Diurnal signals in satellite sea surface temperature measurements

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The formation of a near-surface diurnal warm layer, particularly in regions with low wind speeds, is clearly present in daytime satellite sea surface temperature (SST) measurements. TMI, AMSR-E, and AVHRR satellite SST retrievals reveal significant diurnal amplitudes covering large oceanic regions, with regional distribution and amplitude of warming varying significantly within annual cycles. The onset of warming sometimes begins as early as 8 AM and generally peaks near 3 PM, with a magnitude of 2.8 K during favorable conditions. After this peak, the signal decays, but sometimes extends until 11 PM. Evidence of warming exists up to wind speeds of 10 m/s, affecting most daytime retrievals, and resulting in a globally average warming of 0.2 K in AVHRR daytime SSTs. This has consequences for any analysis utilizing daytime SSTs. A simple empirical model was calculated from satellite SSTs, satellite wind speeds, and modeled insolation. This model appears to accurately model diurnal warming and nocturnal cooling present in the satellite retrievals. A better understanding of how wind, insolation, and clouds affect diurnal variability is necessary for optimal fusion of satellite retrievals with different ascending node times.