

AN EXPERIMENTAL STUDY OF THE VERTICAL STRUCTURE OF THE MARINE ATMOSPHERIC BOUNDARY LAYER

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EXTENDED ABSTRACT

The main aim of this work was the experimental study of the vertical structure of the mean and turbulent characteristics of the Marine Atmospheric Boundary Layer (MABL). The experimental campaign was carried out at the coastal area of a small island (Nantucket, Massachusetts, USA) that is characterized by flat terrain. The experimental instrumentation, consisted of a 3D commercial acoustic sounder system (sodar), a 10m meteorological mast equipped with low and fast response meteorological instruments measuring at two levels wind, temperature and humidity and a radiosonde system calculating the horizontal wind speed and direction, temperature and humidity profiles.

A first evaluation of the available data for one typical experimental day revealed a 350m deep MABL, characterized with high relative humidity values and associated with a strong temperature height inversion. The wind speed and direction successive one-hour averaged profiles measured by the sodar, give information on the time evolution of the MABL's vertical structure. Finally, the variances of the vertical wind speed profiles estimated by the sodar, depend on the stability of the Atmospheric Boundary Layer and follow the similarity theory for both stable and unstable conditions.

Key words: Marine Atmospheric Boundary Layer, sodar, turbulence parameters