

MINUTES

of the RadioAstron Teleconference on July 29, 2009

N. Kardashev chaired the teleconference.

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

N. Kardashev informed the participants on the progress in mission development:

- In February we completed a testing of all on-board receivers at the Zero-base Interferometer (ZBI) mode. Here in the Astro Space Center, we have processed the data and got a correlation in all spectral bands and corresponding bandwidths. We have confirmed that the sensitivity of the receivers is pretty close to those obtained from the theoretical predictions based on the known parameters. I would like to notice that in these ZBI measurements we used also an on-board H-maser, which also did show positive results: i.e. correlations between space and ground receivers were found with expected amplitudes and phase stability.
- After assembling of the Focal and Instrumentation containers, all the components were tested again for sensitivity and noise temperatures for all bands, and it did also show positive results. A general information about these values has been included into the RadioAstron HANDBOOK issued recently (see below).
- After that, all the instruments (including the H-masers package) were sent to the Lavochkin Association to assemble the Focal, Instrumentation and H-maser containers with SRT from one side (in August) and then with the spacecraft itself (to be completed in September).
- There are two models of the SRT – one for the vibrational tests and another for the rocket fairing compatibility (an initial pre launch test during a month at the Baikonur). As for the vibrational test, it has been completed successfully including a repeatability of the antenna surface quality and its expandability after each vibration impact. The follow-up fairing testing at the Baikonur was also successful, and the model is back to Moscow now. So our general plan is to finish integration with the spacecraft as was outlined above.
- Next important task is to check out for the harmful RI connection between the scientific equipment and other (service) parts of the spacecraft. It will be performed immediately after assembling of all satellite modules which we expect to be finished in September. After that, all systems will be ready for the launch.
- Launch time. Quite complicated point because as you have known our strategy is to launch RadioAstron three month after beginning of the 'Elektro-L' mission which will use the same service module 'Navigator' at the very first time after its recent design. We believe that the Elektro-L experience would essentially increase Navigator's reliability applied to the RadioAstron. But unfortunately, because of delay of the Elektro-L launch, we have got a corresponding RadioAstron delay. Which, in turn, we can use for the better RadioAstron facilities preparation. Because at the moment the Elektro-L launch is scheduled for the 1st of December, my feeling is we would get our launch time in March-April next year.

A. Smirnov described the current status of the Pushchino Tracking Station:

- All tracking station facilities have already been installed on the antenna and in the control room.
- It has already been tested by direct observations of some radio sources.

- We also have checked its compatibility with corresponding onboard package VIRK.
- The TS is equipped by the H-maser and by the universal time supplier via GPS receiver.
- A dedicated meteorological station has been incorporation into the TS system.
- We have checked an antenna pointing system using incoming data from the Ballistic Center (the institution responsible for orbit measurements, prediction and reconstruction).
- Our current work is to investigate how our duplicated facility works with existing software of the TS.
- In October 09, we are going to make a testing of joint TS-VIRK operations.

G. Langston explained the situation concerning the Green Bank Tracing Station:

Currently the NRAO has not yet obtained funding for the GB tracking station. We are having difficulty finding the correct office in NASA that will consider our proposal for collaboration with RA. We believe that this situation can only be clarified by direct communications between RASA headquarters and NASA headquarters. We have written a proposal for the full station. Our intention now is to submit part of this plan to the NASA STTR program with a deadline of Sept 3, 2009. To aid in this effort we would appreciate the documentation describing tracking station feed design and some parameters of the telecommunications system. We need to know the input and output requirements of the communications system; size and power requirements are valuable. Particularly important are the interface for timing and data communications control.

Glen believes that a letter to NRAO inviting collaboration is still important, and that it is now appropriate to send a similar, general, letter to all radio observatories.

Glen confirmed that he would be able to work on the ground portion of the RA in orbit checkout phase, namely, to contribute some efforts to data recording, and to help with the GBT ground observations.

As a result of discussion about other tracking stations outside Russia, it was recognized that, in spite of importance of such tracking station, especially in the southern hemisphere, at least the first year of mission operation will be with the only tracking station in Pushchino.

The status of the data recording and correlation is the following:

[Due to Sergey's absence, we include his written report distribution as follows.]

RDR recorders were tested once again in one-baseline VLBI observations (Kalyazin-Pushchino) two weeks ago. The data was successfully recorded in both 4 and 16 MHz bandwidths and now are under correlation. The preliminary correlation is already obtained but we still have some problems with 4 MHz results (the correlation could be better than we obtained). The reason of the problem is not yet quite clear to us.

Software correlator is operational. A special attention was paid to the Mk-5 data correlation. We use the Mk-5 data sent us by Yuri Kovalev. Thus, the correlator can correlate as well the Mk-5 data and RDR data separately as mixed Mk-5 and RDR data (cross-format correlation). The correlation speed is comparable (or in some case even better) with the Australian DiFX correlator one. But our programmers are full of optimism to improve the algorithms essentially. We use a delay model software from the Sternberg Astronomical Institute provided by Prof. Vladimir Zharov.

We have a contract with IBM Corporation for shipment to ASC one 48-core cluster for the correlator and three data servers (50 Tbytes each) for data archive. The data center is the main problem for us because we had no experience with this matter before but we do our best to solve this problem. In the nearest future we are going to simulate "massed correlation" when the data archive and the correlator will work together for a few days. We need it to see our "weak places". We are going to use the Mk-5 data for this purpose.

J.Romney and Y.Y.Kovalev raised a question on the format of delay model for space-ground baselines that will be used at the ASC correlator. It was decided to ask Sergei to provide the format.

Data recording and correlation outside Russia

M.Popov pointed out a necessity to use foreign correlators in RadioAstron mission operations especially in that cases when several radio telescopes outside Russia were co-observing. In such circumstances SRT data at Pushchino TS will be either recorded with Mk5 recorder or the data will be converted to Mk5 format.

L.Kogan expressed his concern about postcorrelation of space VLBI data. He suggested to refresh the specific AIPS tasks used in VSOP mission.

RadioAstron User's Guide

M.Popov informed the participants about the status of the document. He expressed his acknowledgement to W.Baan, K.Kellermann, G.Tsarevsky who made remarks and corrections to the Guide. G.Giovannini proposed to add the Sardinia Radio Telescope (SRT) in Table 7 of the User's Guide with the note "to be available at the end of 2010". He also recommended to include smaller prospective radio telescopes (~32 m diameter), since at some frequencies the number of large radio telescopes could be too small, and for a better uv-coverage in satellite observations not at very high resolution.

There was some discussion initiated by N.Kardashev concerning the importance of further tests of the MFS technique. K.Kellerman, Y.Y.Kovalev, G.Tsarevsky, T.Tzioumis and L.Kogan took part in the discussion. It was recommended to create a working group on these MFS tests.

M.Popov explained the approach of getting observing time at big radio telescopes for the IOC observations. According to the planned mission schedule with the launch in March 2010, proposals for observing time have to be presented to the February 1 of 2010. The requested observing time will be about 10 hours by 2-3 times depending on the results of fringe search. It was recommended to create working group and to present a draft of the IOC plan to the next teleconference.

As for ESP working group, it was proposed that N.Kardashev, K.Kellerman and W.Baan will chair the group with Y.Y.Kovalev being a secretary.

Visitors to the launch site.

N.Kardashev informed the participants that there is a possibility to visit the launch site for about 20 foreigners. He asks to make a request with standard personal information. Getting a permission may take several months.

Report on the execution of the action items formulated at the previous teleconference: The only essential AI that was not completed: Y.Y.Kovalev to start monthly RadioAstron Letters series; it will be done with the first issue in October 2009.

New action items:

- A.Smirnov: to present a drawing of the feed system of the Pushchino tracking station for G.Langston;
- S.Likhachev: to provide format of the delay model for an orbiting radio telescope to be used at the correlators;
- M.Popov: to form IOC working group;
- Y.Y.Kovalev: to form ESP working group;
- A.Lobanov: to prepare the document describing KSP policy;
- E.Fomalon and Y.Y.Kovalev to contact on creating team for the MFS pre-launch observations.

8. The next teleconference is planned to be held in October 2009.

Agenda of the RadioAstron teleconference on July 29, 2009 (14:00 UT)

	Corrections to the Agenda	N. Kardashev
1	RadioAstron mission status and progress	N.Kardashev
2	Pushchino tracking station (TS)	A.Smirnov
3	Green Bank tracking station	G.Langston
4	Data recording and correlation	S.Likhachev
5	Data recording and correlation outside Russia	M.Popov/participants
6	RadioAstron User's Guide	M.Popov
7	Working group for the IOC	M.Popov
8	Working groups for Early Science Program	M.Popov
9	Visitors (spectators) to the launch site	N.Kardashev
9	Review of Action Items	M. Popov
13	New Action items	M. Popov
14	Proposed date for the next teleconference (October 19-23, 2009)	

List of participants:

Baan W. Astron, the Netherlands
Fomalont E. NRAO USA
Giovannini G. IRA/INAF, Italy
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
Popov M.	ASC, Russia
Preston R.	JPL, USA
Romney J.	NRAO, USA (was not able to connect)
Tsarevsky G.	ASC, Russia
Tzioumis T.	ATNF Australia