SYER 3: Session III

Zeit: Mittwoch 16:30–18:00 Raum: 3C

Hauptvortrag SYER 3.1 Mi 16:30 3C

Tracers in polar ice cores — •Raimund Muscheler — Lund University

Ice cores provide unique records of past climate change. Some key findings about past climate come from ice core records since the precipitation is stored directly and remains relatively unaltered for thousands of years. In addition, the atmospheric composition in the past is stored in the bubbles enclosed in the ice. In many cases annual layers can be counted which provides accurate time scales that are indispensable for the understanding of past climate change.

This talk will give an overview about some of the tracers measured in ice cores and the results that could be obtained from them. Special emphasis will be given to cosmogenic radionculides which record past intensities of galactic cosmic rays reaching the Earth's atmosphere. Such records provide valuable information for different fields of Geosciences. Examples include solar activity reconstruction, solar influence on climate, geomagnetic dipole field reconstruction and carbon cycle changes.

Hauptvortrag SYER 3.2 Mi 17:00 3C

Real-time, in-situ chemical composition measurements of aerosols and clouds: Application of particle mass spectrometry — •Stephan Borrmann — Johannes Gutenberg Universität, Mainz, Germany — Max-Planck-Institut für Chemie, Mainz, Germany

Detailed knowledge of the chemical composition of aerosol particles is essential -among many other fields- for atmospheric physics and chemistry, cloud related research, assessement of pollution sources and atmospheric pollutant dispersal, as well as health related issues. This especially holds for the fine and ultrafine particle fractions with sizes down to 20 nanometers in diameter. For these reasons size resolved, real-time, in-situ aerosol chemical composition measurement techniques with non destructive sampling are key to many different types of experimental studies. In this presentation methods adopting particle mass spectrometry are reviewed including (1.) brief descriptions of the operational principles, (2.) a discussion of capabilities, limitations, and error sources of current modern instrumentation, (3.) and selected examples of applications. Particular emphasis is placed upon recently developed electron impact ionization thermal desorption time of flight mass spectrometers and laser ablation instruments. The measurement examples cover aerosols from emissions of individual cars, of large industrial factories, as well as smog situations. A more complex example involving pecialized particle sampling strategies is used to demonstrate the potential inherent in mass spectrometric particle measurement techniques for cloud research.

Hauptvortrag SYER 3.3 Mi 17:30 3C

Quantitative estimates of fossil fuel CO_2 over Europe using high-precision Radiocarbon observations — •Felix Vogel[1], Bernd Kromer[2], and Ingeborg Levin[1] — [1]Institut für Umweltphysik, Ruprecht-Karls-Universit"at Heidelberg, INF 229, 69120 Heidelberg — [2]Akademie der Wissenschaften & Institut für Umweltphysik, Ruprecht-Karls-Universit"at Heidelberg INF 229, 69120 Heidelberg

To assess the carbon balance on the European scale, quantitative knowledge of the anthropogenic CO_2 emissions from fossil fuel burning is indispensable. Radiocarbon is a key tracer for this purpose because fossil fuel CO_2 is free of ^{14}C. Conventional low-level counting as well as AMS measurements *now* have the precision to provide quantitative estimates of the fossil fuel CO_2 share of a polluted air sample. With this technique and a dedicated long-term monitoring program, validation of the Kyoto-process is possible and in fact provides the only independent method to validate the classical bottom-up emissions estimates and their anticipated changes. Besides this long-term application, we will also present new tools to assess processes on shorter timescales. Diurnal cycles of quasi-continuous CO measurements, previously calibrated using high-precision $^{14}CO_2$ measurements, are used to evaluate regional models as well as high-resolution inventories for fossil fuel CO2 emissions.