Geophysical Research Abstracts
Vol. 17, EGU2015-8287, 2015
EGU General Assembly 2015

Long-Term Observations of Dust Storms in Sandy Desert Environments

Hye-Won Yun, Jung-Rack Kim, and Yun-Soo Choi
The university of seoul, Geoinformatics, seoul, Korea, Republic Of (long5540@gmail.com)

Mineral dust occupies the largest portion of atmospheric aerosol. Considering the numerous risks that dust poses for socioeconomic and anthropogenic activities, it is crucial to understand sandy desert environments, which frequently generate dust storms and act as a primary source of atmospheric aerosol. To identify mineral aerosol mechanisms, it is essential to monitor desert environmental factors involving dust storm generation in the long term.
In this study, we focused on two major environmental factors: local surface roughness and soil moisture. Since installments of ground observation networks in sandy deserts are unfeasible, remote sensing techniques for mining desert environmental factors were employed. The test area was established within the Badain Jaran and Kubuqi Deserts in Inner Mongolia, China, where significant seasonal aeolian processes emit mineral dust that influences all of East Asia.
To trace local surface roughness, we employed a multi-angle imaging spectroradiometer (MISR) image sequence to extract multi-angle viewing (MAV) topographic parameters such as normalized difference angular index, which represents characteristics of the target desert topography. The backscattering coefficient from various space-borne SAR and stereotopography were compared with MAV observations to determine calibrated local surface roughness.
Soil moisture extraction techniques from InSAR-phase coherence stacks were developed and compiled with advanced scatterometer (ASCAT) soil moisture data. Combined with metrological information such as the European Centre for Medium-Range Weather Forecasts (ECMWF) ERA interim, correlations between intensity of sand dune activity as a proxy of aeolian processes in desert environments, surface wind conditions, and surface soil moisture were traced.
Overall, we have confirmed that tracking sandy desert aeolian environments for long-term observations is feasible with space-borne, multi-sensor observations when combined with metrological information. Next, micro-scale properties extracted from ground observations will be compared and calibrated with remotely sensed desert environment parameters. We expect that such will provide a clearer understanding of dust storm generation in sandy deserts.