



Abstract View

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Large Diurnal Heating of the Sea Surface Observed by the HCMR Experiment

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ABSTRACT

Day–night surface temperature differences measured in the infrared (10.5–12.5 μm channel) by the HCMR satellite experiment frequently show large diurnal heating (several $^{\circ}\text{C}$) of the upper layer of the ocean during the summer months in the Mediterranean Sea when the wind speed is low. When observed in the 0.5–1.1 μm channel, glitter reflectance—i.e., direct solar radiation specularly reflected towards the sensor—correlates with diurnal heating. Glitter reflectance has been modeled to retrieve an equivalent wind speed. Observed diurnal heating (ΔT) do not exceed 5°C , in agreement with the limit value calculated from the heat transfer equation assuming thermal diffusivity is only molecular. The influence of wind speed can be approximately described by $\Delta T = 0.4U^{-1} + 0.5$ (in $^{\circ}\text{C}$ for U in m s^{-1}), for U less than 2 m s^{-1} . A mean diurnal heating of nearly 1°C is calculated for the marine coastal areas of southern France. During this period, satellite observations should be restricted to night and early morning orbits, or to periods of high wind speed ($U > 5 \text{ m s}^{-1}$).

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