Geophysical Research Abstracts
Vol. 20, EGU2018-12235, 2018
EGU General Assembly 2018

A new paradigm for aeolain process monitoring employing UAV and satellite sensors: Application case in Kubuqi desert, China

Cheng-Wei Lin (1), Jungrack Kim (2), Shih-Yuan Lin (1), and Yunsoo Choi (2)
(1) National Chengchi University, Taipei, Taiwan, (2) University of Seoul, Seoul, South Korea

Arid sand deserts have been identified as a major source of mineral dust storms and their expanding speed in the last decades has been rapidly accelerated by many natural and anthropogenic factors. Although it is highly required to establish a reliable monitoring scheme for the aeolain process over sand deserts, its difficulties such as logistic issues and temporal/spatial coverage and resolution of sensing network are very obvious and not easily addressable in the conventional in-suite measurements. Thus, in this study, we designed a multi remote sensing data fusion approach mainly employing satellite and UAV remote sensors to constantly and precisely monitor desert aeolian process. The proposed scheme applied over a test site located Kubuqi desert, which is one of desert belts in North West China and presumed a major origin of dust storms in N.E Asia based on precedent studies.
First, planimetric distribution and 3D magnitude of sand dunes were reconstructed by UAV stereo Digital Terrain Model (DTM) and used for the calibration of various topographic parameters, such as aerodynamic roughness length, protrusion coefficient, Normalized Difference Angular Index, phase coherence derived from spaceborne optical/SAR remote sensing assets. Since the test area has been managed by the well-organized international combat desertification activities for a decade, the migration of vegetation canopy which constitutes the aerodynamic local roughness length was accurately incorporated into the time series satellite observations. After all, by the means of information fusion between multi sensor observation and calibrated ground data, the temporal/spatial migration of the target environment which certainly induce dust storm generation were traced and analyzed with the correlations of weather conditions. The scheme will lead the better understanding of Aeolian process in sandy desert which will be highly useful for the combat desertification activities and early warning of dust storm generations. Future researches will be conducted over more extensive spatial and temporal domains the involvement of water aquifer which is the essential resource to regulate desertification.

Acknowledgements: This study was conducted by the support of Korean Forest service. The research activities in the target area were kindly supported/conducted by Future Forest, UNCCD and China Youth League