



Characterizing Dust From Major Dust Sources Using Dust Flux Measurements, Isotopic Finger-Printing, and Major and Trace Element Analysis

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Research Purpose & Background

Dust storms are meteorological events that can transport particulate matter from their source to sinks through the Wasatch Front. These dust events are known to negatively impact human health and the environment, causing diseases such as asthma and pneumonia, increasing frequency and intensity of harmful algal blooms in lakes, and causing earlier snowmelt and decreased runoff from mountain snowpack. While we know its impacts, not much is known about the chemical composition of the dust or major dust sources throughout Utah. The Great Salt Lake, Sevier Dry Lake, and other playas have been identified as significant dust sources in past studies through isotopic fingerprinting (Goodman, et al., 2019)

The purpose of this study is to characterize and quantify the contribution of dust from additional locations throughout Utah using isotopic and chemical data. These will include playas, alluvial fans, degraded rangelands, alfalfa fields, and oil & gas sites (Figure 3). Our goal is to create a characteristic fingerprint for each area that can be identified and traced from source to sink. Better understanding of these dust sources will inform future policy, helping them make better decisions for hazard mitigation moving forward.



Figure 1. Snow trenches and dust sampling in the Uinta Mountains. Dark, linear features are layers of dust in the snow.

Research Questions

- Is dust chemistry more dependent on local geology, or does land use have a significant effect on the geochemistry?
- How does dust flux vary at different locations depending on land use and geomorphology?
- How much does dust from each source contribute to dust in mountain snowpack?



Figure 2. MWAC dust samplers at playa and degraded rangeland sites. Built following guidelines from Blakowski et al. in prep.

Sampling & Lab Methods

- MWAC samplers will be used to measure dust flux variations, helping us understand how airborne dust flux changes based on land use type.
- Surficial soil samples will be taken at each MWAC site and prepped for trace and major element analysis through ICP-MS. Additionally, some of these samples will be selected for strontium isotope analysis.
- Snow dust sampling will take place in the spring in the Wasatch and Uinta Mountains (Figure 1).

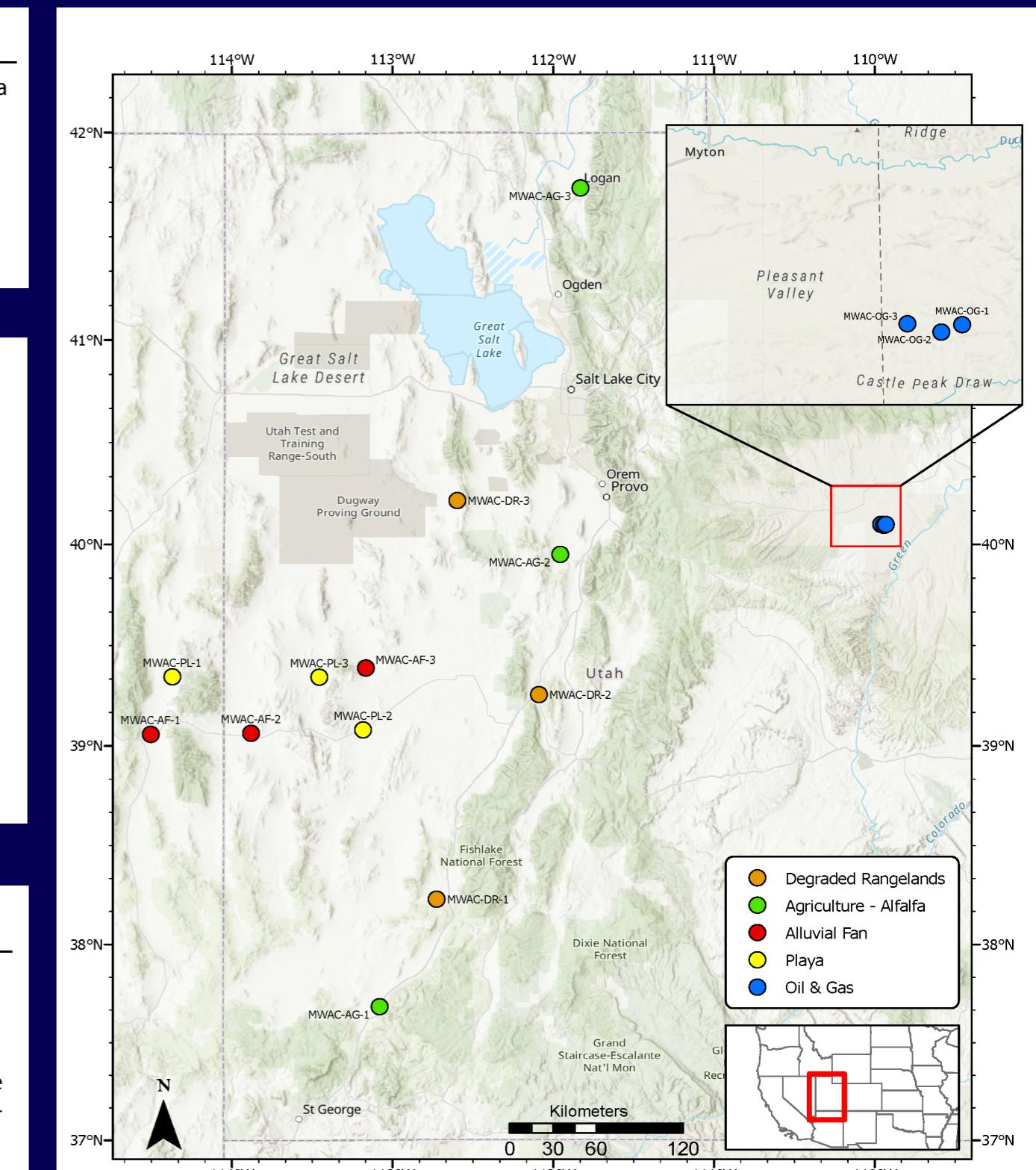


Figure 3. Map of MWAC locations throughout Utah. Three more are currently being built and will be located near the Great Salt Lake