3   Project philosophy EcoRespira-Amazon

Jörg Matschullat • Roberval Monteiro Bezerra de Lima

EcoRespira-Amazon is the first Brazilian-German project attempting to determine soil respiration and soil chemistry at various locations across the Amazon basin, representing different types of land cover in immediate proximity to each other. Thirteen locations with forest next to subsequent agroforestry, agricultural use or pastureland were chosen to study possible impact of land-use change.

In principle, the project follows ideas and methods applied over the last 10 to 20 years in various projects around the world. Soil respiration determination largely draws upon experience gained by the TUBAF team since 2004 in the GREGASO project and its predecessors. Soil chemical investigations feed of the ecogeochemical mapping of Kola peninsula (Reimann et al. 1998), the Baltic Soil Survey (Reimann et al. 2003), the ongoing European GEMAS mapping project and the BraSol-2010 project with attached VeLuDeClim project (http://tu-freiberg.de/en/fakultaet3/mineralogie/geochemistry-geoecology/research/projects#tubafContentsAnchor1; http://www.ngu.no/no/hm/Publikasjoner/Rapporter/2008/2008-038/). EcoRespira-Amazon is in active exchange with related groups and contributes to the UN International Year of Soils and the International Geochemical Mapping Project (IGMP).

EcoRespira-Amazon contributes to global change research, including IPCC-relevant information for future climate model (Earth System Model) runs and to sustainable management practices of the biome, down to the individual landowner level (where applicable). Both levels of information are indispensable for any kind of planning and decision-making to support sustainable long-term development. Without such knowledge, recommendations for land use (agriculture, forestry, urbanization etc.) may easily and irreplaceably compromise the most valuable natural resource soil. Another highly important product is geochemical "background" data for the individual lithologies, soil and land-use types. Such baseline data are needed to assess any type of large-scale environmental change. Related data are currently not available, out-dated or not representative.

Further purposes in this project relate to knowledge transfer in general. The bi-national project is training students, post-graduates and post-docs from Brazil and Germany and will give ample opportunity to further increase experience and knowledge. As of late March 2017, key project partner Dr. Roberval de Lima is being hosted in Freiberg; a doctoral student might follow. Concrete questions are related to our understanding of weathering, alteration of soil chemistry through management practices under tropical conditions, etc. The detection of geochemical anomalies in unknown areas also relates to the land-use (change) aspect.

Our project is a non-commercial scientific project, executed by Brazilian and German university and state institutional members – students and staff. All results are free and may be accessed upon availability on our project website or by contacting the project representatives in Brazil (Prof. Dr. Celso Azevedo at UFAM, Dr. Roberval Monteiro Bezerra De Lima at Embrapa, Dr. Kikue Muroya at IPAAM; all Manaus, Brazil) or in Germany (Prof. Dr. Jörg Matschullat at TUBAF, Freiberg); ► Legal notice page 3.

The project is largely defined by the following research questions – and their implications:

- What are soil respiration (ecosystem respiration) rates in the Amazon basin?
- Does soil respiration change after deforestation and land-cover change? If so, how?
- What defines soil respiration and how: the microbial world or fungal activities?
- What does soil respiration in the Amazon reveal about organic matter turnover rates and are those results in line with previous independent studies?
- How does the pedogeochemistry look like in the Amazon basin?
- Is there a relationship between soil carbon and nitrogen pools and respiration fluxes?
- How do those pools and the respiration rates relate to comparable land-cover types outside of the inner wet tropics?
- Can we use remote sensing on two spatial scales (Satellite and drone based) for upscaling attempts?
- Does the geochemical composition of the different soils at the intended sites and transects show rather narrow distribution?
- Are there unusual element concentrations in certain major, minor or trace elements?
- How do the new data compare to older ones?
- How do the obtained data support concrete ideas and recommendations for future land use in order to reduce or even avoid the worst negative impact and to sustain soil fertility and a future for people living in the Amazon basin?

The rainy season poses particular challenges and even the best driver can get stuck. This will not happen deeper within a forest, yet other surprises and encounters wait therein …