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Models of 9P/Tempel 1 target of Deep Impact mission.

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Thermal evolution models of comet 9P/Tempel 1 have been developed to interpret the results of Deep Impact (De Sanctis et al., A.J., 2007). We found a general agreement between the models' outcome and the mission results, without the need of an "ad hoc" choice of the initial parameters in our cometary models. We found that a "standard" model of porous low density nucleus made of initially amorphous water ice, volatile ices and dust can reproduce the general activity pattern of the 9P/Tempel 1, if the dynamical characteristics of this comet are taken into account. We found that the dynamical characteristics (orbital and rotational) of the comet have strong influence on the thermal history and on the comet behavior. The general aspect of the nucleus is well reproduced by the presence of a dust mantle on the nucleus, which, even if very thin, quenches water production. The models foresee the natural formation of a dust mantle on the comet's surface, and the water flux source is, mainly, a subsurface diffuse source, in agreement with the observations. However, no simple correlation is found between production rates of different volatile gases and their relative abundances in the nucleus. From our models results we can affirm that the coma abundances of volatile species do not match their abundances in the nucleus. A standard model of porous low density nucleus made of amorphous water ice, volatile ices and dust can reproduce the general activity pattern of the comet.