3.072 Simulating the contribution of emissions from oil and gas development to regional nitrogen deposition at National Parks within the Intermountain West.

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Abstract:

Over the last ten years, oil and natural gas extraction has rapidly increased in the Intermountain West states of Wyoming, Colorado, Utah and New Mexico. These operations often occur near sensitive wilderness areas and national parks. Ecosystems within these areas are often near or above a "nutrient nitrogen critical load", meaning that additional nitrogen deposition may foster unwanted changes in plant communities. This study uses the 2011 WAQS (Western Air Quality Study) CAMx (Comprehensive Air Quality Model with Extensions) platform to simulate nitrogen deposition at several western National Parks, and to determine the contribution of emissions from oil and gas sources to this deposition estimate. A fine scale (4km) grid was employed to assess within-park deposition gradients. A detailed emission inventory was developed for the WAQS, including a comprehensive survey of the oil and gas development sector. CAMx predicts both wet and dry deposition of a full suite of nitrogen-containing gases and particles, including ammonia (NH3), nitric acid (HNO3), nitrogen oxides (NOx), peroxyacetyl nitrates (PAN), and particulate ammonium (NH4+) and nitrate (NO3-). National Park Units that were significantly affected with regard to nitrogen deposition from oil and gas sources include Mesa Verde National Park in southwestern Colorado (0.61 kg N/ha/yr, 19% of total deposition), Dinosaur National Monument in northeastern Utah/northwestern Colorado (0.58 kg N/ha/yr, 20% of total deposition), Hovenweep National Monument in southeastern Utah/southwestern Colorado (0.43 kg N/ha/yr, 14% of total deposition), and Rocky Mountain National Park in northern Colorado (0.26 kg N/ha/yr, 8% of total deposition). The bulk of the impact is in the form of oxidized nitrogen deposition, suggesting that NOx controls for oil and gas development equipment (e.g., drill rigs, compressor engines) would be most effective for reducing harmful downwind impacts at National Parks.