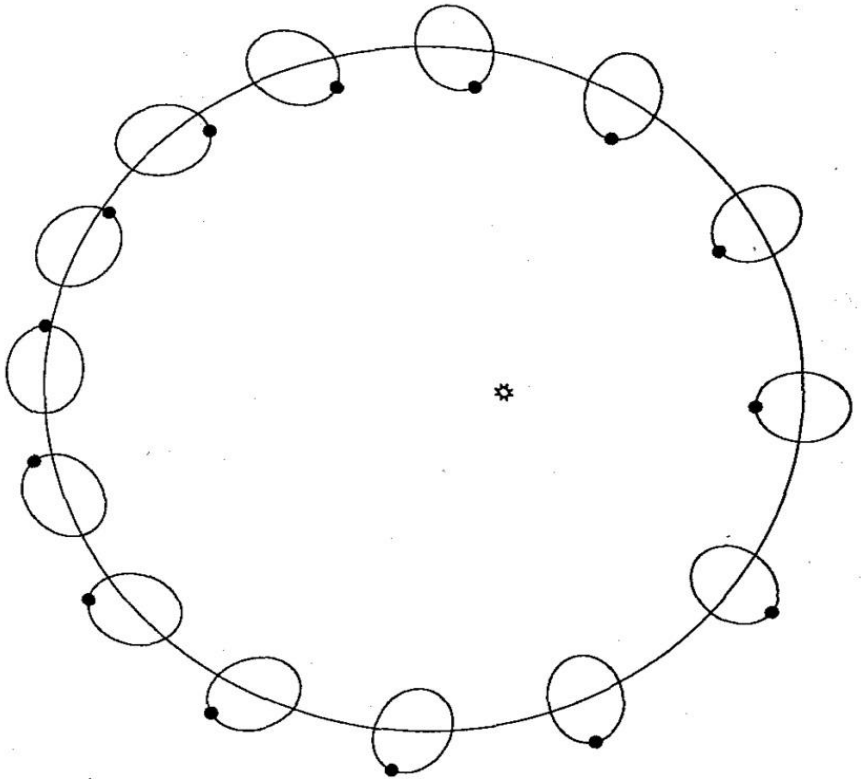
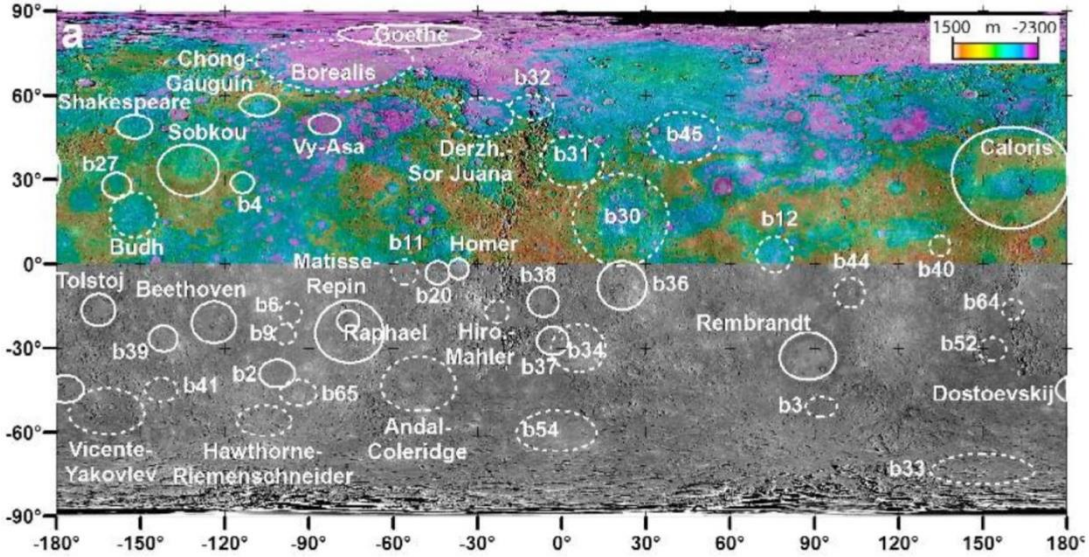
Mercury's Past Rotation

Poster pitch by Jurrien Knibbe

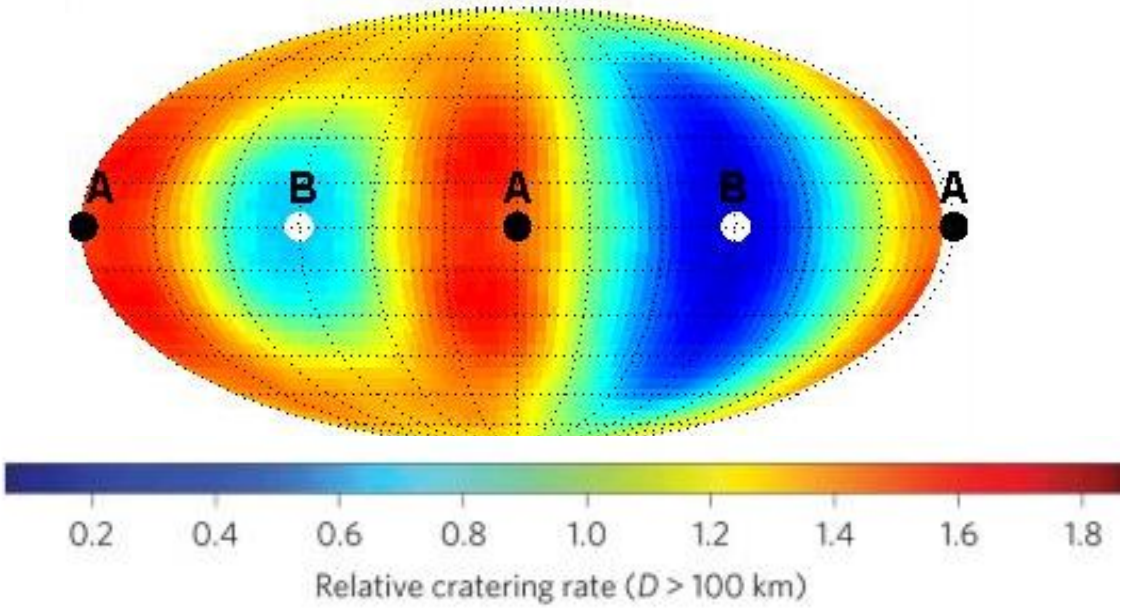


Mercury is now in a 3:2 spin-orbit resonance with orbital eccentricity of ~0.2.

Mercury's Past Rotation



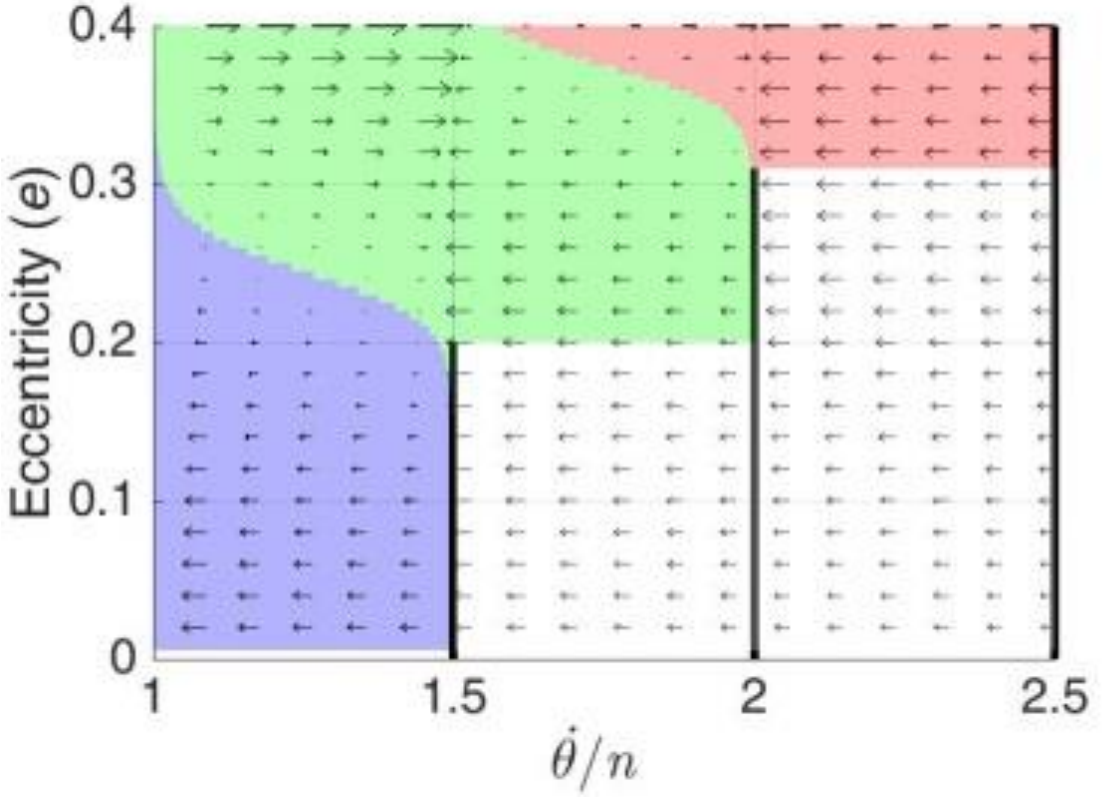
MESSENGER revealed an a-symmetric distribution of large crater on planet Mercury (Fasset et al., 2012).



The simulated cratering distribution for Mercury in a former synchronous rotation. (Reproduced after Wieczorek et al., 2012)

Mercury's Past Rotation

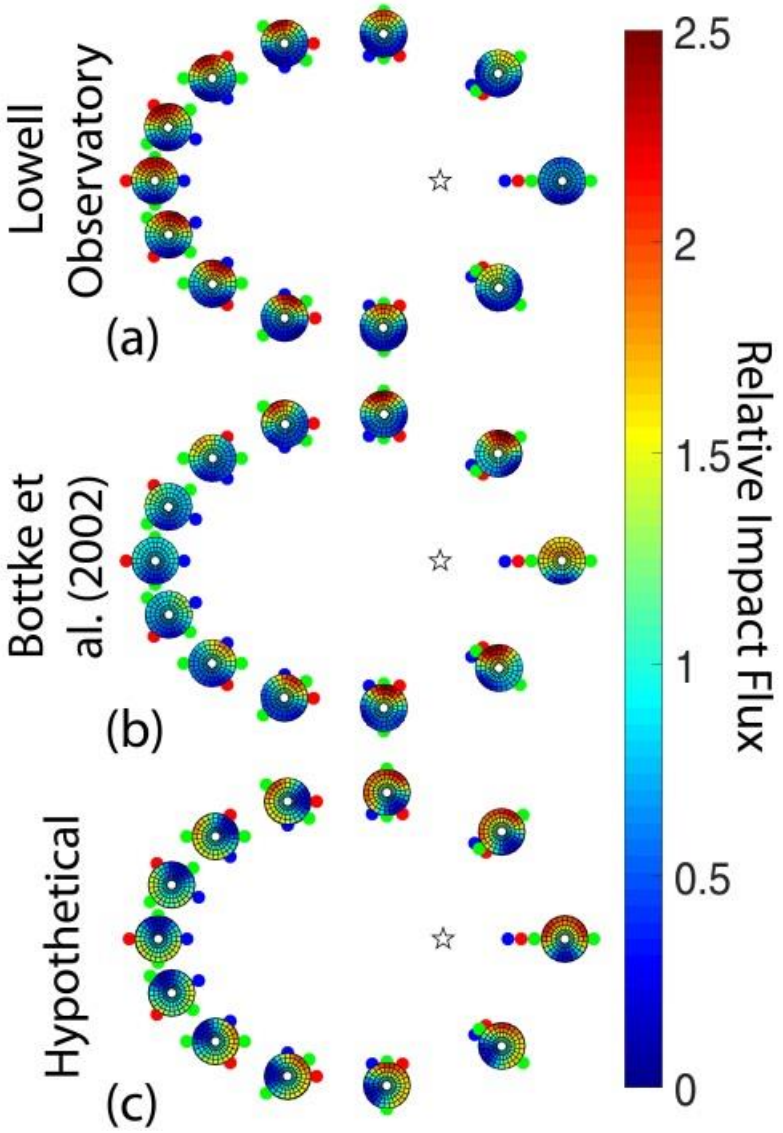
Tidal Torque (Efroimsky, 2012)



reproduced after Makarov (2012).

The tidal torque does not support a tidal spin-up from the synchronous rotation to the current 3:2 spin-orbit resonance.

Mercury's Past Rotation

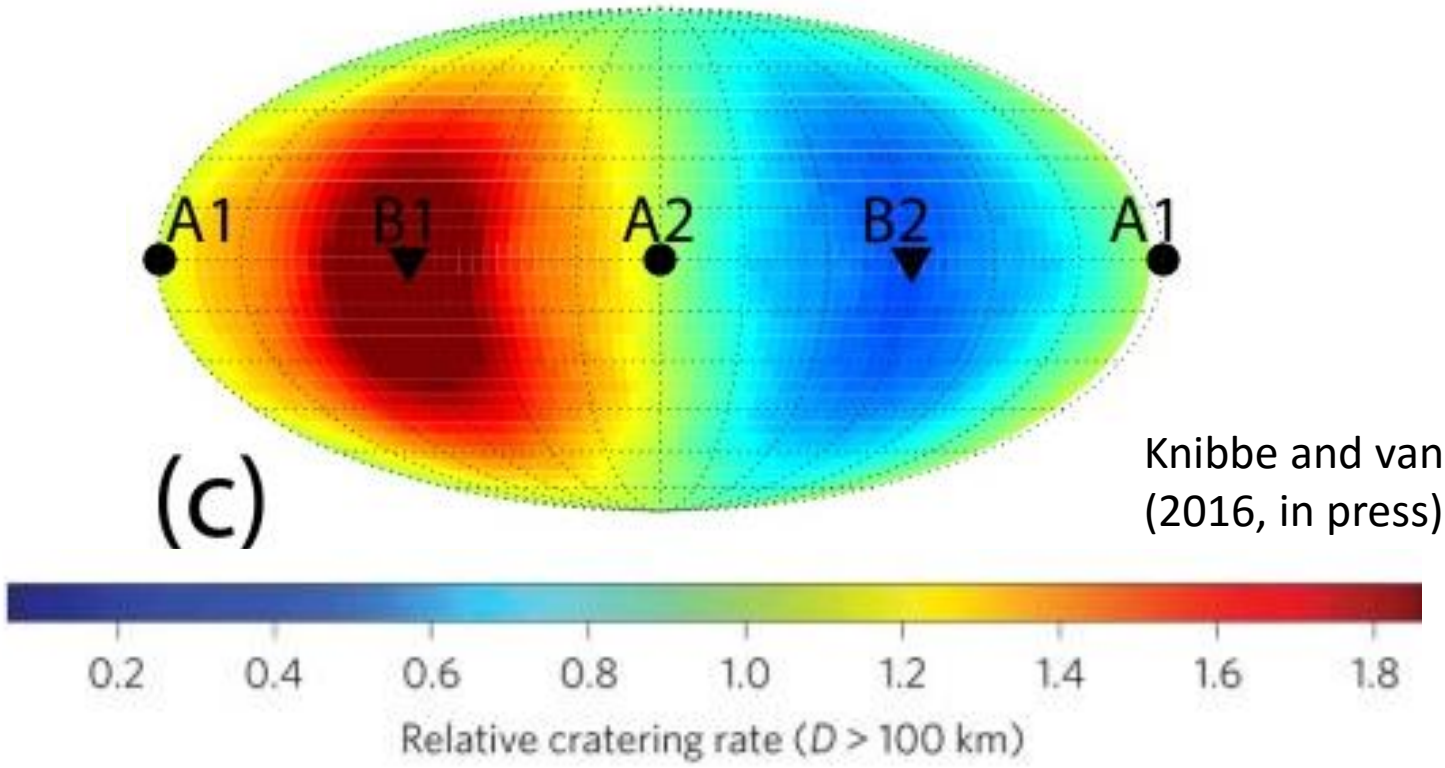


The impact dynamics on Mercury for substantial eccentricity (*e*=0.4 for left figures).

The impact dynamics is such that a non-uniform cratering is expected also in non-synchronous spin-orbit resonances.

Knibbe and van Westrenen (2016, in press)

Mercury's Past Rotation



Knibbe and van Westrenen (2016, in press)

The simulated cratering distribution for Mercury in a former 2:1 spin-orbit resonance (*e*=0.3 for these simulations).

Mercury's Past Rotation

- We propose a rotational evolution of Mercury via a former 2:1 spin-orbit resonance.
- This is consistent both with planetary rotational theories and with the asymmetric distribution of large craters for Mercury.