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Simulated changes in dissolved Iron deposition to the global ocean driven by human activity

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The global 3-d chemistry transport atmospheric model TM4-ECPL is used to simulate the atmospheric cycle of iron (Fe) and evaluate its atmospheric deposition to the ocean by accounting for both Fe natural and anthropogenic sources as well as of the proton and ligand promoted iron mobilisation from dust aerosol. Model evaluation is performed by comparison to available observations. Present day dissolved Fe deposition presents strong spatial and temporal variability with an annual deposition flux about 0.489 Tg(Fe)/yr from which about 25% are deposited over the ocean. The model simulates past, present and future iron deposition accounting for changes in anthropogenic emissions. We show that dissolved iron deposition has significantly increased since 1850 while it is expected to decrease in the future due to air pollution regulations. These changes affect the atmospheric dissolved Fe supply to High-Nutrient-Low-Chlorophyll oceanic areas characterized by Fe scarcity.