Submesoscale cascade processes in the S. China Sea

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The S. China Sea is understood to be one of the most energetic regional seas in the global ocean. The combination of the Kuroshio Current, the monsoon, strong tides, and the dramatic topography of the Luzon Strait lead to a rich physical forcing environment. In addition to the enhanced internal wave environment that has been the focus of much work (ASIAEX, NLIWI and IWISE), the region southwest of Taiwan has been documented as a maximum in eddy kinetic energy. However, outside of the realm of internal wave processes, the physics of the submesoscale cascade of energy has been poorly studied.

Here, we describe a new examination of submesoscale processes in the S. China Sea. The focus is on the class of oceanographic variability that is poorly constrained in models including eddies, vortices and filaments, and their interactions with smaller-scale phenomena (Fig. 1A). While the whole S. China Sea system is of interest, including the Vietnam East Sea, the initial survey work has focused on the region just southwest of Taiwan. In this region, the Kuroshio Current feeds warm-salty water through the Luzon Strait. As the Current meanders into the Luzon Strait, it sheds eddies and filaments, which in turn interact with the local wind forcing. Along the southern tip of Taiwan, the wind field is complicated by the blocking effects of high mountains on the eastern side of Taiwan, with easterly winds south of Taiwan, and northerly winds in the Taiwan Strait. This combination of eddies, filaments, and wind lead to an active submesoscale cascade.

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