The NOAA El Niño Rapid Response (ENRR) Field Campaign

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Forecasts by the summer of 2015 indicated a strong El Niño was very likely during winter 2015-16. This lead time was sufficient to identify an exceptional scientific opportunity to accelerate advances in understanding and predictions of an extreme climate event and its impacts *while the event was ongoing*. Acting on this opportunity, NOAA initiated the El Niño Rapid Response (ENRR) project. The ~~Physical Sciences Division (PSD) led NOAA ENRR project~~ENRR efforts led by ESRL Physical Sciences Division (PSD) included an observational field campaign and model experiments performed to optimize observational strategies and support NOAA services in anticipating risks and impacts related to this event. This presentation focuses on the field campaign.

The primary ~~goal~~ objective of the ENRR field campaign was to determine the initial tropical atmospheric response linking El Niño to its global impacts. The campaign conducted intensive observations in a data-sparse region over the central Pacific Ocean near the heart of El Niño. NOAA's Gulfstream IV (G-IV) was deployed from Hawaii for 22 flights between January 19 to March 9 to obtain wind, temperature, moisture, and precipitation profiles through use of dropsondes, tail Doppler radar, and flight level observations. The majority of those flights were over the central tropical Pacific, sampling organized tropical convection and poleward convective outflow. The G-IV mission concluded with three flights in five days examining the cascade of linked dynamical processes between the Tropics and extratropics that culminated in a landfalling storm with heavy precipitation along the U.S. West Coast ~~on~~ March 10-13. The G-IV data were augmented by twice-daily radiosonde launches from Kiritimati (Christmas) Island, up to 8 times/day launched from the NOAA Research Vessel Ronald H. Brown in the eastern tropical Pacific during a TAO mooring survey, and scanning X-band radar positioned in Santa Clara CA. During the campaign the ENRR project also coordinated with the NOAA ~~SHOUT~~ Sensing Hazards with Operational Unmanned Technology (SHOUT) program, which conducted three extratropical North Pacific flights with the unmanned NASA Global Hawk. In addition, NASA Ames conducted a complementary Alpha Jet flight to measure central California coastal jet features, and ~~SIO~~ Scripps Institution of Oceanography organized complementary Air Force C-130 flights targeting atmospheric rivers over the North Pacific.

Data from the ENRR campaign were provided in real-time for assimilation into operational prediction models through the Global Telecommunication System, and are available to the community through the NOAA ESRL/PSD web site ~~PSD ENRR data~~ENRR data. Here, we present initial results to illustrate how ~~the campaign's objectives are being met~~this unprecedented set of high-resolution tropical atmospheric observations collected during a strong El Niño are being used to 1) ~~provide an unprecedented data set of high resolution observations for evaluating~~evaluate thermodynamic, wind, precipitation and boundary layer structures around and poleward of deep convection ~~during a strong El Niño~~; 2) ~~provide data for use in~~perform satellite validation and calibration, model sensitivity analyses, and data assimilation studies;

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and 3) ~~provide detailed observations to enable NOAA and the external community~~diagnose ~~to advance understanding of physical processes~~ observed and modeled tropical processes ~~in the tropics and~~ and ~~–~~tropical-extratropical ~~interactions to improve~~ interactions to advance understanding and identify model deficiencies in representing physical processes, with the ultimate goal of improving weather and climate predictions.~~weather and climate models, predictions and projections.~~