The U.S. effort of participating CINDY2011: "DYNAMO"

Chidong Zhang (RSMAS/U.Miami)

with
Chris Fairall (NOAA/ESRL)
Richard H. Johnson (Colorado State Univ.)
Michael McPhaden (NOAA/PMEL)

(Presented by Masaki Katsumata of JAMSTEC/IORGC)

“DYNAMO”:
DYNAmics of Madden-Julian Oscillation

U.S. Component to participate “CINDY2011”

Supposed Components

R/V Ronald H. Brown

U.S. Navy Base at Diego Garcia

US DOE ARM new mobile facility (AMF2)

R/V Ron Brown

Sensors:

- C-band Doppler Radar
- Radiosonde
- Surface Meteorological Sensors
- Acoustic Doppler Current Profiler
- CTD system

etc…

R/V Ron Brown

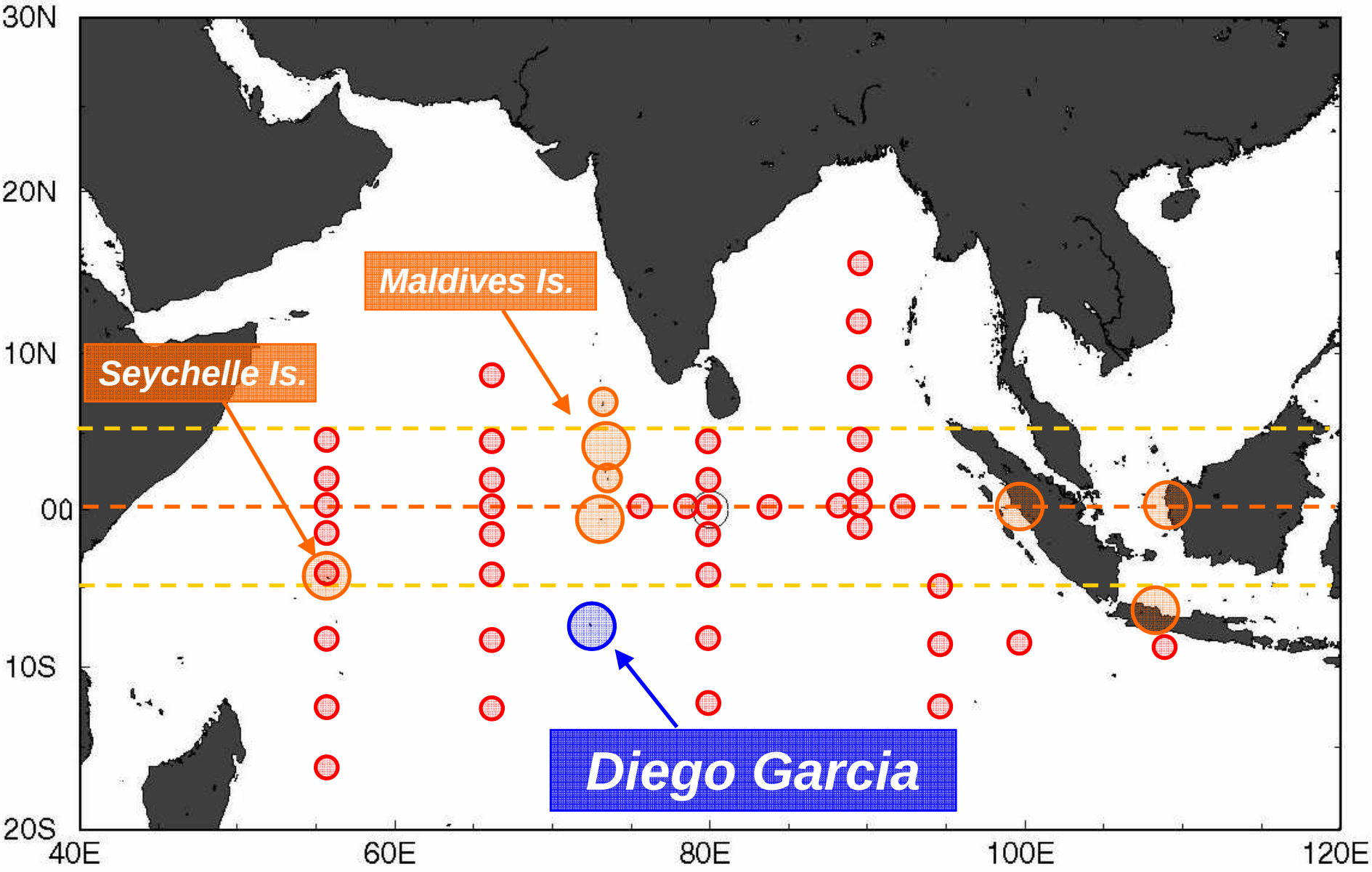
Present Status:

A request for the ship time of R/V Ron Brown has been submitted.

Issues at hand:

Some instruments (including meteorological sensors) on R/V Ron Brown have not worked properly. **It is unclear what NOAA's plan is to have them repaired/replaced**. RHB is currently serving experiment VOCALS (off Chili / Peru). A full status report on her instrumentations will be available later.

Diego Garcia



Diego Garcia

Present Status:

The US Office of Navy Research (ONR) has been briefed about DYNAMO and requested to help open a communication channel with the US Navy base at Garcia Diego on the possibility of launching soundings during DYNAMO.

ARM mobile facility

Sensors:

- Balloon-borne Sounding System (SONDE)
- Micropulse Lidar
- Microwave Radiometer
- Narrow Field of View Zenith Radiometer (869nm)
- Total Sky Imager
- Vaisala Ceilometer
- W-band (95GHz)
- Marine Atmospheric Emitted Radiation (M-AERI)
- Multifilter Rotating Shadowband Radiometer (MFRSR)
- Rotating Shadowband Radiometer
- Surface Meteorological Instrumentations
- Bulk Aerodynamic Fluxes
- Ocean Meteorology
- Sea State
- Acoustic Doppler Current Profiler

"shipboard deployments of the AMF2 are encouraged"

ARM mobile facility

Near Future:

Scientists from a Department of Energy (DOE) laboratory will work to bring the new DOE sea-going mobile facility (AMF2) to DYNAMO. (platform: TBD)

Logistics

Present Status:

• A rough budget for DYNAMO has been estimated.

• A white paper advocating the US participation in CINDY was presented to the US CLIVAR Summit in July 2008 and subsequently received supporting comments and suggestions from its Process Studies and Model Improvement Panel (PSMIP).

• The endorsement from the US CLIVAR has supposedly been forwarded to the US Inter-Agency Panel (including NOAA, NASA, NSF).

United States Participation in the 2011 Cooperative Indian Ocean Field Experiment

Prepared by
Chris Fairall (NOAA/ERSL), *Richard Johnson* (Colorado State University),
Michael McPhaden (NOAA/PMEL), *Chidong Zhang* (University of Miami)

Endorsed by the US CLIVAR MJO Working Group

Background I: Importance of the MJO/TIV

- Monsoons, ENSO, IODZM, ITF
- Teleconnections, extratropical rainfall and temperature extreme events
- Earth's rotation rate, length of the day
- Atmospheric and oceanic chemistry and biosystem (ozone, CO_2, aerosols, chlorophyll)
- Prediction potential (> 20 days)

Background II: Challenges

• limited intraseasonal prediction skill (< 10 days)
• inability of reproducing the MJO/TIV by global climate models
• poor understanding of the mechanisms for the MJO/TIV, especially their convective initiation
• lack of in situ observations in the equatorial Indian Ocean

Background III: MJO/TIV research recommended by

• THORPEX International Science Plan
• ECMWF and WCRP/THORPEX workshops
• Year of Tropical Convection (YOTC)
• US Climate Change Science Program (Synthesis and Assessment Product 3.3 “Weather and Climate Extreme in a Changing Climate”).

Scientific Rationale

• Convective initiation of the MJO/TIV is the least understood and its prediction more limited;

• Hypothesis testing requires continuous time series of vertical structures of convective systems and heat/moisture budgets – *available only from field campaigns*;

• No such time series from the equatorial Indian Ocean is available to date.

JAMSTEC commitment and international interests

• R/V MIRAI: ~ 50 days between Nov. 2011 – Jan. 1012

• seeking international participations

• international interests: Australia, US, China, India, France

Motivation and justification for the US participation

• Benefit from improved intraseasonal-seasonal prediction (hurricanes, North American Monsoon, ENSO, extreme weather events);

• An additional research vessel with Doppler radar capability (e.g., R/V Ron Brown) essential to the data collection – record length (up to 100 days) and constraint for the budget estimates – *only available from the US*.

US facility proposed:

Primary:

• A research vessel with Doppler radar capability (preferably R/V Ron Brown) for 50 days on station to rotate with R/V MIRAI

• soundings (≥ 4/day), air-sea flux and upper ocean measurement

Others (to be specified):

• Enhancement of RAMA

• measurement onboard of the research vessel for satellite validation, aerosols, etc.

Logistics

Comments by the US CLIVAR PSMIP panel

August 4, 2008

United States Participation in the 2011 Cooperative Indian Ocean Field Experiment (CIOFE) (prepared by *Chris Fairall* NOAA/ERSL, *Richard Johnson,* Colorado State University; *Michael McPhaden* (NOAA/PMEL); *Chidong Zhang,* University of Miami)

The PSMIP panel of the US CLIVAR was asked to comment on the draft proposal ''United States Participation in the 2011 Cooperative Indian Ocean Field Experiment''. One of our panel goals is to ensure that process studies lead to improvements in climate models. Over the course of the past few years we developed a set of ''best practices'' for process studies. These best practices are: (1) Modelers and experimentalists should be integrated in the study from the planning stage onward; (2) Synthesis data sets should be created that can be used as benchmarks for assessing and validating models; (3) Broad use of the data should be encouraged through: a) open data policies, b) centralized access to all components of experiment, c) archiving data in format intended for broad use.

The panel supports the preliminary plan with the following questions, comments, recommendations.

We note that tropical intraseasonal variability (TIV) and in particular the Madden-Julian Oscillation (MJO) play important roles in weather and climate. TIV/MJO influence

Logistics

Next Steps:

• A group of people from federal laboratories and universities will extend the white paper into a proposal (or pre-proposal) on DYNAMO.

• A mini workshop on DYNAMO might be held in the near future.

• We will propose to the US CLIVAR office to meet with the US Inter-Agency Panel to discuss the DYNAMO proposal.