# VSOP AO2 PROPOSAL COVER SHEETS

DEADLINE : 8 May, 1998
SEND TO : VSOG, ISAS, 3-1-1 Yoshinodai, Sagamihara, Kanagawa 229-8510, JAPAN

Please read Appendix C of Announcement of Opportunity for details on how to fill in this Cover Sheet.

**(1)** Date prepared : May 3, 1998

**(2)** Proposal title : Rapid Structural Variability in the Inner Jets of Intraday Variable Sources

| **(3)** | INVESTIGATORS | INSTITUTION |
|---|---|---|
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**(4)** Principal Investigator (or contact person) details...


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**(5)** Proposal Abstract :


Intraday variable radio sources exhibit derived brightness temperatures of up to $10^{18-19}$ K. They show correlated rapid flux density variations in all bands of their spectrum (radio- to $\gamma-$rays), indicating that the emitting regions are smaller than typically 1 lightday (corresponding to micro-arcsec sizes). Thus this class of objects is ideally suited for highest angular resolution studies using space-VLBI. With this proposal we focus on detecting structural variations on particularly short time scales. We propose to image the sub-pc scale jets of a small sample of ultra-compact IDV-sources with VSOP at 5 GHz at 3 epochs, 2 of them spaced at intra-day intervals (12-48 hrs). We intend to search for rapid polarization changes of the jet components and for unexpected fast relativistic effects with $10 \leq D \leq 100$ ($D$: Doppler-factor). All target sources are sufficiently compact and polarized at 5 GHz.


**(6)** Proposal Category (indicate all that apply):
Object type:
☑ AGN, ☐ Maser, ☐ Stellar, ☐ Pulsar, ☐ Other :
Observation type:
☑ Continuum, ☐ Spectral Line, ☑ Polarization, ☑ Time-critical, ☐ Other :

**(7)** Number of proposed experiments

An ‘experiment’ is one or more observations of one source at a fixed HALCA set-up. A request to observe the same source at 1.6 GHz and separately at 5 GHz requires two columns to be filled in in item (8) below. A request to observe the same source with HALCA simultaneously observing at 1.6 GHz and 5 GHz requires one column to be filled in. Multi-epoch observations of the same source at the same frequency – a ‘monitoring experiment’ – requires only one column to be filled in. Suggested observing dates, especially for for time-critical and monitoring experiments, should be specified in item (10).

The number of experiments in this proposal is: 6

**(8)** Details of proposed experiments

| | Experiment 1 | Experiment 2 | Experiment 3 | Experiment 4 |
|---|---|---|---|---|
| Source name (J*hhmm*±*ddmm*) | J0721+7120 | J0808+4950 | J0921+6215 | J0958+6533 |
| Alternative name | 0716+714 | 0804+499 | 0917+624 | 0954+658 |
| RA(J2000) (hh mm ss.ssss) | 07:21:53.4485 | 08:08:39.6663 | 09:21:36.2311 | 09:58:47.2452 |
| Dec(J2000) (dd mm ss.ssss) | 71:20:36.3639 | 49:50:36.5310 | 62:15:52.1807 | 65:33:54.8185 |
| Observing frequency band (GHz) | 5 | 5 | 5 | 5 |
| *Continuum observations:* | | | | |
| Standard VSOP freq. channels? | ☑ | ☑ | ☑ | ☑ |
| Channel A range (MHz) | | | | |
| Channel B range (MHz) | | | | |
| *Spectral line observations:* | | | | |
| Ch.A spectral line rest freq. (MHz) | | | | |
| Ch.A LSR velocity (km/s) | | | | |
| Ch.B spectral line rest freq. (MHz) | | | | |
| Ch.B LSR velocity (km/s) | | | | |
| FWHM of field of view required (mas) | | | | |
| Min. spectral channels per IF channel | | | | |
| Correlator averaging time (sec) | | | | |
| No. of correlating passes (if >1) | | | | |
| Total flux density (Jy) | 0.6 | 1.4 | 1.5 | 0.4 |
| Correlated flux (mJy) | > 0.3 | > 0.8 | > 0.9 | > 0.2 |
| *Ground Radio Telescopes:* | | | | |
| Suggested array given at Item (10)? | ☑ | ☑ | ☑ | ☑ |
| *GRT observing mode:* | | | | |
| 128Mbps LCP (standard) | ☐ | ☐ | ☐ | ☐ |
| 128Mbps LCP/RCP | ☐ | ☐ | ☐ | ☐ |
| 256Mbps LCP/RCP | ☑ | ☑ | ☑ | ☑ |
| *Preferred correlator:* | | | | |
| No preference | ☐ | ☐ | ☐ | ☐ |
| Mitaka | ☐ | ☐ | ☐ | ☐ |
| Penticton | ☐ | ☐ | ☐ | ☐ |
| Socorro | ☑ | ☑ | ☑ | ☑ |
| *Monitoring programs*: | | | | |
| Number of observations | 3 | 3 | 3 | 3 |
| Mean interval (days) | 48 hrs, 14 days | 48 hrs, 14 days | 48 hrs, 14 days | 48 hrs, 14 days |
| Related AO1 proposal code(s) | V052, V053 | V052, V053 | V052, V053 | V052, V053 |

| | Experiment 1 | Experiment 2 | Experiment 3 | Experiment 4 |
|---|---|---|---|---|
| Source name (J*hhmm*±*ddmm*) | J1800+782 | J2005+7752 | | |
| Alternative name | 1803+784 | 2007+776 | | |
| RA(J2000) (hh mm ss.ssss) | 18:00:45.6840 | 20:05:30.9985 | | |
| Dec(J2000) (dd mm ss.ssss) | 78:28:04.0182 | 77:52:43.2473 | | |
| Observing frequency band (GHz) | 5 | 5 | | |
| *Continuum observations:* | | | | |
| Standard VSOP freq. channels? | ☑ | ☑ | ☐ | ☐ |
| Channel A range (MHz) | | | | |
| Channel B range (MHz) | | | | |
| *Spectral line observations:* | | | | |
| Ch.A spectral line rest freq. (MHz) | | | | |
| Ch.A LSR velocity (km/s) | | | | |
| Ch.B spectral line rest freq. (MHz) | | | | |
| Ch.B LSR velocity (km/s) | | | | |
| FWHM of field of view required (mas) | | | | |
| Min. spectral channels per IF channel | | | | |
| Correlator averaging time (sec) | | | | |
| No. of correlating passes (if >1) | | | | |
| Total flux density (Jy) | 2.7 | 1.3 | | |
| Correlated flux (mJy) | > 1.0 | > 0.5 | | |
| *Ground Radio Telescopes:* | | | | |
| Suggested array given at Item (10)? | ☑ | ☑ | ☐ | ☐ |
| *GRT observing mode:* | | | | |
| 128Mbps LCP (standard) | ☐ | ☐ | ☐ | ☐ |
| 128Mbps LCP/RCP | ☐ | ☐ | ☐ | ☐ |
| 256Mbps LCP/RCP | ☑ | ☑ | ☐ | ☐ |
| *Preferred correlator:* | | | | |
| No preference | ☐ | ☐ | ☐ | ☐ |
| Mitaka | ☐ | ☐ | ☐ | ☐ |
| Penticton | ☐ | ☐ | ☐ | ☐ |
| Socorro | ☑ | ☑ | ☐ | ☐ |
| *Monitoring programs*: | | | | |
| Number of observations | 3 | 3 | | |
| Mean interval (days) | 48 hrs, 14 days | 48 hrs, 14 days | | |
| Related AO1 proposal code(s) | V052, V053 | V052, V053 | | |

**(9)** VSOP spacecraft observing mode (see Section 3 and Table 5 of the VSOP Proposer's Guide):

- [x] 2 channel x 16 MHz, 2-bit (Standard mode),
- [ ] Other:

Phase calibration tones:

- [x] On (Standard continuum mode),
- [ ] Off (Standard spectral line mode)

(Include justification of any non-standard choice at (10) below)

**(10)** Additional notes to the scheduler :

GRT-array: VLBA + either Bonn or VLA (phased array). 3 epochs of observation per source, 2 epochs scheduled within 12-48 hrs, to be able to detect intraday variability. The 3rd (optional) epoch scheduled after 2-14 days. Need at least one antenna (Bonn or VLA) to measure simultaneously the total intensity and polarization variations (flux measurements between adjacent VLBI scans). One of these antennas will also provide the polarization angle calibration.

**(11)** Attach a scientific and technical justification, not in excess of 2 pages of text and 2 pages of figures. Up to one page of $(u,v)$ plots per source may optionally be included.
(Refer to the VSOP Announcement of Opportunity for detailed instructions.)
Preprints and reprints will not be forwarded to the Scientific Review Committee.

Send two paper copies of the complete proposal to:
VSOP Observing Proposals
VSOP Science Operations Group
Institute of Space and Astronautical Science
3-1-1 Yoshinodai, Sagamihara
Kanagawa 229-8510 JAPAN
In addition, e-mail the completed LaTeX file to submit@vsop.isas.ac.jp

Information from the Cover Sheets of scheduled proposals will be made available from the VSOP WWW site.

**Proposals must be received at ISAS by 8 May 1998**