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Possible Roles of Transition Metals in Cloudwater Relative to the Solar Short-Wave Radiation Absorption Anomaly

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Abstract: Measurements of the absorption of solar short-wave radiation by clouds exceed those predicted by theoretical calculations. In order to understand the roles of minor and trace species in this absorption anomaly, cloudwater samples were collected from individual precipitating clouds and analyzed for trace metals and anionic species. Two generalized approaches were used to assess the direct impact of the absorption of solar short-wave radiation by transition metals and/or their anionic complexes. Additionally, it was suggested that iron and manganese may act as catalyts in the formation of sulfate aerosols which efficiently scatter solar radiation.

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