

Preliminary Back Trajectory Analysis of Reactive Nitrogen Measured during the 2011 GrandTREnds Study at Grand Teton National Park, WY

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Grand Teton National Park (GTNP), Wyoming includes natural areas sensitive to excess nitrogen deposition and it is near nitrogen sources including agricultural activities in Idaho's Snake River Valley to the west and oil and gas extraction in the Upper Green River Basin to the east. The Grand Teton Reactive Nitrogen Deposition Study (GrandTREnds) was conducted in 2011 to better understand potential sources of reactive nitrogen influencing the region.

The core measurement site was located at an elevation of 2722 m near GTNP, at Grand Targhee Ski Resort. The resort is in Targhee National Forest on the western slope of the Teton Mountains, and falls within the Greater Yellowstone Ecosystem. Most measurements at the core site began in late July and continued until September 22, 2011.

Air mass back-trajectories were calculated with the Hybrid Single-Particle Lagrangian Integrated Trajectory Model (HYSPPLIT) with input from the 12-km North American Mesoscale Forecast System (NAM12). Statistical analyses of these trajectories provide insight regarding the source regions that impacted the core site during the study period. These analyses show that, on average, airmasses arrived predominantly from the west, including from the Snake River Valley, and from the southwest, including northern Utah. Airmasses from throughout the region, including western Wyoming, also impacted the site at various times throughout the study.

During a period when measured concentrations indicated biomass burning impacts at the core site, trajectories suggested airmasses reached the site after passing through multiple areas with active fires in Wyoming, Idaho, and Montana as detected from satellite. Also, concentrations of oxidized nitrogen at the core site appear to be at least partially driven by a mountain-valley flow pattern with daytime up valley flows primarily from the southwest and nighttime downslope flows mostly from the southeast at the core site.

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