

JHU/APL NEAR-SURFACE ATMOSPHERIC PROFILER,  
PART II: COMPARISONS OF BOUNDARY LAYER MODEL  
PREDICTIONS OF MODIFIED REFRACTIVITY TO OBSER-  
VATIONS

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The Johns Hopkins University Applied Physics Laboratory developed and fielded an 8-meter atmospheric profiler, mounted on a catamaran, which collected temperature and humidity profiles from near the ocean surface to 7.3 meters in height. Part I of this series of papers addresses the instrumentation design and the first set of vertical data profiles. Vertical profiles of radar modified refractivity and virtual potential temperature were calculated from the raw data profiles. Boundary layer model results are compared to observations from a data set collected on the Wallops Island test range during December 2003. In particular the Naval Postgraduate School (NPS) version of the LKB boundary layer model was used to generate predictions of radar modified refractivity from coincident fixed sensor averages taken from mast-mounted meteorological boxes on the R/V Chessie. The NPS-LKB model first predicts profiles of temperature and humidity from bulk inputs, and then calculates profiles of radar modified refractivity from profiles of temperature and humidity. When evaporation ducts are present, NPS-LKB determines evaporation duct height from the minimum of modified refractivity as a function of height in the profile. No evaporation ducts were observed in the December 2003 data set. Atmospheric conditions were stable during the test, which is an area where the models are generally lacking in field validation. The NPS-LKB results are sensitive to the input sea surface temperature boundary condition. Bulk sea surface temperature from a thermistor at a depth of 2-cm and from APL downward-looking Infrared sea temperature sensor were used. Errors are reduced using the IR sensor, which provides sea surface skin temperature rather than a bulk sea temperature from the immersed thermistor. Initial comparisons of model predictions to field observations are promising.

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3. (a)
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5. This paper should be presented in sequence with an accompanying paper, Part I.