Max Planck Institute
for Biogeochemistry

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Global Interactions between Climate, Soil and Vegetation

Markus Reichstein has been appointed to the new director at the Max Planck Institute for Biogeochemistry in Jena.

The current debate on „global change" focuses mainly on the greenhouse effect and the related warming of the atmosphere, and the potential for feed-backs between higher temperatures and the carbon cycle. But the Earth system is much more complex than these aspects alone. To understand Earth system dynamics in a more comprehensive way, additional interactions have to be examined and considered in depth. In particular those linking the carbon cycle with water and nutrient cycling and feedback mechanisms between vegetation, soils and the atmosphere. For the last six years, Markus Reichstein and his independent Max Planck Research Group successfully dedicated their research to these topics.

After an international search for candidates Markus Reichstein was appointed Max-Planck director and department head on July 1, 2012. „I am looking forward to building up the *Biogeochemical Model-Data Integration* department, which will us allow to intensify the development and improvement of methods and models that help us understand and describe global interactions between climate, soil and vegetation." Reichstein states.

One focus of the new department will be the empirical analysis and global modeling of interactions between the biosphere and the atmosphere. Reichstein and his team are already part of multiple international research projects on Earth system modeling and participate in large scale analysis of carbon cycling and trace gas monitoring of entire continents. One important accomplishment is the global FLUXNET data base, built up by Reichstein and colleagues from Italy and the USA: it contains data from more than 250 locations worldwide about observations of carbon dioxide and water exchange between defined ecosystems and the atmosphere. How do ecosystems respond to climate variations and weather extremes and how do they adapt? In which ways do the water and carbon cycles interact? Which regions of the world are currently the largest carbon sinks minimizing the greenhouse effect and will they remain sinks? These are some of the main questions to be tackled in the department.

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“The soil plays a key role in the comprehension of these topics and the soil is not yet sufficiently studied.“ , Reichstein remarks. Even the total amount of carbon contained globally in soils is quantitatively not well determined. Soil functions and structures are coarsely represented in the current global models, and Reichstein refers to soil carbon „as the dark matter of the Earth system research“. An improved and holistic view of soils based on experiments that isolate processes and the integration in models will thus be emphasized. For example, within the QUASOM project, funded by the European Research Council (ERC), Reichstein’s group aims to describe the role of soil organisms in a heterogeneous vertically differentiated soil environment.

The research focus of the young director perfectly complements the scientific fields of the two other departments in the institute. The department *Biogeochemical Processes,* under the leadership of Susan Trumbore, investigates key processes and organisms within terrestrial ecosystems with an emphasis on soils and forest dynamics. The department *Biogeochemical Systems* led by Martin Heimann develops methods to measure trace gases in situ and uses remote sensing to investigate how regional variations are influenced by surface exchanges. „New insights in these areas can be incorporated in our global models. We can thus adapt the models and improve our understanding of the importance of certain soil processes or atmospheric changes.” Reichstein reports.

Markus Reichstein studied landscape ecology with minors in chemistry, botany, and computer science at the University of Muenster. He received his PhD at the University of Bayreuth and worked as a Marie-Curie fellowship-holder at the University Tuscia in Viterbo, Italy, with longer stays at Berkeley (University of California) und Missoula (University of Montana). In 2006 he started an independent Max Planck Research Group at the MPI for Biogeochemistry in Jena.

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