

# Dynamics of the MJO (DYNAMO)

## United States Participation in CINDY2011

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

#### **Background:**

##### Spring 2008:

Kunio Yoneyama and Masaki Katsumata invited the US participation in CINDY2011;

##### Summer 2008:

- A white paper on the US participation in CINDY2011 was written (Fairall, Johnson, McPhaden, Zhang);
- The idea of CINDY2011 and its US participation were endorsed by the US CLIVAR MJO Working Group;
- A presentation on the US participation in CINDY2011 was made to the US CLIVAR Summit (Waliser);

##### Spring 2009:

- The US CLIVAR Process Studies and Model Improvement (PSMI) panel endorsed the US participation in CINDY2011 (Flatau);
- The US participation in CINDY2011 was named as DYNAMO (McPhaden);
- The DOE/ARM Manus MJO experiment (AMIE) was postponed from 2010 to 2011 to coordinate with DYNAMO/CINDY2011 (Long);
- ONR announced a DRI focusing on coupled air-wave-sea processes involved in the onset of convection and eastward propagation of the active phase of the MJO;
- Program managers of NOAA, NSF, DOE, ONR, NASA were informed of the on-going and planned DYNAMO activities;
- R/V Ron Brown ship time was requested for DYNAMO (Fairall);
- DYNAMO workshop

# Workshop Objective: Plan for actions to move DYNAMO forward – *need a science and implementation plan*

## Scientifically:

1. Define the rationale and objectives of DYNAMO from viewpoints of understanding, simulating, and predicting the MJO, and their societal benefits
  - *What are the gaps in our knowledge of MJO that must be filled with new observations from DYNAMO/CINDY2011?*
  - *What can DYNAMO/CINDY2011 do beyond what TOGA COARE, JASMINE, INDOEX and MISMO have done?*
2. Integrate observational, modeling, and forecast activities of DYNAMO
  - *How should numerical models be used to help planning and executing the field campaign, interpreting field observations, and testing hypotheses?*
  - *How should the field campaign be designed to maximize the value of its data to model validation and improvement?*
3. Optimize observational products from the field campaign
  - *What should be the core MJO observations vs. auxiliary observations that can maximize the overall value of the field campaign?*
  - *How should the atmosphere and ocean observing networks be optimally designed to meet the scientific objectives of DYNAMO?*

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## Programmatically:

### 1. Facilities

- *Ron Brown vs. UNOLS (mobile Doppler radar)*
- *Ship-borne instrument optimization*
- *land component (radar at Maldives, soundings at Diego Garcia?)*
- *Other facilities?*

### 2. Coordination with partner programs

- *Other CINDY2011 components*
- *AMIE*
- *ONR air-sea interaction*

### 3. Program organization

- *Science Steering Committee*
- *Working Groups?*
- *Field support*

### 4. Funding strategy and timeline

## **Action Items after the workshop**

## Hypotheses:

- lower-tropospheric humidity (pre-conditioning):  
advection/divergence vs. surface fluxes vs. vertical advection
- mixed-layer depth/upper ocean heat content
- air-sea interaction, SST diurnal cycle

Low-tropospheric diabatic heating by shallow convection

Scale-interaction: synoptic contribution to intraseasonal surface flux

Role of the boundary layer drying

Circumnavigating precursors

Extratropical influences

## **DYNAMO Observations (Funding Agencies):**

### *Ship* (RB or UNOLS):

- soundings (Johnson, NSF)
- radar (Rutledge, NSF)
- air-sea flux (Fairall, NOAA)
- lidar (Brewer/Tucker, NOAA)
- aerosol (Bates, NOAA)
- high-res mixing (Moum/Lien, NSF/ONR)
- drifters (Lumpkin, NOAA)
- gliders, rapid profilers (P.Flatau, NSF/ONR)

### *Moorings:*

- supper ocean/sfc met (McPhaden, NOAA)

IR flux?

- mixing (Moum/Lien, NSF,ONR)

Supplement RAMA, 1 specific mixing

buoy

### *Aircraft:*

- NOAA P3 (Wang, NOAA)

### *Land:*

#### Gan:

- soundings (Katsumata/Johnson, JAMSTEC/NSF)
- SMART-R (Schumacher, NSF/JAMSTEC)
- AMF2 (Long, DOE)

#### Diego Gacia?

- soundings (Johnson, NSF)
- S-Pol radar (Medina, NSF)
- turbulence (Wang, NSF)
- lidar, surface fluxes (P.Flatau, NSF/ONR)

## **Action Items:**

1. Inquire about observation permission at Dieg Garcia – Eleuterio, C.Zhang
2. Create a DYNAMO website (for internal use first) – Williams, C.Zhang
3. Estimate field experiment cost – everyone!
4. Contact NASA on 7Seas, Glory – Zhang; Minis; YOTC
5. Update the white paper for the Clivar interagency meeting (April) – Fairall, Johnson, McPhaden, C.Zhang;
6. Form a Science Steering Committee (SSC);
7. Clivar interagency briefing (May) – SSC;
8. NOAA Climate Board briefing (?) – SSC;
9. Draft a Science and Implementation Plan for Clivar Summit (June-July) – SSC;
10. NSF proposal to request a UNOLS ship – Moum, Rutledge/Johnson, P.Flatau
11. Form a MJO Modeling Working Group (MMWG), connect to Clivar MJO Task Force, NOAA CTB, YOTC, ARM CMWG, NRL, THORPEX, GCSS
12. Submit an AMF2 proposal to ARM – Long
13. Compile list of deadlines, documents, and presentations