Statistical Analysis of Micrometeoroids Flux on Mercury due to both cometary and asteroidal components.
P. Borin[1] , G.Cremonese[1] and F. Marzari[2], [1]INAF-Astronomical Observatory of Padova (vicolo dell'osservatorio 5, 35122 Padova, patrizia.borin@oapd.inaf.it, gabriele.cremonese@oapd.inaf.it), [2]Department of Physics-University of Padova (via marzolo 8, 35131 Padova, marzari@pd.infn.it).

Meteoroid impacts are an important source of neutral atoms in the exosphere of Mercury. In Borin et al. 2009 we have evaluated the contribution of the asteroidal component at the vapor release, but we have to consider also the cometary supply. Comets and asteroids as a matter of fact are considered to be the two major sources of Solar System interplanetary dust particles. There has been considerable debate still ongoing about which between comets or asteroids provide the most important amount of dust in the Solar System (2; 4).

In this work we compute via N-body numerical integrations the orbital evolution of dust particles produced by Jupiter family comets. As in our previous work, Borin et al. 2009, we consider the orbital motion of the grains taking into account the effect of gravitational and non-gravitational forces.

To estimate the meteoritic flux at the heliocentric distance of Mercury we use the dynamical evolution model of dust particles of Marzari and Vanzani (3). It numerically integrates a (N + 1) + M body problem (Sun + N planets + M body with negligible mass) with the high-precision integrator RA15. Radiation and solar wind pressure and Poynting- Robertson drag are included as perturbative forces together with the gravitational attractions of all the planets in the Solar System.

From our numerical simulations we compute the flux of particles hitting Mercury's surface and the corresponding distribution of impact velocities. Moreover, to calibrate our model, we considered the flux of this kind of dust particles on the Earth.

A precise calibration of the particle flux on Mercury has been performed by comparing the predictions of our model concerning the dust infall on the Earth with observational data.

We give the flux of different size particles originating from Jupiter family comets impacting Mercury and their collisional velocity distribution in order to complete the previous analysis based only on asteroidal contribution at the micrometeoritic flux. We compare our results with previous estimates given by different authors.

References:

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