Feasible Spectral Indices Measurement by Broad-band VLBI in VGOS Era

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To establish next generation geodetic VLBI, called VGOS (VLBI Global Observing System) which is based on the so-called broadband delay which uses four or more frequency bands in the range from 2.5 GHz to 14 GHz(1), we have been developing a broad-band system for Kashima 34 meter radio telescope which is the third largest radio telescope with cassegrain optics in Japan.

Currently we have installed two type of broadband feed (IGUANA-H and NINJA). Firstly for 6.5 GHz to 15 GHz since December 2013 and secondary 3.2 GHz to 14.4 GHz since July 2015. VGOS specification is 2.5GHz, but we designed the NINJA feed from 3.2 GHz to prevent highly RFI circumastances in Japan. Our broad-band system with ambient receiver system having the system temperature is about 150 Kelvin. The signal after the LNA transfers via optical fiber, then high-speed direct sampler called K6/GALAS converted analog to digital without frequency conversion.

By the way, full VGOS radio telescope is built by The Geospatial Information Authority of Japan in Ishioka, Ibaraki, Japan. The feasible broad-band VLBI sessions with Kashima 34 m and new VGOS-type Ishioka 13 m were carried out on January and July 2015. We carried out intensive sessions for 6 to 14GHz (6-bands, 2048Msps, 1bit). Fringes from every six frequencies could be simultaneously obtained after software correlation with GICO3 (2). Then a coherent phase connection over six frequencies were performed. An error of delay resolution function by the super bandwidth synthesis is estimated only 0.1 ps in 1 sec integration. Since we obtain 6 GHz bandwidth correlation result, we try to measure the spectral indices on broad-band correlation by comparing radio sources in these sessions. We will report more detail information in the meeting.

References

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