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Links between Sea Surface Salinity and Terrestrial Precipitation: Case Study of Australia during ENSO/IOD events

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Oceans are the major source of atmospheric moisture that results in precipitation over land. The moisture originating from the ocean through evaporation, leaves an imprint on sea surface salinity. The variation in sea surface salinity, with its associated atmospheric moisture flux enables us to identify the oceanic source of moisture and its trajectory for precipitation over land. In this study we demonstrate that sea surface salinity is a good indicator for locating the ocean sources of moisture and as an example we use Australian precipitation data during El Niño-Southern Oscillation/Indian Ocean dipole (ENSO/IOD) events. These events are ideal for this application because they provide a large signal-to-noise ratio. The moisture transport during the selected ENSO/IOD events from ocean to land is traced by using atmospheric moisture flux divergence. Composite maps of sea surface temperature, sea surface salinity, moisture flux divergence and Australian precipitation during ENSO/IOD events shows, the oceanic signals in precipitation over land. As ENSO/IOD events evolve, a characteristic sea surface salinity signal also emerges, accompanied by moisture flux divergence and transport. Our results also suggest that the characteristic sea surface salinity signatures occur prior to the peak of ENSO/IOD events and raises the prospect that tracking of sea surface salinity can reveal the source of moisture for terrestrial precipitation. Further, our study (for Australia) along with previous study (for US mid-west) show, during extreme precipitation events, moisture originating from ocean (Indo-Pacific for Australia and north Atlantic for US mid-west) leaves an imprint on sea surface salinity in prior seasons. This suggest that preseason sea surface salinity could also aid the improvement of seasonal prediction of extreme precipitation events across the globe.