

## **Flow-topography Interactions in the Vicinity of a Deep Ocean Island and a Ridge**

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### **LONG-TERM GOALS**

The overarching goal is to characterize and to develop model parameterizations of unresolved physical processes resulting from large-scale flow interactions with small-scale abrupt topographic features.

### **OBJECTIVES**

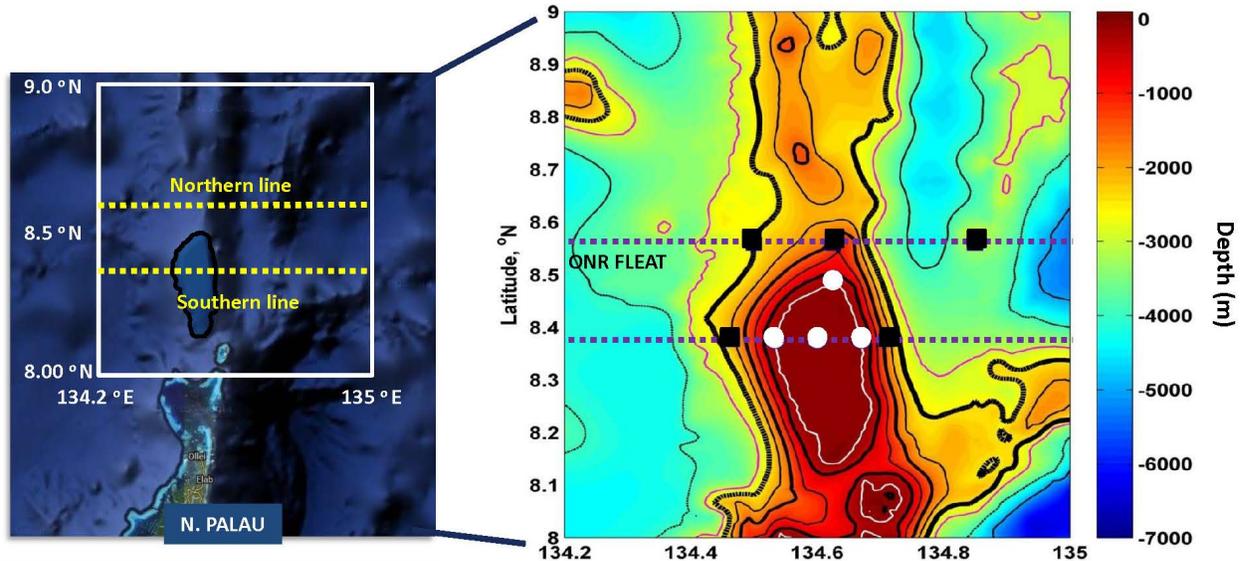
The primary objective is to collect observations to evaluate hydrographic, current, and turbulence fields to characterize currents when a large-scale flow (such as the North Equatorial Current, NEC) encounters a combination of a steep ridge and an island (Palau Island) under a wide range of background currents and stratifications.

### **APPROACH**

We focus on time scales of hours to seasonal variability of currents and mixing in the vicinity of Palau Island. We propose two mooring lines: the first mooring-line located north of Palau covers the submarine ridge, while the second mooring-line covers deep slopes and the shallow bank just north of Palau (Figure 1). We propose to deploy four to five string moorings along with microstructure gliders as part of the ship-based survey. Five sub-surface moorings (black squares) will be deployed around the island at depths ranging from 1000 m to 3500 m, while shallow moorings (white bullets) are limited to upper 100 m. Moorings will be equipped with two ADCPs (300 kHz upward looking and 75 kHz downward looking) and T, C, and P sensors with sampling rates varying from one minute to an hour. We expect to deploy moorings in May 2016. However, the optimal locations of these moorings will be finalized by consulting with other ONR FLEAT-PIs. We anticipate strong down-slope currents, high-frequency motions, and energetic turbulence over the ridges and slopes. We expect to deploy these moorings for a period of about one year. Junior scientist, Dr. Ana Rice, and two engineering technicians Mr. Andrew Quaid and Ian Martens will participate the experiment. Note: extra moorings will be added to the proposed mooring lines if NRL FY17 new start will be funded. We expect to collaborate with Jim Moum at Oregon State University for measuring turbulent mixing and bottom pressure measurements on our moored platforms.

## WORK COMPLETED

Attend the FLEAT planning meeting in June 2015 at Scripps Institute of Oceanography. Preliminary deep-mooring designs have been completed, and parts and sensors are in the processes of ordering.



*Figure 1: Proposed north and south mooring lines and location of shallow (white bullets) and deep (black squares) moorings just north of Palau island.*

## RESULTS

Preliminary design of deep moorings.

## IMPACT/APPLICATIONS

The longer term impact of this study is the development of new parameterizations to improve accurate prediction of ocean flow around abrupt topography in operational Navy models.

## RELATED PROJECTS

NRL FY17 6.2 New Start proposal (pending proposal), titled “Predictability of Flow Interacting with Abrupt Topography (FIAT)”; lead PI: Ana Rice, NRL-SSC. The objective of FIAT is to use observations to develop Navy assimilative modeling capabilities to predict flow interacting with abrupt topography.