

B7 Changing Chemistry and Biogeochemistry in a Changing Climate: Atmosphere, Ocean and Ice

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The impact of pollution is now recognised to extend across all scales from the local to the global. The availability of inexpensive power since the industrial revolution, has led to a growth in the earth population from 1 to over 7 billion. We have entered the new geological age, the anthropocene, and climate change resulting from anthropogenic activity is beginning to have significant impacts. This symposium addresses contemporary multidisciplinary, trans-disciplinary and cross cutting science of relevance to the “Future Earth” programme objectives. The objective is to bring together the leading scientists, researching the changing chemical composition, biogeochemistry and their feedback and builds on the symposium at MOCA 2009. Improved knowledge of these interactions is required to improve our understanding and prediction of environmental and climate

change. One important focus is the interaction between the cryosphere and the atmosphere. The symposium B7 of DACA 2013 addresses key scientific foci, identified by the international Commission on Atmospheric Chemistry and Global Pollution, iCACGP. It comprises three sessions i) Atmosphere Ocean and Cryosphere Interactions; ii) Atmosphere Land Cryosphere Interactions and iii) Atmosphere, UT/LS and Cryosphere Interactions.

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B7.1 Atmosphere Ocean and Cryosphere Interactions

The high latitudes have been changing rapidly in the past 30 years with record low in Arctic Sea occurring in September 2012. In spring and occasionally in autumn, the interaction between sea ice, frost flowers and aerosol results in the bromine explosion the removal of tropospheric ozone and the deposition of mercury in both the Arctic and the Antarctic. Release of Iodine to the atmosphere has its maximum in the Antarctic. The outflow of pollution from Europe results in the Arctic haze and the fires in the boreal forest and peat result in pollution otherwise pristine conditions. The Arctic as a source of methane and sink for carbon dioxide has recently been highlighted. An adequate understanding of all the above issues and their feedback is a key to understanding global oxidative capacity and climate change.

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B7.2 Atmosphere Land Cryosphere Interactions

Atmospheric pollution, released from the growth of large conurbations/megacities, the modern agroindustry/agricultural practises, biomass burning and wildfires, is transported and transformed. from the releases of the growing industrial centres and as a result of biomass burning and forest wild fires to regions. In this manner atmospheric pollution from Europe and also North America enters the otherwise pristine Arctic. Climate change has potentially large consequences for the wetlands and permafrost and their feedback with atmospheric chemistry. The surface fluxes of the greenhouse gases are their future changes are inadequately understood . Improving our knowledge of land surface, cryosphere interactions is of key importance in the assessment of the feedback and

evolution of climate and environmental change. This session addresses the above topics comprising measurements and relevant laboratory studies of the processes involved and modelling studies addressing our understanding and future change.

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B7.3 Atmosphere, UT/LS – Atmosphere Cryosphere Interactions

The Upper Troposphere and Lower Stratosphere region is both a key part of the atmosphere and a less well known part of the cryosphere. In the generally cold temperatures of the UT/LS, phase changes and azeotropic processing results in ice clouds, cirrus and polar stratospheric clouds being formed. These in turn participate in multiphase chemical mechanisms, which transform the chemical composition: one outcome being the ozone hole in spring over the arctic. Atmospheric dynamics also play an important role. The changing Brewer Dobson Circulation and our understanding of the size

and duration of the polar vortex in a changing climate are inadequately understood. The impact of the monsoon, biomass burning and volcanic eruption on this region and exchange between the stratosphere and the troposphere are other important topics to be addressed.

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