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Substantial loss of soil resources by dust-PM emissions due to increased human activities

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Dust emission processes has major implications for loss of soil resources (clays, nutrients) and human exposure to air pollution. Many soils throughout the world are currently or potentially associated with dust emissions, especially in dryland zones. The research focuses on the geomorphic processes in semi-arid soils that are subjected to increased human activities of urban development and agriculture. A boundary-layer wind tunnel has been used to study dust emission and soil loss by simulation and quantification of high-resolution wind processes. Field experiments were conducted in soil plots represent long-term and short term influences of land uses such as agriculture (conventional and organic practices), grazing, and natural preserves. Fluxes of particulate matter (PM) were calculated. The emitted dust-PM was analysed for physical and chemical properties. The results showed changes in dust fluxes in response to the anthropogenic influences on the soil to provide quantitative estimates of soil loss over time. Substantial loss of PM10 (particulate matter that is less than 10 micrometer in diameter), including clays and major nutrients as bioavailable phosphorus, was recorded in most experimental conditions. Integrative analyses of the soil properties and dust experiment highlight the significant implications for soil nutrient resources and management strategies as well as for PM loading to the atmosphere and risk of air pollution.