

RAINFOR People

Erick Oblitas Mendoza
 Instituto Nacional de
 Pesquisas da Amazônia –
 INPA - Manaus, Brazil



Erick is Peruvian, with a degree in Agronomy by the Universidad Nacional de la Amazonia Peruana.

When did you join RAINFOR?

I joined the RAINFOR group in 2009, after completing a Masters at the Instituto Nacional de Pesquisas da AMAZÓNIA – INPA, studying the “Terras Pretas de Índio”. My first campaign with RAINFOR was helping my “compadre Beto” Carlos Quesada with soil collections, in 2009, at the Jenaro Herrera plots, in Peru.

Are you involved in any projects at the moment?

I’m currently living in Manaus - Brazil, and was recently awarded a 2 years CNPq research grant to work as a research fellow at the Ecology Department at INPA (Instituto Nacional de Pesquisas da Amazônia), Brazil. We are now working with soil collections in the intensive phase within the RAINFOR plots, following further developments under the project entitled: “Carbon Balance in a altitudinal gradient of the Andes in Amazonia”.

Which are your main research interests?

I have a large interest in Edaphology, Soil ecology and Biogeochemical Cycles. The RAINFOR Project has enabled me to define more clearly my research lines and to mature professionally.

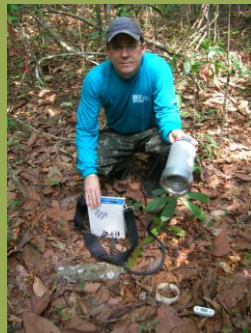


It has been a few months since our last Newsletter and we have lots of interesting news to share with you about what has been happening within the network!

We invite you to visit <http://www.geog.leeds.ac.uk/projects/rainfor/> for regular news updates.

- **Forest Plots.net** - If you haven't visited Forest Plots (www.ForestPlots.Net) recently, we encourage you to do so. Once you have your login/password combination you can explore the website in more detail. This project is associated with RAINFOR, and provides a web-accessible secure repository for the whole network's forest inventories, of which there are currently over 183 plots, plus hundreds more from across the tropics. Plot owners can safely store, manage, and analyse their data here.
- Read up on the **Field Campaigns** the RAINFOR people have been involved in across Amazonia, on the RAINFOR website: http://www.geog.leeds.ac.uk/projects/rainfor/pages/campaigns_eng.html

Recent fieldtrips include Brazil, Bolivia and Peru!



Tanguro, Mato Grosso
 Brazil (Sep 2010)



Team – Bolivia (2010)



Fieldwork - Peru



Team - Mato Grosso, Brazil
 (2010)



Team – Bolivia
 (2011)

Samuel Almeida

We bring the sad news that Samuel Soares Almeida, botanist and ecologist at the Museu Paraense Emílio Goeldi (MPEG), Belém, passed away recently. Samuel has played a key part in MPEG's globally important research on biodiversity in Amazonian forests over the last three decades or more. He was an enthusiastic contributor to, and participant of, RAINFOR, providing long term plot data from the Caxuianá field station, and actively supporting the intensive plot research activities that have made Caxuianá one of the major RAINFOR research sites, and one of the most important research sites in Amazonia.

Many members of the RAINFOR will remember his hosting of the PARAMA field course in Caxuianá. His expertise and his warm and lively personality enlivened all our interactions. We first met Samuel in the late 1990s when he was already a senior scientist. He was the best kind of researcher: serious about the importance of his work, supportive of his students, and intellectually generous to junior colleagues such as ourselves. He was also vigorous and great fun in conversation. Samuel was always open in sharing his ideas and resources, seeing the extra value this could bring to his group and to science if the collaboration was strong.

Never more at home than in the field, especially at the Caxuianá forest that he loved, his interest and detailed knowledge of Amazonian forests never failed him, or failed to impress and entertain others. He seemed most at home hosting a tambaqui barbecue by the river, telling stories about his forest adventures.

Samuel's work has strengthened and embedded MPEG's forest research at internationally-leading levels, and the legacy of the long-term plots he established will continue to have an impact into the future. On a more personal note, all who knew him will miss his great loyalty, laughter and mercurial wit. He leaves a large and vibrant family who we know will carry that personal force into the future.

Patrick Meir and Yadvinder Malhi





Fieldwork in Peru



Fieldwork in Bolivia



Sorting of botanical samples
(Bolivia)



Fieldwork in Peru

- **May 2010 – October 2011 - Peru Fieldtrip**

A two year field campaign is being conducted in Madre de Dios, Peru, to improve biomass estimates in different forest types in this area. The team, lead by **Rosa Goodman** and **Tim Baker**, works in a logging concession near Iñapari and on RAINFOR plots in the Tambopata National Reserve. The first part of this campaign is to weigh trees in the open, bamboo-dominated forests, which is an important forest type where no other directly-measured biomass data exists. Similarly, they will measure and weigh common palm species. These datasets will be used to create new allometric equations to predict carbon storage in trees and palms in this region. Thirdly, they will conduct inventories in the open, bamboo-forest on the logging concession and secondary forests outside the Tambopata National Reserve to estimate total biomass in these forest types. Finally, these and existing ground-based biomass estimates will be used to calibrate remote sensing data over a 13,875 ha area in Tambopata.

- **October 2010** - A comprehensive **Carbon Monitoring Manual** published in Spanish, by **Euridice Honorio** and **Tim Baker** is available to download from the RAINFOR website: http://www.geog.leeds.ac.uk/projects/rainfor/pages/manuals_eng.html

- **November 2010:**

- The 2010 Amazon drought follows closely on the 'drought of the century' event in 2005. The front page of the Reuters website on 29 November carried an extensive piece of reportage from Brazil, including RAINFOR research on the impact of Amazon drought on forests: <http://uk.reuters.com/article/idUKTRE6AS4H420101129>
- This year has seen much of Amazonia in drought, with high temperatures and rivers at record lows across the 6 million square kilometre region. The EGC cluster, at the University of Leeds has anecdotal reports of impacts from many locations and colleagues, including from Bolivia from where **Roel Brienen** returned in Nov. after leading a RAINFOR forest remeasurement team who had to contend with dry heat and choking smoke even within the forest. The 2010 drought follows closely on another extreme drought in 2005. As reported [here](#) the group discovered that the 2005 drought reversed the long-term carbon sink provided by the region (**Phillips et al.**, Science), but perhaps just temporarily. The impacts of cumulative Amazon droughts on forests and people are explored in this Global Post story, including an excellent short video.
- We welcome **David Greenberg**, who has joined us at the University of Leeds for 9 months as a post-doctoral researcher on the RAINFOR project supported by the Moore Foundation. He brings important new skills to our project in spatial analysis and cartography which he combines with a strong background in tropical ecology, and will help RAINFOR to convert science outputs on Amazon carbon dynamics into maps and other forms suited to conveying them better to policy-makers and public. Originally from New York, David moved straight to the UK winter from sunny southern California!

- **October – December 2010 - Intensive carbon cycling field campaign 2010**

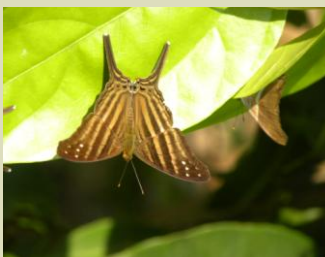
During the months of October to December 2010, **Chris Doughty** visited most of the intensive carbon cycling sites to meet our collaborators and collect standardized leaf physiology measurements of sunlit and shaded leaf light saturated photosynthesis and dark respiration. Below is a brief update for each of the sites he visited.

Kosñipata Valley

The Kosñipata valley sites of San Pedro, Wayquecha and Esperanza are all running smoothly with **Walter Huasco** and **Liliana Baca** supervising data collection. San Pedro lost a portion of its land cover in a landslide. We continued to collect data both before and after the landslide. This will help us to better understand the role of landslides on the carbon balance of these forests. These sites are logistically challenging but the data set looks excellent thanks to the hard work of **Javier Silva**, **Walter** and **Liliana**.



Fieldwork in Tanguro, Mato Grosso, Brazil



Tambopata

Filio Farfán is doing well coordinating data collection at the Tambopata site. The sites are home to an amazing diversity of animals and on the path to the forest we saw giant anteaters, monkeys, wild pigs, and many others. We have recently begun work on a third plot that will be in the footprint of the new eddy covariance tower. This will allow us to compare our “bottom up” estimates of GPP to the top down estimate produced by the eddy covariance towers. In the next few months both should be running and producing interesting data.

Kenia

Alejandro Araujo is doing an excellent job coordinating data collection at Kenia, the most logistically challenging of the intensive carbon cycling sites. During the visit we stayed on a cow farm which had no electricity. To power our batteries we visited a neighbouring farm who allowed us to use their generators in exchange for providing the films to watch. It was a good way to gain local support for the project as well as gain the energy to power our equipment. Although a very difficult site to get to, Alejandro has provided excellent, continuous data.

Allpahuayo

The Allpahuayo site near Iquitos has struggled a bit, but is now in the hands of **Jack Gutierrez** and the Institute for Amazonian studies in Iquitos. One of the sites is remarkably on a white sand substrate. Understanding the full carbon cycling there will provide very interesting data for a nutrient poor site. Jack was doing a good job with the site when I visited and we hope to have a complete continuous dataset by the end of the year.

Tanguro

The Tanguro site is run by **Wanderley Rocha** in collaboration with our Brazilian partners in IPAM. This is the site of a remarkable experimental burn. There are three sites located near the large and expanding soybean fields of Mato Grosso, Brazil. One site is the control site, the next is burned yearly, and the third is burned every three years. We will soon understand how regular burns will affect carbon cycling in the Amazon. We have been measuring soil respiration, trunk respiration, and fine root growth, while our partners have been measuring litter fall, trunk growth, and LAI. The site has had complications due to the many Tapirs who enjoy eating the plastic instruments. However, Wanderley has managed to outwit the Tapirs using metal instruments and is doing great work.

Caxiuanã

I did not have the opportunity to visit the Caxiuanã site on the previous trip, but I have been in regular contact with **Lola da Costa**, the supervisor of the site, who is doing a great job. There will be a meeting at the site in May when I will visit and collect leaf physiology measurements.

• December 2010:

- **Forest Plots.net** - Plot data from **179 plots** from Africa and South America is now publically available! South American plot data comes from Bolivia, Brazil, French Guiana, Guyana, Peru and Venezuela.
- **RAINFOR** was awarded a **NERC Urgency Grant**. An excerpt of the submitted proposal can be found on the next page.

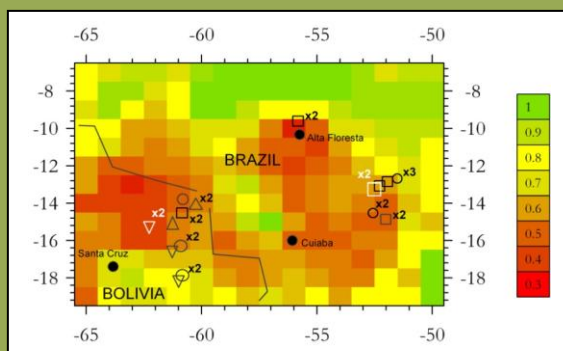
“Assessing the impacts of the 2010 drought at the Amazon forest-savanna zone of tension

Oliver Phillips (Principal Investigator), **Ted Feldpausch** (Research Co-Investigator) [University of Leeds];
Project Partners: **Jon Lloyd** [University of Queensland], **Yadvinder Malhi** [Oxford University Centre for the Environment], **Luzmila Arroyo** [Museo de Historia Natural Noel Kempff Mercado, Santa Cruz, Bolivia],
Beatriz Marimon [Universidade do Estado do Mato Grosso, Nova Xavantina, MT, Brazil]

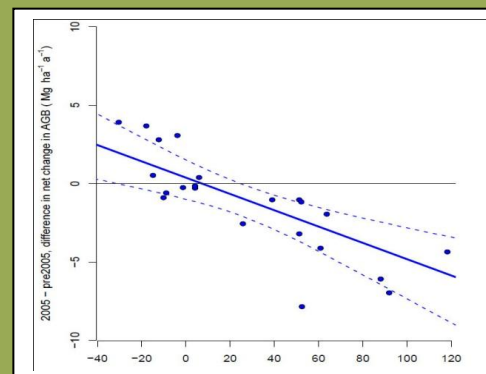
In 2010 the Amazon Basin experienced unusually dry conditions, a second major drought in five years, which represent a contemporary analogue to what some predict will be the future climate of the region. This is because most climate models predict an increase in dry season intensity, and all climate models predict an increase in temperature in the coming century as a consequence of global climate change. The sequence of droughts in (1997/98, 2005 and now 2010) may also just be a statistical aberration. Regardless of the drivers, the current drought can help us evaluate how humid forest, dry-deciduous forests and savanna ecosystems and species respond differentially to drying, so helping us to assess the potential magnitude of forest decline as the Amazon climate dries.

Following the establishment in 2007 and 2008 of plots in transitional forest, seasonally dry-deciduous forest and savanna in Southern Amazonia into the RAINFOR-affiliated “*Tropical Biomes in Transition*” (TROBIT) network (NERC Consortium) we are now for the first time able to examine the extent to which different species within the various vegetation formations at the forest/savanna ecotone respond to anomalously dry conditions. And, as shown in Fig 1, this was also an area strongly affected by the current drought, with some sites more strongly dried (almost double) than any of our 2005 samples.

Under the present study we will resample 23 * 1-ha permanent sample TROBIT-RAINFOR plots in Bolivia and Mato Grosso (MT) Brazil. The vegetation and climate ranges from seasonally dry tropical forest and savanna in central-east Bolivia (precipitation as low as 800 mm a⁻¹) through savanna and transitional forest in both regions (1150-1650 mm a⁻¹), to “core” rain forest several hundred kilometres in Amazonia proper. In addition to forest inventory and floristic at each plot, we will resampled 492 plot trees for foliar nutrients as well as basic structural characteristics such as leaf area (L_A), wood density (ρ) & gas/solid/water content (Δ), leaf area/stem area ratios (φ).



Left: Fig 1. Distribution of ZOT plots (Bol. west, MT east), 2010 precipitation shown as a fraction of mean dry season rain (data: US National Centers for Environmental Prediction, Climate Prediction Center).



Right: Fig 2. Biomass dynamics in Core Amazonia during 2005 were predicted by the anomaly in the dry season cumulative water deficit (CWD)⁴; by this metric the driest plots in our 2010 sample (Δ CWD 210mm) were more droughted than the driest 2005 plots (Δ CWD 120mm).

In the current study we will test whether: (1) the 2010 drought caused biomass carbon loss from forest but not savanna; (2) the 2010 drought accelerated mortality rates and reduced growth and mortality for forest but not savanna; (3) that forest and savanna plots that had the greatest biomass loss and/or mortality rates also occupy sites with shallower soil; (4) that within each stand, species which also occur in drier areas were more drought-resistant (*sensu* growth and mortality) than those already at the dry end of their range; (5) that species differences in drought sensitivity are associated with variations in structural traits.”

- With funding from this NERC Urgency Grant to the University of Leeds, a team of 9 people led by **Alejandro Murakami** (Museo de Historia Natural de Parque Noel Kempff, Bolivia) and **Yoko Ishida** (INPA, Brazil) started a recensus to include about 10 permanent sample plots in Bolivia. To find out more about this fieldtrip, please visit the **RAINFOR Campaigns** page:

http://www.geog.leeds.ac.uk/projects/rainfor/pages/campaigns_eng.html

- **February 2011:**

- **Hans ter Steege** has updated his **ATDN website** and diversity maps. At the moment the ATDN database holds just over **900** plots, but he hopes to hit the 1000 barrier very soon: <http://web.science.uu.nl/Amazon/ATDN/Index.html>

- **March 2011:**

- **Juliana Stropp** publicly defended her PhD thesis entitled "*Towards an understanding of tree diversity in Amazonian forests*", on March 21, at Utrecht University. The research which was conducted in collaboration with RAINFOR is presented in Chapters 2 and 5. Some pictures of the fieldwork and the thesis itself can be downloaded from the RAINFOR website: http://www.geog.leeds.ac.uk/projects/rainfor/pages/publications_eng.html

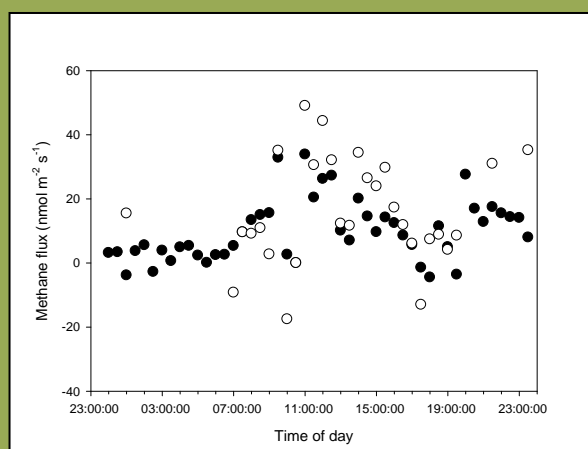
AMAZONICA NEWS

- **7-9th December 2010** – The **I NERC/AMAZONICA – FAPESP/CTracKer&Water WORKSHOP** took place in Ubatuba, São Paulo, Brazil. 42 participants from around the world focussed on the carbon balance of the Amazon region. Many thanks to **Joana Ricardo** and **Mónica Felipe** for their valued help, and to everyone in our postgraduate and research community for their enthusiastic involvement.



Participants – AMAZONICA Meeting

- **February 2011** - The Edinburgh and São Paulo group conducted the first measurements of methane fluxes over a river surface in Brazil. The data are from the Araguaia River at Bananal Island, during February 2011 (Fig 1). They used a small tower on the edge of the river, choosing the location so that all data represent the fluxes from the river surface. The two separate measuring systems give similar results (Fig 2). The fluxes are somewhat less than those we have measured over a sheep pasture, and much less than those measured by others over rice paddy fields, but similar to those reported from sphagnum bogs. The team also measured the fluxes of CO₂, water and sensible heat.



Left: Fig 1. - Observation tower, for measurement of fluxes of methane, carbon dioxide, water and sensible heat. The picture shows Anitra Fraser maintaining the instruments.

Right: Fig 2. - Fluxes of methane measured on 20th February 2011, Araguaia River, Brazil. The fluxes represent half-hour means of fluxes over the river, obtained with the Los Gatos (closed circles) and Li-Cor (open circles) gas analysers.

October 2010 - April 2011

An update from the Amazon-wide Greenhouse Gas measurement program - L. Gatti, E. Gloor, J. Miller, A. Martinewski, L. Basso, L. Gatti, H. Rocha, J. Lloyd

Regular biweekly aircraft based profiles have been made and samples analysed for CO₂, CO, CH₄, N₂O and SF₆ for the full year 2010 (in total ~ 80 profiles). Aircraft stations include Santarém, Alta Floresta, Rio Branco and Tabatinga. The data from the aircraft sites and atmospheric transport information (back-trajectories) have permitted us to determine seasonality, annual net and purely forest carbon uptake and release, as well methane sources for an area covering approximately 2/3 of the basin. The results are very interesting and we are currently in the process of writing two manuscripts, one on CO₂ and one on CH₄. The results are in line with the results of Phillips et al. 1998 who discovered a large forest sink and the suggestion that this may be a response to a change in the atmospheric environment (e.g. J. Lloyd, pers. comm.). We have also started measurements at three stations located at the Atlantic coast to sample the concentration of incoming air. These include Salinópolis – Pará, Natal – Rio Grande do Norte and Calçoene – Amapá.



Santarém



Rio Branco

Actual Network for GHG measures



Latest publications

2011

Lewis S.L., Brando P.M., Phillips O.L., van der Heijden G.M.F., Nepstad D. (2011) The 2010 Amazon Drought. *Science*, Vol 331: 554

2010

Barlow J., Ewers R.M., Anderson L., Aragão L.E.O.C., Baker T.R., Boyd E., Gloor E., Hall A., Malhi Y., Milliken W., Mulligan M., Parry L., Pennington T., Peres C.A., Phillips O.L., Roman-Cuesta R.M., Tobias J.A., and Gardner T.A. (2010) Using learning networks to understand complex systems: a case study of biological, geophysical and social research in the Amazon. *Biological Reviews, Cambridge Philosophical Society*

Contact us for a pdf copy of these articles or visit: <http://www.rainfor.org>

RAINFOR papers in discussion

Biogeosciences

An Interactive Open Access Journal of the European Geosciences Union

We encourage our partners and collaborators to visit [Biogeosciences](http://www.biogeosciences-discuss.net/special_issues34.html) to participate in the interactive discussion following this link:

http://www.biogeosciences-discuss.net/special_issues34.html

If you have any feedback, comments or ideas for the next Newsletter, please email:

j.l.s.ricardo@leeds.ac.uk

