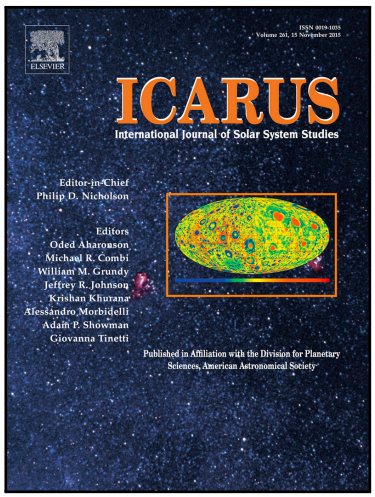

Nonlinear tidal dissipation in the subsurface oceans of Enceladus and other icy satellites

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Highlights

- Oceanic tidal heating from eccentricity forcing is strongly suppressed on Enceladus and other small satellites by the ice shell's mechanical forcing.
- For large satellites, oceanic tidal heating from eccentricity forcing is enhanced due to the ice shell's self-gravity.
- An ice shell increases oceanic obliquity tide heating on most satellites, except Triton, due to self-gravity and the flow properties of Rossby-Haurwitz waves.
- Non-linear tidal heating in barotropic ocean tides is still found to be small compared to radiogenic decay, except for Triton.
- Dynamic tidal forcing drives a time-varying pressure excess at the ocean surface due to the restrictive nature of the ice shell.