Modelling dust emissions from agricultural sources

From local air quality to global climate impact, mineral dust is essential to the Earth's system. Hence, it is a mandatory part of many earth system models, and the accurate description of dust sources is a major research topic. One particular source is agriculture, where several processes are related to dust emissions. One of them, Wind erosion from bare or sparse vegetated cropland, has always been a relevant topic for agriculture itself but also air quality and economics. In recent aerosol models, however, this potential dust source is somewhat underrepresented, even though it might contribute up to 10% to the global dust load.

Agriculture is the central human resource, and it can be expected that the cropland area will further increase globally like it did in the past. This amplifies that even though our recent aerosol models focus mainly on desert regions as the primary mineral dust source, the next generation of models should include all considerable sources, including those that seemed neglectable in the past.

Agricultural dust emission is a global topic. However, depending on the region, it varies enormously in its extent, structure and form. Recent efforts at the Leibniz Institute for Tropospheric Research made the aerosol model MUSCAT capable of simulating European dust outbreaks in a local scale model setup.

This project aims to transfer the knowledge earned by high-resolution case studies to a general parametrisation of agricultural dust that might be used in future aerosol models on a continental and global scale.