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P-3 Meteorological Modeling Using WRF-ARW Model for
Grand Bay Intensive Studies of Atmospheric Mercury

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Measurements at the Grand Bay National Estuarine Research Reserve (NERR) support a range of research activities aimed at improving understanding of the atmospheric fate and transport of mercury. Routine monitoring was enhanced by two intensive measurement periods conducted at the site in summer 2010 and spring 2011. Detailed meteorological data are required to properly represent the weather conditions, determine the transport and dispersion of plumes, and the wet and dry deposition of mercury. To describe the mesoscale features that might influence future plume calculations for mercury episodes during the Grand Bay Intensive campaigns, fine resolution meteorological simulations using the Weather Research and Forecasting (WRF) model were conducted with various initialization and nudging configurations. The WRF simulations with nudging generated reasonable results in comparison with conventional observations in the region and measurements obtained at the Grand Bay site, including surface and sounding data. The grid nudging, together with observational nudging, had a positive effect in wind prediction. However, nudging of mass fields (temperature and moisture) led to overestimates of precipitation which may introduce significant inaccuracies if the data are used for subsequent atmospheric mercury modeling. The regional flow prediction was also influenced by the reanalysis data used to initialize the WRF simulations. Even with observational nudging, the summer case simulation results in the fine resolution domain inherit features of the reanalysis data that result in generating different regional wind patterns. In contrast, the spring intensive period showed less influence from the reanalysis data.