Geophysical Research Abstracts
Vol. 21, EGU2019-12410, 2019
EGU General Assembly 2019

Scale and Rossby number dependence of the observed imprint of ocean mesoscale SST on wind stress

Niklas Schneider

Department of Oceanography and International Pacific Research Center, University of Hawai'i at Mānoa, Honolulu, United States (nschneid@hawaii.edu)

Ocean-mesoscale sea surface temperatures (SST) leave a strong imprint on surface wind stress. To explore the dependences of underlying dynamics on length-scale and on large-scale wind direction and speed, we represent the spatial co-variability of QuikSCAT scatterometer observed equivalent neutral winds and AMSR-E radiometer SST by spectral transfer functions. These relate spectral amplitudes of winds and SST as a function of wave numbers aligned with, and perpendicular to, large-scale winds. Application in the Southern Ocean shows this approach captures the equivalent neutral wind responses, and shows distinct dependences on scale and on large-scale wind speed and direction. For Rossby numbers larger than one, ocean-mesoscale SST induced wind speeds are large and include a lagged component. This suggests modulation of vertical mixing as underlying process. For Rossby numbers smaller than one, responses of wind speed and direction reflect a modulation of Ekman spiral with a thermally direct circulation due to SST induced pressure gradients. Responses to idealized sea surface temperature patterns recover and refine published composites.