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Constraining dust longwave and shortwave radiative effect from laboratory measurements and model simulations: comparison with radiation measurements

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We report measurement of dust refractive indices both in the longwave (LW) and in the shortwave (SW) part of the spectrum. These refractive indices are obtained from the laboratory measurements of 19 real dust samples with contrasted mineralogical composition from 4 continents.
We present in-situ radiation measurements reported in the literature for the LW and SW that constrain the radiative effect of dust and compare them with the results of a multi-year simulation of the LMDZORINCA model.
This presentation will discuss results obtained from the combination of the following information on dust cycle: a global mineralogical database, optical measurements in the laboratory, in-situ radiation measurements and an optical model to derive dust optical properties.
These measurements of refractive index allow us to conclude that the LW radiative effet of dust is smaller relative to most of the already published results. The constraints brought by the mineralogical composition on dust properties in the shortwave indicate that dust is less absorbing than previously assumed. We will discuss the range obtained for the overall dust radiative effect when varying both the mineralogy and the assumed size distribution.