UP 7: Atmosphere - lab studies

Time: Tuesday 17:30–18:15 Location: G 1.011

Invited Talk UP 7.1 Tue 17:30 G 1.011

Ice formation and crystallization in mesospheric clouds — •Denis Duft[1], Mario Nachbar[2], and Thomas Leisner[1,2] — [1]Karlsruhe Insitute of Technology, Karlsruhe, Germany — [2]University of Heidelberg, Heidelberg, Germany

In this contribution we present results from a laboratory experiment designed to study the formation of ice at cold conditions. Specifically, we investigate the heterogeneous formation of ice on small aerosol particles which provide the surface for ice formation in the mesosphere. We show, that amorphous solid water, a highly viscous non-crystalline ice phase similar to supercooled liquid water, is the water ice phase which deposits from the gas phase below 160K, even though it is thermodynamically unstable and crystallizes above 120K. We also show, that amorphous solid water crystallizes to small nano-crystallites which greatly influence the properties of the ice phase. The nano-crystals are stable for hours below 160K and for even longer times at lower temperatures such that nano-crystalline ice can be regarded as a separate ice phase on atmospheric time scales. Only at temperatures above 160K the nano-crystalline ice transforms to micro-crystalline ice whose properties are typically given in textbooks.

UP 7.2 Tue 18:00 G 1.011

Precision measurements of the absolute ozone absorption cross section at the 325 nm HeCd laser line - the resolution of a long standing ozone puzzle ? — •Christof Janssen[1,2], Hadj Elandaloussi[1], and Julian Gröbner[3] — [1]LERMA-IPSL, Sorbonne Université, UPMC Univ. Paris 06, CNRS, Observatoire de Paris, PSL Research Univ., Paris, France — [2]Institut für Umweltphysik, Universität Heidelberg, Heidelberg, Germany — [3]Phys. Meteorol. Observatorium Davos, WRC, Davos Dorf, Switzerland

Ozone is a key molecule in the Earth's atmosphere and the study of ozone hole recovery has become a major topic. Recovery rates being slow and depending on many factors, global and long-term observations of high accuracy are required to derive meaningful trends. While diverse observational platforms (from ground, balloons or satellites) provide such measurements, uncertainties and inconsistencies of the spectroscopic database being used for ozone retrieval are of considerable concern for the quantification of concentrations and trends.

In this talk, we will first introduce common measurement methods as well as currently used and recommended reference data in the UV and IR. We will discuss where and to which extent inconsistency problems exist. Then we present new highly accurate measurements of the absolute absorption cross section of ozone at the 325 nm wavelength of the HeCd laser. These measurements, as well as our previous work at 253.65 nm and in the IR shed new light on currently used absorption spectroscopic data used for ozone remote sensing, as they reveal potential biases in the UV and the IR spectral regions.