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Observations of the surface temperature field at an air-water interface for both stable and unstable conditions[1] GEOFFREY SMITH, ROBERT HANDLER, NICHOLAS SCOTT, Naval Reasearch Laboratory — High-resolution infrared (IR) imagery of the air-water interface was obtained during experiments performed at the ASIST facility at the University of Miami. During the experiments wind speeds ranged from approximately 2 ms^{-1} to 10 ms^{-1}, and flux based Richardson numbers ranged from about 10^{-2} to 10^{-5}. Results from two regimes will be presented: the cool-skin case, where the water surface temperature is less than the bulk fluid, and the warm-skin case, where the water surface is warmer than the bulk. In the cool skin case the low wind speed data show a cellular structure in which the lateral length scale of the cells varies as the inverse of the friction velocity. The imagery clearly shows a progression from no waves, through non-breaking gravity waves, to a system of seemingly omnidirectional breaking events. In the warm-skin case the dominant cellular structure is still present, strongly suggesting that these small scale features are due to shear instabilities in the surface layer. However, the natural stability of the system appears to surpress the smallest scales of the surface turbulence.

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