UP 7: Methoden - Messverfahren und Datenauswertung

Time: Wednesday 11:30–12:15 Location: MAG 100

UP 7.1 Wed 11:30 MAG 100

Entwicklung eines Instruments zum Nachweis von Bromnitrat und Iodnitrat durch DOAS-Messungen von Stickstoffdioxid — •Christoph Kleinschmitt[1], Lennard Herlyn[1], Martin Horbanski[1], Stefan Schmitt[1], Julian Wittmer[2], Denis Pöhler[1], Cornelius Zetzsch[2] und Ulrich Platt[1] — [1]Institut für Umweltphysik (IUP), Ruprecht-Karls-Universität Heidelberg — [2]Bayreuth Center of Ecology and Environmental Research (BayCEER), Universität Bayreuth

Messungen von Halogenoxiden XO (X = Br, I) und Stickstoffdioxid (NO_2) in der atmosphärischen Grenzschicht am Toten Meer deuten auf Vorkommen von Bromnitrat ($BrONO_2$) und Iodnitrat ($IONO_2$) hin, die mit bisher verfügbaren, für Feldmessungen geeigneten Methoden nicht gemessen werden können. Zur genaueren Abschätzung der Quellstärke der reaktiven Halogenoxide BrO und IO müssen allerdings die Reservoirgase $XONO_2$ berücksichtigt werden. Daher wurde ein neuartiges Instrument entwickelt, welches $XONO_2$ thermisch (bei $T \approx 160\,^{\circ}C$) in XO und NO_2 zersetzt und das entstandene NO_2 in der aufgeheizten Probe mithilfe der resonatorgestützten DOAS-Methode (CE-DOAS) misst. Durch den kompakten, geschlossenen Resonator wird dabei ein mobiler Einsatz im Feld ermöglicht.

Das Instrument wurde erstmals im Rahmen von Smogkammer-Experimenten in Zusammenarbeit mit der Universität Bayreuth eingesetzt, bei denen die Dunkelchemie von Iod und NO_2 unter Zugabe von Ozon untersucht wurde. Dabei konnten $IONO_2$-Konzentrationen von bis zu 550 ppt nachgewiesen werden.

UP 7.2 Wed 11:45 MAG 100

Deciphering transitions in climate time series using Bayesian inference — •Nadine Berner[1], Martin H. Trauth[2], and Matthias Holschneider[1] — [1]Focus Area for the Dynamics of Complex Systems (DYCOS), Universität Potsdam — [2]Institute of Earth and Environmental Science, Universität Potsdam

The estimation of transition events in environmental time series challenges analysis methods and modeling concepts. Commonly such changes are considered as isolated singularities in a more regular background indicating the transition between two regimes governed by different internal dynamics or external forcings.

Our aim is to derive a probabilistic expression quantifying multiple transition events in a data set on different temporal scales. Therefore we model a change in terms of the underlying regular dynamics and the evolution of the scedasticity of the data. We combine these two aspects in a linear mixed model which speeds up computations considerably. Furthermore we accomplish the estimation of the model's parameters via Bayesian inference and obtain associated uncertainty levels in a natural way. By applying a kernel based approach, we formally localize the resulting joint probability density of a transition. Thus we are able to investigate highly complex signals explicitly for trend changes in the statistical properties, without enlarging the dimensionality of the assumed underlying model.

We discuss our method's performance on well studied hydrological time series and present preliminary results of long scale, highly complex palaeo-signals from Northern Africa.

UP 7.3 Wed 12:00 MAG 100

Probing soil moisture by cosmic ray induced neutron showers — •Markus Köhli and Ulrich Schmidt — Physikalisches Institut, Universität Heidelberg, Heidelberg, Germany

The measurement of soil moisture at scales which average over local geological and biological structures is a major challenge in characterizing the land surface. It especially becomes important as refined numerical models in meteorology make use of mesh sizes of one kilometer or less. Fast cosmic ray induced neutrons are considered to be a probe for the determination of soil moisture on such medium scales. It is a the characteristic feature of hydrogen to slow down neutrons very efficiently during the scattering process. This leads to the spectrum of reflected neutrons being dependent on the water content.
In this talk Monte Carlo based simulations are presented to study the soil footprint measured by neutron detection systems. Therefore the influence of a number of features on neutron flux will be discussed and quantitatively described.