

EGU22-1683, updated on 13 Aug 2022

<https://doi.org/10.5194/egusphere-egu22-1683>

EGU General Assembly 2022

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## Quantitative Assessment and Mapping of soil water and wind erosion in Pakistan

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Soil erosion is a serious environmental problem, water erosion and wind erosion pose a greater threat to the sustainable development of Pakistan. In order to provide a scientific basis for the Pakistan's soil and water conservation, this study used sub-meter resolution sampling survey (totally 475 units) and regional soil erosion factors (R, K, LS, B) as data sources, and calculates soil erosion rate maps (5m resolution) for each sampling unit based on the CSLE model, then uses a machine learning method to quantitatively make a soil erosion rate map in Pakistan that are closer to the real soil erosion characters. Based on climate, soil, topography, vegetation and other datas, the RWEQ model was used to quantitatively estimate the soil wind erosion rate map of Pakistan. Finally, the soil water erosion and wind erosion rate maps of Pakistan were spatially overlaid, taking into account the natural conditions of Pakistan, and according to the soil loss tolerance threshold, the study area is divided into wind erosion area, water erosion area, wind/water erosion interlaced areas. The results showed that : (1) Soil erosion in Pakistan is mainly concentrated in Potohar and its surrounding areas, the desert in the southwest, and the Thar desert in southeast. (2) The Kharan Desert in Balochistan and the Thar Desert in the southeast are dominated by wind erosion, Punjab and Sindh are dominated by water erosion, and wind and water erosion are combined in the northern mountainous areas and around the Suleiman Mountains Range. This study quantitatively estimated the rate of soil water erosion and wind erosion simultaneously in Pakistan, the results can more accurately express the spatial distribution characteristics of soil erosion in the country, provide a scientific basis for policy-making of soil and water conservation.