Badlands (BADL1) 2020 Site Report

The Interagency Monitoring of Protected Visual Environments (IMPROVE) is a long-term air pollution measurement program designed to document and track visibility in protected areas. IMPROVE samples and analyzes the haze particles that impair visibility so their sources can be identified and addressed.

Percent of Samples Successfully Collected and Analyzed Per Year

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Samples Successfully Collected and Analyzed in 2020 by Filter Type. PTFE: 119 (97.5%), Nylon: 122 (100%), Quartz: 122 (100%)

The plots below show temporal trends for site 46-071-0001 alongside network-wide CSN and IMPROVE median concentrations. The top plot shows the variability of the reconstructed fine mass (RFM) concentrations during 2020; RFM can only be calculated if all three filters collected on a sampling day are valid. The bottom plot illustrates the long-term trends of ambient concentrations; the gray shaded region represents the range of values measured each year at this site, illustrated using the 10th and 90th percentile values.

More Information

To view and download IMPROVE data, you can visit: https://www.epa.gov/outdoor-air-quality-data
The Univ. of California, Davis website with information about current research and publications: https://aerc.ucdavis.edu/
The Colorado State Univ. website with data resources, literature, and visibility overviews: http://vista.cira.colostate.edu/Improve/
The EPA website with guidance and background documents: https://www.epa.gov/amtic/chemical-speciation-network-csn
Real-time air monitoring data for the United States: https://www.airnow.gov/
The following plots summarize the chemical composition of particles collected at this site. The monthly averaged compositions calculated from 2016-2020 data are shown on the left while compositions for the day with the highest measured concentrations during 2020 are shown on the right.

### Average Monthly Particle Composition

**Components**
- **Salt**: $1.8 \cdot Chloride$
- **Soil Dust**: $2.2 \cdot Al + 2.49 \cdot Si + 1.63 \cdot Ca$
- **Soot**: $Elemental Carbon$
- **Organic Matter**: $1.4 \cdot Organic Carbon$
- **Nitrate**: $1.29 \cdot Nitrate$
- **Sulfate**: $4.125 \cdot Sulfur$

**Natural Sources**
- Ocean spray, dry lakebeds
- Soil resuspension, dust storms
- Wildfires
- Plants, animals, wildfires
- Plants, animals
- Volcanism

**Anthropogenic Sources**
- Chemical manufacturing, lake consumption
- Construction, agriculture, deforestation, unpaved roads
- Motor vehicles, wood burning, smoking
- Motor vehicles, cooking oils, household cleaners
- Fertilizer, stock yards, chemical manufacturing
- Coal-fired power plants, chemical manufacturing

### Highest Day

**Components**
- salt
- soil.dust
- soot
- organic.matter
- nitrate
- sulfate

**Micrograms Per Cubic Meter**

The following map shows the average RFM concentrations for nearby sites in both CSN and the rural IMPROVE Network. The point shapes indicate which network the sites are associated with. The color bar indicates the average annual RFM concentration (micrograms per cubic meter) measured at each site in 2020.