

List of potential MSc-thesis with the RIMFAX mission team

½ and 1-year duration, flexible

First supervisor: Svein-Erik Hamran. Further supervisors depending on topic: Titus Casademont, Tor Berger, Sverre Brovoll, Henning Dypvik, Sigurd Eide

This list is not exhaustive. If you have ideas & questions, please reach out to any of the staff above, 2nd floor, CENSSS.

Technical topics:

- Neural Networks
 - UNET-clustering for faszies classification. Further develop existing code and include whole traverse data
 - Hyperbola detection. Further develop existing code and include whole traverse data
 - Implementation of Italian method for frequency interpolation
- Signal processing
 - Hyperbola enhancement with UiO-developed method
 - Hyperbola enhancement with Bauer/Schwarz 2019
 - Geophysical migration
- Software development
 - Turn rimfax processing and notebooks into Napari data viewer package with interactive functionality
- Software development/automation:
 - Automation of rimfax operational procedures
- Engineering
 - Instrument characterization with field experiments at FFI or TU Dresden
 - Antenna pattern, resolution, detection rate, surface roughness
- Modeling of wave propagation
 - GprMax Modeling of RIMFAX over certain scenarios on Mars with antenna
 - Antenna itself
 - Titled layers at Seitah, cyclic steps, surface roughness
- Volcanic geology
 - Search and interpretation of Lava flow features such as lava tubes and pillows

Martian geology with Henning Dypvik:

- Various geological/geophysical themes on Seitah/Maaz relations based on Rimfax radargrams in combination with information from other Perseverance instruments. Any lithological information to extract? Can this be applied to other areas in Jezero? What about other Martian regions? Compare with Earth analogs.
- Various sedimentological/stratigraphical themes e.g. related to delta progradation onto eroded and weathered/altered Seitah /Maaz lithologies. Based on Rimfax radargrams in combination with information from other Perseverance instruments, compared to Earth analogs. Can this give information about timing? Is it possible to differentiate the effects of e.g. erosion, alteration, reworking and various facies developments?