

Examining the Biogeochemical Cycling of Nitrogen and Its Impacts Across South African Ecosystems

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Abstract

The biogeochemical nitrogen (N) cycle in South Africa is influenced and in turn influences a number of crucially important global change processes. However, the natural N cycling in South Africa is not well-understood. The “Emissions, deposition, impacts - Interdisciplinary study of N biogeochemical cycling (EDI-SA)” project is working to improve our baseline understanding of the natural biogeochemical cycling of reactive nitrogen N in non-industrialized ecosystems across South Africa. This includes quantifying Nr fluxes from emissions through to deposition, identifying linkages between Nr cycling and related species such as ozone, and evaluating ecosystem impacts. Previous work has focused on the impact of atmospheric acidic deposition on ecosystems at sites almost exclusively on the industrialized Highveld. This has left large gaps of knowledge in the biogeochemical cycling and ecosystem impacts, particularly within the diverse natural ecosystems found across South Africa. To address this gap, EDI-SA is applying a more holistic approach using measurements (from two South African Research Infrastructures; EFTEON and BIOGRIP) and modelling to investigate multiple linkages within the biogeochemical cycling of N with a focus on improving the understanding of the N storage, transformations and fluxes in natural ecosystems. The project is applying a variable resolution sampling approach to investigate processes which occur at multiple spatial scales, and employs multiple measurement techniques including atmospheric measurements, stable isotope analysis of aerosol particles, rainwater and soil, and soil biogeochemistry. This contribution will detail the approach of this interdisciplinary project, highlight results from the first soil and air sampling campaigns, as well as the atmospheric composition modelling that assesses the relative importance and impacts of N emissions from soil across South Africa. The establishment of baseline soil, plant and atmospheric information will allow future research to assess the potential changes to N biogeochemical cycling into the future in a changing climate.

Early Career Scientist

NO, I am not an early career scientist.

IGAC Regional Working Groups

ANGA: African Group on Atmospheric Sciences