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Introduction: TNOs are believed to be pristine remnants of planets formation. Their study provides constrains on the early stages of solar system formation, but their great distance and their resulting faintness make TNOs' physical properties hardly accessible. In spite of this, colors are known for more than a hundred objects [1], and spectra show the presence of ices such as water or methane ices [2]. These properties are usually explained as due to different primordial compositions, and/or diverse degrees of surface alteration. Indeed, irradiation of the surface produces a polymerization of the surface layer [3], leading to the formation of a meter-thick crust in 10^{7-9} years [4]. On the other hand, collisions and possible comet-like activity - detected at large heliocentric distances [5] and even suspected for TNOs [6] - can expose fresh material to the surface. Besides, the presence of crystalline water ice and potentially of ammonia ice ([7], [8]) raises the question of TNOs internal activity, since their surfaces should be depleted from such volatiles in less than 10^7 years [9].

Model rationale : Modeling of thermal processes have been performed in order to understand the evolution of icy bodies including TNOs and comets. Most recent works achieve a quasi-three dimensional description: they include 3D boundary conditions, but assume that radial heat flux prevails (see [10] for a review). Those models have shown that some TNOs can remain relatively pristine, while some others can be highly processed, and even differentiated ([11], [12]).

Enzian et al. (1997) [13] and Orosei et al. (1999) [14] showed that lateral heat fluxes might have a great influence in the determination of temperature distribution. For this reason, a fully 3D thermal model has been developed.

Thermal modeling:

Numerical method: This new 3D thermal model assumes spherical bodies. The diverse compositions, sizes and orbits that can be accounted for allow to model both TNOs or comets. 3D boundary conditions are considered, and azimuthal and meridional heat fluxes are accounted for through expansion of the temperature on spherical harmonics. Radiogenic heating from short and long lived elements is considered, as well as the heating due to the phase transition between amorphous and crystalline water ice.

Discussion: The aim of this model is to determine if internal activity - outgassing or cryovolcanism for example - can be an important process to consider in the study of TNOs' surfaces. Preliminary results will be therefore presented and discussed.

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