



Atmospheric Nitrogen Inputs to the Ocean and their Impact

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Atmospheric nitrogen inputs to the ocean have been identified as an important source of nitrogen to the oceans which has increased greatly as a result of human activity. The significance of atmospheric inputs for ocean biogeochemistry were evaluated in a seminal paper by Duce et al., 2008 (Science 320, 893-7).

In this presentation we will update the Duce et al 2008 study estimating the impact of atmospheric deposition on the oceans. We will summarise the latest model estimates of total atmospheric nitrogen deposition to the ocean, their chemical form (nitrate, ammonium and organic nitrogen) and spatial distribution from the TM4 model. The model estimates are somewhat smaller than the Duce et al estimate, but with similar spatial distributions. We will compare these flux estimates with a new estimate of the impact of fluvial nitrogen inputs on the open ocean (Sharples submitted) which estimates some transfer of fluvial nitrogen to the open ocean, particularly at low latitudes, compared to the complete trapping of fluvial inputs on the continental shelf assumed by Duce et al. We will then estimate the impact of atmospheric deposition on ocean primary productivity and N₂O emissions from the oceans using the PlankTOM10 model.

The impacts of atmospheric deposition we estimate on ocean productivity here are smaller than those predicted by Duce et al impacts, consistent with the smaller atmospheric deposition estimates. However, the atmospheric input is still larger than the estimated fluvial inputs to the open ocean, even with the increased transport across shelf to the open ocean from low latitude fluvial systems identified.

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