Effect of N2O emission from natural soil and ocean and anthropogenic sources on N2O concentration: consideration using AGCM

Kentaro Ishijima[1]; Prabir Patra[2]; Masayuki Takigawa[3]; Takakiyo Nakazawa[4]; Shuji Aoki[5]; Toshinobu Machida[6]; Shinji Morimoto[7]

[1] FRCGC; [2] FRCGC/JAMSTEC; [3] FRCGC, JAMSTEC; [4] CAOS, Tohoku Univ.; [5] CAOS, Graduate School of Sci., Tohoku Univ.; [6] NIES; [7] National Institute of Polar Research

Atmospheric nitrous oxide (N2O) concentration was simulated using a chemistry-coupled atmospheric general circulation model (AGCM) nudged with ECMWF (European Centre for Medium-Range Weather Forecasts) meteorological fields for the period 1987-2002, in order to elucidate contributions of N2O fluxes from natural soil and ocean and anthropogenic sources to atmospheric N2O concentration at individual N2O monitoring stations. Surface fluxes of N2O were prepared by combining the above three components of fluxes. For natural soil fluxes, annually-constant fluxes by EDGAR (Emission Database for Global Atmospheric Research) and monthly-varying fluxes by obtained from the CASA (Carnegie-Ames-Stanford Approach) terrestrial biogeochemistry model. As the natural oceanic fluxes, both annually-constant and monthly-varying fluxes by GEIA (Global Emission Inventory Activity) were prepared. The natural and soil fluxes were assumed to be cyclostationary. Anthropogenic fluxes were made for individual years by linear temporal interpolation of anthropogenic fluxes of 1980, 1990, 1995, 2000 by EDGAR. And GEIA anthropogenic fluxes containing natural soil fluxes were also used. Importance of each flux for simulated atmospheric N2O concentration at each station was explored by combining above three components of fluxes, in which only one component was increased by a factor of 1-2. Some improvements were seen in simulations containing the above factored fluxes, compared to those using original fluxes. It reflects imbalance in globally distributing the three components of fluxes at the present stage of each inventory estimation. Further details will be provided in the presentation.