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Mars subsurface hydrogen as seen by FREND onboard TGO

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Fine Resolution Epithermal Neutron Detector (FREND) is a neutron telescope installed onboard Trace Gas Orbiter (TGO). Its collimator defines a narrow field of view allowing for spatial resolution of up to 60 km, unprecedented before. The mission reached its science orbit in April 2018 and continues successful mapping of the planet's epithermal neutron flux, which is a good sign of hydrogen (and water) in the subsurface.

FREND is a statistical instrument, meaning that the more it observes the planet the more significant its maps become. In this talk we will present how hydrogen maps evolved during the first year of measurements, revealing new features of the subsurface hydrogen that were not known before.

Moreover, we are observing seasonal variations of the polar ice caps with FREND – the instrument is sensitive to the thickness of CO_2 snow being deposited or evaporating on the poles. A similar effect is observed by HEND instrument onboard Mars Odyssey for a number of years, but FREND is seeing polar caps variability with much more features due to its higher spatial resolution.

As TGO continues operations, FREND will gather more neutron flux data improving its dataset and spatial resolution.