

Integrated Land Ecosystem - Atmosphere Processes Study

What is iLEAPS?

- iLEAPS is a core project of International Geosphere - Biosphere Programme (IGBP)
- iLEAPS promotes new integrated research approaches in global change research
- iLEAPS aims at improved understanding of interacting physical, chemical, and biological processes, linkages and feedbacks, and changes due to human activities in the land-atmosphere interface affecting the Earth System



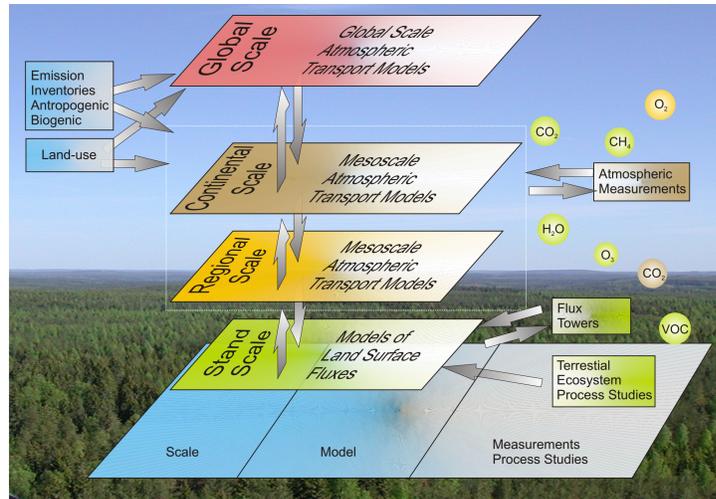
iLEAPS MATERIAL

To receive biannual iLEAPS newsletters, quarterly e-mail bulletins and e-mail alerts, please join the iLEAPS mailing at www.ileaps.org

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Integrated iLEAPS Approach



iLEAPS Science Foci

- Land-atmosphere exchange of reactive and conservative compounds: Key interactions and feedbacks in the Earth System
- Feedbacks between land biota, aerosols and atmospheric composition in the climate system
- Feedbacks and teleconnections in the land surface-atmosphere-water-system
- Transfer of material and energy in the soil/canopy/boundary-layer system: Measurements and modelling

Scientific achievements 2007

New iLEAPS recognized projects:

- EUCAARI
European Integrated project on Aerosol Cloud Climate and Air Quality interactions
- IGBP Cross-Project - FIRE ACTIVITY
- WATCH
Water and Climate Change
- LUCID
Land-Use and Climate, Identification of Robust Impacts

ACPC Aerosols, Clouds, Precipitation, Climate initiative



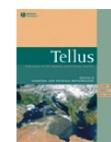
ACPC planning group is also an ISSI Team. First ISSI meeting was held in Bern, Switzerland, 28-30 January 2008

iLEAPS-IGAC-GEWEX joint activity ACPC was established with the aim to initiate an IGBP-WCRP level project. In 2007, ACPC Planning Group wrote a joint white paper, held a specialist workshop in Boulder, Colorado. The Planning Group is working towards a ACPC Science Plan and Implementation Strategy.

The Planning Group members:
iLEAPS: Andi Andreae, Markku Kulmala, Danny Rosenfeld
IGAC: Sandro Fuzzi, Colin O'Dowd, Graciela Raga
GEWEX: Tom Ackerman, Bill Lau, Ulrike Lohmann, Pier Siebesma

More information on ACPC at www.ileaps.org

During the year 2007, iLEAPS organised and co-sponsored several workshops, meetings and training courses on land-atmosphere interactions.



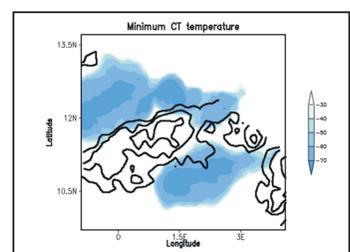
iLEAPS special issue from the Boulder Science Conference 2006 was published. Science papers are available at <http://www.blackwell-synergy.com/toc/teb/59/3>

iLEAPS Science highlights



The importance of land-atmosphere interactions for WAM weather prediction

Numerical and theoretical studies have shown that mesoscale gradients in land surface properties can induce circulations in the atmosphere. Taylor and Ellis and Taylor et al. provided the first well-resolved observations of atmospheric flows induced by soil moisture from recent rainfall. The studies were based on aircraft and satellite imagery data from the Sahel. Mesoscale perturbations to the background flow were found, consistent with low level divergence over wet soil and convergence in drier areas.



The figure shows wet soils from rain the previous day (black contours) and the location of deep convective cloud the following afternoon. Analysis of many such cases showed that afternoon storms tend to occur over dry soils.

The soil moisture and atmospheric wind patterns were statistically coherent on wavelengths down to 20 km. These results suggest that mesoscale convergence lines forced by soil moisture may play a significant role in the meteorology of the Sahel.

Taylor CM and Ellis JE 2006. Geophys. Res. Lett., 33 and Taylor CM, DJ Parker & PP Harris 2007. Geophys. Res. Lett., 34, L15801

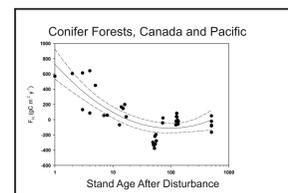


Breathing of the terrestrial biosphere

Eddy covariance measurements over 500 site-years of data on net and component carbon fluxes were studied.

Key findings include:

- 1) ecosystems with the greatest net carbon uptake have the longest growing season, not the greatest canopy photosynthesis (FA)
- 2) ecosystems losing carbon were recently disturbed and many old-growth forests act as carbon sinks



Baldocchi D 2007. Turner Review no. 15., Australian Journal of Botany, 56(1): 1-26.

Figure 1. shows the relationship between net carbon exchange and canopy age since disturbance (logging). The data are from several chronosequence studies done in central and western Canada and the Pacific Northwest over conifers.

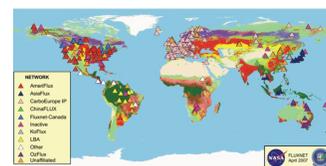


Figure 2. Global distribution of long-term carbon dioxide, water vapour and energy flux measurement sites, associated with the FLUXNET program and its regional partners. The sites overlay the Modis IGBP land use map.

