



The Partnership for International Research and Education (PIRE) is an international partnership between scientists in the U.S. and Brazil.

PIRE opportunities include National Science Foundation fellowships and a yearly intensive graduate field course in the Amazon of Brazil on forest ecology and biogeochemistry.

Amazon-PIRE
PARTNERSHIP FOR INTERNATIONAL RESEARCH AND EDUCATION IN
AMAZON-CLIMATE INTERACTIONS

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Lead Institutions

The University of Arizona
Harvard University

The University of São Paulo
National Institute for Amazon Research (INPA)
Brazil Agriculture Research Agency (EMBRAPA)

Support by

US National Science Foundation

The National Council for Scientific and Technological Development (CNPq-Brazil)

WHAT IS THE FUTURE OF AMAZÔNIA UNDER CLIMATE CHANGE?

Amazon-PIRE: A National Science Foundation Funded Partnership for International Research and Education in the Amazon

CORE PARTICIPANTS:

U.S. University of Arizona: Scott Saleska (Ecol. & Evol. Biol, EEB.), James Shuttleworth (Hydrology), Alfredo Huete (Soil, Water & Env. Sci.); Judie Bronstein (EEB); Brian Enquist (EEB); Tim Finan (Anthropology); Travis Huxman (EEB); Joellen Russell (Geosciences); Sylvia Tesh (Latin Am. Studies); Scott Whiteford (Latin Am. Studies)

Harvard University: Steven Wofsy (Earth & Planet. Sci); Paul Moorcroft (Org. & Evol. Bio.); Scot Martin (Engineering & Appl. Sci.)

Brazil. University of São Paulo: Plínio de Camargo (CENA); Paulo Artaxo (Inst. of Physics); Humberto da Rocha and Pedro L. Silva-Dias (Atm. Sciences);

Federal University of Pará: Julia Cohen, Renato da Silva, and Rodrigo da Silva (Meteorology);

National Institute for Amazon Research (INPA): Antonio Manzi

Brazil Agriculture Research Agency (EMBRAPA): Raimundo de Oliveira

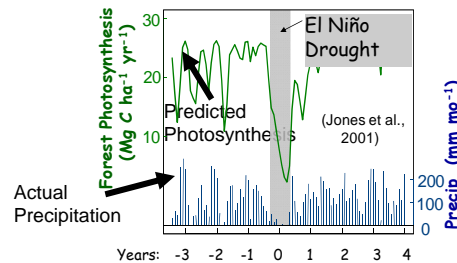
Museu Goeldi and National Inst. for Space Research (INPE): Leonardo Sá

Hypothesis:

Models predict that climate change will cause widespread tree death and the catastrophic collapse of Amazon forests. These models predict that this dieback response will begin with strong limitation of photosynthesis during El Niño droughts.

The Amazon-PIRE will test the hypothesis that...

Water limitation will cause forest photosynthetic production to decrease during dry periods and plummet during El Niño drought years.



Test Hypothesis by Observing Forest Responses to El Niño Drought

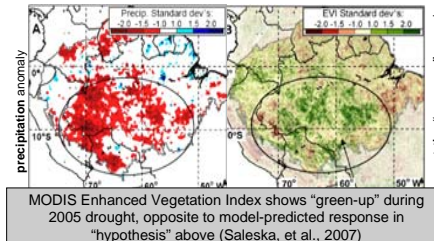
1. Forest Metabolism
Eddy Flux Towers to measure CO₂



2. Vegetation Dynamics

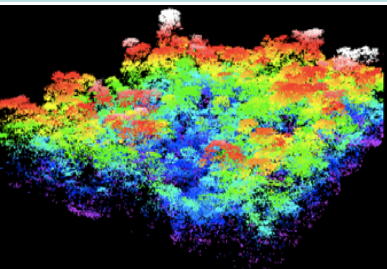


3. Remote Sensing of Forest Vegetation



MODIS Enhanced Vegetation Index shows "green-up" during 2005 drought, opposite to model-predicted response in "hypothesis" above (Saleska, et al., 2007)

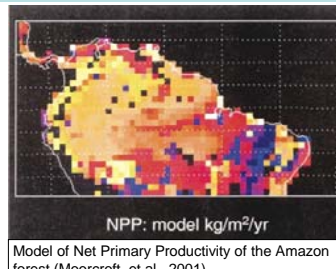
4. LiDAR Remote Sensing



5. Experiments in Biosphere 2
(of large-scale drought)



6. Modeling Ecosystem Structure and Biogeochemistry at Multiple Scales



Model of Net Primary Productivity of the Amazon forest (Moorcroft, et al., 2001)

Amazon Field Course



July 12-23, 2008 at Tapajós National Forest (near Santarém, PA, Brazil)

Students learn about scientific instrumentation (left) and measure light levels in the forest canopy using a balloon (right)

NSF Stipends to Support U.S. Student Participation in Amazon-PIRE:
full-year graduate stipends, summer project (grad & undergrad)

- Amazon-PIRE fellowships include:
 - ✓ 30K annual stipend (1-2 years)
 - ✓ partial tuition subsidy,
 - ✓ travel allowance to Brazilian sites and institutions.
- Amazon-PIRE is committed to diversity in education. We encourage applications from women and underrepresented minorities.
- Eligibility: U.S. citizens or permanent residents enrolled in eligible graduate studies at University of Arizona or Harvard University.

Four-part International Education Program:

1. Interdisciplinary curriculum & advising:

- Scientific coursework in ecology & biogeochemistry; hydro-meteorology & climate; and ecosystem modeling
- Instruction in Portuguese language and Brazilian culture
- Effective mentoring by U.S. and Brazilian advisers and collaborators

2. Amazon field course

U.S. and Brazilian students collaborate with world-class scientists and local Amazon woodsman (mateiros) whose main education comes from working in the forest.

3. International collaboration at Brazilian field sites, institutions and laboratories

U.S. students work at Amazon field sites, including:

- Tapajós National Forest (near Santarém),
- Caxiuanã National Forest (near Belém), and
- Cuieiras Reserve (near Manaus).

Brazilian students participate through exchange (via funding from Brazil or other sources) with U.S. institutions.

4. Broader Education & Outreach

Local outreach at Amazonian universities by PIRE participants enhances community relations in Amazônia, and leads to educational outreach in the U.S. about global environmental issues.

Relevant disciplines include: ecology; geosciences; hydrology and water resources; soil, water, and environmental science.

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