AO40 Feasibility Study
Focal Region Mapping Experiment Observation Plan – August Campaign

Karl F. Warnick, Brian D. Jeffs, Michael Elmer, and Vikas Asthana
Department of Electrical and Computer Engineering
Brigham Young University
warnick@byu.edu

German Cortes, Ganesh Rajagopalan, and Phil Perilat
National Atmosphere and Ionosphere Center/Cornell University and Arecibo Observatory

11 August 2010 ver. 2

Experiment Objectives

1. [Done – redo to verify maps] Produce a map of the peak sensitivity of 19 element formed phased array feed (PAF) beams as a function of x-y position in the AO focal plane over roughly a 1.6m diameter region.
2. [Done] Determine boresight beam peak sensitivity as a function of z offset (focus)
3. [Done] Map formed beam pattern shape and sidelobes for a subset of PAF positions over the focal plane.
4. [Done] Map the beam sensitivity over frequency for all or a subset of the PAF positions.
5. [Need method to separate Tsys and aperture efficiency] Measure system gain stability, aperture efficiency, and beam equivalent system noise temperature.

Pre-Experiment Schedule

Aug. 12 Thu.	BYU shipment arrives at Arecibo
Aug. 13 Fri.	Lift equipment (four PCs, rack rails, NI cables, KVM switch)
Aug. 14 Sat.	(pm) Jonathan Landon arrives, install lifted equipment in racks
Aug. 15 Sun.	Taylor Webb and Vikas Asthana arrive
Aug. 16 Mon.	Finish installing PCs in rack, test 40 channel data acquisition system
	Test full system using on-sky source, check sensitivity and SNR on all channels

Observation Times

Aug. 17 Tue.	12am to 7am (7 hrs)
Aug. 18 Wed.	12am to 7am (7 hrs)
Aug. 23 Mon.	5:30am to 7:30am (1.5 hrs)
Aug. 24 Tue.	11pm to 7am (8 hrs)
Aug. 25 Wed.	11pm to 4:30am (5.5 hrs)
	Total observation time: 29 hrs

Experiment Schedule

Aug. 16 Mon.	Early evening - brief test observation: A0 coarse grid, verify correlated data
Aug. 17 Tue.	*12am to 7am (Single pol array)*
	All observations at 1600 MHz unless otherwise noted
	A0 fine grid, z = -5 cm minus standoff offset, **verify map from correlated data**
	D4 or C5, D5, D6 fine grids
	A0 superfine grid, z = 10cm minus standoff offset
	A3 superfine grid, z = 10cm **(verify x-y position---source was off map for June A3)**
	Check to ensure that FoV at z = 10cm is within A1-A6 ring, evaluate need for D maps
	Begin A2 superfine grid, z = 10cm minus standoff offset

Short observations:

Complex source fields for image mosaic - 3 x 3 or 5 x 5 observation grid

Flat hydrogen field **(1420 MHz)** for Tsys calibration

System stability check - weak milliJy sources, repeated several minute small grids/slices

Verify superfine maps from correlated data

Aug. 18 Wed. *12am to 7am (Single pol array)*

Finish A2 superfine grid, z = 10cm minus standoff offset

Begin A1, A4, A5, A6 superfine grids, z = 10cm (minus standoff offset)

Aug. 19-21 Correlate all remaining data from Aug. 16-18

Install and test dual pol array, verify correct array orientation

Test 40 channel data acquisition

Brief test observation: A0 coarse grid, verify 40 channel correlated data

Aug. 23 Mon. *5:30am to 7am (Dual pol array)*

A0 fine grid, z = -5cm minus standoff offset

Begin A0 superfine grid, z = 10cm minus standoff offset

Three partially polarized sources and one unpolarized source, A0 fine grids, z=-5cm minus standoff

Frequency sweep, A0 fine grid, z = -5 cm minus standoff offset

Aug. 24 Tue. *11am to 7am (Dual pol array)*

Three partially polarized sources and one unpolarized source, A0 fine grids, z=-5cm minus standoff

Begin A1-A6 superfine grids, z = -10cm minus standoff offset (start with incomplete single pol grids)

Aug. 25 Wed. *11pm to 4:30am (Dual pol array)*

Continue A1-A6 superfine grids, z = -10cm minus standoff offset

Staffing

Jonathan	Aug. 14-30
Vikas	Aug. 15-30
Taylor	Aug. 15-23
Dave	Aug. 23-30

Post-Experiment Schedule

Aug. 26 Thu. Disassemble all BYU equipment

Lower all BYU equipment

Aug. 27-28 Prepare BYU equipment for shipment

Box, wrap, band, and label pallets

Aug. 30 Mon. BYU staff departs, equipment ships