Study of the rotation of Mars from the lander-Earth Doppler measurements

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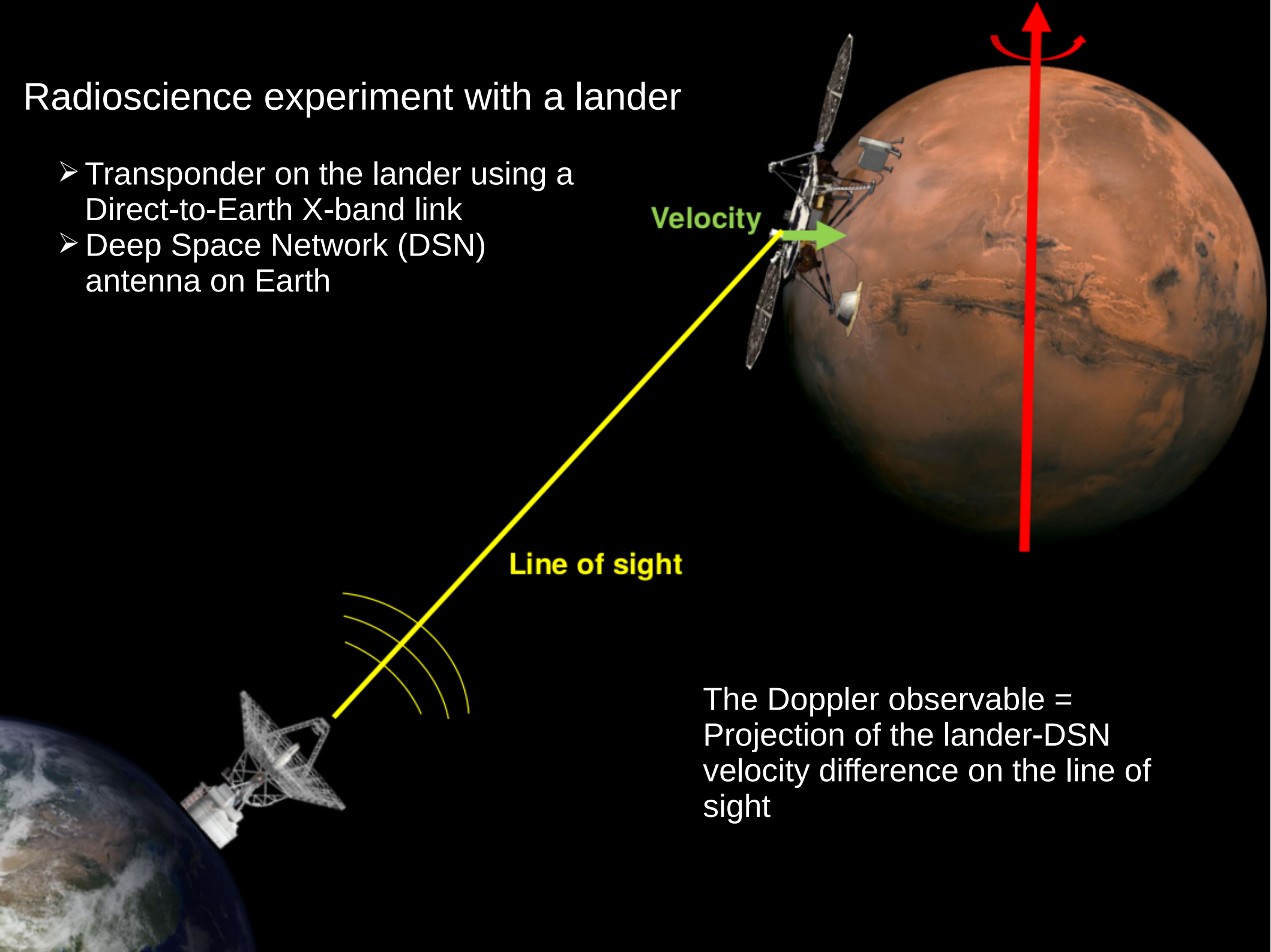
Radioscience experiment with a lander

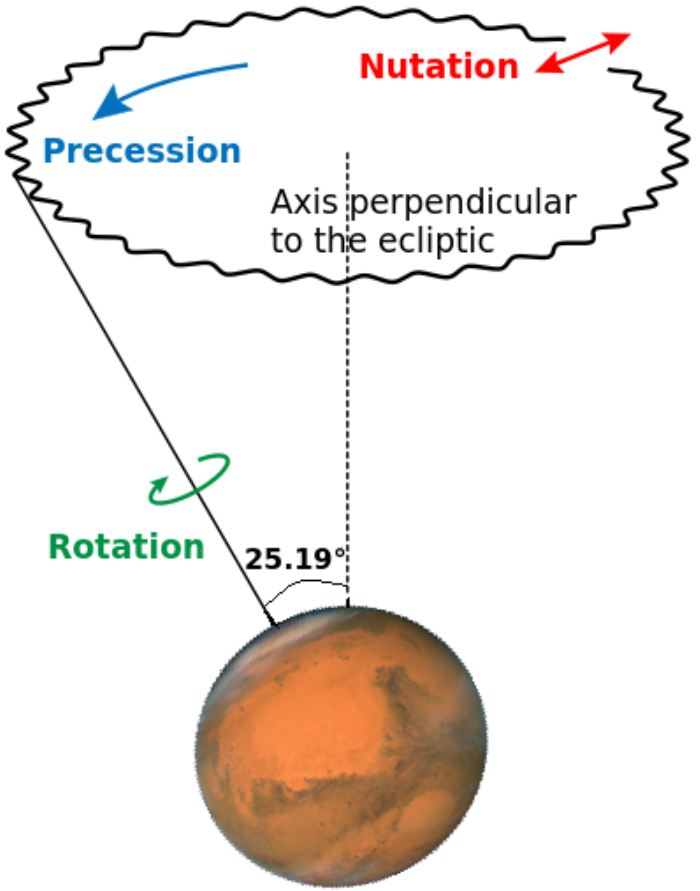
- Transponder on the lander using a Direct-to-Earth X-band link
- Deep Space Network (DSN) antenna on Earth



The Doppler observable = Projection of the lander-DSN velocity difference on the line of sight

Rotation of Mars

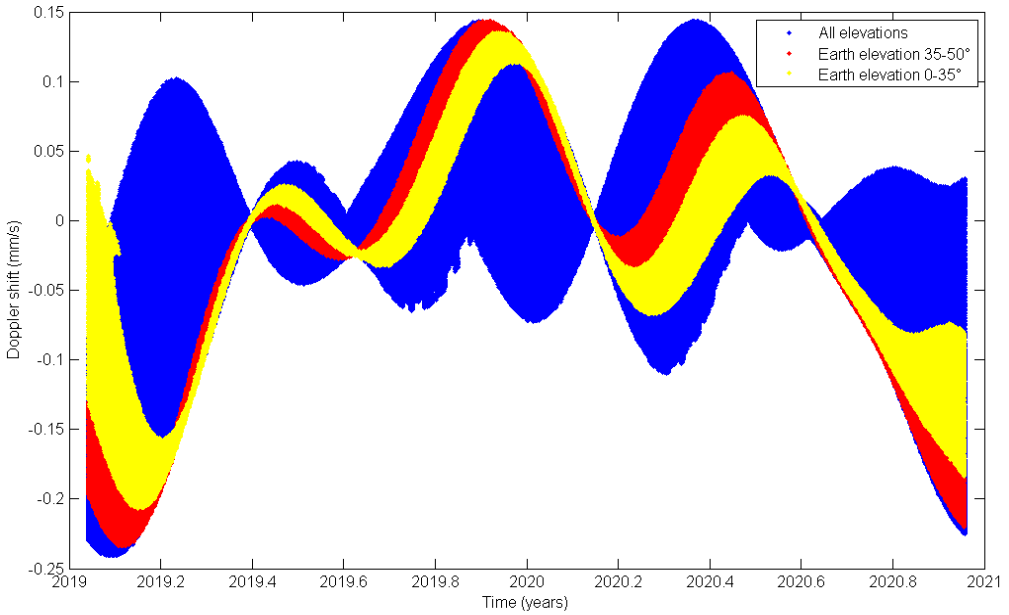
- Variations of the rotation rate = variations of the length-of-day.
- Variations of the orientation of the rotation axis in space = precession (long term) and nutations (periodic).



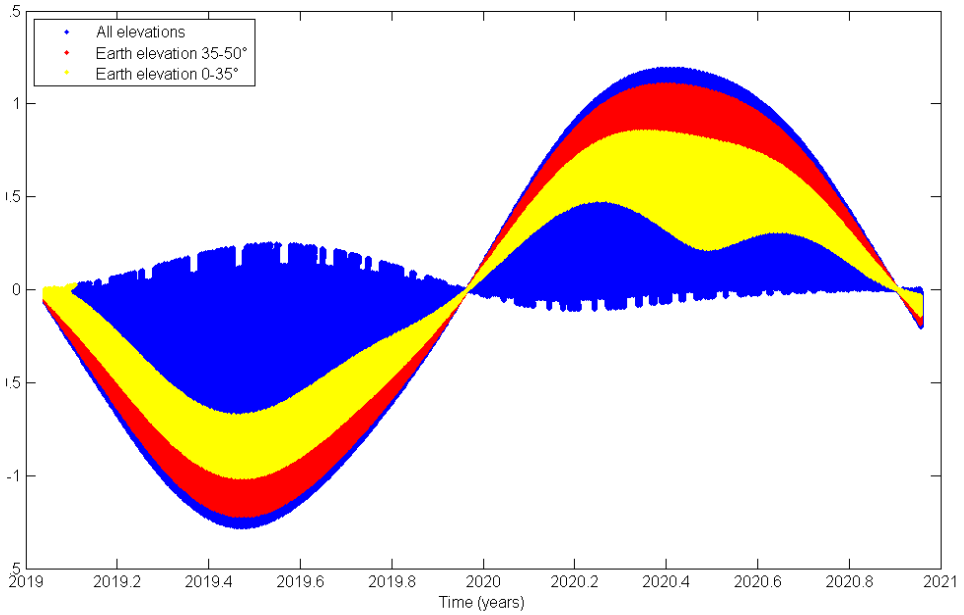
Final goal: obtain informations on the interior on Mars and characterize its liquid core.

First simulations results

- Signature of the rotation parameters on the Doppler shift: difference between the Doppler observable estimated taking into account a parameter and the Doppler estimated without.



Signature of annual rigid nutations for different Earth elevations



Signature of annual LOD for different Earth elevations