ON NEAR-TERM SPACE-VLBI MISSION VSOP-2

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Successful launch in 1997 and operation of space-VLBI satellite HALCA and VSOP(VLBI Space Observatory Programme) observations with wide international collaborations made space-VLBI a reality. The mission has been in scientific operation in 1.6 GHz and 5 GHz bands, and studies has been done mainly in the jet phenomena related to active galactic nuclei. Extending the frequency into higher frequency range has the advantage of less absorption through the ambient plasma and less contribution from the scattering. This also add merits for higher angular resolution observations. Thus, second generation space VLBI mission, VSOP-2, with higher observing bands has been planned as a near term project with the launch date of about 2011 or so.

Scientific objectives of VSOP-2 are very high angular resolution imaging of astrophysically exotic regions, which includes the jets, accretion disks of active galactic nuclei(AGN), water maser emissions, micro-quasars, corona of young stellar objects, etc.

The mission satellite is planned to have a 9m deployable mesh antenna with 8, 22 and 43 GHz receivers, and a high speed data down link at 1 Gbps to the ground tracking stations to be recorded in VLBI format. Magnetic field information is imortant to understand these and dual polarisation receivers will be installed for all bands.The satellite will be in 7.5 hour eccentric orbit with 25,000 km apogee height and 1,000 km perigee height with 31 degrees inclination angle, and M-V rocket is assumed as a launcher. The highest angular resolution of about 40 micro-arrc-second is achieved at 43 GHz band. Higher two frequency bands are cryogenically cooled, and space-ground inerferometer continuum sensitivity will be better by the factor of about ten compared to VSOP, thanks to lower system temperature and higher bit rate. Phase referencing capability by switching the whole spacecraft is also studied, and this could add more sensitivity.

Engineering developments are in progress to realize this mission, and those items are deployable antenna, high data rate transmission, cryognic receivers, antenna pointing, accurate orbit determination, etc. Five years\' study budget has been used for basic design. Radioastronomy antenna is an off-set Cassegrain antenna, and main reflector is made up of 7 segments each consisting of deployable radial ribs structure covered with mesh. Upgraded specifications(larger antenna with better surface accuracy, dual-polarization, cooled receivers, higher bit rate, phase-referncing,,,) over VSOP must be met with the same launcher, and this made stringent limits to the satellite design, but basic satellite design has converged into a good shape with 910 kg total mass and 1.8 kW generated power.

The proposal will be submitted to ISAS/JAXA and evaluated in 2005. We regard this a near-term mission, and hope that that the success of the mission will invite following missions to go further to mm and sub-mm space-VLBI to prove directly even to the black hole environments.

International collaboration is important as for VSOP, and both instrumental and scientific collaborations are under discussion. The frequencies for VLBI tracking must be changed from 15.3 GHz phase up-link and 14.2 GHz down-link carrier for HALCA to 40 GHz phase up-link and 37-38 GHz down-link band for VSOP-2. Numbers of potential antennas are increasing in East Asia, and this includes VERA(4-station), KVN(3-station), and Chinese antennas.