Binge/purge oscillations of the thawing Fennoscandian Ice Sheet revealed by ε_{Nd} and biomarkers

G. SOULET[1,2]*, G. MENOT[1], G. BAYON[2], F. ROSTEK[1], E. PONZEVERA[2], G. LERICOLAIS[2] AND E. BARD[1]

[1]CEREGE, Univ. Aix-Marseille, CNRS, IRD & Collège de France, Technopole de l'Arbois BP80, 13545 Aix en Provence cedex 4, France (*correspondence: soulet@cerege.fr)

[2]Ifremer, centre de Brest, Géosciences Marines, 29280 Plouzané cedex, France

At its maximum extent, the FIS advanced into the watershed of the Dnepr River, one of the main rivers feeding the former Black Sea 'Lake'. As a consequence, the Black Sea basin potentially represents a suitable location to investigate the dynamics of the FIS retreat and its impacts on global/regional climate and European hydrographical reorganizations in the context of the Last Deglaciation.

Here, we report high-resolution geochemical data from a core retrieved in the Black Sea. We combine the use of Nd isotopes in clay fraction (ε_{Nd}) and bulk XRF-Ti/Ca as tracers for sediment provenance, together with biomarkers as tracers for river runoff (BIT-index) and boreal soil leaching (C_{25}-alkanes). During Heinrich Event 1 (HE1), four drastic periods of Deglacial Water Pulses (DWPs) occurred as unequivocally revealed by the biomarkers. Concomitantly, ε_{Nd} signatures clearly demonstrated that the DWPs were generated by the thawing FIS. Each period of DWPs (~200 yr in duration) occurred repeatedly every 200 yr, displaying a peculiar cyclic-like pattern. By analogy with MacAyeal [1]'s model, we propose a binge-purge model to explain the observed cyclicity: the binging period requiring a continuous FIS retreat, the purging period involving regional interactions between the formed proglacial lakes and the atmosphere.

[1] MacAyeal (1993) *Paleoceanography* **8**, 775–784.

Impact of aerosols on the equilibrium response of the climate system

GABRIELA SOUSA SANTOS* AND ISABELLE BEY

Institute for Atmospheric and Climate Science & Center for Climate Systems Modeling, ETH Zurich (*correspondence: gabriela.sousa-santos@env.ethz.ch)

Aerosols have both a direct and indirect effect on climate. The first effect arises from the aerosol scattering and absorption of radiation in the atmosphere. The indirect effect relates to their influence on cloud properties.

In the present study, we investigate the equilibrium response of the climate system to two scenarios of primary emissions of black carbon, organic carbon, sulfur dioxide, benzene, toluene, and xylene correspondent to 1850s and today conditions. We use the fully-unified aerosol-climate model ECHAM5-HAM coupled to a mixed layer ocean (MLO)[1, 2, 3]. Using a MLO coupled to the climate-aerosol model allows us to diagnose the aerosol impact in a comprehensive manner. The emissions were taken from the ACCMIP (Atmospheric Chemistry & Climate Intercomparison Project) [4], an inventory developed for the next IPCC assessment.

We will show results of several equilibrium simulations with a focus on the response of the hydrological cycle to aerosol effects, like impacts on water vapour, sensible heat fluxes, precipitation minus evaporation patterns, convective mass fluxes, etc. Preliminary results indicate that the aerosol forcing of black carbon, organic carbon, and sulfur dioxide from 1850s to present day resulted in a global mean surface cooling of 0.9K, a reduction in global mean precipitation of 0.11mm/d (3.41%), and an increase in cloud cover of 1.1%.

[1] Lohmann *et al*. (2007) *Atmos. Chem. Phys*., **7**:3425446. [2] Roeckner *et al*. (1995) In R.J. Charlson and J. Heintzenberg, editors, *Aerosol forcing of climate*, chapter **18**. John Wiley & Sons. [3] Stier *et al*. (2005) *Atmos. Chem. Phys*., **5**:1125-1156. [4] Lamarque *et al*. (2010), *Atmos. Chem. Phys*., **10**:7017-7039.