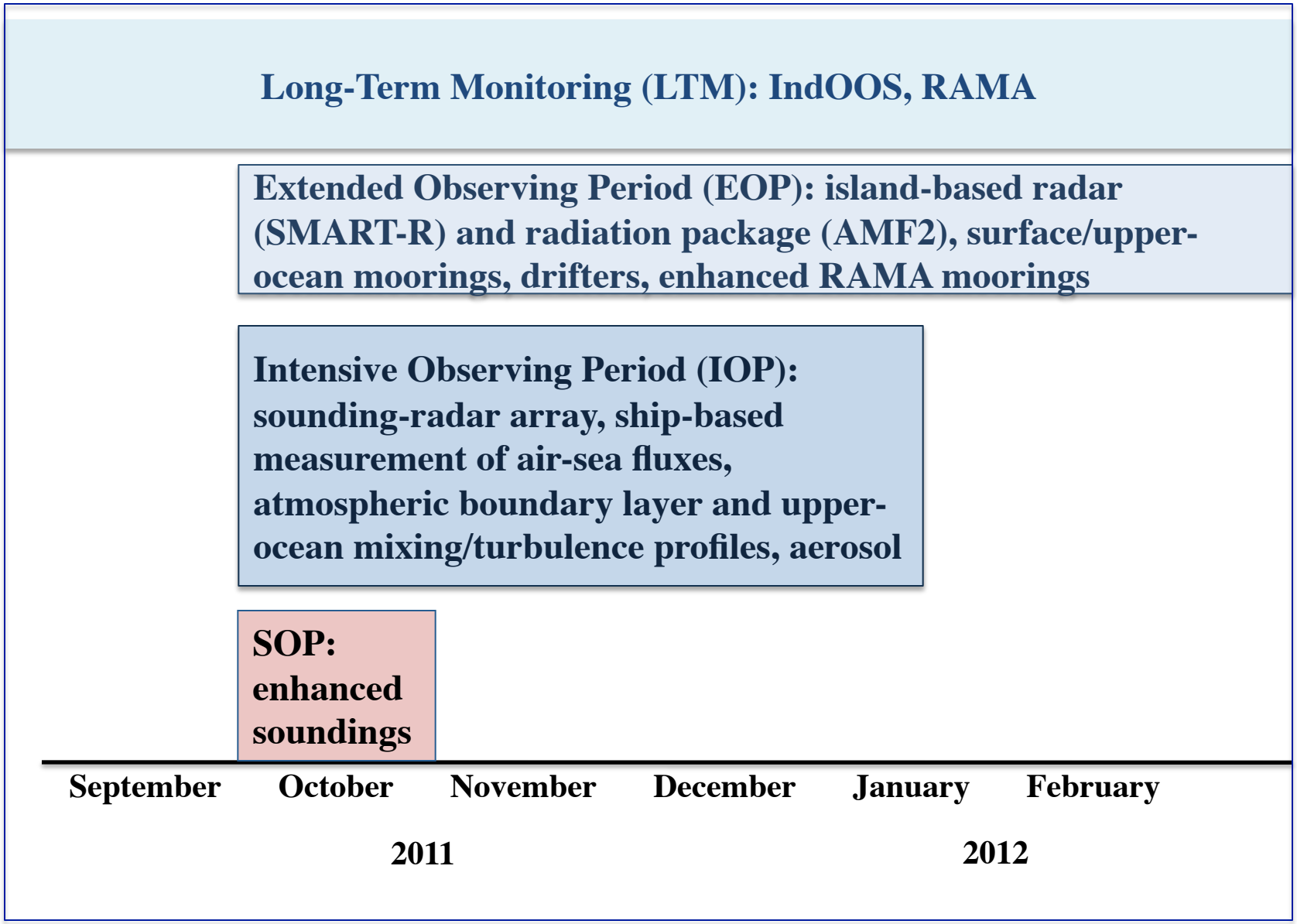
Cooperative Indian Ocean Experiment on Intraseasonal Variability in Year 2011 (CINDY2011)
and
Dynamics of the MJO (DYNAMO)

Field Campaign

October 1, 2011 – March 31, 2012



DYNAMØCINDY2011 Observation Periods



Summary of DYNAMO Observations

Gan Super site

Facility	Platform	Period	Hypothesis Testing
S-PolKa radar	**Gan**	**IOP**	**I, II**
SMART radar	Gan	EOP	I, II
AMF2	Gan	EOP	I, II
ISS	**Diego Garcia**	**IOP**	**I, II**
GAUS/wind profiler	**US ship**	**IOP**	**I, II**
TOGA radar	US ship	IOP	I, II
aerosol	US ship	IOP	II
surface flux, Doppler lidar, cloud radar	US ship	IOP	I, II, III
upper-ocean mixing	US ship	IOP	III
surface current and temperature	drifters	EOP	III
surface meteorology and upper-ocean profiles	moorings	IOP	III

IOP: October 1, 2011 – January 15, 2012
EOP: October 1, 2011 – March 31, 2012

DYNAMO Sounding-Radar Network

(4 soundings per day for IOP; 8 per day for SOP)

NCAR S-PolKa Radar

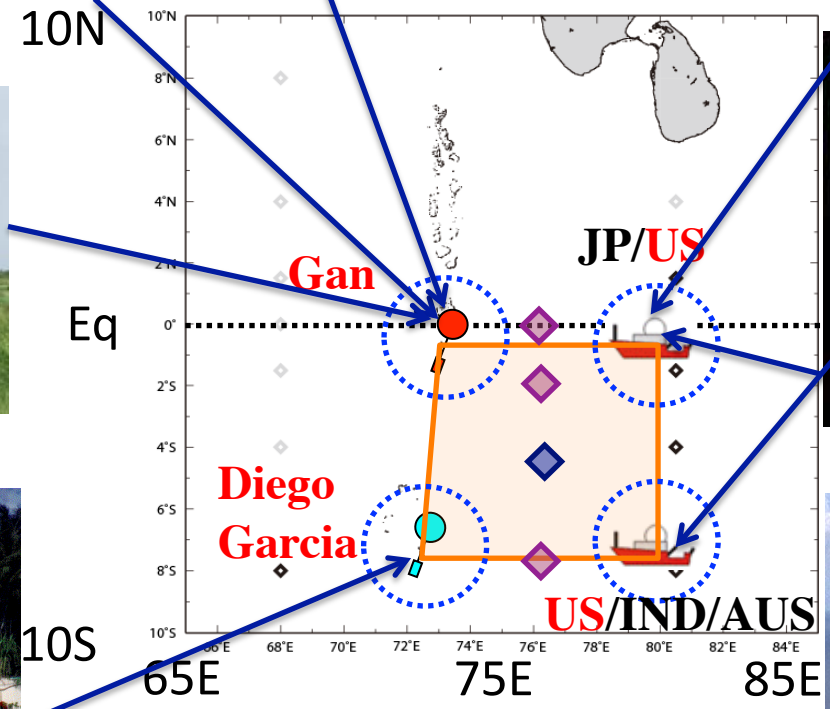
Texas A&M SMART Radar

MIRAI C-band Radar

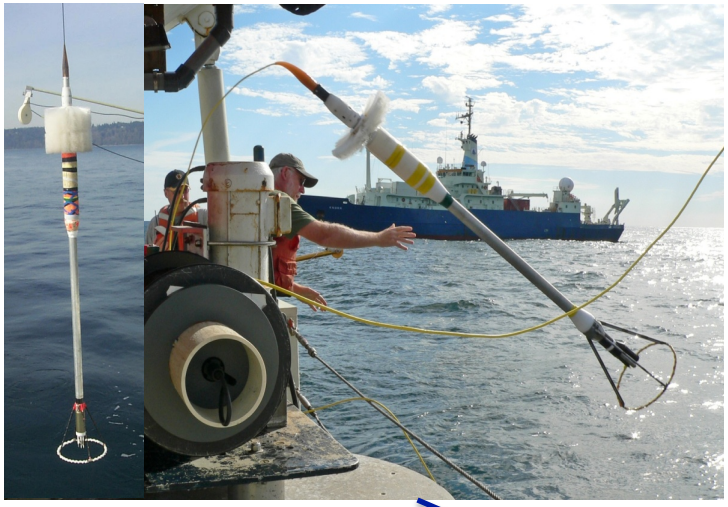
NASA TOGA Radar

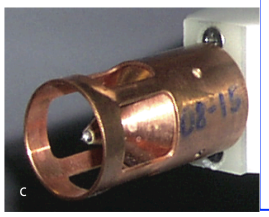
ARM AMF2

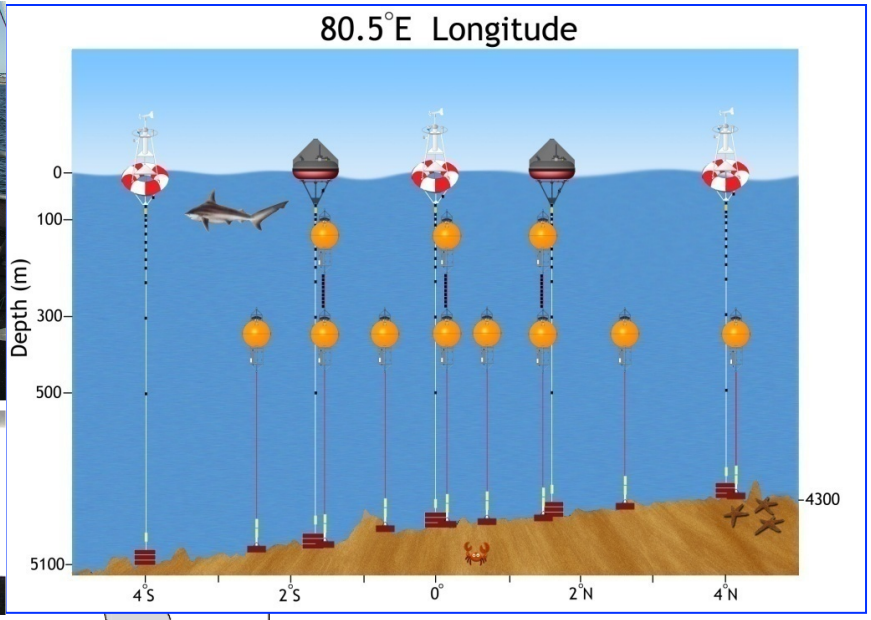
NCAR ISS

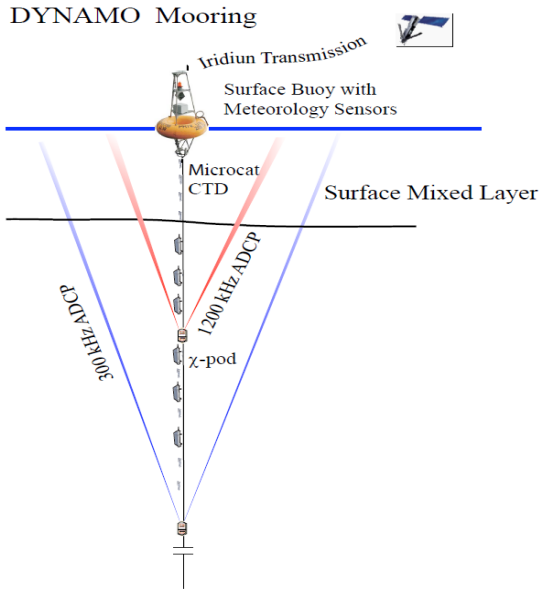


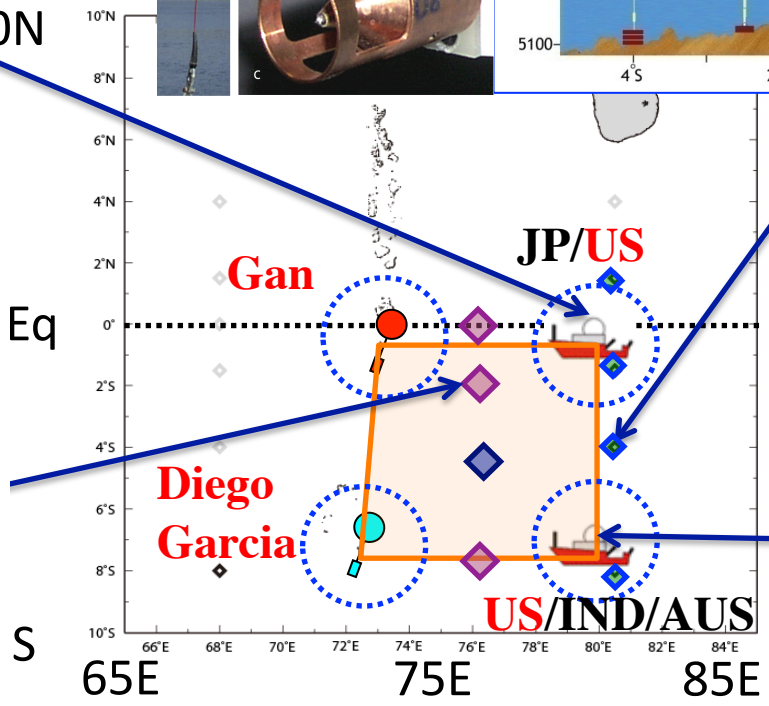
DYNAMO Air-Sea Interaction Network

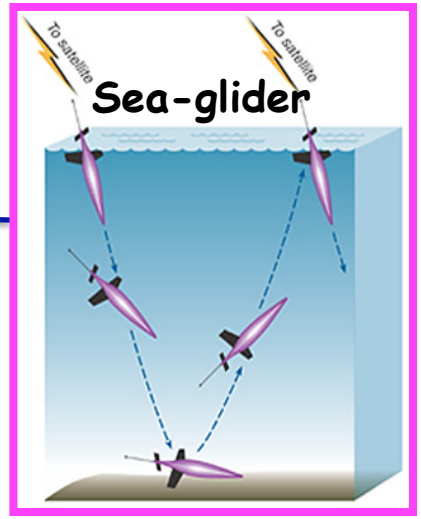












DYNAMO Modeling Activities

Process-oriented studies and model improvement proposed by DYNAMO modeling group

- Global AGCMs, OGCMs, CGCMs (inc. SP-CAM, CAM5)
- Tropical channel model (nested to cloud resolving resolution)
- Global cloud system resolving models (inc. WRF, NICAM)
- Coupled regional mesoscale model (ONR)
- Limited domain cloud system resolving models (WRF, SAM): conventional and WTG forcing methods
- Single column atmospheric model and ocean mixing-layer model (e.g. various versions of SCAM)

DYNAMO forcing dataset for SCMs, limited domain CSRM

- integrated flux dataset (buoy, aircraft, ship)
- advective tendencies from array (large array!)

RADAR

- integrated dataset of cloud statistics (reflectivity, echo-top height, cloud width and depth, precipitation rate, etc) that can constrain CSRMs. Include non-precipitating clouds

Integrated water vapor dataset (microwave radiometer, sounding, X/Ka band radar, aircraft, et al)

Hindcast experiments