AMAZALERT Newsletter

AMAZALERT

A research project on impacts of climate change and land-use change in Amazonia

Editorial
News from the Co-ordinator

Bart Krujit

AMAZALERT has entered its final phase, and our challenge is now to bring all the good work together to meet our promises.

As you can read in this newsletter and on our website, much has been done so far.

We defined the Amazon's main ecosystem services. We consulted stakeholders on the possible scenarios for future development of the region and their own influence on this, to define new sets of land-use change scenarios. We explored the range of predictions of dynamic vegetation models and coupled land-atmosphere models, and finally, we are shaping the contours of what an early-warning system for Amazon dieback could look like.

One question that comes in ever sharper focus is: is it perhaps less likely than often assumed in the past decade that the Amazon can experience critical transitions, such as 'die-back'?

Even the latest IPCC WG II report is tuning down the expectations for such disastrous development. Our models show mixed evidence for this: degradation, especially associated with persistent fires, is definitely simulated in some models. It is also clear that much depends on the models' sensitivities to the key variables temperature and CO2. But it does seem clear that we need rather extreme climate and land-use change to radically affect the region.

Is that good news (as the Amazon seems robust) or bad news (as it might discourage stringent policies)

Let us realise that good policies and responsible governance is part of that robustness of the region. With bad policies, the vulnerability will also increase dramatically! The contribution of AMAZALERT to such robust policies will focus on 1) better quantified uncertainty on the natural processes; 2) insight how policies ultimately affect the region; and 3) a 'blueprint' for an early-warning system to see radical changes coming such that mitigation or adaptation action can be taken.

This issue's highlights:

- *Editorial: News from the Co-ordinator*

- *AMAZALERT WP2 Meeting in Ghent*

- *Project duration extended, final meetings almost fixed*

- *Impressions from AMAZALERT Tel-Co Meeting 5-9 May 2014*

- *CO2, temperature and drought: the three most uncertain natural drivers of amazon forest change*

- *Just published*

- *EU stakeholder workshop in Brussels*
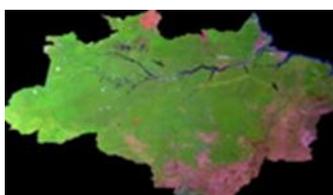
AMAZALERT WP2 Meeting in Ghent

Hannes De Deurwaerder
The AMAZALERT WP2 Meeting in Ghent, 14-16 January 2014, was both, a scientific and a gastronomic success with no less than 17 participants and 10 people calling in by videoconference.

All presentations, conclusions of discussions and future perspectives are accessible via the UGent-AMAZALERT webpage (www.AMAZALERT.ugent.be).

Project duration extended, final meetings almost fixed

Bart Krujit
For several reasons, AMAZALERT has been granted an extension of 3 months, such that the project will now end by November 30, 2014.
One of the most important reasons for this is that this enables us to organise a joint final/annual meeting with our 'sister'-project ROBIN **www.robinproject.info** which studies the link between biodiversity and climate change mitigation for South-America.

Alter-do-Chao (©los viajes del cangrejo, flickr.com)

Still subject to changes, there will be **three linked events during the week of 6-10 October, 2014**:
-   A meeting for stakeholders and policy makers (6 October, Belem, PA, Brazil), where combined insights and products of both projects will be discussed.
-   A semi-open science meeting (7-8 October, Alter-do-Chao, Santarem, PA, Brazil) where results of both projects and beyond will be shown and discussed
-   Project internal workshops (8-10 October, Alter-do-Chao, Santarem, PA, Brazil).

Impressions from AMAZALERT Tel-Co Meeting 5-9 May 2014

Bradley Christoffersen

From my perspective, the meeting this week was a very productive interchange among AMAZALERT colleagues. The online forum was actually very effective and with surprisingly very few glitches. AMAZALERT should be proud that this effort avoided on average 1.5 metric carbon tons of emissions per person who avoided overseas travel to participate in the meeting! [Read more](#)


I enjoyed seeing and/or hearing several people from the different work packages who I had met for the first time at the mid-term meeting in Wageningen last year, and it was great meeting (albeit virtually!) new colleagues who I had not yet met, such as **Richard Betts**.

Being a vegetation modeller, I benefited with focused discussions from other WP2 colleagues (**David Galbraith, Hans Verbeeck, Hannes de Deurwaerder, Celso von Randow, Kirsten Thonicke, Anja Rammig, Patrick Meir**) on a proposed review paper to synthesize current knowledge to provide constrained estimates of the range of possible future outcomes of Amazonia.

I likewise benefited from listening to updates from other work packages, in particular, **Juan-Pablo's** latest results on empirical constraints on changes in the dry season length in Amazonia by 2100 which were quite interesting.

Finally, I commend **Bart** and **Celso** for having successfully put all the pieces together to make this meeting happen and for the stimulating discussions on the Early Warning System which pulled all of us together across packages.

It will be exciting to see the outputs in the coming months!
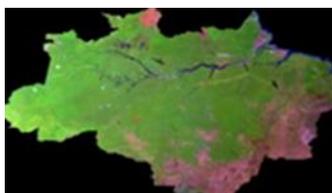
CO2, temperature and drought: the three most uncertain natural drivers of amazon forest change

Bart Krujit

Of course, the major factor in Amazon change is deforestation, followed by the vulnerability of forests to fire.

But beyond these the direct effects of climate change on the vitality of the Amazon forests are strongly associated with projected changes in atmospheric CO2, temperature and rainfall.
At the same time, it turns out that these factors are associated with major uncertainties in the models that are used to forecast forest change.

AMAZALERT addresses all these, and is also associated with projects that address them more specifically. The ORHIDEE and JULES models are being improved to resolve poor sensitivity of photosynthesis, respiration and allocation to drought, while intensive field work in the ESECAFLOR plots in the Caxiuana reserve (Pará state) supports this.

Several field campaigns on the temperature sensitivity of photosynthesis are now suggesting that this sensitivity is much less than assumed in most models. Finally, we know that the drastically fertilising effect of increasing CO2 in most models is likely too strong.

Most models in AMAZALERT are now being improved to account for nutrient (N and P) limitation of this CO2 fertilisation, while a new initiative is being supported to build an AMAZON FACE (Free-Air CO2 Elevation) experiment, near Manaus. This new project is now entering its pilot phase.
All in all, we expect in the short term to already be able to constrain models much better where it concerns drought, temperature and nutrients, while first experimental results on CO2 effects will become available in about five years' time.

Scientist operating equipment to measure stem respiration in the ESECAFLOR plot.

Just published …

Modeling forest dynamics along climate gradients in Bolivia

Christian Seiler

As reported in the *Journal of Geophysical Research: Biogeosciences* by authors **C. Seiler**, R. W. A. Hutjes, **B. Kruijt**, J. Quispe, S. Añez, V. K. Arora, J. R. Melton, T. Hickler and P. Kabat, a dynamic vegetation model (LPJ-GUESS) was adapted to simulate present day potential vegetation as a baseline for climate change impact assessments in the evergreen and deciduous forests of Bolivia. Results were compared to biomass measurements (819 plots), and remote sensing data. Using regional parameter values for allometric relations, specific leaf area, wood density and disturbance interval, a realistic transition from the evergreen Amazon to the deciduous dry forest was simulated. This transition coincided with threshold values for precipitation (1400 mm yr−1) and water deficit (−830 mm yr−1), beyond which leaf abscission became a competitive advantage. Significant correlations were found between modeled and observed values of seasonal leaf abscission ($R2 = 0.6$, $p < 0.001$) and vegetation carbon ($R2 = 0.31$, $p < 0.01$). Modeled Gross Primary Productivity (GPP) and remotely sensed Normalized Difference Vegetation Index (NDVI) showed that dry forests were more sensitive to rainfall anomalies than wet forests. GPP was positively correlated to the El Niño Southern Oscillation index in the Amazon, and negatively correlated to consecutive dry days. Decreasing rainfall trends were simulated to reduce GPP in the Amazon. The current model set-up provides a baseline for assessing the potential impacts of climate change in the transition zone from wet to dry tropical forests in Bolivia.

Read more

Germán Poveda and colleagues recently published:

Poveda, G., L. Jaramillo, and L. F. Vallejo (2014), Seasonal precipitation patterns along pathways of South American low-level jets and aerial rivers, *Water Resour. Res., 50, 98-118, doi: 10.1002/2013WR014087*.

Read more
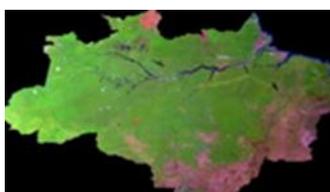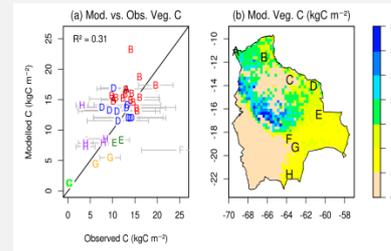
At the International conference 'Global Vegetation Monitoring and Modeling' in Avignon, 3-7 February 2014, both **Hans Verbeeck and Hannes De Deurwaerder** presented a poster covering topics linked with the AMAZALERT project.

- *The ambiguity of amazon drought events and their impact on the forest carbon cycle. H. De Deurwaerder , H. Verbeeck, K. Steppe*

- *Light Use Efficiency in amazon ecosystems: a multi model-data inter comparison. H. Verbeeck , B. Poulter, H. De Deurwaerder, M. De Weirdt, K.Steppe, P. Peylin, P. Ciais*

Both posters can be found here: Read more

EU stakeholder workshop in Brussels December 11, 2013

Ariella Helfgott
The European Workshop on the Future of the Amazon was held in Brussels on December 11, 2013. The purpose of the workshop was to disseminate the results of AMAZALERT thus far, to assess the current impact of European policies and behaviors on deforestation of the Amazon and to discuss no regret policies Europe could adopt in order to contribute towards zero deforestation by 2050. The workshop built on two previous workshops that were conducted in Brazil (Belem and Brasilia respectively) and yielded two plausible future outlooks for the Brazilian Amazon in 2050. It was the third and last stakeholder workshop conducted within AMAZALERT.
A mixture of stakeholders was selected to ensure relevant expertise. Participants included representatives from various DGs within the European Commission, Forest Certification bodies, INGOs, the private sector, academia, Brazilian representatives. Roughly 25 people attended the workshop.

Read more

AMAZALERT (2011-2014) is co-funded by