Coupled ocean-atmosphere interactions over oceanic boundary currents

*Hyodae Seo[1]

1. Woods Hole Oceanographic Institution

The oceanic boundary current systems are often characterized by the intense and narrow currents and the enhanced eddy activity. The induced SSTs and surface currents induce significant and persistent spatial variations in the momentum, heat, and moisture fluxes, whose impacts are manifested not just on the stability of the currents and the upper ocean stratification but also extends to the downstream development of the atmospheric processes. Two types of eddy-induced coupled feedbacks exist, one that arises from the mesoscale SST impacting the surface wind, and another through the surface current that modulates the stress through relative wind effect. These thermal and mechanical couplings co-exist in nature, but their impacts are shown to be rather distinctive. The goal of this presentation is to review these distinctive effects of eddy-induced air-sea coupled feedbacks, examine spatial scale dependence of the coupling, and explore their coupled effect on the large-scale atmospheric circulation. The presentation will focus on several oceanic boundary current systems, including the California Current System in the Northeast Pacific and two seasonal western boundary currents in the Indian Ocean. The relevance of the result to other, more significant western boundary currents in the extratropics will also be discussed.

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