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Total saltation fluxes under dry and weakly-crusted conditions.

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Saltation sand movement is a most important mechanism to produce dust emission from arid environment. For this, saltation flux, q(z, d), is expressed and used in the emission scheme in most of dust models to date. It is expressed as functional form of friction velocity, soil moisture, soil size distribution and so on. Among them, friction velocity is the key controlling parameter and, therefore, monitoring with high time response instrument are required for this.
Field experiments using sand particle counters (SPC; Mikami et al., JGR, 2005) and an automatic weather station were made under wet and weakly crusted conditions in a fallow field in Australia to monitor the saltation process. SPC can measure number of saltation sand particles ranging 40 to 600 μm with 32 channels every second. Three SPCs (5, 10, and 30 cm in height) were used for evaluating total saltation flux, Q. Results can be summarized as follows; (1) Quadratic exponential function, q=q0 EXP(-aZ-bZ^2), can well represent the profile of saltation fluxes, q(z), that is integrated function of q(z, d), d=40 to 600 μm. (2) A simple exponential function of q, q=q0 EXP(-aZ), evaluated from lowest saltation fluxes at 5 and 10 cm underestimates the total saltation flux Q compared with Q integrated from quadratic exponential function. (3) Threshold friction velocities under dry/wet and non-crusted/weakly-crusted conditions agreed well with previous results by Ishizuka et al. (JGR, 2008). (4) Weakly-crusted condition do not altered threshold friction velocity. But total saltation flux Q is slightly weakened compared with non-crusted condition.
These results suggest that multi level monitoring of saltation sand particles within lowest layer, namely lower than 20 cm, is required for precise monitoring of saltation flux.