UP 11: Atmosphere - Trace Gases

Time: Thursday 10:00–11:15 Location: H41

Invited Talk UP 11.1 Thu 10:00 H41

Towards disentangling natural and anthropogenic CO2 and CH4 fluxes using space based measurements of XCO2 and XCH4 — •Heinrich Bovensmann, Michael Buchwitz, Konstantin Gerilowski, Sven Krautwurst, Thomas Krings, Maximilian Rauter, Oliver Schneising, Jens Heymann, and John P. Burrows — Institut für Umweltphysik, Universität Bremen

The concentrations of CO2 and CH4 in the atmosphere are affected directly by anthropogenic activity (fossil fuel combustion, biomass burning, agriculture and land usage change) and natural phenomena. Adequate knowledge of the sources and sinks of both gases, as well as the related feedbacks is a pre-requisite for the reliable prediction and management of the future climate of our planet. In spite of the recognised importance of this issue, our current understanding about sources and sinks of the greenhouse gases CO2 and CH4 is still inadequate. During the last years, data from SCIAMACHY on ENVISAT as well as from GOSAT have demonstrated that atmospheric columns of CO2 and CH4 provide unique information about changes in greenhouse gas fluxes and its linkage with climate feedbacks, despite some limitations in data coverage and quality. In parallel airborne remote sensing of XCO2 and XCH4 make substantial progress in demonstrating that emissions from strong local point sources can be derived from such measurements. The talk will present recent progress made in greenhouse gas research using airborne and satellite data of CO2 and CH4 and will give an outlook on future greenhouse gas satellite missions like the CarbonSat concept.

Invited Talk UP 11.2 Thu 10:30 H41

AIRCORE as a new tool to study stratospheric age of air — •Andreas Engel and Harald Bönisch — Goethe Universität Frankfurt, Institut für Atmosphäre und Umwelt

Mean age of air is a fundamental parameter describing the tracer-transport in the stratosphere. It can be determined from long lived tracers without sinks or sources in the region of interest, which show steady and monotonous trends in the atmosphere.

Observations of the most common mean age tracers, SF6 and CO2, so far required heavy and difficult to launch instrumentation. So far large and very expensive balloons were needed to carry instrumentation up to 30 km altitude. A new method for collecting stratospheric air has been described by Karion et al. (2010), and has been named AIRCORE. This method relies on collecting stratospheric air in a long and thin-walled tube during the descent of a balloon. Due to the weight of the tube, which can be below 2.5 kg, a launch on small and inexpensive radio sonde balloons is possible. Due to the length of the tube the information on the chemical composition of the air is conserved for some time in a similar way as in an ice core. However, the information is lost due to diffusion after some time.

We present first stratospheric observations of CO2, CH4 and CO based on this method during balloon flights in Timmins, Canada in August 2014 and 2015. We discuss the applicability of the method for mean age determination and the altitude range for which results can be obtained. Finally we present the new mean age results in context with previous observations of mean age nad long term trends.

Kaffeepause (15 min)