



Dry and Wet Atmospheric Nitrogen Deposition in West and Central Africa

Marcellin Adon (1,2), Corinne Galy-Lacaux (1), Claire Delon (1), Fabien Solmon (1), Veronique Yoboué (2), Kobus Pienaar (3), Babakar Diop (4), Luc Sigha (5), Laouali Dungall (6), and Aristide Akpo (7)

(1) Laboratoire d'Aérodynamique, Toulouse, France (lacc@aero.obs-mip.fr), (2) Université de Cocody, Abidjan, Côte d'Ivoire, (3) School of Physical and Chemical Sciences, North-West Univ., Potchefstroom, South Africa, (4) Université de Bamako, Mali, (5) Université de Yaoundé CRH IRGM, Yaoundé, Cameroun, (6) Université de Niamey, Niger, (7) Université Abomey Calavi, Cotonou, Benin

This work is part of the IDAF (IGAC/DEBITS/Africa) programme which started in 1995 with the establishment of 10 measurement sites representative of major African ecosystems. The objectives of the programme are to study wet and dry deposition fluxes, to identify the relative contribution of natural and anthropogenic sources and factors regulating these fluxes. In this way, the IDAF activity is based on high quality measurements of atmospheric chemical data (gaseous, precipitation and aerosols chemical composition) on the basis of a multi-year monitoring. The main objective of this paper is to present the first estimation of the atmospheric nitrogen deposition budget in Africa based on experimental measurements over a 7 year period. To estimate atmospheric nitrogen deposition fluxes, including both wet and dry processes, we compiled the IDAF nitrogen data (gas, particles, rain) obtained from the measurement network for the period 2000-2007. In western and central Africa, we studied a transect going from dry savanna to humid savanna and forest. Results will be compared to South African IDAF sites representative of a rural and an industrialized semi-arid savanna. Presenting the dry deposition in gaseous and particulate forms associated with wet deposition, this study will allow to estimate (i) the interannual variation of the deposition fluxes, (ii) the relative contribution of dry and wet deposition processes and (iii) the total nitrogen deposition at regional representative sites in Africa. The total nitrogen deposition is estimated to be around 6 kg N.ha⁻¹.yr⁻¹, 6.5 kg N.ha⁻¹.yr⁻¹ and 13 kg N.ha⁻¹.yr⁻¹ respectively over dry savanna, humid savanna and over the forest. These values should be taken with caution and we estimated the uncertainties on the budget to be around 30%. If the estimations of wet deposition fluxes are known within a 10 % margin, dry deposition fluxes present larger uncertainties mainly due to dry deposition calculation. It is also important to note that our budget don't take into account all nitrogenous species, especially organic nitrogen species. An important result highlighted by this budget is the importance of dry deposition processes in west central Africa, especially for nitrogenous gaseous compounds. In dry savanna and forest, the relative contribution of dry deposition is about 60 %. In the wet savanna the contribution is around 53 %.