Scientific Departments

Biogeochemical Processes

Prof. Susan Trumbore, PhD (Managing Director until 09/18)
Phone +49 (0)3641 57 6110
trumbore@bgc-jena.mpg.de

Biogeochemical Integration

Prof. Dr. Markus Reichstein (Director)
Phone +49 (0)3641 57 6273
mreichstein@bgc-jena.mpg.de

Biogeochemical Systems

Director N.N.
Phone +49 (0)3641 57 6301

Research Groups

Molecular Biogeochemistry

apl. Prof. Dr. Gerd Gleixner
Phone +49 (0)3641 57 6172
gerd.gleixner@bgc-jena.mpg.de

Organic Paleobiogeochemistry

Dr. Christian Hallmann
Phone +49 (0)421 218 65 82057
challmann@bgc-jena.mpg.de

Functional Biogeography

Dr. Jens Kattge, Prof. Dr. Christian Wirth
Phone +49 (0)3641 57 6226
jkattge@bgc-jena.mpg.de, cwirth@uni-leipzig.de

Research Groups

Biospheric Theory and Modeling

Dr. Axel Kleidon
Phone +49 (0)3641 57 6217
akleidon@bgc-jena.mpg.de

Hydrology-Biosphere-Climate Interactions

Dr. René Orth
Phone +49 (0)3641 57 6250
rene.orth@bgc-jena.mpg.de

Theoretical Ecosystem Ecology

Dr. Carlos Sierra
Phone +49 (0)3641 57 6133
csierra@bgc-jena.mpg.de

Terrestrial Biosphere Modeling

Dr. Sönke Zaehle
Phone +49 (0)3641 57 6230
szaehle@bgc-jena.mpg.de

Scientific Members of the Max Planck Society

Prof. Dr. Martin Heimann
Phone +49 (0)3641 57 6350
martin.heimann@bgc-jena.mpg.de

Prof. Dr. Ernst-Detlef Schulze
Phone +49 (0)3641 57 6100
dschulze@bgc-jena.mpg.de

Max-Planck-Institut
für Biogeochemie

Exploring the Earth

Element Cycles & Climate System

International Max Planck Research School
for global Biogeochemical Cycles (IMPRS- gBGC)

Dr. Steffi Rothhardt (Coordination)
Phone +49 (0)3641 57 6260
Fax +49 (0)3641 57 7260
imprs-gbgc@bgc-jena.mpg.de
www.imprs-gbgc.de

Research Coordinator, Press
Dr. Eberhard Fritz
Phone +49 (0)3641 57 6800
efritz@bgc-jena.mpg.de
presse@bgc-jena.mpg.de

Press & Public Relations
Susanne Héjja
Phone +49 (0)3641 57 6801
shejja@bgc-jena.mpg.de
presse@bgc-jena.mpg.de

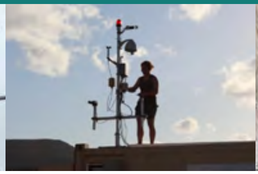
Max Planck Institute for Biogeochemistry
Beutenberg Campus
Hans Knöll-Str. 10, 07745 Jena, Germany

Phone +49 (0)3641 57 60
Fax +49 (0)3641 57 70
info@bgc-jena.mpg.de
www.bgc-jena.mpg.de

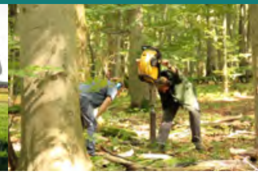
GPS
50.910070 °N or 50° 54′ 36.23896′′ N
11.566650 °E or 11° 33′ 59.95278 E

May 2018

MAX-PLANCK-GESELLSCHAFT





Our mission: to investigate how global element cycles interact with the climate system.

Cycles of essential elements

Biogeochemistry is the study of Earth's metabolism. Elements essential for life, such as carbon, nitrogen, oxygen, and phosphorous, are continuously subject to biological, chemical, and physical transformations as they are exchanged among the Earth's lithosphere, hydrosphere, biosphere, and atmosphere.

"Biogeochemical cycles" are quantitative descriptions of how elements are distributed and exchanged among these 'spheres'.

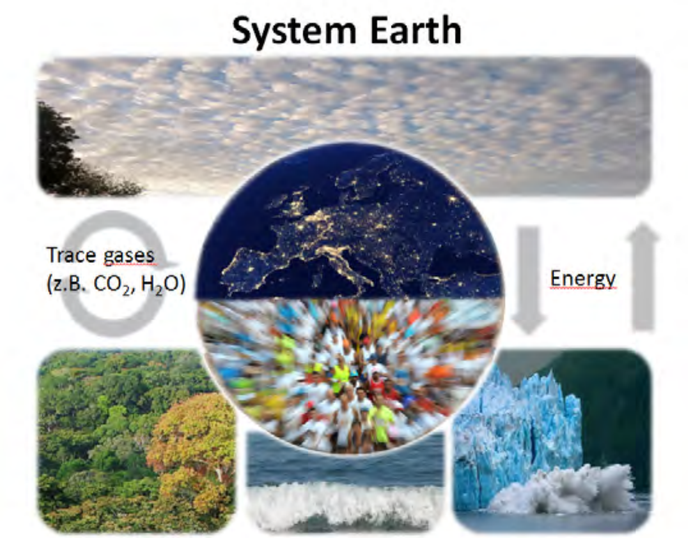
For example, the element carbon can exist as the gases carbon dioxide and methane in the atmosphere, as organic molecules in organisms, soils and sediments, and in dissolved inorganic and organic forms in surface waters and oceans. Processes exchanging carbon between organic and gaseous forms include photosynthesis, respiration, and decomposition, while soluble inorganic forms can exchange with solid carbonate minerals. Biota mediate most of the processes transforming carbon from one form to another and the rates vary with environmental conditions.

Earth System and Climate

Biogeochemical cycles interact in complex ways with Earth's climate. They control variations in the atmospheric concentrations of greenhouse gases like carbon dioxide (CO_2), water vapor (H_2O), methane (CH_4), and nitrous oxide (N_2O), which in turn affect the radiative balance of the atmosphere. Large-scale changes in land surface vegetation also influence physical climate through their impact on the surface energy balance.

Our Research

Our Institute aims to better understand the role played by land biota in global biogeochemical cycles. We focus on land because it is where humans live, and because the role of land is among the largest uncertainties in global budgets of carbon (C), nitrogen (N), phosphorus (P), and water.



Our scientists prioritize observing and understanding current and ongoing changes in the Earth System. Activities associated with increasing human demands for energy, water and food have fundamentally altered global biogeochemical cycles and caused rapid increases in atmospheric greenhouse gases, and therefore Earth's climate.

Conversion of large regions of the land surface has affected the diversity and geographic distribution of Earth's biota. Understanding the implications of these changes for the future state of the Earth system is a major scientific challenge, and an urgent one given future demands on ecosystems for resources to sustain increasing human population and living standards. The study of the Earth System differs from standard reductive methods of science. We have only one Earth, and its properties are inexorably linked to its unique evolutionary history.

The changes we are currently imposing on the Earth System provide opportunities to learn how it operates by observing its responses. However, we are conducting unplanned experiments, with many factors changing at the same time and no 'control' – no Earth unaltered by humans for comparison. Furthermore, our ability to observe the complete Earth System in all its aspects is quite limited.

The processes controlling interactions among climate, land surface and biogeochemistry span 18 orders of spatial magnitude: we must understand what factors alter activity of a molecule such as the enzyme RuBisCO responsible for photosynthesis, and how that may help explain global patterns of vegetation productivity visible from space.

Method Diversity

We take advantage of lab and field experiments, measuring instrumentation in ecosystems and on aircraft, satellite measurements, modeling, and data analyses by machine learning, analyzing air, water, and soil samples using biomarkers and stable isotopes.

To handle all the complex interactions and to make large leaps in scale, we rely on conceptual and computational models to test our understanding of the processes determining the state of the Earth System and how it responds to changes.

There is no Earth unaltered by humans available for comparison nor can we go back in time.