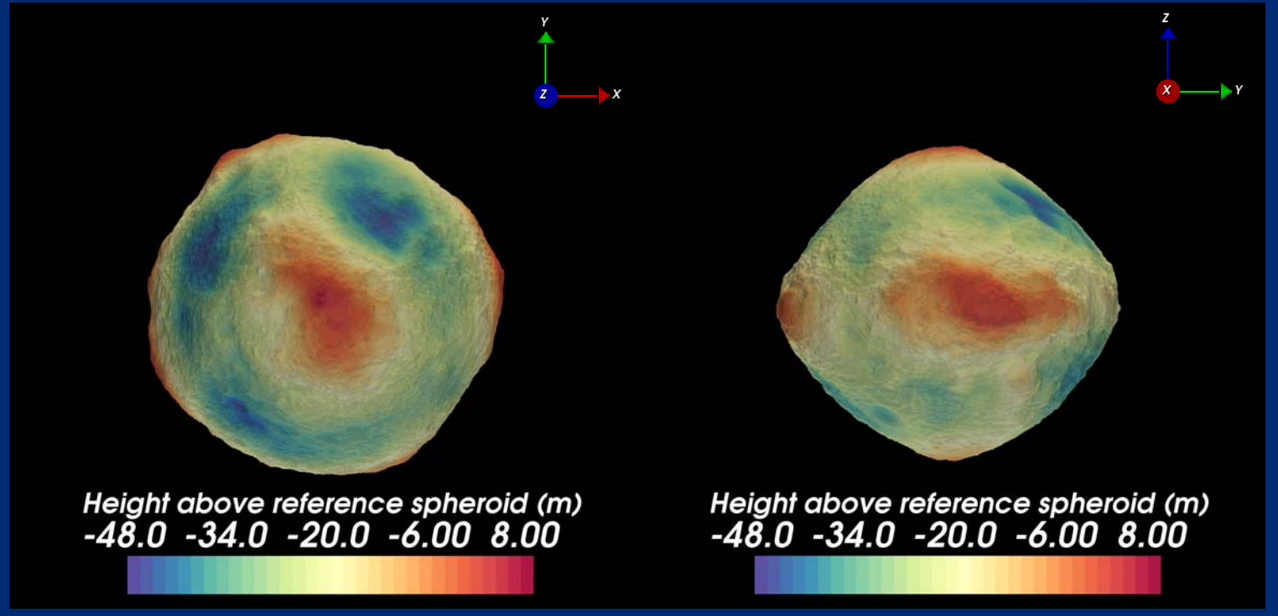
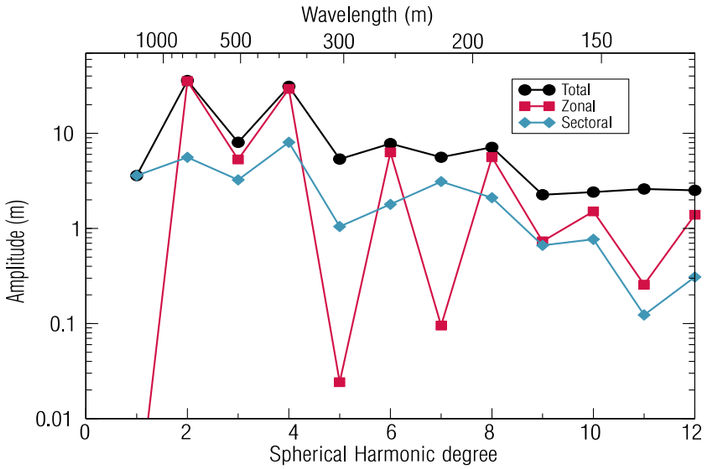
The Rotation and Shape of Bennu

- Images of asteroid (101955) Bennu acquired by the OSIRIS-REx mission reveal a rubble-pile body.
- Large scale shape dominated by equatorial ridge and four north-south ridges.
- N-S ridges may point to underlying structure or to partial failure of interior from rotational stress

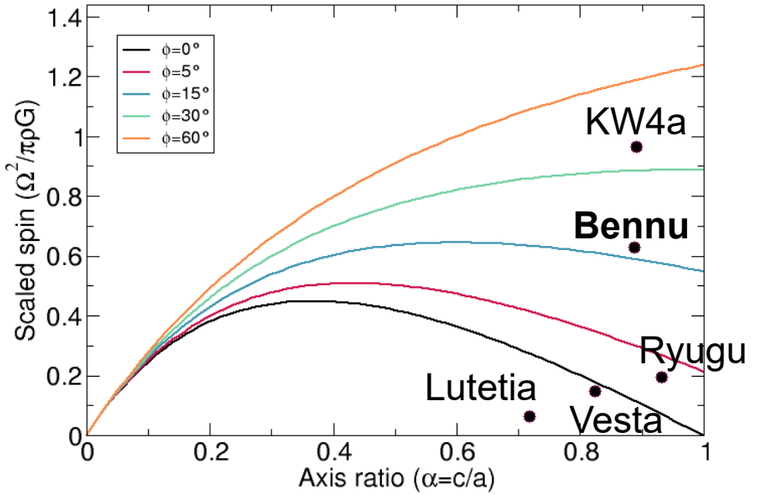




The peak in topography at a wavelength of ~400 m (spherical harmonic degree 4) indicates the ridge around the equator and the four north-south trending ridges.

Bennu rotates too quickly to be held together by gravity alone. Internal friction and/or cohesion is needed to prevent it from breaking up.

- The curves shown on the plot to the right show the maximum stable spin for a given friction angle ϕ.
- Bennu's spin rate is increasing with time, and so Bennu is moving upwards on this graph. In 1.5 million years, it will reach the top of the plot, and no amount of friction will be sufficient to prevent breakup of the asteroid.



Bennu has some strength preventing it from breaking up at fast rotation rates

Roberts, J.H. et al. (2019), *LPSC 50,* 1756; Barnouin, O.S. et al. (2019), *Nature Geosci. 12,* https://doi.org/10.1038/s41561-019-0330-x