

Oceanic and atmospheric weather intertwined

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Abstract

The oceanic weather, ocean mesoscale eddies, typically features sea surface temperature (SST) anomalies. These SST anomalies are expected to affect the overlying atmosphere. Here, based on satellite observations of several 100,000 snapshots of eddies in the Southern Ocean occurring between 1997 and 2010, we show that ocean eddies significantly alter near surface wind and cloud properties as well as rainfall by several percent. The spatial pattern of these changes is consistent with a mechanism labeled downward momentum mechanism in which the SST anomalies related to eddies modify the stability and thus turbulence of the atmospheric boundary layer. This impact of the oceanic on the atmospheric weather appears striking given the fact that the two feature typical spatial scales that differ by an order of magnitude: Oceanic eddies constitute non-stationary SST fronts of moderate size relative to low pressure systems constantly passing by at these latitudes. We expect our results to hold globally, though, given that we are finding the effect to intensify with increasing wind speeds, the mid-latitude westerly wind belts with comparatively high average wind speeds may be especially prone to the SST effect. I will discuss the potential of the impact of SST anomalies to in turn alter ocean mesoscale energy.