

Earth-Moon-Sun alignments influencing Tropical Climate Events

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Abstract

The traditional approach used to monitor sea level from satellites has to date relied on the removal of tidal elevations. However, at periods close to fortnight tides, instabilities in the oceanic and atmospheric circulations can emerge. Here we report that Tropical Instability Waves (TIW) occur quasi-biweekly in the three ocean basins and atmosphere when the Earth-Moon-Sun alignments increase the diurnal energy converging from mid-latitudes to the two fluids in the tropics. The quasi-biweekly Indian Ocean TIWs are associated with vertical tropospheric convection, asymmetrically influencing the North and South climate at longer periods. We find that every 18.6 years, as the amplitude of diurnal tides and the lunar inclination decrease, biweekly TIWs become less active in the Pacific, favoring the growth of El Niño events like in 1997. Our coral reef record analysis confirms that since 1850, all years of lunar minimum had warm events.