

# Accepted Manuscript

Ocean tidal heating in icy satellites with solid shells

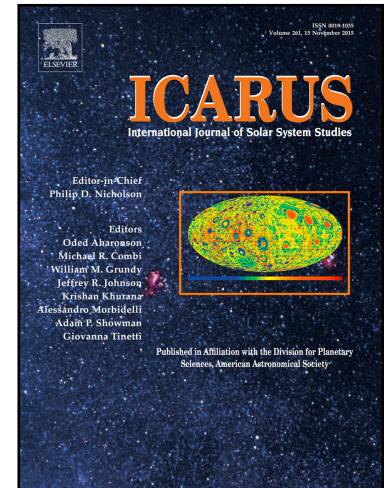
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**Highlights**

- The stabilizing effect of an overlying shell damps ocean tides, reducing tidal heating.
- The dynamic surface displacement driven by eccentricity and obliquity forcing can have a phase lag relative to the forcing tidal potential due to the delayed ocean response.
- Measurement of the obliquity phase lag (e.g. by Europa Clipper) would provide a probe of ocean thickness.
- The time-averaged surface distribution of ocean tidal heating is distinct from that due to dissipation in the solid shell, with higher dissipation near the equator and poles for eccentricity and obliquity forcing respectively
- Explaining Enceladus' endogenic power radiated from the south polar terrain by ocean tidal heating requires ocean and shell thicknesses that are significantly smaller than the values inferred from gravity and topography constraints

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