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A Monthly, High-resolution Dust Emission list of Soil Wind Erosion over Beijing Plain Area

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Getting an accurate high-resolution wind erosion dust emission inventory is still a challenging task. The existing annual emission inventory is not sufficient to develop high efficient emission control strategies for regional haze events, considering the notable seasonal variation of soil dust emission. Here, we took advantage of high spatial resolution Landsat archive with 30-year record to identify the intra- and interannual variability of bare land area in Beijing plain. The satellite images show that averaged area of bare land reached a maximum of 4500km2 in February and a minimum of 500km2 in August, while the bare land area of Beijing plain had reduced by about 600 km2 between 1987 and 2016 as a result of urban sprawl. Based on meteorological data, field experiment data and the empirical parameters recommended for Beijng area, we estimated the annual and monthly soil dust emission over Beijing plain area by wind erosion equation (WEQ). We tested different climatic factors and concluded that monthly climatic factor reflects more intra-annual climatic variability than annual climatic factor due to varied conditions of climate, vegetation coverage and tillage in semi-humid Beijing. A more reliable monthly soil dust emission list presents that cumulative emission of dust aerosols by the wind erosion reaches 1.8×104 tons per year, and induced PM10 emission was estimated to be 5.5×103 tons per year, which is approximately 7 times higher than result estimated by annual climate factor. The PM10 emission reached a maximum of 1.4×103 tons in December, and emissions in winter and spring account for nearly 91 percent. DaXing and TongZhou districts contributed more than half of the city's soil dust emission, due to soil properties and climatic conditions. So it's suggested that taking dust control measures in farmland would help to lower local atmospheric particulate emissions and mitigate pressure on air quality during the heating period.