

JAM 1/09/12

## DYNAMO Project

Field Phase Interim Progress Report  
30 December 2011

The project has been underway for over three months, though the official start date of the Intensive Observing Period (IOP) was 1 October. This report updates EOL staff on the data collection activities now underway in the DYNAMO Project. We continue in the IOP that lasts until 15 January 2012. Some facilities will continue observations through the end of March 2012. We recommend that you visit the DYNAMO Field Catalog at: <http://catalog1.eol.ucar.edu/cgi-bin/dynamo/report/index>. There is much more detailed information from all of the facilities, including reports, special products and science summaries.

The general weather pattern is now in the suppressed phase of the MJO. There have been three active phases since the beginning of October. There has been nearly continuous sampling by radar, upper air soundings, ship and buoy instrumentation. The first of the active phases occurred in the late October early November period in the DYNAMO Project domain. The second active phase was in the domain in the late November early December time period. And finally a period in late December appears to be an MJO with a few different characteristics. That said, there has been interesting weather at all of the observing sites throughout the 3 months of deployment.

### R/V Revelle, R/V Mirai, R/V Baruna Jaya III Ship Operations

The R/V Revelle has completed the first 3 legs of this long DYNAMO deployment. Leg 3 began on 8 November and concluded on 8 December in Phuket, Thailand. The Revelle was on station in the Indian Ocean to observe a complete MJO sequence from onset to secession. Interesting observations during the event included increased air-sea fluxes, precipitation near 50mm/day during the heavier rain, a westerly wind burst (>19m/s) and freshening of the ocean surface mixed layer. They are now in the middle of leg 4 that began on 16 December. The ship is located again along the Equator and making a full suite of observations as described in previous reports and on the catalog. They will return to Phuket one final time in mid-January 2012.



*Figure 1. Science crew from R/V Revelle cruise 3. Messrs. Verstraete and Lim are seen on the left side of the image*

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The R/V Baruna Jaya III sailed from 2-12 December from/to Merak, Indonesia to participate in DYNAMO. This is the 4th ship involved in atmospheric and oceanographic measurements. The vessel was located at 70°S, 95°E during the majority of its cruise making sounding, surface meteorology, sea surface temperature observations and collecting all sky imagery.



**Figure 2. Indonesian R/V Baruna Jaya III as deployed during CINDY/DYNAMO in the Indian Ocean.**

R/V Mirai cruise leg 2 began on 28 October after from Colombo, Sri Lanka and all measurements as described on the catalog and in the CINDY reports were resumed. The Mirai was on station at the Equator when the MJO active phase occurred in late November over the Indian Ocean.



**Figure 3. R/V Mirai operations during the leg CINDY/DYNAMO deployment in the Indian Ocean.**

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## **EOL/RSF and Texas A&M Research Doppler Radar Support**

The S-PolKa and SMART-R radars continued to collect data throughout the November-December period. Both radars are running well. The Ka band did have some minor outages but was repaired and back on line in short order. There is a very complete set of Addu Atoll science summaries throughout the two months prepared by the U. Washington group (e.g. Houze, Hence, Barnes, Chakravarty, Burleyson, Li and Powell) with contributions from the EOL S-PolKa scientists (Ellis, Weckwerth, Dixon, Hubbert) and available on the DYNAMO Field Catalog at: <http://catalog1.eol.ucar.edu/cgi-bin/dynamo/report/index>.

In addition, there are a number of other products, reports from facilities participating in the field campaign and weather forecasts that can be found on the site.

EOL staff deployed to Addu Atoll during the month of November and December include Scott Ellis, Mike Dixon, Joe VanAndel, Mike Strong, Al Phinney, Vivek, Paloma Gutierrez, Rich Erickson, Jose Meitin, Pei Tsai, Jonathan Emmet, Gordon Farquharson, Grant Gray, John Hubbert, Bryan Gales, Joe Vinson, Chris Burghart and Tammy Weckwerth. EOL/RSF has deployed most of its staff multiple times to support the radar facility operations in the Maldives. This is the longest S-PolKa deployment on foreign soil in Facility history.

The 17th SAARC Summit was held on Addu Atoll without incident, or at least any major ones. The DYNAMO team continued its operations at the Addu Supersite without difficulty.

## **EOL/ISF Integrated Sounding System Support**

EOL continues to operate two ISS sites for DYNAMO: on the R/V Revelle (a Scripps Institution of Oceanography vessel) and on the island of Diego Garcia at a Naval Support Facility (NSF) on the U.S. Air Force site. Both sites are established and operational launching radiosonde soundings every 3 hours, as well as running wind profilers and other surface meteorological equipment. Over 1400 soundings will be launched over the next 3 months from the two ISS sites alone.

The Revelle system continues operational in the research area east of the Maldives (along 80° East), followed by a port call in Phuket, Thailand, and is now back out in the research area. Sounding launches of either 4 (through November and early December) or 8 (at the present time) per day have continued through the period.

The system on Diego Garcia continues with regular sounding launches throughout the two month period. Eight per day launches continued through early December and now 4 per day launches are being made. There are enough expendables to permit an occasional 8 per day launch until operations conclude on 15 January 2012.

Both sites are being operated by EOL staff and 14 students from CSU and other universities. Sailing on the R/V Reville during November and December included Kurt Knudson, Lou Verstraete and Tim Lim, Laura Tudor, Chris Golubieski, Jonathan Smith, and Nicol Colasacco-Thumm. The Diego Garcia deployment for November and December was made up of staff from EOL/ISF and students from participating universities and included; Bill Brown, Lou Verstraete, Steve Cohn, Heather McIntyre, Rachel McCrary, Adam Davis, Jared Lee, Walter Hannah, Stephanie Slade, Jennifer Standridge, Ghassan Alka, Jr., and Jonathan Clark. Set-up crews were these folks, and Gary Granger, Steve Semmer, & Charlie Martin; at tear-down we will be joined by Patti Kidd.

### EOL/CDS Support

CDS provides extensive support in the planning and implementation of communications on Addu Atoll as well as the DYNAMO Field Catalog. Wide bandwidth communications for the S-PolKa, SMART-R and ARM sites is working well and provides for the real time exchange of radar and other meteorological data among the sites as well as improved Internet connectivity from the Maldives to the rest of the world.

Greg Stossmeister, Susan Stringer, Dennis Flanagan, Scot Loehrer, Jose Meitin and John Allison continue to contribute their considerable talents to customizing the Field Catalog system for this project and continue to support the system as it grows ever larger. This is a complex implementation with mirrored catalogs running in Boulder and on Addu Atoll because of the bandwidth constraints. In addition, CDS has provided a 'low bandwidth' version of the catalog that will help allow those aboard ship and on Diego Garcia to see important products and reports that may be useful keeping up to date with project activities. We are seeing an unprecedented amount of special reports and products from the research facilities at this time. We believe the catalog will be a long term resource for the documentation of this 6-month long field deployment.

The acquisition and relay of project research soundings to the GTS has taken considerable time and effort to coordinate, implement and monitor. Steve Williams and Scot Loehrer continue the task of coordinating with Colorado State University and nearly a dozen operational weather centers around the globe to make sure the research soundings are arriving at the numerical weather centers (e.g. NCEP, JMA, ECMWF) so that they might be assimilated into the operational global models. In addition, Steve has worked out a formal agreement with ECMWF to receive a special product stream from their operational models that are housed on the DYNAMO Field Catalog. <http://catalog1.eol.ucar.edu/dynamo/>

### DYNAMO Sounding Network

Dick Johnson and Paul Ciesielski from Colorado State University continue to support the implementation of the DYNAMO high resolution sounding network. Overall performance of network is quite good with launch success rate between 95-100% at all sites in the Indian Ocean region. The launch site at Manus Island in the western Pacific Ocean has a launch success rate around 90%. All nine enhanced research and operational sites in the enhanced network reported sonde data on the GTS at same time for the first time at 1200 UTC 29 October. The CSU group prepares several preliminary products that can be accessed via the Field Catalog. Figure 10 shows all sounding sites in the DYNAMO domain. The large red dots show the inner array with 4-8 per/day launches during most of the IOP. The EOL sites are the ones at Diego Garcia and at the SE Ship location. CSU is operating the launch site at Malé. The soundings at Gan and Manus Island (right edge of the image) are operated by the ARM/AMIE Project. An enhanced launch schedule at the Seychelles and Colombo, Sri Lanka are also underway. As of 9 January 2012 there have been approximately 12000 releases from the combined sounding sites shown in Figure 4

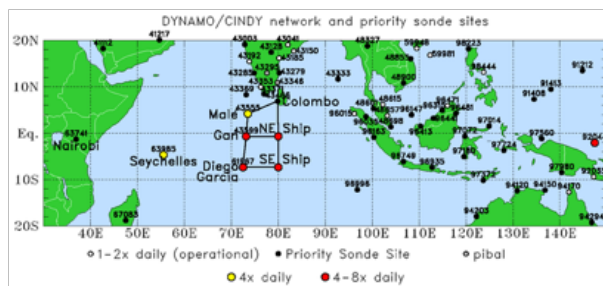


Figure 4. DYNAMO/CINDY Sounding network. There are special higher resolution operational and research sites shown in the larger yellow and red dots.

### DYNAMO Aircraft Operations (NOAA P-3 and French Falcon 20).

The NOAA P-3 was deployed to Diego Garcia from mid-November to mid-December 2011. The primary scientific mission was to document boundary layer, air-sea interface, upper ocean and low-mid troposphere. Instrumentation on the aircraft included a variety microphysical, state and dynamical instrumentation as well as deployable dropsondes and AXBTs. The aircraft is also equipped with C-band conventional and X-band Doppler weather radar for detailed reflectivity and air motion measurements along the path of flight. The P-3 science team developed a series of flight modules that permitted the accomplishment of multiple science objectives on a single flight. The aircraft made observations in various locations within the DYNAMO Project domain including in the vicinity of the ships along 80°E and near Addu Atoll and the radar supersite. There were 12 research flights made during the deployment period. Flight mission reports are available on the DYNAMO Field Catalog.



*Figure 5. NOAA P-3 on the tarmac at Diego Garcia during DYNAMO.*

The French SAFIRE Falcon 20 jet aircraft was deployed to Gan Island to make microphysical measurements in the anvils of convective systems within the coverage area of the S-Polka and SMART-R radars. The aircraft was in the Maldives from late November through mid-December 2011 and 8 research and or calibration missions were flown. These measurements will be part of the calibration of a new satellite recently launched as a collaboration between France and India.



*Figure 6. CNES Falcon 20 jet aircraft on the tarmac at Gan International Airport, Maldives*

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**End of Report**