

Influence of deposition of atmospheric nitrogen compounds on the surface marine ecosystem at the Japan Sea

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The sensitivity of the atmospheric deposition of inorganic nitrogen compounds to the surface chlorophyll-a mass concentration at the Japan Sea was investigated using a 3-D lower trophic-marine ecosystem model (NEMURO) combined with an atmospheric regional chemical transport model (WRF-CMAQ). The monthly mean values for the wet and dry deposition of nitrogen compounds including gases (HNO₃ and NH₃) and aerosol particles (NO₃⁻ and NH₄⁺) over the Japan Sea were determined using the WRF-CMAQ, indicating that wet deposition was dominant in all seasons. These values were input into the surface of ocean of NEMURO as a new nitrogen source. The annual average of surface chlorophyll-a mass concentration at the Japan Sea was increased from 0.26 to 0.35 mg/m³. The growth ratios of chlorophyll-a mass concentration in summer was factor of ~2.1, while that in wintertime was factor of ~1.1, indicating that the atmospheric deposition of inorganic nitrogen compounds highly influence to the surface chlorophyll-a mass concentration in summer.

Keywords: Nitrogen compounds, deposition, Japan Sea, marine ecosystem