

OCCR Flash – News from the Oeschger Centre

The Oeschger Centre has gained considerable expertise in designing and building new, ever more precise instruments. Such world class measuring devices form the basis for pushing the limits of climate sciences.

Novel method for investigating sediment structures

The OCCR's *Lake Sediments and Paleolimnology* group is at the origin of a hyperspectral imaging scanner. The instrument offers a rapid, non-destructive and cost-effective way of generating records of sediment properties and composition at the micrometer-scale. Following a detailed brief, the device was built as a prototype by a Finnish company specializing in remote-sensing technology. The scanner combines micro remote-sensing techniques with lake sediment analysis and consists of a hyperspectral camera and a sample tray that moves underneath an illumination chamber and the camera slit. Scanning techniques, among other advantages, allow to quickly produce long data series, and offer the opportunity to replicate data sets, which is often impossible or inefficient with analytical techniques. With the new measuring device conceived in Bern one meter of sediment core is measured in ca. 15 min and ca. 45 GB of data is produced.

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Unique wind measurements in the middle atmosphere

The OCCR's *Atmospheric Radiometry and Processes* group has been carrying out pioneering work in the measurement of profiles of horizontal wind in the upper stratosphere and lower mesosphere (ca. 30 – 70 km altitude). The ground-based microwave Doppler wind radiometer (WIRA) built at the University of Bern is the only device worldwide that allows continuous wind measurements at this altitude. Up to now, very few measurement techniques were operated at this altitude but only on a campaign basis. The only continuous source of wind data so far were models. Over the last five years, WIRA has been measuring at different locations for periods up to 11 months. A comparison of these data series and model data revealed good agreement in the stratosphere. In the mesosphere, however, differences in the wind speed were found. Recently, a second, especially compact instrument (WIRA-C) was built. It can be used anywhere in the world where provided



The WIRA wind radiometer in operation at the Observatoire du Maïdo on La Réunion island.

power and internet access is available. The WIRA instruments operate highly automated and are remote controlled. In spring 2016 the wind radiometers will be installed in Northern Norway and La Réunion for a prolonged measurement period. Contact: niklaus.kaempfer@iap.unibe.ch

Non-destructive measurement method for ice cores

The OCCR's *Past Climate and Biogeochemical Studies on Ice Cores* group is developing a new analysis method for extremely small ice samples. This development will be crucial for the future «Beyond EPICA - Oldest Ice» project, an endeavour to study 1.5 million-year-old ice from Antarctica. The new method will allow, for the first time, to determine both the concentrations of the greenhouse gases carbon dioxide, methane and nitrous oxide as well as the isotopic composition of carbon dioxide on a single measurement of the same sample. The project deepSLice («Deciphering the greenhouse gas record in deepest ice using continuous sublimation extraction/laser spectrometry») comprises the construction of a multi wave-length Quantum Cascade laser spectrometer, currently developed together with the project partner Empa. On the other hand, a new sublimation device for quantitative extraction for gases in ice is built. In combination this approach will allow the quantification of all parameters on air samples of only 1 ml STP.

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