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An experimental study of the air/water interfacial surface temperature field during mixed convection[1] J. KOU, Clemson University, K.P. JUDD, V Systems, Inc., J.R. SAYLOR, Clemson University — The statistics of the surface temperature field of an air/water interface undergoing mixed convection were investigated experimentally. A body of water was exposed to a flow of air having a speed ranging from 1.0 to 4.0 m/s. The water body was warmer than the air and heat was transferred from the water to the air via mixed convection. The temperature field of the water surface was measured using an infrared camera. The statistics of the surface temperature field were computed, specifically the root mean square (rms) and the skewness. The rms was found to increase linearly with the heat flux emanating from the water surface, and was found not to be a function of the wind speed. The skewness was a weak function of the heat flux, and depended strongly on the wind speed. Although obtained under laboratory conditions, these results suggest that remotely sensed statistics of the surface temperature field can be used to measure the heat flux and the wind speed over water bodies. The temporally averaged surface temperature varied significantly across the water surface, requiring care in choosing a method for subtracting a mean prior to computing rms and skewness. The pdfs of the surface temperature field are also presented.

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