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Wind Speed, Surface Flux, and Convection Coupling from CYGNSS Data

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This study analyzes wind speed and surface latent heat flux anomalies from the Cyclone Global Navigation Satellite System (CYGNSS), aiming to understand the physical mechanisms regulating intraseasonal convection, particularly associated with the Madden-Julian oscillation (MJO). The importance of wind-driven surface flux variability for supporting east Pacific diurnal convective disturbances during boreal summer is also examined. An advantage of CYGNSS compared to other space-based datasets is that its surface wind speed retrievals have reduced attenuation by precipitation, thus providing improved information about the importance of wind-induced surface fluxes for the maintenance of convection. Consistent with previous studies from buoys, CYGNSS shows that enhanced MJO precipitation is associated with enhanced wind speeds, and that associated surface heat fluxes anomalies have a magnitude about 7%-12% of precipitation anomalies. Thus, latent heat flux anomalies are an important maintenance mechanism for MJO convection through the column moist static energy budget. A composite analysis during boreal summer over the eastern north Pacific also supports the idea that wind-induced surface flux is important for MJO maintenance there. We also show the surface fluxes help moisten the atmosphere in advance of diurnal convective disturbances that propagate offshore from the Colombian Coast during boreal summer, helping to sustain such convection.