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for Geodesy and Astrometry**

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To: Pascale Ferrage

**Re: Compatibility of DORIS and geodetic VLBI using  
the S/X System at Badary, Syowa, and Yarragadee**

While it is highly desirable to co-locate the various space-geodetic techniques at as many locations as possible for comparison and combination purposes, the co-locations should not lead to substantial degradations of one or more of the techniques. For this, the spacing between the techniques as well as mitigation measures need to be considered carefully.

Here we look into three existing co-locations between DORIS and the current S/X VLBI system. The sites under consideration are: Badary, Russia; Syowa, Antarctica; and Yarragadee, Australia. Each site needs to be looked at separately.

**Badary:** The Institute of Applied Astronomy (IAA) examined the compatibility of the geodetic S/X VLBI system and DORIS and found that both systems can be operated at Badary in parallel without impacting the performance of the other technique. The findings were published in the proceedings of the IVS 2010 General Meeting. The paper is available online at the IVS Web site at <http://ivscc.gsfc.nasa.gov/publications/gm2010/ilin.pdf>. These findings, however, only hold for the S/X VLBI system that is used for IVS observing. Like several other VLBI stations, Badary is a dual-usage station, i.e., it is also (or mostly) being used for non-IVS astronomy observations, which operate also on other bands, among them L-band. The host organization decides how much observing time is allotted to geodetic S/X VLBI and how much to astronomy purposes. For non-IVS astronomy sessions (e.g., domestic Russian sessions, EVN sessions) the host may decide that the RFI potential of DORIS is too great for simultaneous observing. In particular, the list of dates provided by IDS when the DORIS beacon was turned off are astronomical EVN sessions. No IVS geodetic sessions were included in the list.

**Syowa:** The radio antenna at Syowa is mostly used as uplink and downlink station for Japanese supported satellite missions. Up to six days per year are dedicated to participation in geodetic VLBI sessions. For logistical reasons, the correlation of geodetic VLBI sessions is delayed by up to a year after observing. The antenna is scheduled to be decommissioned at the end of 2015. There have been no tests performed regarding the compatibility of geodetic VLBI and DORIS at the site. Given the logistical complications, sparseness of observing, and the upcoming decommissioning of the antenna, it seems reasonable to maintain the current status quo and accept the minor loss of DORIS data. Syowa is only scheduled for three sessions in the rest of 2012 and for six sessions in 2013.

**Yarragadee:** Similar to the compatibility tests performed at Badary, the Australian AuScope project in cooperation with NASA GSFC investigated the situation at Yarragadee. Using the rapid-turnaround session R4515, the DORIS beacon was on for half the time and off for the other half to test if there is a significant difference in VLBI performance when the DORIS transmitter is active or in standby mode. The station staff saw no differences in the real-time measurements. The correlation and analysis showed no detectable negative effects of DORIS on the VLBI results. These findings are basically identical to the ones obtained at Badary, i.e., there is no significant conflict between the two techniques when using the S/X VLBI system. Consequently DORIS at Yarragadee is now operated without interruptions from geodetic VLBI sessions.

Sincerely,



Dirk Behrend  
IVS Coordinating Center Director