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Effects of asteroid and comet impacts on thermal environment and atmopsheric erosion

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Asteroid and comet impacts have implications on the atmospheric and thermal evolution of terrestrial planets and hence on their habitability. They can affect the planetary evolution by eroding the mass of the atmosphere and by depositing energy at the surface. These effects depend on impactor and surface parameters, including composition, size, density and impactor velocity. In this study, we investigate the effects of impactors of various sizes on the environment and on the evolution of the mantle and atmosphere of terrestrial planets with a special emphasis on Mars. Models with different levels of complexity are used to explore the thermal effects and the atmospheric erosion ; They vary from semi-analytical models to fully coupled subsurface/atmosphere numerical codes. While small impactors with relatively small velocities have only local and time-limited effects, large impactors can create a strong thermal anomaly affecting both the crust and the mantle, which can trigger a change in the dynamic patterns of the mantle.