

Southern Arizona Dust Storm Workshop
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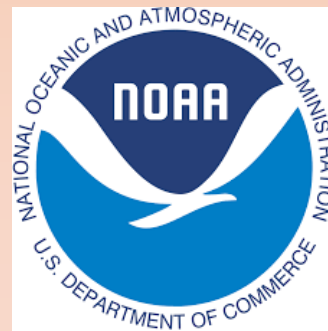
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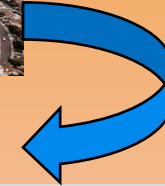
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Shutting down dust emission during the middle Holocene drought in the Sonoran Desert, Arizona, USA

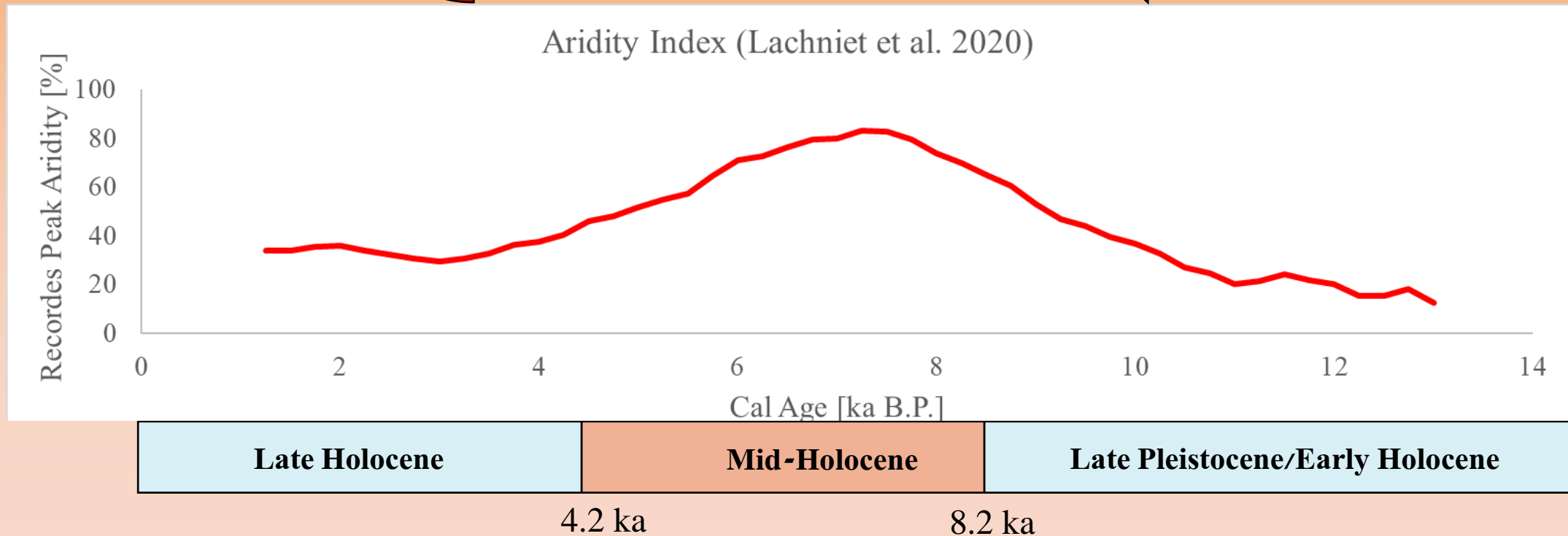
Guy Tau^{1,2*}, Onn Crouvi², Yehouda Enzel¹, Nadya Teutsch², Paul Ginoux³ and Craig Rasmussen⁴



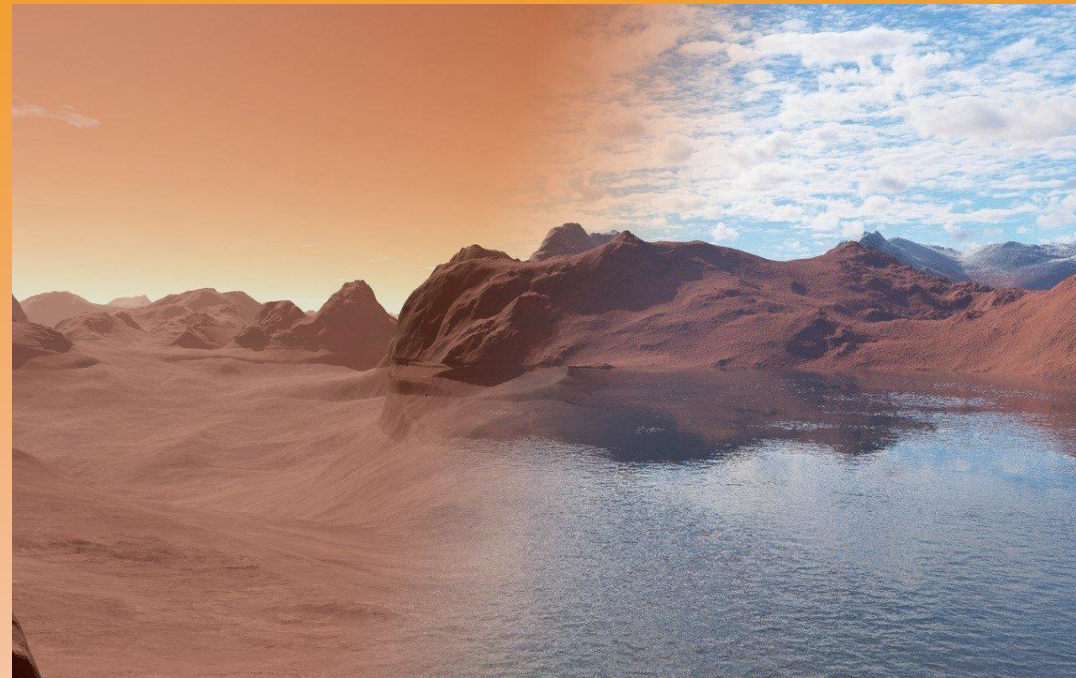
Motivation



?



Motivation



Late Pleistocene/Early
Holocene

Mid - Holocene

Late Holocene

Classification of dust sources



Transport-limited



Supply-limited



Availability-limited

Hypothesis

Decreasing vegetation coverage
exposes available sediments



Increasing
Dust flux

Decreasing storm frequency and magnitude
Decreases dust sources sediment refill



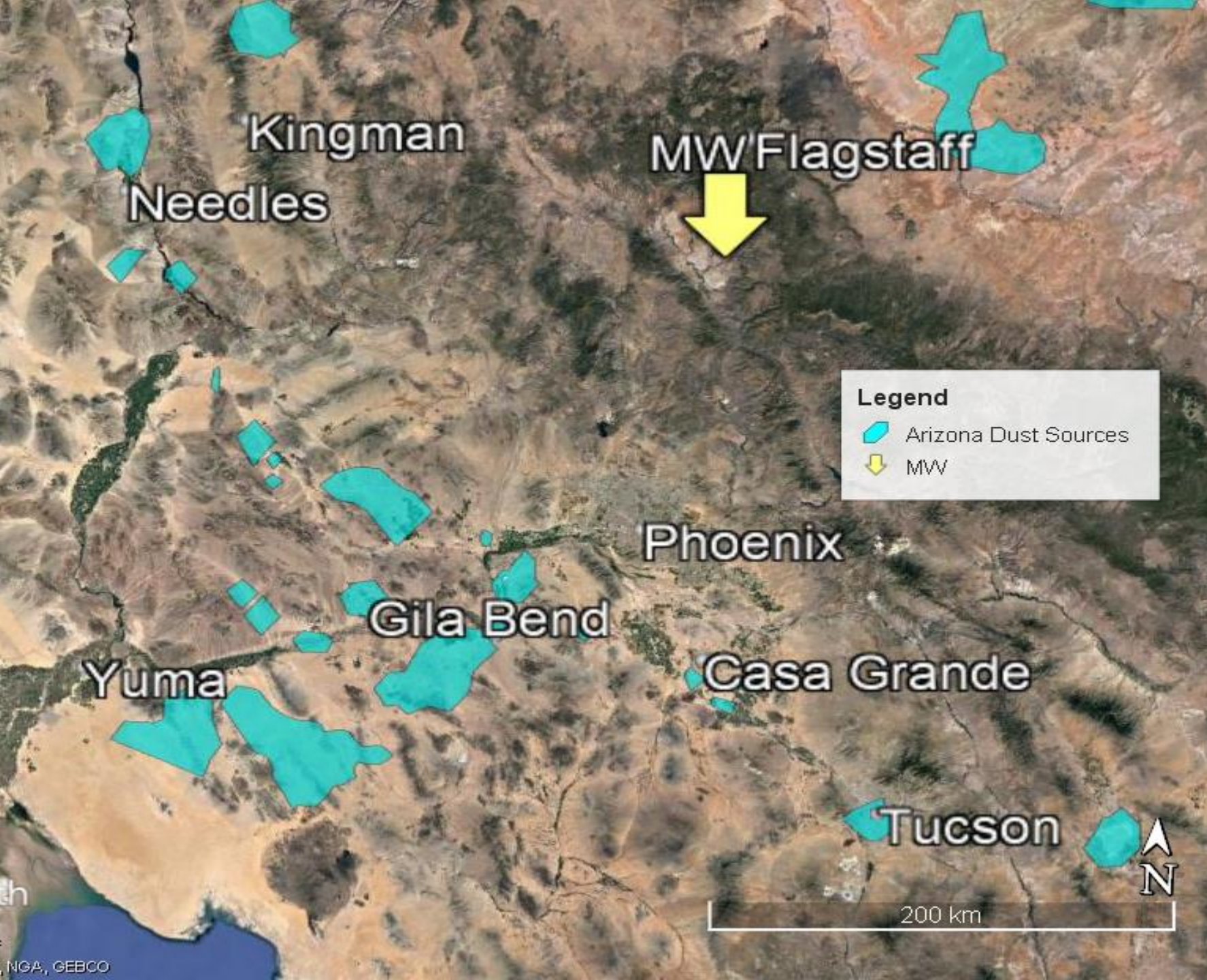
Decreasing
Dust flux

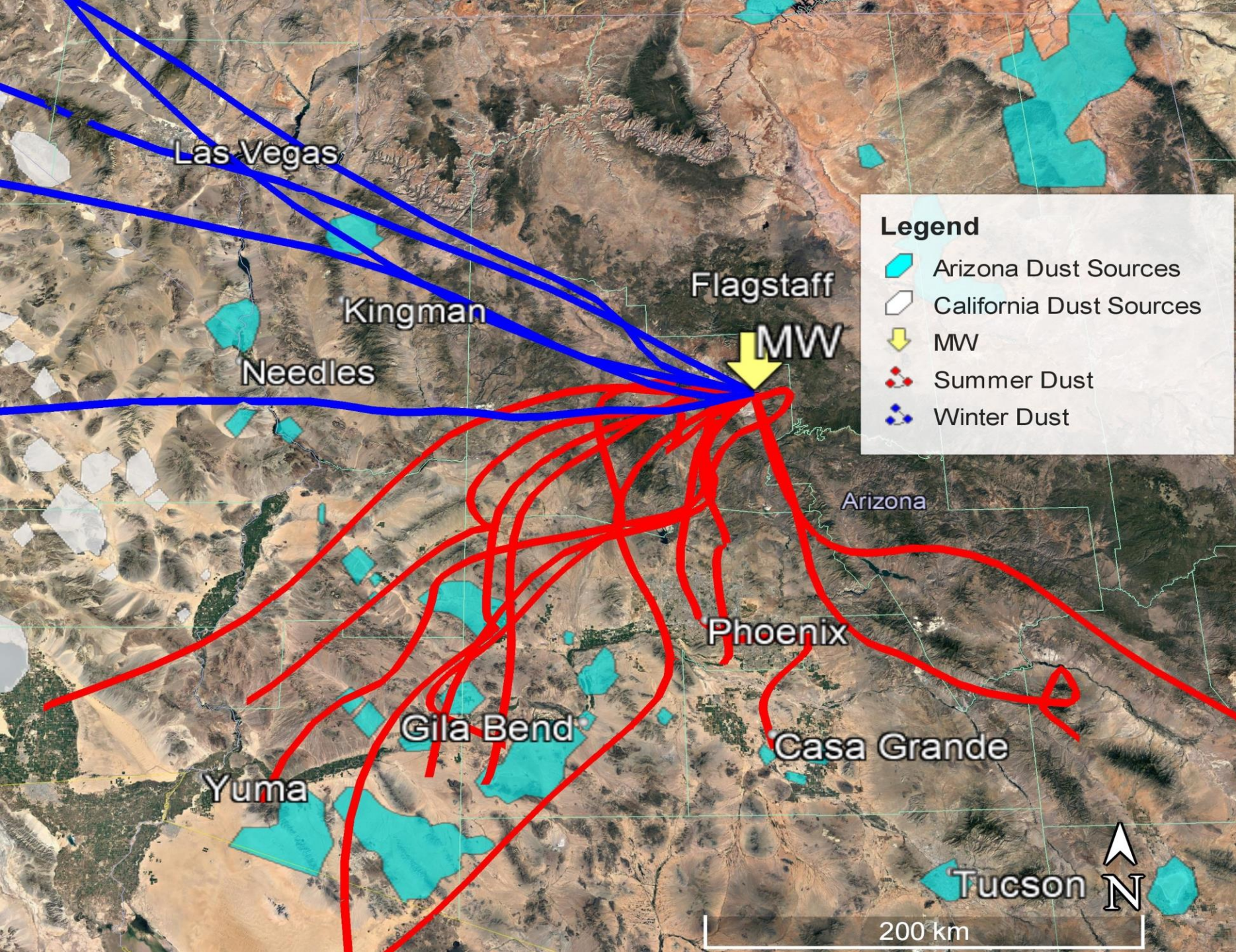
Climate changes to an
arid phase



Results

Potential dust sources

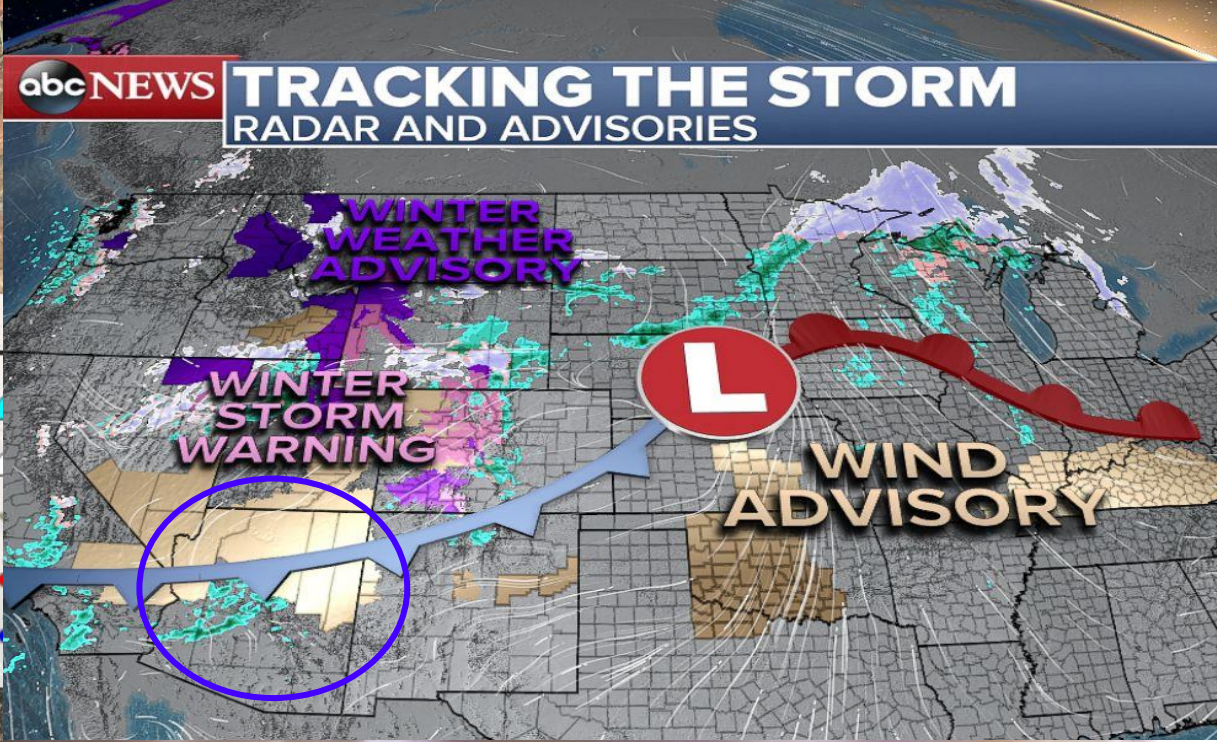
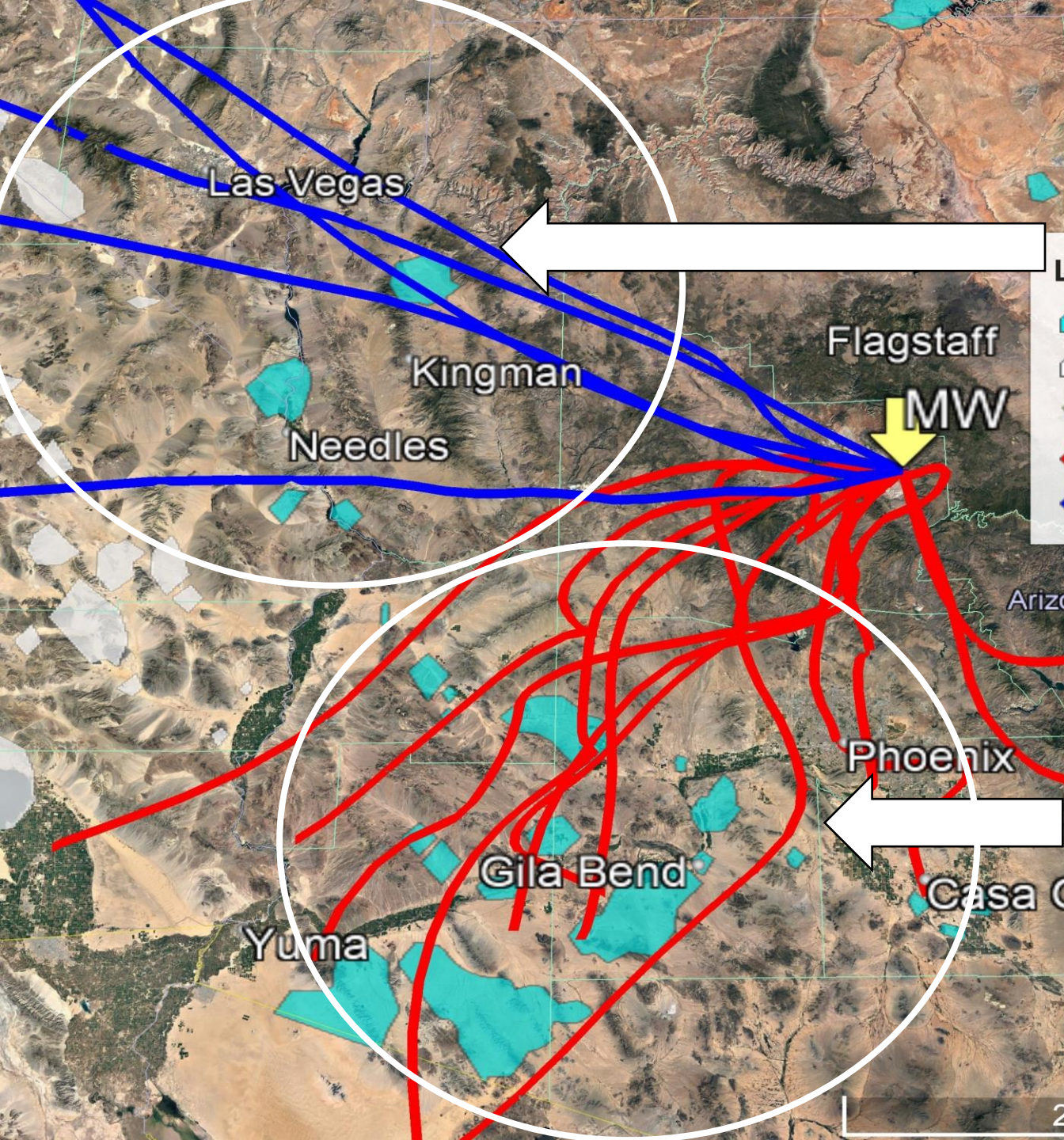


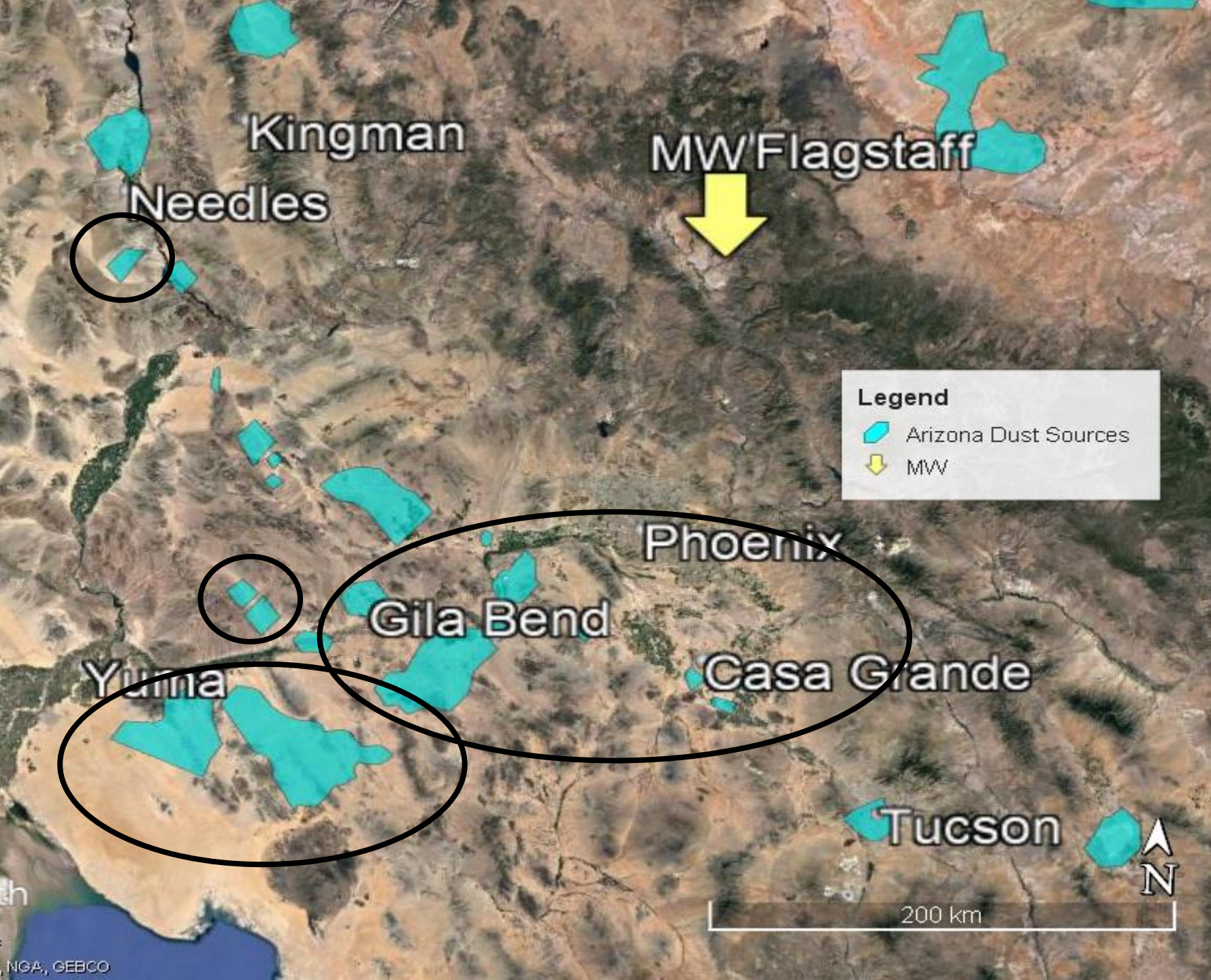


Results

**Active
dust
sources**







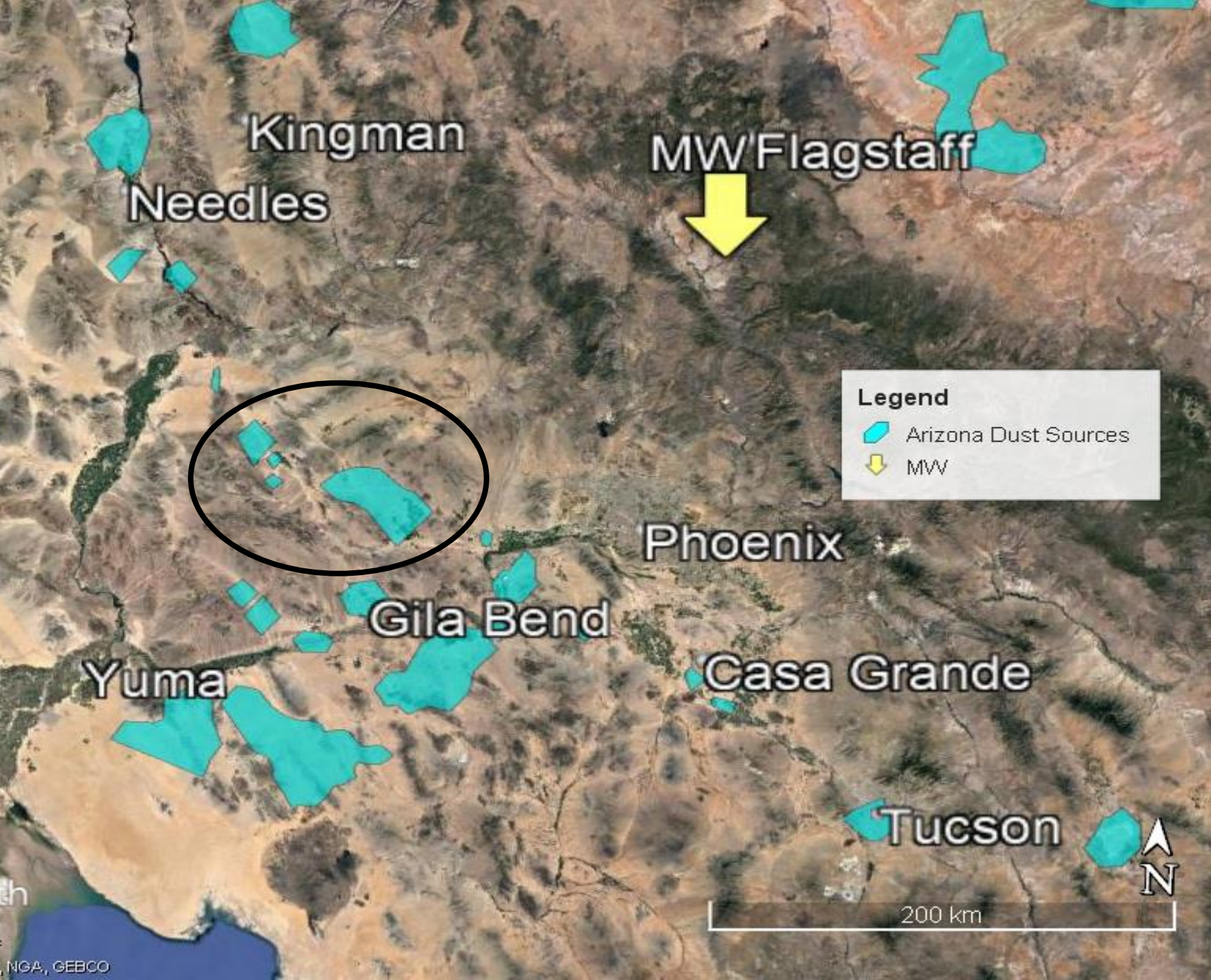
Results

Active
dust
sources

Alluvial
Fan







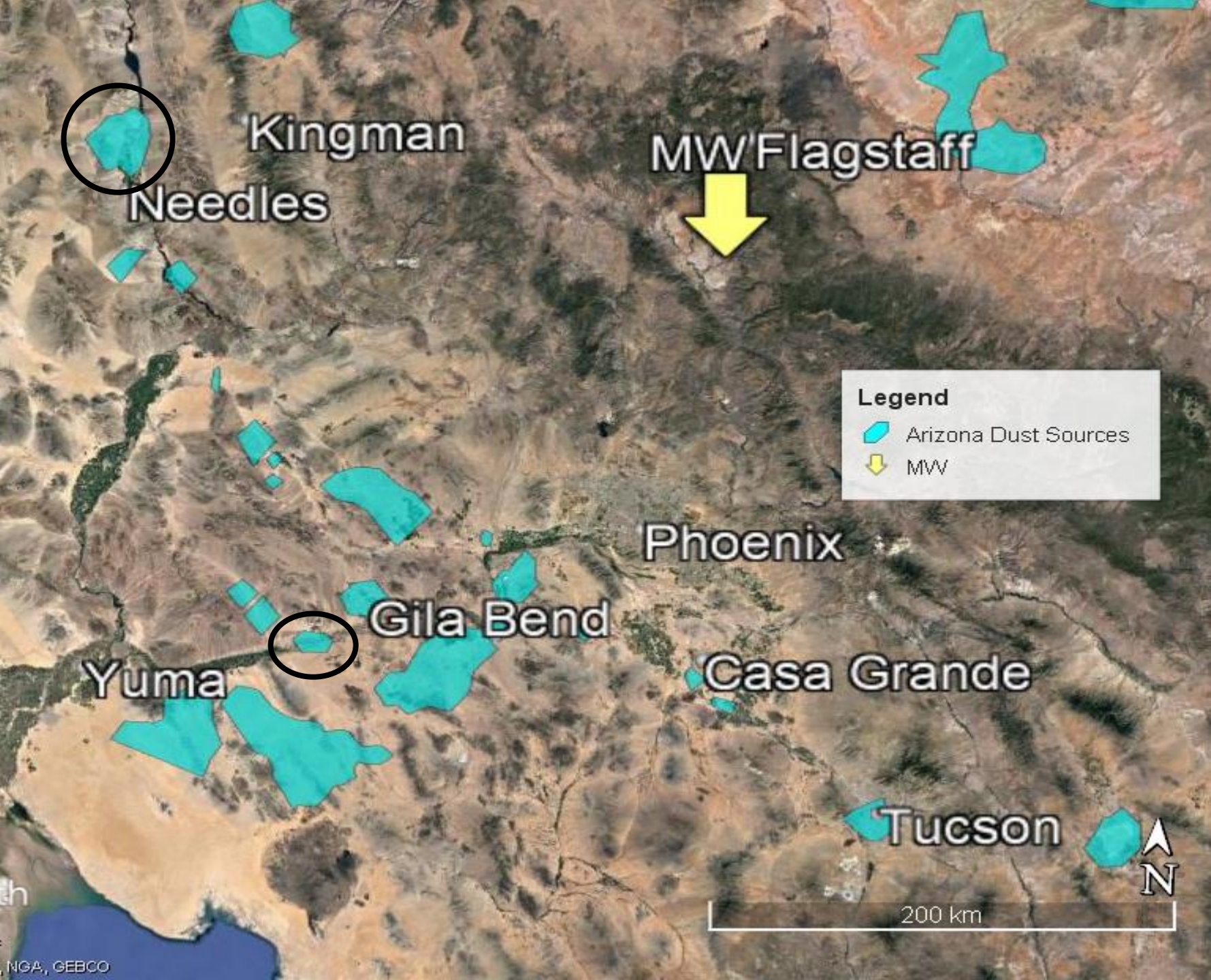
Results

Active
dust
sources

Silty-clay
wash







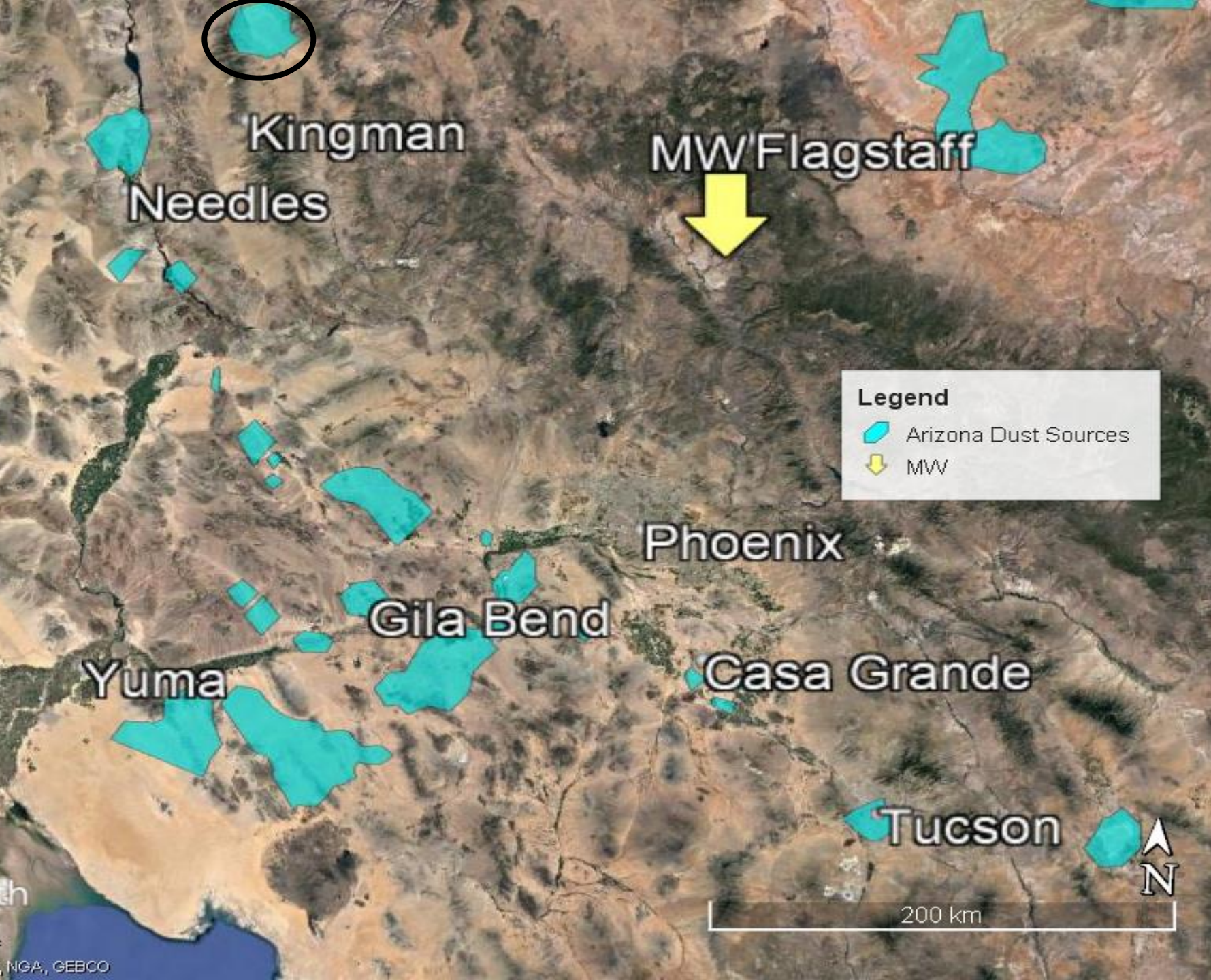
Results

Active dust sources

Colorado and Gila River Flood Plains







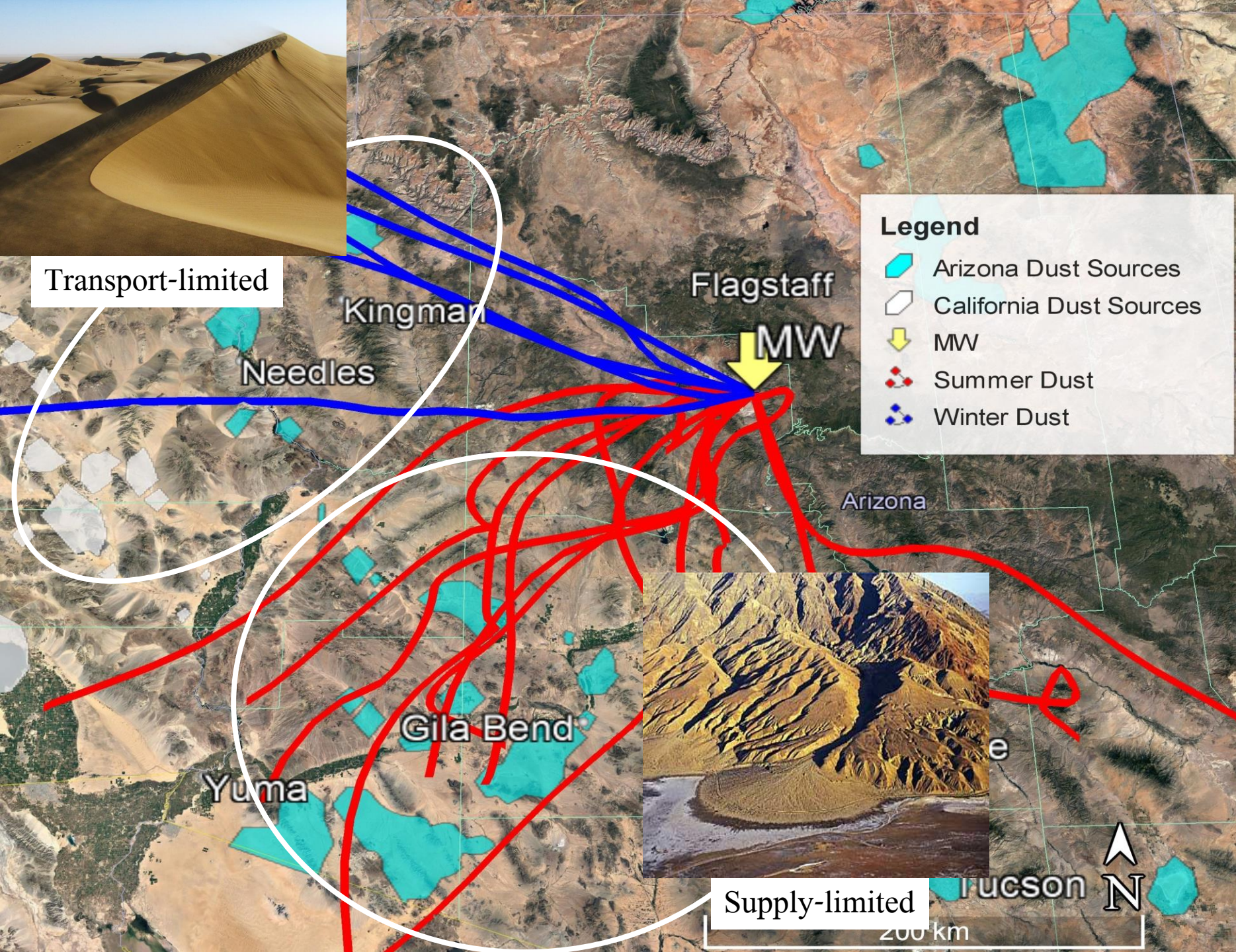
Results

Active
dust
sources

Playa







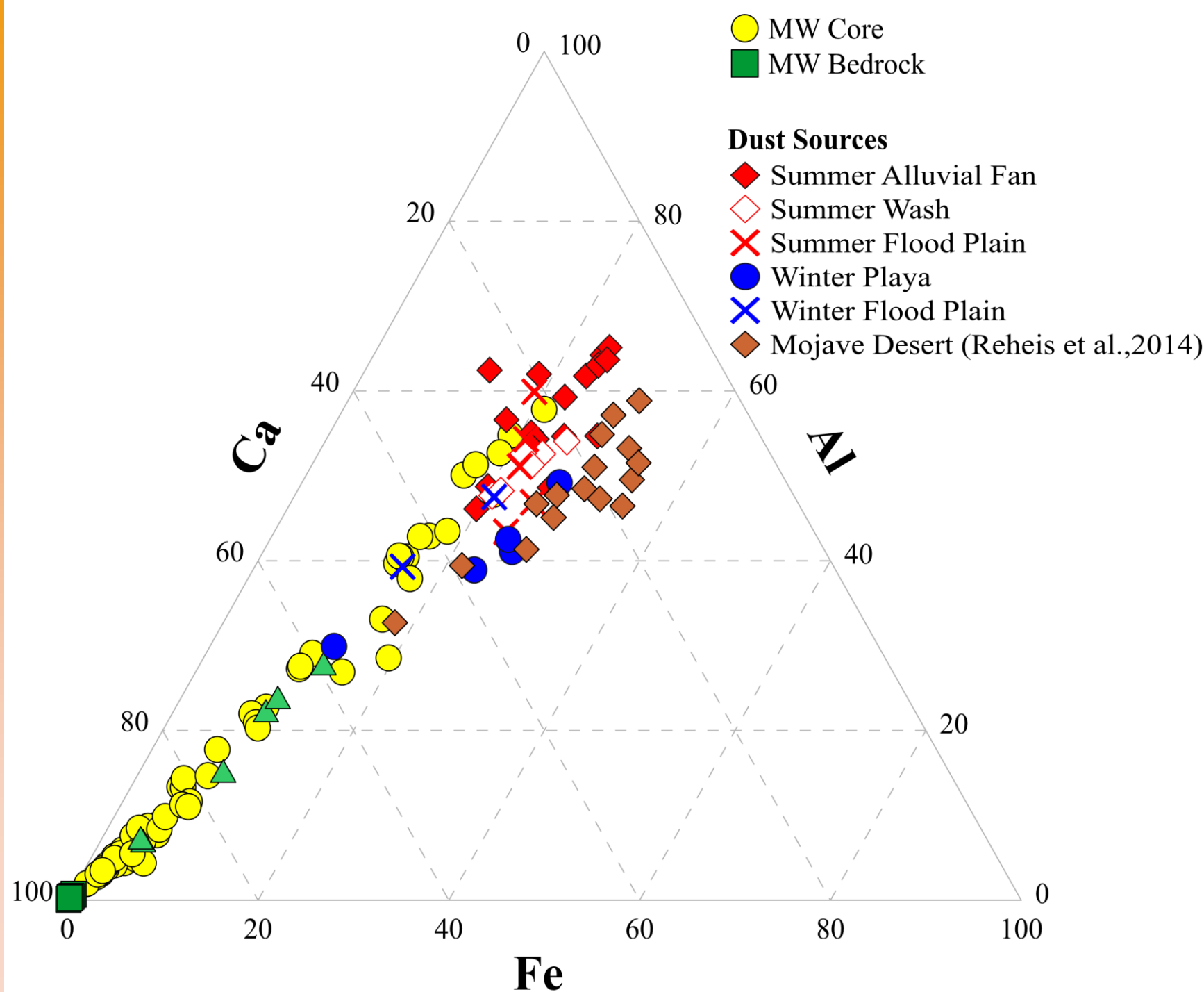
Results

Potential
dust
sources

Results

Major Elements

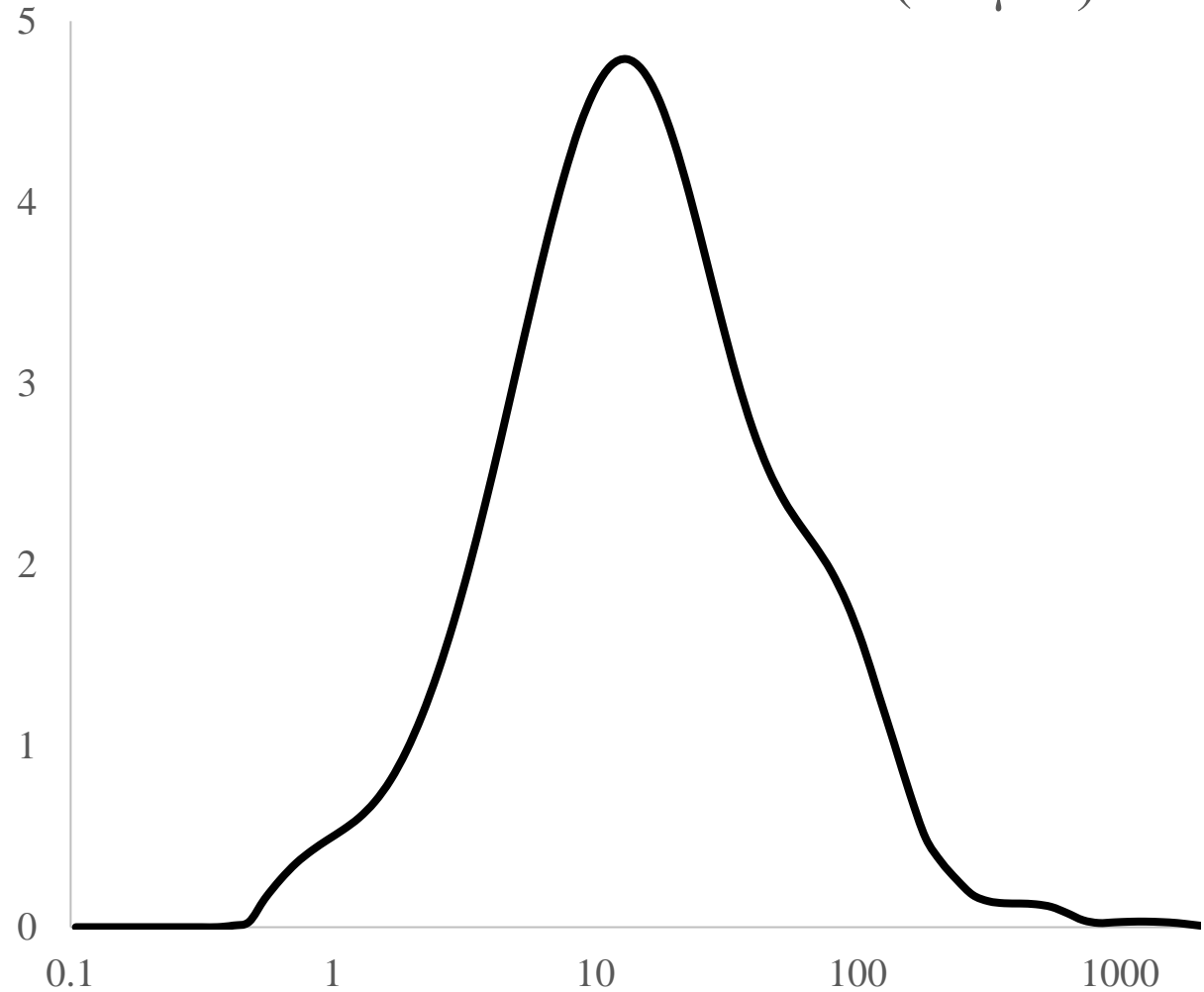
- Major elements triangle diagram reveals that MZW samples are mixed between two end members, the local bedrock and Arizona dust sources. Dust sources have high Al values; thus, Al-based dust flux was calculated.
- Mojave Desert values were taken from Reheis et al., 2009.



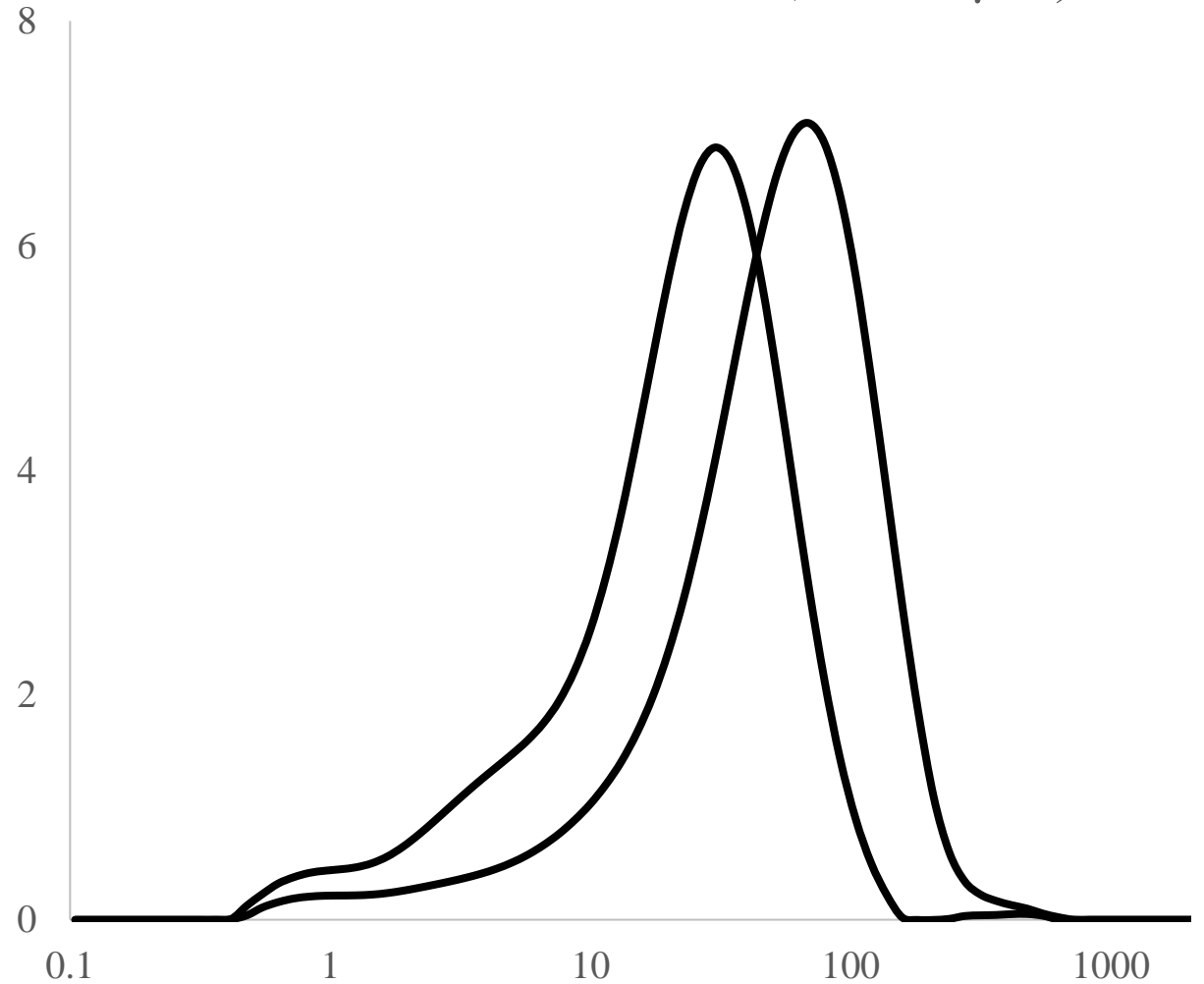
Results

Grain Size End Member (EM) Modeling Analysis

Fine End Member (13 μm)

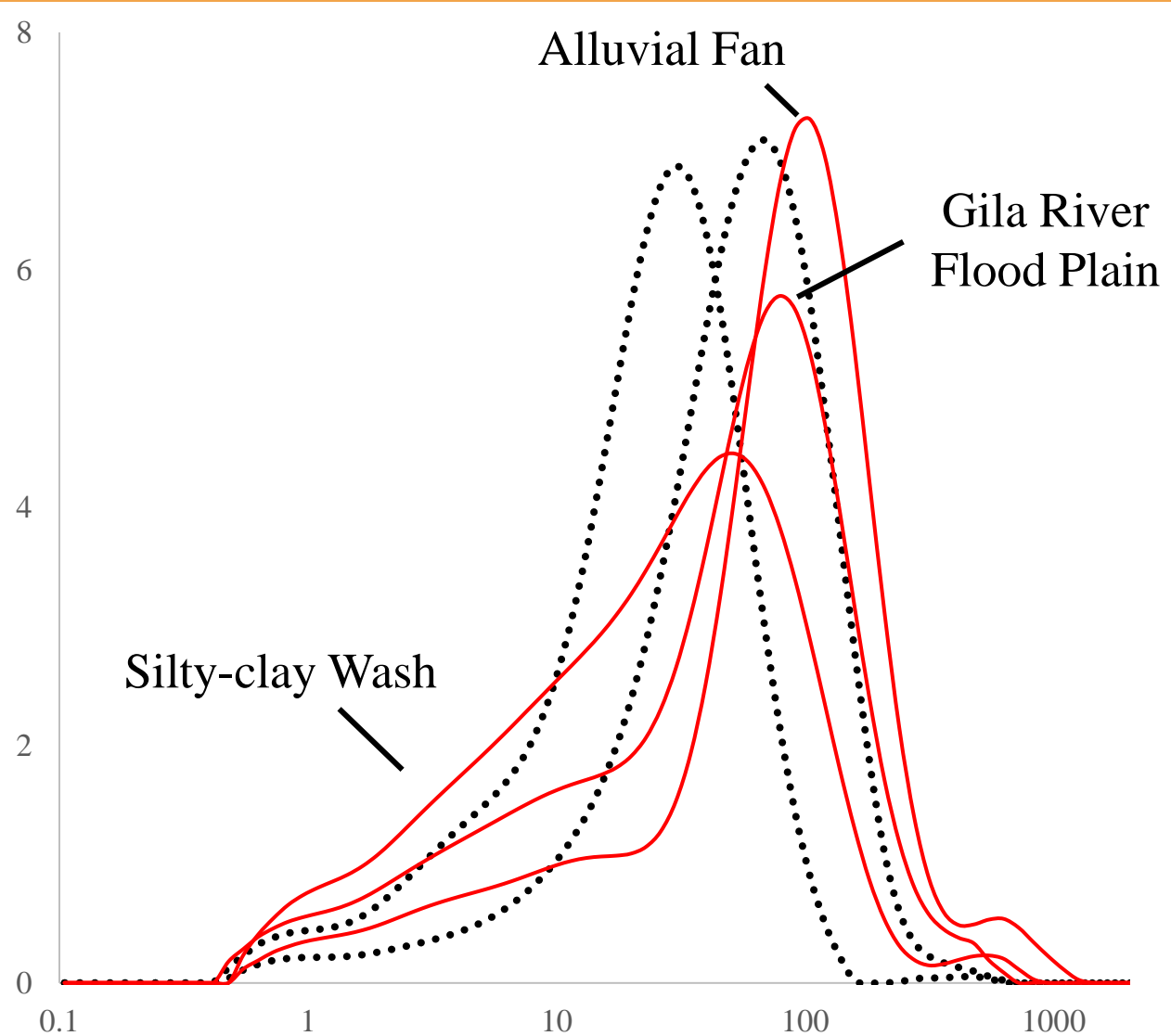
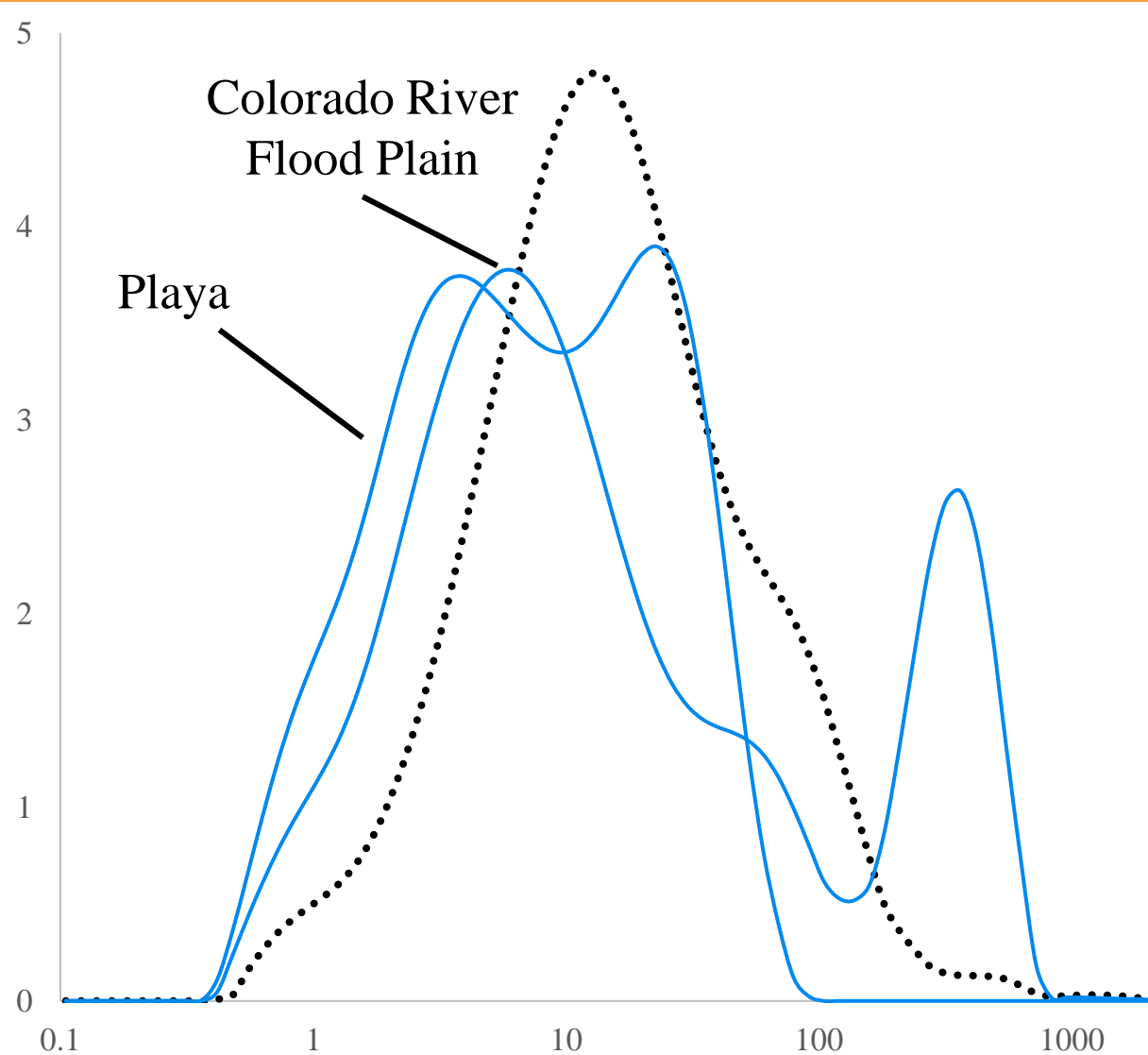


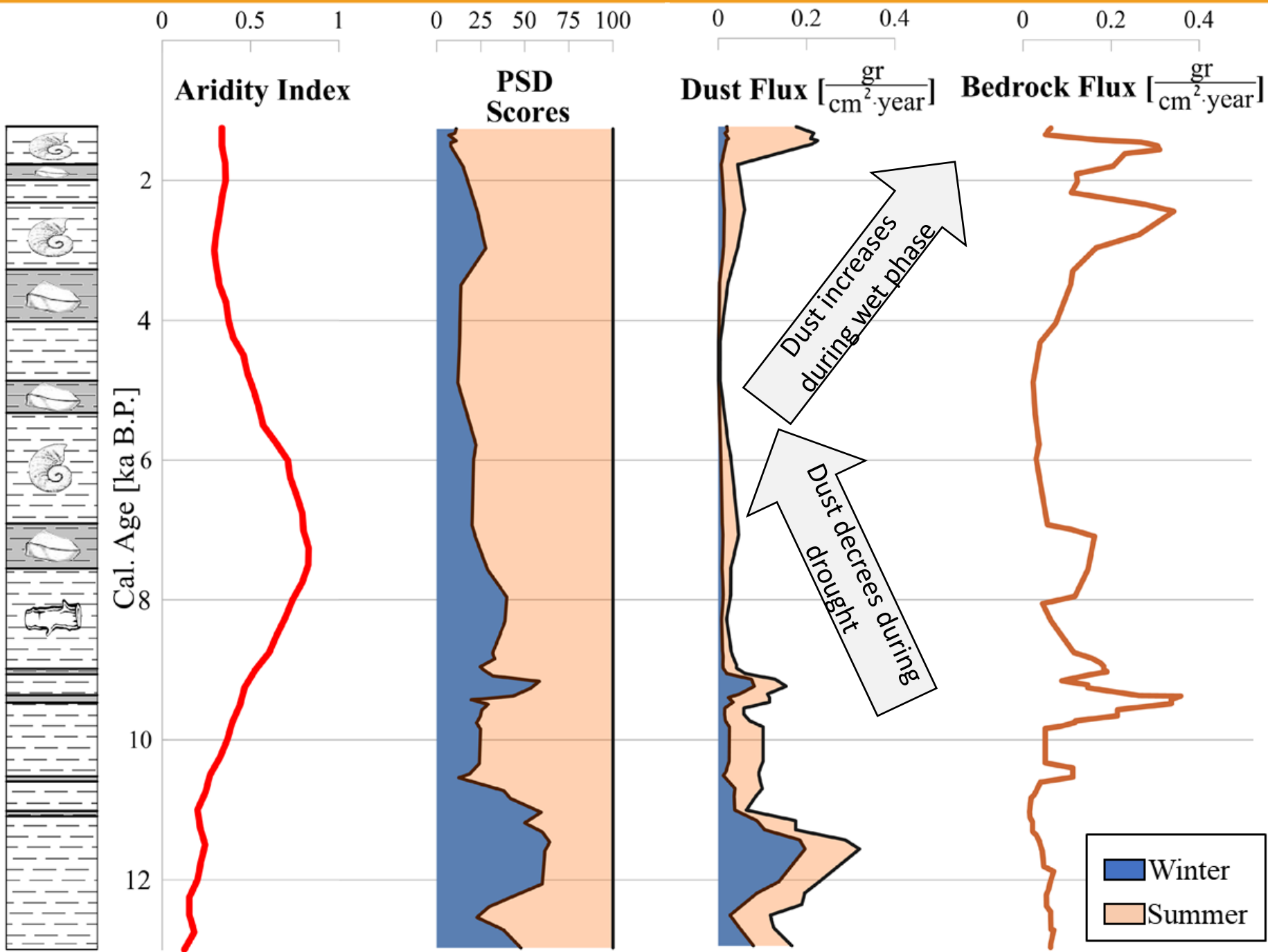
Coarse End Member (34, 75 μm)

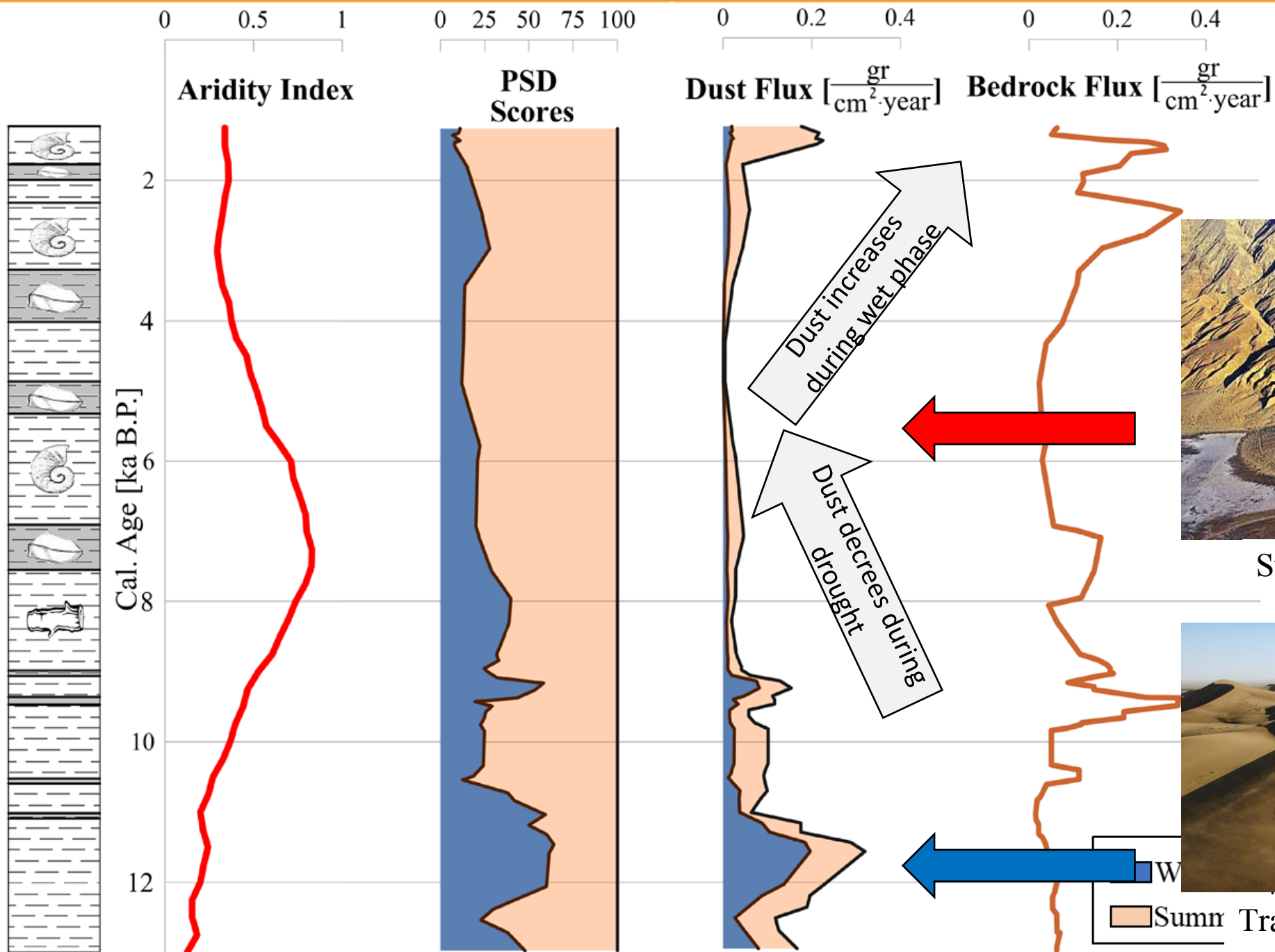


Results

Grain Size End Member (EM) Modeling Analysis







Supply-limited



Transport-limited

Conclusions

- The current dust sources of Arizona were identified and studied, revealing summer coarse dust arriving from the Sonoran Desert and fine winter dust from the Mojave Desert.
- Arizona's dust-cycle is controlled by the characteristics of dust sources (i.e., supply-limited and transport-limited) and climate change (humid/drought).
- Dust flux was found to be minimal during arid periods of the Holocene



Questions?