LWA1 Jupiter radio monitoring during the Hisaki observation campaign

*Kazumasa Imai[1], Yusei Nakayama[1], Charles A. Higgins[2], Masafumi imai[3], Tracy Clarke[4]

1. Department of Electrical Engineering and Computer Science, National Institute of Technology, Kochi College, 2. Middle Tennessee State University, 3. University of Iowa, 4. Naval Research Laboratory

The Long Wavelength Array (LWA) is a low-frequency radio telescope designed to produce high-sensitivity, high-resolution spectra in the frequency range of 10-88 MHz. The Long Wavelength Array Station 1 (LWA1) is the first LWA station completed in April 2011, and is located near the VLA site in New Mexico, USA. LWA1 consists of a 256 element array operating as a single-station telescope. The sensitivity of the LWA1, combined with the low radio frequency interference environment, allows us to observe the fine spectral structure of Jupiter's decametric modulation lanes.
During the Hisaki observation campaign from January 1 to 15 in 2014 we made a series of observations to monitor Jupiter's decametric radio emissions by using LWA1. During this period we used 91 hours of total machine time of LWA1. We selected the LWA1 spectrograph observing mode (time resolution: 40ms, frequency resolution: 20kHz). The total volume size of the collected data was about 117GB.
During this observing period 14 non-Io-related events of Jupiter radio emissions were observed: 7 for the non-Io-A source, 6 for non-Io-B, and 1 for non-Io-C. We developed a system of semi-automatic data analysis in the study of Jupiter's decametric modulation lanes. By using this system we analyzed the 14 non-Io-related Jupiter radio emissions.
By the modulation lane method [Imai et al., 1997, 2002, 2006], the source parameters of the non-Io-related sources were analyzed. The source L-shell parameter in the case of non-Io-related sources is not well known; therefore, we assumed the fixed L-shell value. One non-Io-A event shows the different cone half-angle parameters between two groups of arc structures on the dynamic spectrum. All other non-Io-A events show almost the same value of cone half-angles based on the fixed L-shell value. The results of all non-Io-related data analysis will be discussed.

References:
(1) Recent Progress in the Measurement of Jupiter's Decametric Radio Source Parameters by the Modulation Lane Method, K. Imai, F. Reyes, T.D. Carr, and A. Lecacheux, Planetary Radio Emissions VI, Austrian Academy of Sciences Press, pp.213-221 (2006)
(2) Measurement of Jupiter's Decametric Radio Source Parameters by the Modulation Lane Method, K. Imai, J.J. Riihimaa, F. Reyes, and T.D. Carr, Journal of Geophysical Research, Vol.107, A6, 10.1029/2001JA007555 (2002)
(3) Modeling Jupiter's Decametric Modulation Lanes, K. Imai, L. Wang, and T.D. Carr, Journal of Geophysical Research, Vol.102, A4, pp.7127-7136 (1997)

Keywords: Jupiter radio, decametric emissions, modulation lanes, radio source parameters

