UP 5: Meßtechmik

Time: Thursday 8:45–9:30 Location: G/gHS

Invited Talk UP 5.1 Thu 8:45 G/gHS

Satellite remote sensing of atmospheric trace gases in the UV/vis spectral range: observing pollution in the atmospheric layer in which we live — •Thomas Wagner — MPI for Chemistry, Hahn-Meitner-Weg 1, 55131 Mainz

In 1995 the Global Ozone Monitoring Experiment (GOME) was launched. It was the first space-borne instrument recording continuous spectra of the backscattered solar radiation with moderate spectral resolution. Originally designed for the measurement of stratospheric ozone it soon turned out that also absorptions of several important tropospheric trace gases like NO2, SO2 or HCHO could be detected in GOME spectra. Because of the earth*s transparency in the UV / vis spectral range, even trace gases located close to the surface can be measured. Global maps of tropospheric trace gases measured by GOME and its successors (SCIAMACHY, OMI, and GOME-2) have revolutionised our understanding of the distribution of tropospheric pollutants. The presentation provides an overview on the measurement technique and highlights important results obtained during the last two decades. An outlook is given on planned near-future missions with largely improved spatial resolution.

UP 5.2 Thu 9:15 G/gHS

Diurnal dynamics of land surface-atmosphere exchange inferred from thermodynamic constraints — •Axel Kleidon and Maik Renner — Max-Planck-Institut für Biogeochemie, Jena, Germany

The convective boundary layer strongly shapes the exchange of energy and mass between the land surface and the atmosphere. Here, we approach this tightly coupled system by deriving the thermodynamic limit by which convective motion can be generated from the diurnal radiative forcing. An important part of the derivation is the inclusion of heat storage changes that are caused by the diurnal imbalance of absorbed solar radiation. Using 6-hourly radiosoundings of the Meteorological Observatory Lindenberg - Richard-Assmann-Observatory (MOL-RAO) of the German Meteorological Service (DWD) in Brandenburg we find that most of diurnal heat storage changes take place in the lower atmosphere. Using surface observations of absorbed solar radiation and the ground heat flux, our approach predicts the diurnal course of turbulent heat fluxes at the surface and heat content changes in the lower atmosphere surprisingly well. What this implies is that the diurnal dynamics of the atmospheric boundary layer are strongly constrained by the diurnal imbalance in the local radiative forcing. The resulting dynamics of the atmospheric boundary layer then reflect the tight interaction between turbulent heat fluxes, atmospheric heat storage changes, and thermodynamic limits to generate turbulent exchange.