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To: VSRT Group
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Subject: Science ideas for a single baseline VSRT

While the VSRT is primarily a teaching, it may be possible to use a simple 2 element interferometer for new science. However, considerable development of calibration techniques are needed to realize this potential. Some ideas for original science are as follows.

1] Solar flux monitor at 12 GHz.

Monitoring the total flux at 12 GHz is the most obvious project for a VSRT. With a short baseline the system is very sensitive, however calibration is the major challenge. Using an absorbing vane as an artificial source is a possibility but needs development. Extending the baseline would make the VSRT more sensitive to sunspot activity and less sensitive to calibration. Another possibility is to use opposite circular polarizations on each dish making the VSRT interferometer sensitive to linear polarization. Most active regions on the Sun are circularly polarized but a few linearly polarized regions have been reported (see Alissandrakis & Chiuderi-Drago, *Ap.J.* **428**, L73, 1994)

2] Lunar flux vs. phase

An accurate measurement of the lunar flux variation with lunar phase at 12 GHz would be a new result. Again the challenge is how to make an accurate calibration while avoiding the signals from old satellites which radiate out of the allocated band. In this case relative calibration may be adequate and we plan to develop an inexpensive noise source which radiates from the center of each dish from a common diode. Another possibility is the measurement of linear polarization. (see Poppi et al, *Astrophysical Polarized backgrounds*, 2002)

3] Tropospheric scintillation measurements

The 12 GHz signal from the Sun (or a DBS satellite) scintillates due to variations of refractive index. The VSRT could be the ideal little instrument to extend the measurements of Karasawa et al. (see Karasawa et al, *IEEE Transactions of Antennas and Propagation*, **vol. 36**, No. 4, pp 563, 1998)