SAT Calibration Requirements on South Pole Infrastructure

Kirit Karkare
SAT Calibration Hardware

Things to measure

- Main beams
- Sidelobes
- TQU beams/pol angles
- Bandpasses
- Time constants
- Optical efficiency
- Magnetic sensitivity
- Vibration sensitivity
- RFI sensitivity
- Pointing

Hardware

- Near-field beam mapper
- Large thermal chopper
- Far-field flat mirror
- Mast
- Amplified microwave source (+ rotating polarized stage)
- Sparse wire grid, dielectric sheet
- Fourier Transform Spectrometer
- Optical filters
- Narrowband source
- Aperture-filling thermal load
- Helmholtz coil
- Accelerometers
- RF sources
- Star camera
Far-field measurements

Use a redirecting flat mirror and source on mast
Far-field calibration requirements

Each SAT needs a clear line-of-sight to a mast/source ~200m away (distance somewhat flexible)

Mast should extend to [TBD] degrees above clear horizon as viewed with mirror

Mase can be raised/lowered

Expect to perform calibrations with many (all?) SATs simultaneously

SAT and mast building need to communicate, including data (e.g. TTL signal)
Sidelobes, Pol, Bandpass

Far sidelobe measurements

Amplified broad spectrum noise source

Rotating polarized source (referenced to gravity)

FTS
Additional requirements

For far-sidelobe measurements, each SAT needs to see a mast/source on the same building. Mast should be extendable to higher than the far-field measurement [TBD].

Calibrators (far-field flat, thermal load, FTS, etc.) need to be taken from lab into the ground shield, and then mounted on the SATs
- Clearance around lab doors and stairs
- Ground shield door
- Lifting strategy

Communication to apparatus (and people!) on the mount from inside
Far-field flat mounting

- Mirror
- Mounting Jib
- Crane (telescoping)

Far-field flat mirror