A References

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B Acronyms and Abbreviations

α	Right Ascension
δ	Declination
ω	Argument of Perigee
Ω	Right Ascension of the Ascending Node
AIPS	Astronomical Image Processing System
A/D	Analog to Digital
ATCA	Australia Telescope Compact Array
ATNF	Australia Telescope National Facility
AO	Announcement of Opportunity
CIS	Commonwealth of Independent States
DAT	Digital Audio Tape
DSN	Deep Space Network
EVN	European VLBI Network
FITS	Flexible Image Transport System
ftp	file transfer protocol
FWHM	Full Width Half Maximum
GPS	Global Positioning Satellite
GRT	Ground Radio Telescope
GVWG	Global VLBI Working Group
HALCA	Highly Advanced Laboratory for Communications and Astronomy
IF	Intermediate Frequency
IRM	Image Rejection Mixer
ISAS	Institute of Space and Astronautical Science
JIVE	Joint Institute for VLBI in Europe
JPL	Jet Propulsion Laboratory
LO	Local Oscillator
LCP	Left Hand Circular Polarization
mas	milli-arcseconds
Mbps	Mega bits per second
NAO	National Astronomical Observatory
NASA	National Aeronautics and Space Administration
NRAO	National Radio Astronomy Observatory
PI	Principal Investigator
QPSK	Quadrature Phase Shift Key
RCP	Right Hand Circular Polarization
RCS	Reaction Control Subsystem
RFI	Radio Frequency Interference
RMS	Root Mean Square
SEFD	System Equivalent Flux Density
SNR	Signal to Noise Ratio
SPAS	Space VLBI Assistance Software
SRC	Scientific Review Committee
SVLBI	Space VLBI
SVPIS	Space VLBI Principal Investigator Software
TDRSS	Tracking and Data Relay Satellite System
URL	Uniform Resource Locator
VLA	Very Large Array
VLBA	Very Long Baseline Array
VLBI	Very Long Baseline Interferometry
VSOG	VSOP Science Operations Group
VSOP	VLBI Space Observatory Programme
WSRT	Westerbork Synthesis Radio Telescope
WWW	World Wide Web

C HALCA Spacecraft Tables

Table 17: Satellite Mass Budget (kg)

Radio astronomy payload	27.1
K_u-band communication	31.8
Deployable antenna	247.1
GPS receiver	7.8
Electric power	118.0
S-band communication	8.4
Command and data processing	15.8
Attitude and orbit control	78.4
Reaction control system (RCS)	30.0
Launch operation	6.4
Thermal control	20.0
Structure	117.6
Wire harness and others	45.0
Satellite dry mass	753.4
RCS propellant	62.0
Total mass	815.4

Table 18: Satellite Power Budget (W)

	Apogee	Perigee
Science payload	70.7	70.7
K_u communication system	44.3	44.3
K_u antenna	40.0	40.0
Solar panels	2.9	2.9
Power	4.8	4.8
S-band receiver	7.6	7.6
S-band transmitter	12.7	4.6
Command and data handling	15.6	15.6
Inertial reference units	37.3	37.3
Star trackers	69.4	69.4
Reaction wheels	26.4	26.4
Attitude control	10.6	10.6
Momentum unloading	0.0	18.2
GPS	9.7	31.4
Battery heater	29.2	29.2
Reaction control system heater	60.6	60.6
Sum	441.8	473.6
Conversion and other losses	92.5	100.4
Charging	30.2	30.2
Total power consumption	564.5	604.2

Table 19: Antenna Characteristics (from Takano et al. 1994)

Frequency (GHz)	1.66	4.85	22.15	Remarks
Gain (if 100% efficient) (dB)	42.86	52.17	65.36	Aperture area 50.1 m^2
Aperture illumination (dB)	-0.74	-0.90	-0.98	
Spillover (dB)	-2.44	-0.85	-0.40	
Blockage (dB)	-0.30	-0.30	-0.30	Sub-reflector supports
Surface accuracy (dB)	-0.01	-0.04	-0.94	0.5 mm RMS
Mesh reflectivity (dB)	-0.01	-0.01	-0.06	Mesh reflection loss
Dielectric loss (dB)	-0.01	-0.01	-0.08	White paint
Feed loss (dB)	-0.72	-0.55	-0.53	Horn, feed
Antenna gain (dB)	38.63	49.51	62.07	
Aperture efficiency (%)	38	54	47	

D All-Sky (u,v) Plot Examples

In this appendix are shown All-Sky (u,v) coverages plotted every three months during AO phase 2 observations with the HALCA spacecraft co-observing with the VLBA. Although the official AO2 observing period is from 1-Jan-1999 to 31-Dec-1999 some observations may be scheduled from October 1998 onwards. For this reason the All-Sky (u,v) Coverage for 15-Nov-1998 is also shown in this Appendix.

Each (u,v) coverage is for an observation that lasts the full length of time the VLBA can observe the source. Also plotted on these figures are the location of the Sun, the 80°, 110°, and 145°solar avoidance constraints, the orbital plane, the orbit normal and orbit anti-normal directions (labeled as N), and the apogee and perigee directions (labeled as A and P respectively).

In order to keep down the size of the Proposer's Guide the examples in the Appendix have been restricted to only one ground array. Proposers are strongly encouraged to obtain the proposal aid software, described in Section 13, to investigate for themselves how the (u,v) coverage varies as a function of the ground array used, epoch of observation and length of observation.

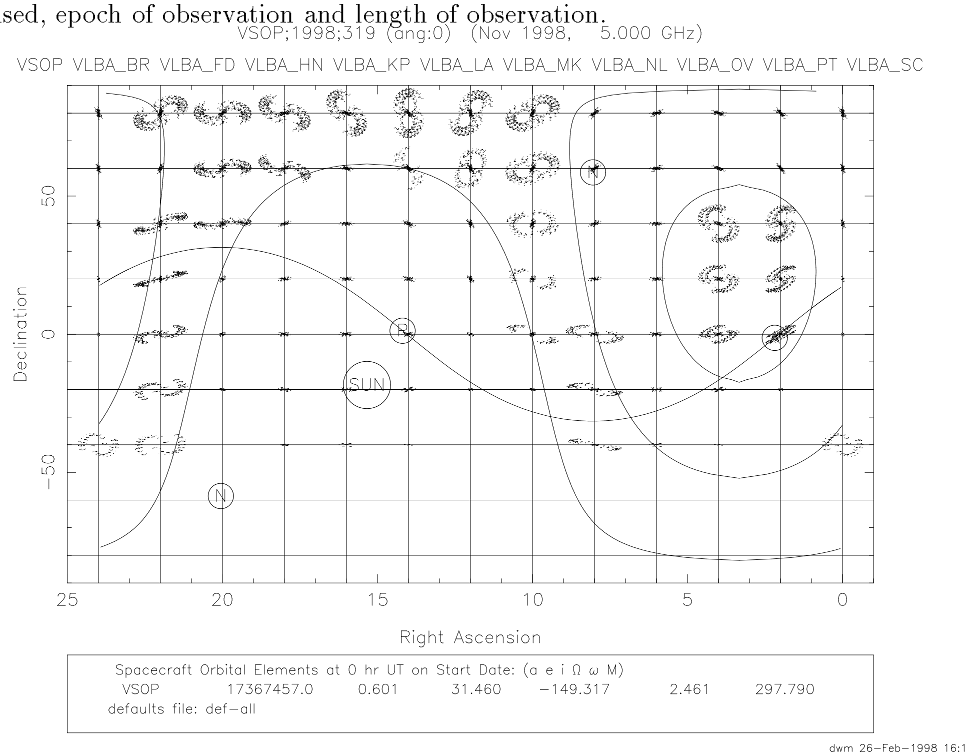

Figure 7: All-Sky (u,v) Plot for the VSOP Spacecraft with the VLBA on 15 Nov 1998.

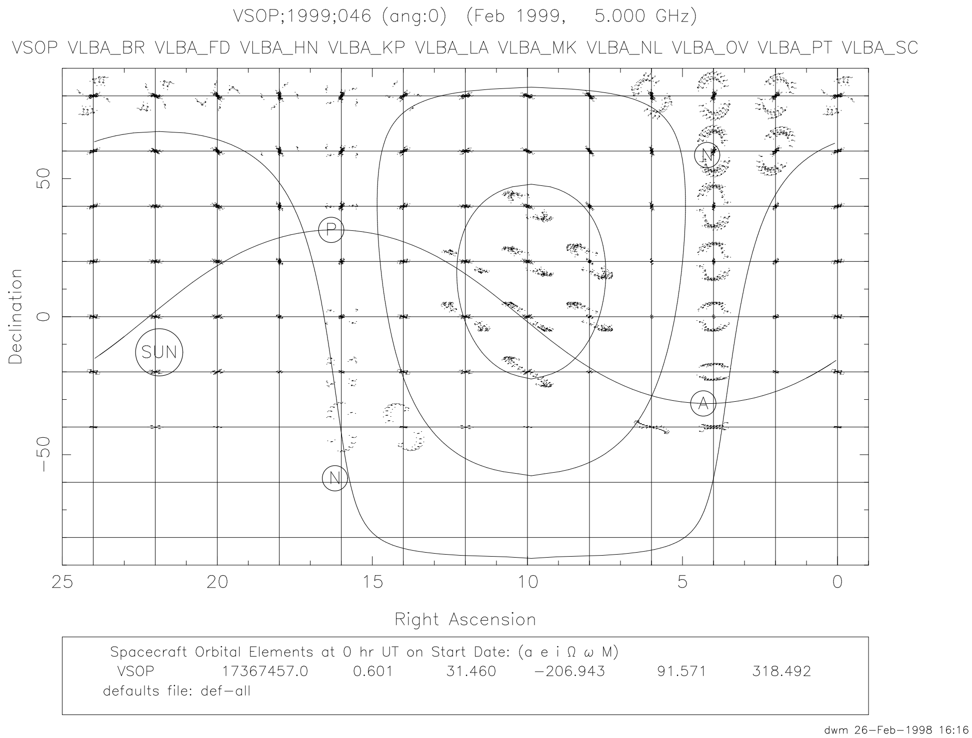

Figure 8: All-Sky (u,v) plot for the VSOP spacecraft with the VLBA on 15 Feb 1999.

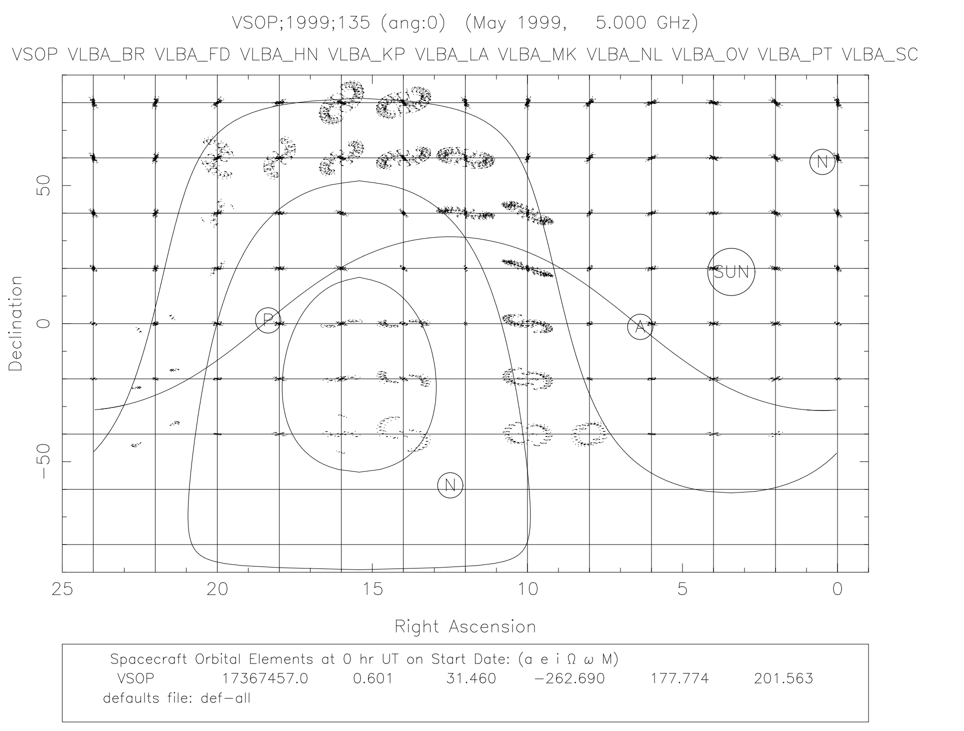

Figure 9: All-Sky (u,v) Plot for the VSOP Spacecraft with the VLBA on 15 May 1999

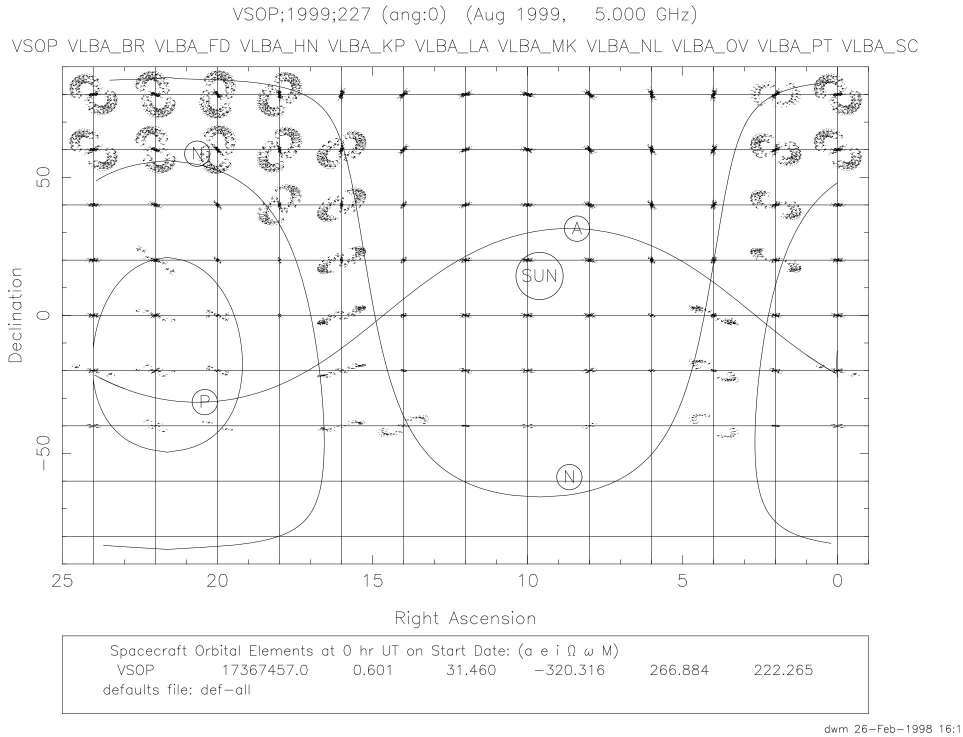

Figure 10: All-Sky (u,v) Plot for the VSOP Spacecraft with the VLBA on 15 Aug 1999.

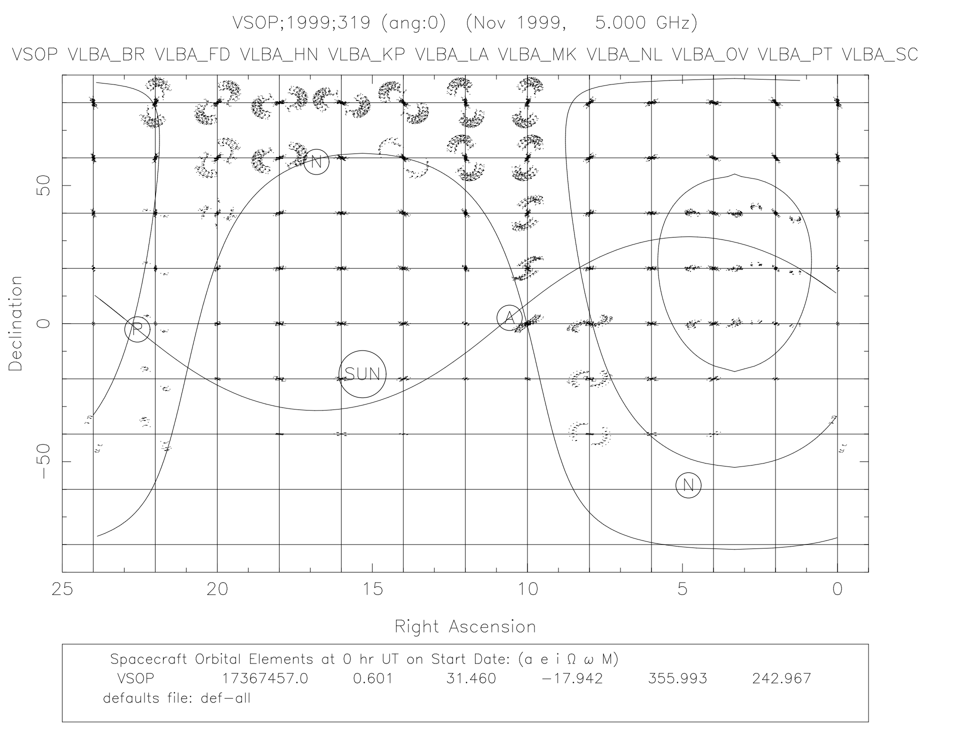

Figure 11: All-Sky (u,v) Plot for the VSOP Spacecraft with the VLBA on 15 Nov 1999.