

MINUTES

of the RadioAstron Teleconference on March 11, 2008

N. Kardashev chaired the teleconference.

The agenda of the teleconference and the list of participants are attached to the Minutes.

The main intent of the teleconference was to review a current status of the **RadioAstron** mission development.

V. Andreyanov informed the participants about the status and progress in technical developments achieved since the last teleconference of October 2007:

The Space Radio Telescope

- Some defects (deformation) were found as a result of mechanical tests of SRT mass-dimension model. Designers decided to improve the fixation of the central mirror and then to repeat the tests again.
- A Geometrical tuning of the flight petals is conducted with laser measurement system. A Full flight antenna reflector will be mounted after the tuning and final installation of the petals, and will be measured later.
- A New flight 6-cm Receiver (designed in Russia) was tested in the ASC and it is ready for the integration into the SRT electronic complex. The Cooled LNA noise temperature is about 26 K.
- Flight models of the VIRK system were not yet delivered to the ASC, to our regret. Now VIRK (without antenna) is being tested in the factory.
- We expect to get them in the ASC in March-April.
- A Digital part of the ZBT configuration has been tested in the ASC. We used the Formatter and the Decoder in the space arm and the DAS in the ground arm; the Disk Recorders also were used. Now results of the ZBT test are being analyzed.
- During March-April we plan to begin a delivery of the flight devices to the Lavochkin for the installation on the construction frames with a flight cable net. After this preliminary installation the tests will be continued.
- A Program of the acceptance tests of the flight SRT was corrected. We added a test on the electro-magnetic compatibility with the spacecraft's systems in the un-echoic chamber (in the Lavochkin).

A Tracking Station in Pushchino

- An Installation of the microwave and digital parts of TS on the 22-m antenna [is] has been finished.
- A Reference frequency and a time service have been prepared.
- An On-board radio complex simulator for the TS testing have been created.
- A Design of the Software for the station control has begun.
- We hope to equip TS completely [in] this year.

Question: G. Langston: How will you test TS operation in conjunction with the VIRK system?

Answer: First, we plan to use a VIRK simulator. Then, probably, we shall use an engineering model of the VIRK system as well.

Question: K Kellermann: Can you clarify a situation with the schedule of the mission and the expected launch date?

Answer: The schedule is such that all instrumentation will be ready to the launch of the mission [in] to the end of 2008. Our feeling is that April 2009 is a more realistic date.

N. Babakin made comments on the vibration tests. He informed the participants that big part of the vibration tests were successfully finished. What is left – the tests in a transportation and in a shooting configurations. The tests will take about six weeks. Then, the model will be prepared [to] for thermal tests in a vacuum chamber starting in August and completed in September 2008. As for the flight model, a science payload will be delivered from the ASC to Lavochkin for general tests in the working configuration

together with the space craft bus. These tests will be started in June 2008 .

G. Langston explained that he is looking for a possibility to get funding for the works on the tracking station through the proposal from WVU on the development at the NRAO facilities for space tracking. It is not clear[,] what is a time scale for this activity, but an optimistic expectation is that the Green Bank tracking station may be ready during first year of the RadioAstron operations.

Y.Y. Kovalev reported that VLBI observations in the MFS mode will be conducted on March 15 2008 with two 70-m DSN radio telescopes in Robledo and Goldstone in the range of 18-26 GHz with frequency switching corresponding to the RadioAstron MFS mode. Two radio sources will be observed (1803+784 and 3C 345) during 12 hours. The objectives of these test observations are to check the observing mode, correlation and procedures of data analysis. Recording will be done on the Mk5 disks, and data correlation will be conducted in the Bonn at MPIfR correlator. A Subsequent MFS postprocessing analysis will be done by L. Kogan and S Likhachev.

There was a short discussion between Y. Kovalev and L. Kogan concerning of details of the frequency switching during the observations. [N. Kardashev]

M. Popov described a plan of composing an In-Orbit-Checkout Program (IOCP) for the RadioAstron mission. He proposed to establish an In-Orbit-Checkout Working Team (IOCWT) with the following tentative membership:

Ph. Edwards, E. Fomalont, K. Kellermann, Y.Y. Kovalev, G. Langston, A. Lobanov, R. Preston, J. Romney.

The nearest task of the IOCWT will be a critical review of the draft of the IOCP which will be issued by the ASC in May 2008. The Second important objective for the IOCWT activit[ies]y [will be [the] a preparation of proposals asking support from several big radio telescopes (Effelsberg, GBT, DSN). A [Full] list of the [expected] actions for IOCWT may be the following:

- 1) planning of the order of experiments;
- 2) selection of prospective radio sources;
- 3) negotiation for observing time with GRTs;
- 4) data correlation;
- 5) operations.

Participants of the teleconference emphasized that proposals for observing time at selected radio telescopes must be prepared and submitted before October 1, 2008. It was also recommended to apply for the NASA support with the DSN radio telescopes together with regular proposals through the NRAO reviewing process.

V. Slysh outlined several areas for the Key Science Program (KSP). A Tentative list is below:

- 1) MFS imaging of selected radio sources (N. Kardashev, S. Likhachev, L. Kogan?, Y.Y. Kovalev)
- 2) A Survey of compact extragalactic radio sources (Y.Y. Kovalev, K. Kellermann?, E. Fomalont?, V. Slysh)
- 3) Pulsars (M. Popov, N. Bartel, C. Gwinn)
- 4) Fine structure of H2O masers (V. Slysh, W. Baan?, V. Migenes?)
- 5) Monitoring of IDV radio sources (Y.A. Kovalev, A. Zensus?, A. Lobanov?)

Observations on targets of opportunity are also admitted. Slysh explained that RadioAstron mission will provide about 50% of observing time open for the peer reviewed proposals.

Short discussion was held on the I. Novikov's proposal on including in the KSP some [particular] polarization observations to study a fine magnetic field structure of extragalactic radio sources.

N. Kardashev informed the participants on the preliminary program of the symposium "Radio Universe at Ultimate Angular Resolution" which is planned on October 20-24. He explained that 3 days of meetings will be devoted to theoretical aspects of possible phenomena that potentially may be observed with a high angular resolution; 2 days will be spent in discussion of technical parameters of the RadioAstron mission. Visits to the Lavochkin and Pushchino TS are also anticipated for the interested participants.

Report on the execution of the action items formulated at the previous teleconference:

1. The ASC -- to display at the WEB[-] site a principal diagram of the design of the TS in Pushchino.
2. J. Romney – to look for data records of some VSOP experiment processed at the VLBA correlator.
3. M. Popov -- to request [by E-mail] the participants about the most convenient date for the RadioAstron Symposium.
4. S. Slysh – to distribute an abstract of the Key Science Program presented at the teleconference.

All action items were completed and closed.

New action items:

- M. Popov: to prepare a draft of the IOCP in May 2008 and to distribute it to the members of the IOCWT. The IOCP shall include a rough estimate of the necessary [volume] amount of observing time at ground radio telescopes.

The next teleconference is planned to be held in June 2008.

**Agenda of the RadioAstron teleconference
March 11, 2008 (14:00 UT)**

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|----|---|---------------|
| 1 | Corrections to the Agenda and introductory notes on the status of the RadioAstron mission | N. Kardashev |
| 2 | RadioAstron project status and progress | V. Andreyanov |
| 3 | Pushchino tracking station (TS) | V. Andreyanov |
| 4 | Green Bank tracking station | G. Langston |
| 5 | DSN proposal for GRT tests in the MFS mode | Y.Y. Kovalev |
| 6 | Working team for planning of the IOC | M. Popov |
| 7 | Key science teams | V. Slysh |
| 8 | Workshop in Moscow in April 2008 | N. Kardashev |
| 9 | Review of Action Items | M. Popov |
| 13 | New Action items | M. Popov |
| 14 | Proposed date for the next teleconference (June, 2008) | |

List of participants:

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| Andreyanov V. | ASC, Russia |
| Baan W. | Astron, the Netherlands |
| Bartel N. | York University, Canada |
| Gwinn C. | UCA, USA |
| Kanevsky B. | ASC, Russia |
| Kardashev N. | ASC, Russia |
| Kellermann K. | NRAO, USA |
| Kogan L. | NRAO, USA |
| Kovalev Y.Y. | MPIfR and ASC |
| Lobanov A. | MPIfR, Germany |
| Langston G. | NRAO, USA |

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|--------------|-------------------------------------|
| Lister M. | Purdue University, USA |
| Popov M. | ASC, Russia |
| Preston R. | JPL, USA |
| Romney J. | NRAO, USA (was not able to connect) |
| Tsarevsky G. | ASC, Russia |