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Physical properties of cosmic dust, from observations and simulations of their thermal emission and scattered light

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Understanding the changes in the physical properties of interplanetary dust particles with e.g. the solar distance is mandatory to assess the main processes (fragmentation, evaporation) that have shaped their evolution while they were spiralling towards the Sun. Information is mainly provided through remote observations of the dust particles thermal emission and scattered light (i.e. zodiacal light intensity and polarization), which require some inversion of the data [1].
This paper will review previous observations (obtained from Earth and space based observatories), and suggest trends in the dependence upon the solar distance of the intensity, polarization, temperature and albedo. The interpretation of the results, usually made with the assumption of spheroidal dust particles, will be analyzed for porous aggregates of refractory and organic compounds. Such particles are indeed detected in cometary comae and are likely to form a major component of the interplanetary dust cloud. The results of new numerical simulations, performed for fractal core-mantle aggregates, will be presented and discussed. Finally, the significance of these results will be estimated for circum-stellar dust clouds or rings.

References

[1] A.C. Levasseur-Regourd, I. Mann, R. Dumont, M. Hanner In *Interplanetary dust*, Kluwer, p. 57-94 (2001)