UP 15: Methods - Measurement Techniques

Time: Thursday 15:15–16:00 Location: H41

UP 15.1 Thu 15:15 H41

The method of soil moisture sensing by cosmic ray neutrons — •Markus Köhli[1], Martin Schrön[2], and Ulrich Schmidt[1] — [1]Physikalisches Institut, Ruprecht-Karls-Universität Heidelberg, Germany — [2]Helmholtz-Zentrum für Umweltforschung - UFZ, Leipzig

Probing soil moisture at intermediate scales in between those of satellite based systems and local measurements has turned out to be feasible by detecting environmental neutrons. The technique of passively sensing neutrons originating from cosmic particle air showers offers the possibility of detecting water by averaging over hectares. The key characteristic of the method is the exceptionally high moderation performance of hydrogen. It slows down fast neutrons whereas other heavier elements independent of the chemical composition rather reflect them. The environmental neutron density therefore strongly depends on the water content present around the sensor. We present Monte Carlo based simulations and measurements to study the footprint of this method for various conditions. Intensity and range dependencies can now be described by analytical functions. Especially the altitude of the sensor is the target of interest.

UP 15.2 Thu 15:30 H41

Correlative Microscopy at ProVIS - Centre for Chemical Microscopy — •Matthias Schmidt, Hryhoriy Stryhanyuk, Hans Richnow, and Niculina Musat — Helmhotlz-Centre for Environmental Research (UFZ) Leipzig, Germany

The UFZ has established the ProVIS - Centre for Chemical Microscopy, recently. ProVIS aims to visualise biochemical processes on cellular level. It comprises of equipment for sample preparation, a number of different microscopes - fluorescence, electron (SEM)- and helium ion microscopes (HIM) and imaging mass-spectrometers. We will present a correlative microscopy study on an environmental sample of microbes and sediments taken from the Davidschacht mine-tailings. The sample was filtrated on a Pd/Au sputter-coated filter, chemically fixed, fluorescence in-situ hybridised (FISH) and critical-point-dried. In order to detect the positions of bacteria on the filter fluorescense microscopy was employed and the regions of interest (ROIs) were laser-marked. In the SEM and HIM providing a lateral as well as depth resolution of significantly better than 4nm the morphology of the bacteria detected by FISH was investigated. The chemical composition of the sediments in the sample was investigated by energy dispersive X-ray spectroscopy. Further chemical information was gained from nanoSIMS experiments. The results obtained by the different methods were correlated and overlayed using the ImageJ-plugin CORRELIA which we have developed at ProVIS.

UP 15.3 Thu 15:45 H41

High-resolution turbulence observations in the stratosphere with LITOS — •Jens Söder, Michael Gerding, Andreas Schneider, and Franz-Josef Lübken — Leibniz-Institut für Atmosphärenphysik an der Universität Rostock, Kühlungsborn

Many studies show that gravity waves dissipate a distinct amount of energy while propagating through the stratosphere, even if this region is in general statically and dynamically stable. For studies of stratospheric turbulence and wave dissipation we have developed the balloon-borne instrument LITOS (Leibniz-Institute Turbulence Observations in the Stratosphere), resolving structures in the atmospheric wind field down to the scales of millimeters. LITOS data cover both the inertial and viscous subrange of the energy spectrum, allowing for the most direct calculation of energy dissipation rates. Recently, a new version of LITOS has been developed that can be launched from every radiosonde station. We have performed several flights from Kühlungsborn/Germany (54°N, 12°E), thereof one during nighttime. Various turbulent layers with a vertical thickness in the order of a few 10 m have been observed. Stratospheric energy dissipation rates greatly vary within only a few tens of meters, roughly between 1e-7 and 10 W/kg, with a mean value of roughly 1e-3 W/kg. Huge differences have been found in the altitudinal structure and strength of stratospheric turbulence during the different flights. The outcome of the flights will be discussed in their geophysical context. Furthermore, first results from the METROSI-LITOS campaign at Andenes/Norway (69°N, 16°E) in January 2016 are presented.