

Global Change

International Geosphere-Biosphere Programme

Issue 74 ■ Winter 2009

PLANETARY BOUNDARIES

Nine identified
Three crossed

Global CO₂ budget
Variations and trends

A vision for 2050
The future could
be bright

Climate-change index
A new tool for the
public and policymakers



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What are the key boundaries that have kept our planet's climate stable for 11,000 years?

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Can the complexities of the Earth system be condensed down to a single number like the FTSE or Dow Jones indices?

16 A vision for our planet

By 2050, everyone will have access to adequate food, clothing, housing, and clean water. This is the dream. Read how to make it a reality.

20 Tracking China's urban emissions

A first estimate of China's urban energy use.

24 Have we reached peak CO₂?

If CO₂ is seen as a non-renewable resource, then the answer is yes.

28 Closing the global budget for CO₂

The global financial crisis probably explains the modest 2% growth in emissions in 2008 compared with 2007.

32 Where sinking land meets rising water

Five hundred million people call deltas their home. Their home is sinking.

36 Climate services for all?

The World Climate Conference laid out a framework for climate services on the time and space scales needed by society. Will it deliver?

40 Getting a handle on ecosystem services

Identifying and valuing ecosystem services has proved difficult. Here land-use scientists discuss new ways of valuing land.

Cover image

Maintaining the long-term environmental stability of the Holocene, some experts suggest, will require respecting nine interlinked planetary boundaries that define a "safe operating space" for humanity. As the dials on the image depict, we have already overstepped three of the boundaries.



Welcome to Global Change, the new magazine from the International Geosphere-Biosphere Programme. Global Change is based on our old newsletter, which has had a long and successful history. With the new magazine, we want to broaden our appeal and reach a wider audience. It will be distributed to researchers, policymakers, funders, journalists, pressure groups and others.

This first issue is timed to coincide with the Copenhagen climate talks: many of the articles focus on recent carbon-cycle research. Of course, IGBP research goes much wider than climate change, and this will be reported in coming issues. We sincerely hope that you enjoy our magazine, and we look forward to your feedback.

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Global Change primarily publishes articles reporting science from within the extensive IGBP network.

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IGBP core projects

Analysis, Integration and Modelling of the Earth System (AIMES)

Global Ocean Ecosystem Dynamics (GLOBEC)

Global Land Project (GLP)

International Global Atmospheric Chemistry (IGAC)

Integrated Land Ecosystem-Atmosphere Processes Study (iLEAPS)

Integrated Marine Biogeochemistry and Ecosystem Research (IMBER)

Land-Ocean Interactions in the Coastal Zone (LOICZ)

Past Global Changes (PAGES)

Surface Ocean-Lower Atmosphere Study (SOLAS)

Global environmental change joint projects

Global Carbon Project (GCP)

Global Environmental Change and Food Systems (GECAFS)

Global Water System Project (GWSP)

Global Environmental Change and Human Health (GECHH)

Synthesis, integration and exploration

Geoengineering

The role of changing nutrient loads in coastal zones and the open ocean in a high CO₂ world

Global nitrogen assessment and a future outlook

Earth-system resilience: Earth-system prediction

Earth-system impacts from changes in the cryosphere

Megacities and coastal zones

Global environmental change and sustainable development: the needs of least developed countries

The role of land cover and land use in modulating climate

Aerosols

ICSU's global environmental change programmes

DIVERSITAS

International Geosphere-Biosphere Programme

International Human Dimensions Programme

World Climate Research Programme

And their Earth Systems Science Partnership



International Council for Science

IGBP is an ICSU global
environmental-change programme.

IGBP focuses the international research community on the planet's key biogeochemical processes – the carbon, oxygen, nitrogen, water, phosphorus, and sulphur cycles. Our work includes understanding and predicting how these cycles are changing and the impact of human activities on them.