

Dust in the Southern Great Plains Ecoregion of Oklahoma: Characterization and Spatiotemporal Relationships

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The southern Great Plains Region (SGPR) of the United States (US) is a drought-prone area that, as indicated in several studies, has suffered several large-scale, multi-year droughts since the 20th century, as well as multidecadal megadroughts as recently as the Medieval Climate Anomaly from 800 to 1300 C.E. Modeling studies consistently show a positive correlation between aridity and dust emissions in the south and southwestern US for past, present, and future climate scenarios and several remote sensing studies show that most North American dust emission point sources are split between the GPR and the Western US. Westernmost Oklahoma (OK) is notorious as a locus of the Dust Bowl, yet there is a dearth of data on dust—its flux, composition, and spatial and temporal variability in west-central Oklahoma. This is particularly surprising considering Oklahoma's rank as the US state most vulnerable to droughts according to a 2020 study. However, many of the recent studies in GPR dust habits did not include the entire portion of Oklahoma (OK) that falls within the Great Plains Ecoregion, often limiting areas of study to the panhandle and/or the southwestern corner of the state.

To better understand dust impacts on west-central Oklahoma and how dust has influenced the region in the past, we have deployed six dust traps (modified from a USGS design) throughout west-central Oklahoma. Traps

are in sites adjacent to weather/climate (Oklahoma Mesonet) stations, with care taken to avoid areas downwind of disturbed sites. Traps are sampled quarterly. In addition to the traps, soil augers were taken at the four sites designated as least disturbed in recent history. Mass (for dust flux), particle size- and shape analyses, and geochemical analyses are ongoing in order to characterize the dust inputs to this region, and to delineate allochthonous (dust) contributions to soils of western Oklahoma. We will present preliminary results observed from collections taken in the spring and summer of 2024.

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