Geophysical Research Abstracts, Vol. 7, 00027, 2005
SRef-ID: 1607-7962/gra/EGU05-A-00027

The relation between primary production and the seasonal burden of Dimethylsulphide-derived aerosols in the Arctic

B. Qu (1) and A. J. Gabric (2)

(1), (2) Australia School of Environmental Studies, Nathan Campus, Griffith University, Australia (b.qu@griffith.edu.au /Fax: +61 738757459)

Global climate is intimately connected to variability in sea ice, open ocean biogeochemical cycling and circulation, atmospheric radiation, and clouds over the Arctic Ocean. Uncertainty in the formulation of interactive air-sea-ice processes results in large differences between the arctic, and global, climates simulated by different global climate models. Tropospheric aerosol particles presently constitute one of the largest uncertainties in model calculations of the climate forcing due to anthropogenic greenhouse gas emissions. Ice cover has a special role in the biogeochemistry of the Arctic Ocean, both via its significant effect on regulation of the large distribution of phytoplankton production and its impact on air-sea exchange of biogenic trace gases, such as dimethylsulphide (DMS). Here we describe the relation between physical forcings and phytoplankton biomass (based on 5 years SeaWiFS satellite data recorded during 1998-2003) in the Barents Sea (30-35°E; 70-80°N). The relationship between temperature, photosynthetic available irradiance (PAR), cloud cover, ice cover and CHL were analysed. The field data was based on the three cruises, which gathered biological and physical measurements on vertical potential density, temperature, salinity, CHL and organic sulphur compounds. Both data sets were used to calibrate a regional DMS production model. Significant inter-annual variation of CHL leads to significant inter-annual variability in the observed and modelled production of DMS in the study region. We applied the CSIRO coupled GCM forcings to the calibrated DMS model to predict sea-to-air flux of DMS for contemporary and enhanced greenhouse conditions in the zonal 70°- 80°N band. Significant loss of summer ice cover, an increase of sea surface temperature (SST) and a general decrease in mixed layer depth (MLD), could

lead to annual DMS flux increases of more than 100% by the time of equivalent CO_2 tripling (year 2080).