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Micrometeorological characteristics of sea fogs off the west coast of the Korean Peninsula

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Incheon International Airport (hereafter IIA) is located on a partly reclaimed island off the west coast of Korea and aircraft operation at IIA often suffers from visibility degradation due to sea fogs. The number of sea fogs that influenced the IIA area is 35 from 2002 to 2006. They are classified into cold sea fogs (27) and warm sea fogs (8), based on the temperature difference between the sea surface and the air above, i.e. the SST and the air temperature at the buoy near IIA. However, clear physical mechanisms that lead to the formation of both cold and warm sea fogs have not been identified yet. For that task, various analyses of meteorological data from micrometeorological to synoptic scales including vertical soundings must be examined. In addition, numerical modeling should be supplemented because of the temporal and spatial limitation of observation. Many scientists studying the physical processes of fog with numerical models emphasize that it is important to fully understand the effects of radiative cooling, turbulent mixing, aerosols and vegetations.

In this study, micrometeorological effects of turbulence and radiation on sea fogs are examined using both observed meteorological data at the buoy, vertical sounding measured at an island to the west of IIA, and numerical simulation results with the Weather Research and Forecast version 3 (WRFV3) model. Among the analyzed observational data, are sensible and latent heat fluxes, calculated with the meteorological data at the buoy. These are examined in association with the bulk Richardson number for each sea fog case. WRFV3 supports the Large Eddy Simulation (LES) for small grid spacing. Five nested domains of 18 km, 6 km, 2 km, 500 m and 100 m are used along with 65 vertically stretched layers. The LES is carried out only for the finest horizontal resolution. Detailed results will be shown at the conference.