Zurich–Basel
Plant Science Center

Terrestrial Ecosystem Physiology

Terrestrial ecosystems in a changing environment

Terrestrial ecosystems are important components of the global climate system as sinks or sources of water and trace gases such as carbon dioxide or methane. Furthermore, terrestrial ecosystems provide essential services to society by producing food, wood and improving water quality. Our group aims to understand the ecophysiology and biogeochemical cycles of terrestrial ecosystems and to investigate how they respond to a changing environment and to land-use management.

As a key tool we use recently developed laser spectrometry for continuous measurements of stable isotopes in carbon dioxide and water vapor as tracers of the carbon and water cycles in forests and grasslands. Particularly we aim to understand the response of terrestrial ecosystems to drought across different spatial scales ranging from leaf to ecosystems and regions. The scope of our research links plant sciences and earth sciences by combining ecophysiology, stable isotope ecology, micrometeorology, and soil sciences. We employ various techniques such as flux measurements via eddy covariance and chambers, stable isotopes of carbon and oxygen, and ecosystem modeling.

Flux measurements at a forest tower using laser spectroscopy for stable isotopes in CO_2 and H_2O.

Research focus

- Ecophysiology and biogeochemistry of terrestrial ecosystems
- Stable isotope ecology
- Ecosystem-atmosphere interaction
- Carbon and water cycle

Interdisciplinarity

- Global change
- Sustainability and land-use
- Plant ecology

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Liste 1: Promotionsarbeiten

	Betreuer(in)	Doktorand(in) und Titel	Anzahl der Betreuer
1.	Prof. Knohl, Alexander	Gentsch, Lydia; Investigating isotopic signatures of carbon and oxygen in carbon dioxide and water vapour in forest ecosystems	1
2.	Prof. Knohl, Alexander	Barthel, Matthias; The influence of drought on carbon and water cycling in terrestrial ecosystems using stable isotopes as tracers	2

Liste 4: Forschungsprojekte

	Projekt-ID	Projektleiter	Titel
1.	19573	Knohl, Alexander	ISOCYCLE: Tracing the carbon and water cycle in terrestrial ecosystems with stable isotope spectroscopy
2.	21203	Knohl, Alexander	Liquid water isotope laser spectrometer
3.	21463	Knohl, Alexander	MIBA: Moisture Isotopes in Biosphere and Atmosphere

Liste 5: Wissenschaftliche Publikationen

a) Referierte Publikationen

	Publikations-ID	Autoren	Titel	Erschienen in
1.	43442	Gockede, M., Foken, T., Aubinet, M., Aurela, M., Banza, J., Bernhofer, C., Bonnefond, J. M., Brunet, Y., Carrara, A., Clement, R., Dellwik, E., Elbers, J., Eugster, W., Fuhrer, J., Granier, A., Grunwald, T., Heinesch, B., Janssens, I. A., Knohl, A., Koeble, R., Laurila, T., Longdoz, B., Manca, G., Marek, M., Markkanen, T., Mateus, J., Matteucci, G., Mauder, M., Migliavacca, M.,	Quality control of CarboEurope flux data - Part 1: Coupling footprint analyses with flux data quality assessment to evaluate sites in forest ecosystems	Biogeosciences

		Minerbi, S., Moncrieff, J., Montagnani, L., Moors, E., Ourcival, J. M., Papale, D., Pereira, J., Pilegaard, K., Pita, G., Rambal, S., Rebmann, C., Rodrigues, A., Rotenberg, E., Sanz, M. J., Sedlak, P., Seufert, G., Siebicke, L., Soussana, J. F., Valentini, R., Vesala, T., Verbeeck, H., Yakir and D.		
2.	35901	Knohl A., Søe A.R.B., Kutsch W.L., Gockede M., Buchmann N.	Representative estimates of soil and ecosystem respiration in an old beech forest	Plant and Soil
3.	43443	Knohl, A., Baldocchi D. D.	Effects of diffuse radiation on canopy gas exchange processes in a forest ecosystem	Journal of Geophysical Research-Biogeosciences
4.	43444	Kutsch, W. L., Kolle, O., Rebmann, C., Knohl, A., Ziegler, W., Schulze and E. D.	Advection and resulting CO2 exchange uncertainty in a tall forest in central Germany	Ecological Applications
5.	43445	Luyssaert, S., Schulze, E. D., Borner, A., Knohl, A., Hessenmoller, D., Law, B. E., Ciais, P., Grace and J.	Old-growth forests as global carbon sinks	Nature
6.	42957	Valentino, F.L., Leuenberger, M., Uglietti, C., Sturm, P.	Measurements and trend analysis of O2, CO2 and d13C of CO2 from the high altitude	Science of The Total Environment

			research station Junfgraujoch, Switzerland – A comparison with the observations from the remote site Puy de Dome, France	

c) Varia

	Publikations-ID	Autoren	Titel	Erschienen in
1.	43449	McDowell N., Baldocchi, D.D., Barbour M., Bickford, C., Cuntz M., Hanson D., Knohl A., Powers H., Rahn T., Randerson J., Riley W.J., Still C., Tu K., Walcroft A.	Understanding the Stable Isotope Composition of Biosphere-Atmosphere CO2 Exchange	EOS

Liste 6: Vorträge vor wissenschaftlichem Publikum

a) Eingeladene Vorträge vor wissenschaftlichem Publikum

	Redner	Titel
1.	Knohl, Alexander	Wasser- und Stoffdynamik in Waldökosystemen, Potsdam, Germany, October 2008, Geoecological Colloquium
2.	Knohl, Alexander	Interaction of carbon and water cycle in forest ecosystems, Göttingen, Germany, November 2008, Bioclimatological Colloquium
3.	Knohl, Alexander	Assessing carbon and water cycles in terrestrial ecosystems with stable isotopes, Bern, Switzerland, December 2008, Plant Physiological Colloquium
4.	Knohl, Alexander	Wasser- und Stoffdynamik in terrestrischen Ökosystemen, Müncheberg, Germany, December 2008, ZALF Colloquium

b) Sonstige Vorträge und Posterpräsentationen vor wissenschaftlichem Publikum		
	Redner	Titel
1.	Barthel, Matthias	Using stable isotope laser spectroscopy to investigate the influence of drought on the mesophyll conductance to carbon dioxide, Spain, Sa Coma, 28 September 2008, ESF Exploratory Workshop - Mesophyll conductance to carbon dioxide: mechanisms, modeling and ecological implications
2.	Sturm, Patrick	High-Precision Measurements of Stable Isotopes in CO2 and H2O using Infrared Laser Spectroscopy, France, Giens, 31.8.-5.9.2008, Joint European Stable Isotope User Meeting
3.	Sturm, Patrick	Ecosystem Fluxes of Stable Isotopes in CO2 and H2O Above a Forest Measured by Laser Spectroscopy, USA, San Francisco, 15.-19.12.2008, AGU Fall Meeting
4.	Knohl, Alexander	A new technique for measuring continuously isotopic processes under field conditions, Birmensdorf, Switzerland, April 2008, QUERCO project workshop
5.	Knohl, Alexander	Response of forest ecosystem fluxes and feedbacks to the atmosphere during droughts of various degrees in the years 2000 to 2006, Leipzig/Germany, September 2008, EURECO-GFOE Conference
6.	Barthel, Matthias	The influence of carbon and water cycling in terrestrial ecosystems using stable isotopes as tracers, Switzerland, Kloster Kappel,20.08.2008, ETHZ LFW PhD Symposium
7.	Gentsch, Lydia	Tracing the Carbon and Water Cycling through Terrestrial Ecosystems Using Stable Isotope Laser Spectroscopy, France, Giens, 31.8.-5.9.2008, Joint European Stable Isotope User Meeting
8.	Gentsch, Lydia	Investigating Carbon Isotope Ratios of CO2 Fluxes in a Mountainous Forest Ecosystem in Switzerland, Switzerland, Kloster Kappel, 20.08.2008, PhD Symposium of the Institute of Plant Sciences, ETH Zurich

Liste 7: Gutachten

	Gutachter	Art des Gutachtens	Typ der anfordernden Organisation	Sitz der anfordernden Organisation	Anzahl
1.	Sturm, Patrick	Publikationen			2
2.	Knohl, Alexander	Publikationen			13

Liste 12: Kommissionsarbeit

	Kommissionsmitglied	Neu	Typ Kommission	Typ Organisation	Sitz	Anzahl
1.	Knohl, Alexander; Editorial Review board member of Journal	Ja	Editorial Board	Privatfirmen / Industrie	International	1

Liste 13: Öffentlichkeitsarbeit

b) Vorträge vor nicht-wissenschaftlichen Gremien

	Bezeichnung
1.	Hochpräziese Messungen von Kohlendioxid- und Wasserisotopen in der Chamau: Ein Ausblick, Informationsveranstaltung für die Mitarbeiter der ETH Forschungsstation, Chamau, 26.3.08

c) Andere Veranstaltungen

	Bezeichnung
1.	Podiumdiskussionsteilnehmer zu Marie Curie Actions "People: Theory into Practice", Veranstaltung "New Frontiers New Challenges" an der ETH Zürich, 3.6.2009