

Abstract Submitted
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Role of aeolian hysteresis and secondary turbulence in dust entrainment over arid landscapes SANTOSH RANA, WILLIAM ANDERSON, UT Dallas — Saltation, the wind-blown hopping motion of sand particles, plays an effective role in dust emission from the sediment bed. Low and high momentum regions appear as long streaks in atmospheric turbulence. Positive and negative vertical velocity are associated with low and high momentum regions respectively. High momentum regions initiate saltation when the fluid velocity exceeds the fluid threshold value and saltation continues till the fluid velocity drops below the impact threshold value. This phenomenon is called hysteresis or the lag between the initiation and cessation of saltation. Saltation occurs during this hysteresis period. The sweeping motion and the negative vertical velocity of the high momentum regions do not allow entrainment of the dust released during saltation. However, the positive vertical velocity associated with the low momentum region picks up the dust. A conditional averaging method is employed to study this paradox as two modes of dust entrainment. In the primary mode, the dust released by the saltating particles of the high momentum region is entrained by the neighboring low momentum region. In the secondary mode, dust released due to saltation by a very recent high momentum region is entrained by a closely following low momentum region in the flow direction. Here, we explain how dust exposed to the low momentum region as a result of hysteresis gets entrained by two modes of transport. The methodology explained here is applicable to both earth and mars conditions.

William Anderson
UT Dallas

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