

Surface Dust Entrainment Index and Evaluation of Dust Source Environment

X.G. Qin

Institute of Geology and Geophysics, Chinese Academy of Sciences, 19 Beitucheng Xi RD.
Beijing 100029, China (xiaoguangqin@mail.igcas.ac.cn)

Dust storm is one of natural disasters, especially in Northern China. In study of dust storm, weather condition is usually paid more attention in past. In this study, the surface condition is analyzed by extracting a surface dust entrainment index from remote sensed image. Researches of dust emission demonstrate that the saltation bombardment efficiency ratio, F/Q (vertical dust flux/horizontal dust flux), is linearly proportional to the fraction of dust contained in the parent soil, f , and inversely proportional to soil surface hardness parameter, p^k , with $k=1\sim 1.5$. For large p (hard surface), $k\sim 1$ and for smaller p (soft surface), $k\sim 1.5$. Major factors form soil surface, impacting the soil surface hardness parameter, are (1) inter-particle bonds, surface strength and energy partition (2) soil particle distribution (3) shape of the surface, which are concluded into three indexes that can be measured from remotely sensed image: surface soil pattern, vegetation cover, soil moisture. At first, Normalized Difference vegetation Index (NDVI), Normalized Difference Water Index (NDWI) and Normalized Difference Soil Index (NDSI) are calculated based on TM data. Then, a Surface Dust Entrainment Index (SDEI) is derived from the three indexes based on a simplified model. The index, SDEI, is applied to several areas around Keerqin desert in order to evaluate environment of there areas.