

ATMOSPHERIC NITROGEN INPUTS TO THE NORTH SEA

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The ANICE (Atmospheric Nitrogen Inputs into the Coastal Ecosystem) project addressed the flux of nitrogen species from the atmosphere into the ocean, with emphasis on coastal waters. The results serve to identify the role of the atmosphere as a source of biologically essential species to the marine biota. ANICE focused on quantifying the deposition of atmospheric inputs of inorganic nitrogen compounds (HNO_3 , NO_3^- , NH_3 and NH_4^+) into the North Sea, and the governing processes. Dissolved organic nitrogen (DON) in rain and aerosol received some attention as well, but only during the experiments. The Southern North Sea was studied as a prototype. Because the physical and chemical processes are described, as opposed to empirical relations, the results can potentially be transferred to other regional seas like the Mediterranean, the North Atlantic continental shelf area and the Baltic. Two intensive field experiments were undertaken, involving an off-shore platform (Meetpost Noordwijk, or MPN, at 9 km from the Dutch coast), a coastal station, the Weybourne Atmospheric Observatory (WAO) in East Anglia (UK), and during the second experiment water sampling from a lifeguard boat. Long term measurements were made on a ferry sailing between Hamburg and Harwich/NewCastle. These measurements provided data for sensitivity studies of a variety of problems associated with the coastal region that are not easily evaluated with larger scale models, to constrain models and to test model results. A suite of models was applied varying from very simple parameterizations to complicated chemistry transport models. Spatial scales varied from hundreds of meters to the entire southern North Sea. Time scales varied from minutes to hours, and the final results covered episodes spanning less than a day to annual average.