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Modeling of atmospheric iron processing carried by mineral dust and its deposition to ocean

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Relatively insoluble iron in dust originating from desert soils increases its solubility after Fe carried by mineral dust is chemically processed by the atmosphere. After dust is deposited deposition to the ocean, soluble Fe as a nutrient could enhance the marine primary production.
The atmospheric dust cycle is driven by the atmospheric processes often of smaller, meso-scales. The soil mineralogy of dust emitted from sources determines also how much Fe in the aerosol will be finding. Once Fe is exposed to the atmospheric processes, the atmospheric radiation, clouds and polluted air will chemically affect the iron in dust.
Global dust-iron models, having typical horizontal resolutions of 100-300 km which are mostly used to numerically simulate the fate of iron in the atmosphere can provide rather global picture of the dust and iron transport, but not details. Such models often introduce simplistic approximation on the Fe content in dust-productive soils. To simulate the Fe processing we instead implemented a high resolution regional atmospheric dust-iron model with detailed 1km global map for the geographic distribution of Fe content in soil. We also introduced a parameterization of the Fe processing caused by dust mineralogy, cloud processes and solar radiation. We will present results from simulation experiments in order to explore the model capability to reproduce major observed patterns of deposited Fe into the Atlantic cruises.