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Wind-induced near 13-day ocean response in the North Pacific: Observation and simulation

Jae-Hun Park (1), Hanna Na (2), D. Randolph Watts (2), Kathleen Donohue (2), and Ho Jin Lee (3)

(1) Korea Institute of Ocean Science and Technology, Ansan, Korea, (2) Graduate School of Oceanography, University of Rhode Island, Narragansett, USA, (3) College of Ocean Science and Technology, Korea Maritime University, Busan, Korea

Wind-induced near 13-day barotropic ocean response in the North Pacific is investigated using both in-situ bottom-pressure measurements and numerical simulations. In the 2-year-long Kuroshio Extension System Study (KESS) experiment, near-bottom pressure sensors observed an energetic high-frequency variation near 13-day periods. The first cyclostationary empirical orthogonal function (CSEOF) mode for the near 13-day KESS bottom pressure explains about 57% of the variance and exhibits nearly in-phase variability in space with a hint of westward propagation. It also shows that the strong 13-day variability occurs during winter and is driven by the large-scale wind-stress curl over a broad region of the North Pacific. The result from a wind-forced numerical simulation over the North Pacific closely follows the observations. Additional numerical experiments using different topographies including flat bottom case indicate that topography confines the barotropic response to the west of Emperor Seamount Chain and slows the westward propagation of the near 13-day bottom-pressure variability.