

Seasonal Nitrogen Deposition Budgets at Rocky Mountain National Park

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Excess nitrogen (N) deposition is occurring in Rocky Mountain National Park (RMNP) that is altering its ecosystems. The Rocky Mountain Atmospheric Nitrogen and Sulfur (RoMANS) study was conducted to improve our understanding of the origins of N species in RMNP as well as the complex chemistry occurring during transport from sources to receptor. This study measured N deposition during a spring and summer period in 2006 and found that about a third of the N deposition was due to wet-deposited organic N and ammonia dry deposition. Neither of these N deposition pathways is measured in routine monitoring programs. Missing from these budgets was the contribution of dry-deposited organic N. In addition, there were questions about the representativeness of the RoMANS results to other years and seasons. To address these issues, a year of detailed measurements of ambient concentrations and wet deposition of N compounds was conducted at RMNP during 2009. These measurements included indirect estimates of ambient organic N concentrations. It was found that large contributions of wet-deposited organic N and dry-deposited ammonia occurred during all four seasons, with average spring and summer N deposition budgets similar to those from the RoMANS study. In addition, the measurements indicate that large ambient concentrations of organic N compounds were also present that could significantly contribute to the total N deposition at RMNP.

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