

RIMFAX Ground Penetrating Radar Observations of Subsurface Structures in Jezero Crater, Mars.

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NASA's Perseverance Rover is exploring the Jezero Crater carrying the RIMFAX ground penetrating radar. RIMFAX has acquired a continuous subsurface radar image at 10 cm intervals along the rover's > 20 km long groundtrack across the Crater Floor and the Western Fan deposits, probing depths of ~20 m below the rover. RIMFAX provides subsurface context for better understanding the depositional environments of the major units that the rover has examined on the mission so far.

RIMFAX imaged the Crater Floor where the overall subsurface layering structure appears to generally be horizontal along rover traverses in the Máaz formation parallel to the boundary of the Séítah region. However, when the rover path becomes more perpendicular to the boundary of Séítah the layering structure appears to dip downward away from the Séítah area at angles of up to 15°. These dipping layers are observed all around Séítah and have been interpreted to be either deltaic foresets or from an igneous intrusion uplift (Hamran et al. 2022).

At the boundary between the Jezero Crater floor and the Jezero Western fan, RIMFAX detects a distinct subsurface discontinuity (Paige et al. 2023). The observed subsurface layering relationships are interpreted to demonstrate the presence of an angular unconformity at the base of the fan, reflecting erosion of the crater floor prior to the deposition of younger stratified successions of the lower fan.

RIMFAX can estimate the density of the subsurface rocks by measuring the radar velocity in the ground (Casademont et al., 2023). The velocity is measured by matching hyperbolic shapes to point scatterers in the subsurface. RIMFAX measures average densities from 3.0 to 3.3 on the Crater Floor (Casademont et al., 2023).

References

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