

# First steps toward the establishment of a Nitrogen Cycling network in Latin America (Nnet)

Ariel F. Stein<sup>1</sup>, Jean Ometto<sup>3</sup>, Cristina Forti<sup>3</sup>, and Richard Artz<sup>2</sup>

Nitrogen is a key element for life on Earth, strongly associated with ecosystem function and many human activities, and significantly perturbed from natural background conditions over much of the planet. The lack of information, however, on the nitrogen cycle in Latin America is a serious impediment to our ability to evaluate current conditions and predict future impacts as human activity continues to alter nitrogen reservoirs and impact cycling on regional and global scales. Empirical measurements of nitrogen atmospheric deposition and other important aspects of nitrogen cycling are extremely scarce in Latin America, severely restricting the successful application of global and regional circulation models in this region.

We are in the process of developing a broad integrative network of research stations and outreach programs across multiple eco-regions and socioeconomic backgrounds in Latin America, with the formation of the Nitrogen Cycling in Latin America; Drivers, Impacts and Vulnerabilities network (Nnet). Our goal is to examine human impacts in natural and modified ecosystems across a wide range of climates, ranging from direct measurements to regional modeling exercises, aspiring to a greater understanding of how nitrogen excess or shortage affects ecosystem processes and biodiversity. With a common framework of experimental design and sample collection in sites distributed along extensive regional precipitation gradients, we expect to provide original, innovative, and integrative results related to ecosystem function and nitrogen dynamics. In several study sites distributed in the region defined according to physiographic and socio-economic attributes, the following inputs and outputs of nitrogen will be reviewed and analyzed: (i) inputs: Natural and cultivation induced biological nitrogen fixation, fertilizer use, and atmospheric deposition; (ii) Outputs: Net exports of agricultural products at the regional level and estimates at local scale of gaseous emissions from land use (fertilizer volatilization, biogenic soil emissions and burning), export of nitrogen to groundwater and surface waste (domestic, agricultural and industrial) and via nitrification and denitrification. Generation of regional-scale products based on this local-scale information will require an intense level of effort to model regional-level nitrogen atmospheric deposition, and to frame a network of sampling sites and to frame a network of sampling sites that eventually will become more permanent contributors to the global networking community. Our work aims to constrain regional atmospheric chemistry and transport models, which will in turn feed global models, leading to the enhancement of our understanding of the global nitrogen cycle.

In this presentation we will focus on the development of the Nnet wet deposition network. We will show some preliminary results from a station in central Argentina where the NADP weekly sampling protocol was adapted for local application. A description of the site setting and challenges encountered to implement a workable protocol will be presented. We will also discuss future plans for network expansion and the establishment of an Nnet Central Analytical Laboratory at INPE in Brazil.

<sup>1</sup> ERT, Inc (ariel.stein@noaa.gov)

<sup>2</sup> Air Resources Laboratory (ARL), NOAA

<sup>3</sup> Instituto Nacional de Pesquisas Espaciais (INPE), Brazil