

Visiting researchers prompt IPRC/JIMAR mini-workshop on submesoscale phenomena

The stirring and mixing of the upper ocean by eddies involves complex motions and interactions that are dependent on scale, location, and even season. Presentations at IPRC's recent mini-workshop focused on motions occurring on the small to medium scale—1 km to 100 km—usually referred to as “submesoscale.” The research on these submesoscale dynamics represents an international effort, as aptly demonstrated by the array of presenters from France, Japan, and the US at the event.

The lively, interactive workshop at IPRC was inspired by the visit of **Patrice Klein**, from the French Research Institute for Exploitation of the Sea (IFREMER), who is spending two years at the California Institute of Technology and the Jet Propulsion Laboratory (JPL). Klein presented

an interesting look at the potential for, and possible issues of, studying submesoscale dynamics using an upcoming satellite instrument called SWOT (Surface Water Ocean Topography), an ocean altimeter that uses interferometry to increase resolution to ten times greater than previous satellite altimeters. **Lee Fu**, also of JPL, delved into more SWOT details, focusing on the challenges of calibrating and verifying the instrument in order to take advantage of the higher resolution footprint of only 2 km. He recommended



deploying arrays of buoys in targeted locations to make concurrent sea surface measurements and provide ground-truthing for the orbital instrument. **Daiki Ito**, from Tohoku University, Japan, later took up a similar theme, using multiple sources to make *in-situ* measurements of submesoscale phenomena: shipboard observations, ARGO float data, and satellite altimetry.

Bo Qiu, from the Oceanography Department at the University of Hawai'i at Mānoa, examined submesoscale dynamics in a region of the western Pacific Ocean, identifying the dominant processes in four distinct flow regimes. He noted some specific seasonal differences observable in his data set, a relationship also discussed in more detail by **Hideharu Sasaki**, from the Japan Agency for Marine-Earth Science and Technology (JAMSTEC). Sasaki focused on the Eastern Subtropical Pacific, presenting model results that indicate the mechanisms that control the seasonal variability in submesoscale activity observed in that region. Emphasizing the atmosphere-ocean connection, there was speculation that wind instability and mesoscale activity in the atmosphere could be a source for ocean submesoscale activity. **Kelvin Richards**, Director of IPRC, finished off the workshop by presenting preliminary work combining biogeochemical modeling with ocean mixing models to examine the possible effects of climate change on submesoscale activity and resulting changes to the oceanic biosphere.

By the end of the workshop, there was much satisfaction about the shared information, and strong agreement that interested parties must have a repeat of the event next year.