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Field sampling of loose erodible material: A new method to consider the full particle-size range

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The aerodynamic entrainment of sand and dust is determined by the atmospheric forces exerted onto the soil surface and by the soil-surface condition. If aerodynamic forces are strong enough to generate sand and dust lifting, the entrained sediment amount still critically depends on the supply of loose particles readily available for lifting. This loose erodible material (LEM) is sometimes defined as the thin layer of loose particles on top of a crusted surface. Here, we more generally define LEM as loose particles or particle aggregates available for entrainment, which may or may not overlay a soil crust.
Field sampling of LEM is difficult and only few attempts have been made. Motivated by saltation as the most efficient process to generate dust emission, methods have focused on capturing LEM in the sand-size range or on determining the potential of a soil surface to be eroded by aerodynamic forces and particle impacts. Here, our focus is to capture the full particle-size distribution of LEM in situ, including the dust and sand-size range, to investigate the potential and likelihood of dust emission mechanisms (aerodynamic entrainment, saltation bombardment, aggregate disintegration) to occur. A new vacuum method is introduced and its capability to sample LEM without significant alteration of the LEM particle-size distribution is investigated.