



GLIDE-P: GLobal Inventory of Dust Emitting Playas

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Playas are ephemeral, endorheic lake systems that are common in arid regions. They have been consistently identified as both regionally and globally significant sources of mineral dust; but their absolute contribution to the global dust cycle over space/time is poorly understood. However, we do know that emissions of dust from large playas can impact significantly on regional climate through a range of land/atmosphere interactions. It is also clear that not all playas have or will emit dust, and those that do emit dust rarely do so consistently. That these systems are also extremely sensitive to human interventions is also clear. Thus, global models that target ephemeral lakes at source areas often struggle to model the emission characteristics accurately. It is clear that our understanding of dust emission from these environments at scales relevant to climate models is poorly constrained.

Existing research confirms that the underlying potential for dust emission from playas within dryland regions can be extremely varied; large disparities are noted to exist from one playa to another, and significant spatial/temporal heterogeneity has been observed within those playas that do emit dust. However, recent research suggest that the emission potential of a playa system can be constrained through combined understanding of critical thresholds for first-order controls on sediment availability: (1) basin hydrology and flooding regime, and (2) basin geochemistry and surface mineralogy. These factors are time/sample dependent but, coupled with appropriate basin-scale climate observations (i.e. wind speed, temperature, relative humidity), can provide a generic and robust basis for understanding whether or not a playa either does, has or will emit dust.

Using a range of readily available global Earth observation and climate data sets, this study provides a pathway for complete understanding and quantification of the global dust emission contribution of ephemeral lakes. Implications of this data set for dust emission modelling and future dust scenarios will be outlined.