

Using strontium isotopes to identify dust sources to the Wasatch Front

Dust storms are becoming more frequent with the desiccation of saline lakes around the globe, with negative impacts on air quality. In this study, we used $^{87}\text{Sr}/^{86}\text{Sr}$ ratios measured on PM10 filters collected on the Wasatch Front to identify potential dust from playas (dry lakebeds) in western Utah. Our previous work has shown unique $^{87}\text{Sr}/^{86}\text{Sr}$ ratios for different playas, providing a fingerprint for identifying dust sources. As a test case, we used archived DAQ filters from the Hawthorne station (Salt Lake City) from two contrasting dust events, each with different $^{87}\text{Sr}/^{86}\text{Sr}$ ratios. One filter, collected 22 March 2009, had an $^{87}\text{Sr}/^{86}\text{Sr}$ ratio similar to Sevier Dry Lake. The other filter, collected 7 August 2009, had an $^{87}\text{Sr}/^{86}\text{Sr}$ ratio similar to the Great Salt Lake. Backward trajectory models support these results, with the March dust event driven by southerly winds (transporting dust from Sevier Dry Lake) and the second dust event driven by westerly winds (transporting dust from Great Salt Lake and Bonneville Salt Flats). As a comparison with archived PM10 filters, we are currently collecting biweekly samples at Provo to evaluate $^{87}\text{Sr}/^{86}\text{Sr}$ ratios over time in different size fractions (PM2.5, PM10, and total suspended particulates). Our goal is to use $^{87}\text{Sr}/^{86}\text{Sr}$ fingerprints to calibrate dust transport models to quantify dust from different playa sources.