BNL-60190

Influence of anthropogenic sulfur emissions on sulfate burdens over the North Atlantic Ocean in October and November, 1986

C.M. Benkovitz and S.E. Schwartz

Proceedings of the Fourth International Aerosol Conference, Los Angeles, Aug. 28-Sept. 2, 1994, pp. 663-4, 1995.

The hypothesis that anthropogenic sulfate aerosol influences clear-sky and cloud albedo, and can thus influence climate has been advanced by several investigators; current global-average climate forcing is estimated to be of comparable magnitude, but opposite sign, to longwave forcing by anthropogenic greenhouse gases. The high space and time variability of sulfate concentrations and aerosol column burdens have been established by observational data; however, geographic and time coverage provided by data from surface monitoring networks is very limited. Consistent regional and global estimates of sulfate aerosol loading, and the contributions to this loading from different sources, can be obtained only by modeling studies. We have developed a sub-hemispheric to global-scale Eulerian transport and transformation model that calculates atmospheric sulfate from its precursors. The meteorological driver is the output from the 6-hr forecast model of the European Centre for Medium-Range Weather Forecasts; the model includes transport, sulfur chemistry with parameterized oxidant concentrations, time-and-location dependent dry deposition, and we deposition. Calculations have been performed for October 13 to November 15, 1986 covering the North Atlantic and adjacent continental regions. Emissions were taken from regional inventories for North America and Europe and from a global fossil fuel combustion inventory for other regions. Here we discuss the influence of anthropogenic sulfur emissions on the sulfate burdens (volume integral of concentration) over the North Atlantic.

Research by BNL investigators was performed under the auspices of the U.S. Department of Energy under Contract No. DE-AC02-98CH10886.