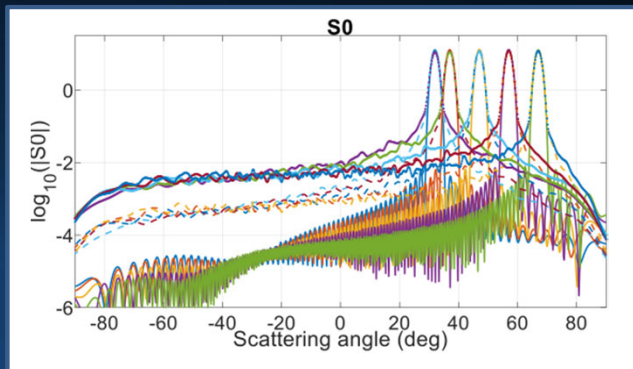
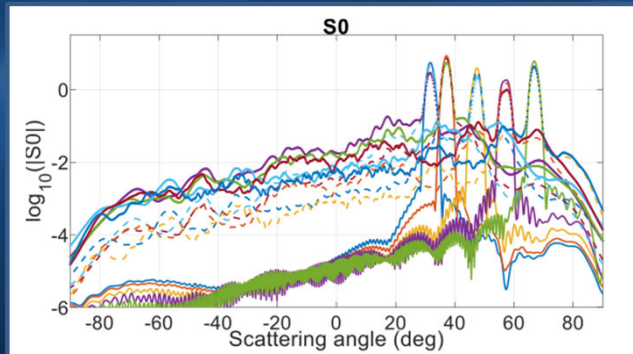


Stokes Reflectometer for Soil Moisture, Subterranean Voids, and Subsurface Ice



Mean First Stokes parameter for saturated soil on dry soils of varying roughnesses



Mean First Stokes parameter with an added snow layer on the layers modeled above

The Stokes Reflectometer takes a novel approach to the retrieval of soil moisture profiles at higher spatial and temporal resolutions than current capabilities allow.

- Existing satellites for monitoring soil moisture are few in number and provide data at three-day or longer intervals, with resolution ~ 20 km.
- We have developed a low-power, low-mass, UHF, hybrid-polarimetric system using forward scatter across the Brewster angle that can be deployed as a network of small-sats or as ride-along sensors on communications networks to provide high-resolution daily to hourly monitoring of soil moisture.
- In this work, we modeled hybrid-polarimetric signatures of soils expected for our system configuration with COMSOL.
- **Once ionospheric effects are removed from the data, the modeling shows significant, measurable differences in retrieved Stokes parameters between frozen and thawed soil with and without snow, thus validating the Stokes Reflectometer approach.**