UP 14: Atmosphäre - Aerosole/Wolken

Zeit: Donnerstag 14:30–16:15 Raum: GW2 B3009

Hauptvortrag UP 14.1 Do 14:30 GW2 B3009

Cloud top pressure retrieval from MERIS and OLCI: Global assessment — •Jürgen Fischer, Ulrich Küster, Cintia Carbajal, and Rene Preusker — Freie Universität Berlin

Cloud top pressure (CTP) retrievals from measurements within the O2 A-band of MERIS (Medium Resolution Imaging Spectrometer on board ENVISAT) have been analysed with respect to a decadal variability on a global scale. Clouds are subject of climate studies, because they have a large impact on the earth radiation budget and it is very likely that clouds respond on climate change. Due to the high variability of clouds no significant trend in cloud cover and cloud properties has been identified so far. Nevertheless, recent climate studies indicate that the vertical structure of clouds and zonal shifts of clouds might be caused by climate change. Since the MERIS and OLCI measurements within the O2 A-band are sensitive to the vertical cloud profile, we assessed the global MERIS CTP product during its 10 years of operation to detect regional cloud anomalies. We also compared the single MERIS CTP product with the synergistic MERIS and AATSR CTP product, which is less sensitive to the vertical cloud profile.

UP 14.2 Do 15:00 GW2 B3009

Polarized inelastic scattering by ice clouds and dust aerosols for Sentinel-4 — •Luca Lelli, Vladimir Rozanov, Marco Vountas, and John Burrows — Institute of Environmental Physics and Remote Sensing, University of Bremen, Bremen, Germany

The quantification of rotational Raman scattering (RRS) and the filling in of the oxygen A-band (O2A) by inelastically scattered photons is investigated as it can be used for cloud, aerosol and greenhouse gas characterisation. We present simulation results using the radiative transfer model SCIATRAN. The vector version of SCIATRAN has been extended to account for the spectral effects of RRS in presence of aerosols and clouds.

Upon comparison with previous independent results published in the literature for Fraunhofer lines and O2A, results for the polarized, inelastic radiative transport are shown for various viewing geometries, instrumental specifications and geophysical scenarios. Specifically, bidirectional reflective effects induced by a polarizing surface are taken into account as well as scattering properties of asymmetric dust particles and ice crystals.

Seasonal maps of filling-in and degree of linear polarisation are shown for real viewing geometries of the upcoming geostationary Sentinel-4 mission, equipped with the payload UVN that covers the oxygen A-band at a nominal spectral resolution of 0.12 nm.

UP 14.3 Do 15:15 GW2 B3009

Characterization of optically-trapped submicron aerosol particles by ultraviolet broadband light scattering — •Kivanc Esat, Gregory David, Irina Ritsch, and Ruth Signorell — Laboratory of Physical Chemistry, ETH Zurich, Switzerland

Aerosol particles in the size range from a few 100 nanometers to a few microns have a large impact on our atmosphere. Their shape, size, refractive index, and composition are the key properties governing their interaction with light and determining the processes they experience in the atmosphere such as hygroscopic growth, nucleation and aging. Broadband light scattering (BLS) experiments on single isolated particles are useful to study such processes in the laboratory because they simultaneously measure the particle size and the wavelength-dependent refractive index. Our new BLS setup provides data in the UV and visible spectral ranges (320 - 700 nm). Inclusion of the UV spectral range is crucial for the sizing of submicron particles and allows for the retrieval of refractive indices in a range where such data are rare but urgently needed. In this presentation, we report the combination of a new BLS experiment with counter-propagating optical tweezers facilitating contactless characterization of particles as small as 300 nm. The presentation will highlight the broad applicability of the UV BLS experiment by means of four examples: 1) The sizing of calibrated submicron polystyrene latex sphere (PSL). 2) The evaporation of binary glycerol water droplets. 3) The hydration/dehydration cycling of aqueous potassium carbonate droplets. 4) Photochemical reactions of oleic acid droplets.

UP 14.4 Do 15:30 GW2 B3009

Desert dust outbreaks near West-Africa observed from space — •Abram Sanders[1], Luca Lelli[1], Pepijn Veefkind[2], Johan De Haan[2], Marco Vountas[1], and John Burrows[1] — [1]Institut für Umweltphysik (IUP), Universität Bremen, Bremen, Germany — [2]Koninklijk Nederlands Meteorologisch Instituut (KNMI), De Bilt, Netherlands

The Saharan region is responsible for more than half of the global dust emissions and large amounts of dust are transported across the Atlantic year-round along seasonally varying transport routes. In this study, we retrieve the height of dust plumes over ocean in outflows off the West-African coast from satellite measurements of backscattered solar radiation.

We retrieve Aerosol Layer Height (ALH) from SCIAMACHY measurements of the oxygen A absorption band using the operational retrieval setup for TROPOMI on the Sentinel-5 Precursor. We focus on the time period of 2007-2008, because the SAMUM-2 measurement campaigns took place at Cape Verde during that period and a MACC-II reanalysis run with improved dust parameterizations covering the same period was recently completed. One of the criteria for pixel selection was a high value for the Absorbing Aerosol Index so that we know a priori that pixels contain significant amounts of (elevated) dust.

We will briefly explain the general measurement principle and we will show SCIAMACHY retrieval results and comparisons with external data sets for a number of case studies.

Kaffeepause (30 min)