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Database of mineral composition in arid soils and its application in atmospheric transport of iron embedded in dust

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Dust minerals play an important role in various processes in which aerosol affects the human health and environment, including ocean productivity, cloud ice nucleation and atmospheric radiation. Content of minerals in aerosols is dependent on mineral composition in arid soils. For numerical models for atmospheric transport of mineral fractions in dust it is necessary to provide high-resolution data on soil mineral composition, since dust emission processes are typically of small scale character. We report on developing the global 1km resolution database of most frequent minerals in erodible soils (GMINER30). Using the database case study, we have simulated the atmospheric transport of iron embedded in dust using DREAM-Iron model. The model takes into account atmospheric Fe processes and consequent Fe-solubility increased with distance from soil/mineral sources in horizontal. Similar spatial dependence of Fe-solubility is simulated in the vertical as well.