Geophysical Research Abstracts
Vol. 17, EGU2015-1355, 2015
EGU General Assembly 2015

Filling a missing link between biogeochemical, climate and ecosystem studies: a global database of atmospheric water-soluble organic nitrogen

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It is time to collate a global community database of atmospheric water-soluble organic nitrogen deposition.

Organic nitrogen (ON) has long been known to be globally ubiquitous in atmospheric aerosol and precipitation, with implications for air and water quality, climate, biogeochemical cycles, ecosystems and human health. The number of studies of atmospheric ON deposition has increased steadily in recent years, but to date there is no accessible global dataset, for either bulk ON or its major components. Improved qualitative and quantitative understanding of the organic nitrogen component is needed to complement the well-established knowledge base pertaining to other components of atmospheric deposition (cf. Vet et al 2014). Without this basic information, we are increasingly constrained in addressing the current dynamics and potential interactions of atmospheric chemistry, climate and ecosystem change. To see the full picture we need global data synthesis, more targeted data gathering, and models that let us explore questions about the natural and anthropogenic dynamics of atmospheric ON.

Collectively, our research community already has a substantial amount of atmospheric ON data. Published reports extend back over a century and now have near-global coverage. However, datasets available from the literature are very piecemeal and too often lack crucially important information that would enable aggregation or re-use. I am initiating an open collaborative process to construct a community database, so we can begin to systematically synthesize these datasets (generally from individual studies at a local and temporally limited scale) to increase their scientific usability and statistical power for studies of global change and anthropogenic perturbation. In drawing together our disparate knowledge, we must address various challenges and concerns, not least about the comparability of analysis and sampling methodologies, and the known complexity of composition of ON. We need to discuss and develop protocols that work for diverse research needs. The database will need to be harmonized or merged into existing global N data initiatives.

This presentation therefore launches a standing invitation for experts to contribute and share rain and aerosol ON and chemical composition data, and jointly refine the preliminary database structure and metadata requirements for optimal mutual use.

Reference: Vet et al. (2014) A global assessment of precipitation chemistry... Atmos Environ 93: 3-100