Atmospheric Turbulence Measurements in Coastal Zone during C-Fog 2018

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Measurements of atmospheric turbulence made at Ferryland, Newfoundland, Canada located near the coast of the Atlantic Ocean south to City of St. John's during the C-Fog Program (September-October 2018) are used to study turbulent fluxes, scaling laws for turbulent mixing, turbulent kinetic energy, dissipation rates, and basic meteorological parameters in the coastal zone. A collaborative research project, dubbed as the C-Fog (coastal fog) designed to better understand air-sea/land coupling in the coastal zone with emphases on marine fog. Coastal fog is a challenging type with important maritime and aviation implications. Marine fog typically forms due to advection of warm and moist air over colder ocean surfaces (called cold sea fog) or cold dry air over warmer ocean surfaces (warm sea fog). The study focuses on sub-grid turbulence processes relevant to NWP and other numerical forecasting models. Turbulent and mean meteorological data were collected at multiple levels on 16-m flux tower deployed on land in close proximity of the shoreline. The data allow studies of temporal and spatial variations of offshore and onshore coastal atmospheric boundary layer flows, developing internal boundary layers over inhomogeneous regions with and without fog. This study compares the turbulent fluxes and other turbulence statistics as well as different scaling laws over different footprints, including a relatively smooth sea surface and aerodynamically rough dry inland areas. (This research was funded by the ONR Award # N00014-18-1-2472 entitled: Toward Improving Coastal Fog Prediction, C-FOG).