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Intraseasonal Sea Surface Warming in the Western Indian Ocean by Oceanic Equatorial Rossby Waves

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In the western Indian Ocean, a novel process is identified whereby equatorial Rossby waves grow and maintain warm sea surface temperature anomalies against cooling by processes related to atmospheric convection. Such cooling processes include increased upper ocean mixing, enhanced latent heat fluxes out of the ocean, and reduced shortwave radiation into the ocean resulting from increased cloud cover. When downwelling equatorial Rossby waves enter the western Indian Ocean, SST anomalies of +0.15K develop around 60E. These warm anomalies are hypothesized to stimulate convective onset of the Intraseasonal Oscillation by increasing atmospheric boundary layer convergence and surface heat fluxes. The upper ocean warming that manifests in response to the oceanic waves is examined in a mixed layer heat budget using observational and reanalysis products, respectively. In the heat budgets, horizontal advection is the leading contributor to warming, in part due to an equatorial westward jet of 80 cm/s that is forced by the downwelling waves. When anomalous currents associated with the waves are removed in the respective budgets, warming in the western Indian Ocean is eliminated in observations and reduced by 55% in reanalysis.