

Satellite Observations of Surface Signatures in the Philippine Sea

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LONG-TERM GOALS

The long term goal of this proposed project is to enhance our understanding of the oceanographic processes and features arising in and around straits, and improve our capability to predict the inherent spatial and temporal variability of these regions using models and advanced data assimilation techniques. Features and processes of interest are those which drive the local spatial variability on short time scales, via their relation to abrupt topography and their interaction with the mean flow, tidal and seasonal cycles. In order to improve the understanding of these dynamical processes in Philippine Archipelago Straits we will collect satellite-based microwave observations to predict better the presence of features and processes in these straits.

OBJECTIVES

To improve the characterizations of the Philippine Archipelago Straits dynamics we propose to acquire satellite data, in particular synthetic aperture radar (SAR) imagery of features and processes present in these straits. The acquisition of these microwave satellite data will support the scientific objectives of this study, and modeling and analysis of the data will be carried out by collaborating investigators. Specific questions to answer these objectives are:

- 1) Does the present DRI afford opportunities to study phenomena or processes that are novel to straits or archipelagos, and perhaps unique to the Philippine Archipelago? Such processes might include:
 - i. Waves and steady flows in branching channels.
 - ii. SAR-detectible surface patterns caused by subsurface features (internal waves, Mach lines, expansion fans, oblique shocks, etc.)
- 2) How does the archipelago geometry impact the propagation of waves through the interior?
 - i. The eastern boundary of the archipelago is bombarded by westward propagating, Pacific Ocean waves and eddies. How far into the interior do these signals propagate?
 - ii. Are there localized regions of supercritical flow that block this flow of information?

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- 3) What factors (including physical processes) determine the distribution and evolution of optical properties, sediment transport, turbidity and other tracers?
- 4) Overall, does the physical oceanography of the archipelago align with one of the paradigms for archipelagos, including coupled oscillators, veins, or porous media?

APPROACH

The multitude of straits and seas within Philippine waters offer a wide variety of topographic conditions, including an assortment of channel widths and sill depths plus island distribution; connecting seas of varied shapes and depths, with a range of remote forcing attributes. Surprisingly, not all that much is known about the oceanography within the Philippine straits and seas (Figure 1).

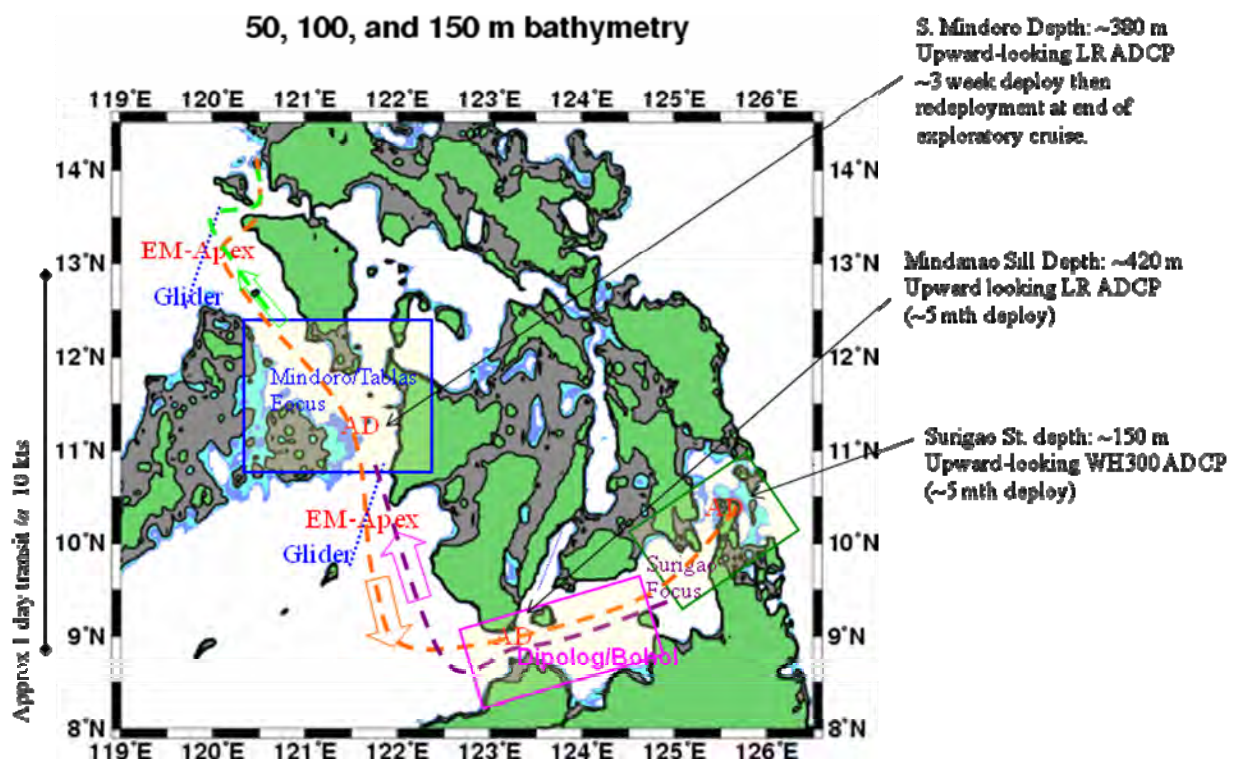


Figure 1: The Philippine Archipelago.

In support of ship-based experiments over the next 12 months, CSTARS plans to acquire all possibly available SAR images over the Philippine Archipelago focusing on major regions such as Surigao Straits, the Mindanao Straits and the Mindoro Straits (Figure 1). We would primarily schedule both ascending and descending passes for ENVISAT ASAR and ERS-2 and some RadarSat-1 using different beam modes that would include ScanSAR, standard and fine beam modes depending on the location. All images would be expedited, if possible, and made available in as soon as possible after acquisition to assist in enhancing the experimental program. To accomplish this we would utilize on

board recording capabilities and retrieve the data from a special ftp site to CSTARS for processing and utilize satellite data relay links and retrieve data from a password-protected rolling archive and/or utilize suitable ground stations in the region to relay the data back to CSTARS.

WORK COMPLETED

- 1) Eighteen swaths of ENVISAT ASAR and ERS-2 data consisting of multiple scenes were collected during the June 2007 experimental phase, then processed and delivered to project.
- 2) New pass schedules have been submitted for a total of 70 ERS-2 and ENVISAT SAR scenes for the upcoming January/February 2008 experiment.

RESULTS

CSTARS only delivers images.

IMPACT/APPLICATIONS

None yet.

TRANSITIONS

None. Project just started.

RELATED PROJECTS

None. Project just started.