

SOLAS Open Science Conference 2009
Discussion Session Report:
Atmospheric Deposition and Ecosystem Response
Tuesday 17th November 2009

Cécile Guieu¹ & Doug Wallace² (Conveners)

¹ Laboratoire d'Océanographie de Villefranche sur Mer (CNRS), France

² Leibniz-Institut für Meereswissenschaften (IFM-GEOMAR), Germany

Atmospheric deposition is an important but poorly understood source of nutrients for large regions of the ocean. The atmosphere delivers a range of key macro- and micronutrients in relative ratios and chemical forms that can be very different from the upward supply of nutrients from the ocean interior. The atmospheric nutrient supply is being perturbed directly and indirectly by mankind: atmospheric pollution has, for example, greatly increased the deposition of nitrogen, and the deposition of dust to the oceans is known to be climate-dependent.

Cecile Guieu, in her opening presentation, identified a set of research needs in the areas of: a) atmospheric transport, processing and deposition; b) organic nutrient and carbon deposition; c) temporal and spatial variability in the response of ecosystems to deposition; and d) how future ocean conditions (e.g. acidification, temperature / stratification change) will affect ecosystem response. This was followed by several short thematic presentations after which the 62 participants took part in an open discussion of the important research questions and the best approaches for addressing them.

An overall need for more and better information concerning the timing and magnitude of deposition, the partitioning of nitrogen between organic and inorganic forms, and more measurements of aerosol-derived phosphorus and speciation was identified. The participants noted the need to maintain and extend time-series of aerosol composition that can be coupled to ocean time-series in order to observe the response of the marine ecosystem to deposition events. Given that anthropogenic nitrogen forcing is largely a Northern Hemisphere phenomenon, whereas climate and acidification effects are global, the need for time-series in both hemispheres was emphasized. Meridional transects of research vessels can provide spatial coverage and remote sensing is of particular use for this topic. It was noted that dedicated SOLAS studies, including regional time-series, could be of considerable value in identifying possible aerosol-derived artefacts in the interpretation of ocean color data.

A set of ongoing, planned and potential regional studies was identified by the participants which should be expanded, and systemized under SOLAS. The groups involved with these presently separate efforts were urged to link their proposals and plans together so that similar experimental and analytical approaches can be applied in different regions, thereby allowing for later comparison between regions. It was also suggested that the individual regional projects should seek funding for student exchanges and other forms of linkage and communication with closely-related projects in other regions.

