



Dissipation due to Wave Attractors on Enceladus

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We study the generation and dissipation of linear internal (inertial and gravity) waves in the subsurface ocean of Enceladus. These internal waves travel through the fluid, inclined to the rotation axis (for inertial waves) or the direction of gravitation (for internal gravitational waves), and reflect from a boundary. In closed domains, multiple reflections in an asymmetric domain cause the internal waves to focus into one orbit, called a wave attractor. Enceladus is a prime candidate for the appearance of wave attractors: Since the moon is tidally locked, tidal waves always excite inertial waves. Enceladus most likely has a global subsurface ocean with a regional sea at the South Pole. This breaks the symmetry and can cause most of the wave attractors to exist near the South Pole of Enceladus. Wave attractors cause enhanced dissipation and a means to localize energy. The enhanced dissipation helps close the gap between the expected and observed heat output of Enceladus. The localization of energy helps explain why the energy output of Enceladus is concentrated around the South Pole.