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CURRENT STATUS OF THE EAVN EXPERIMENTS

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ABSTRACT

VLBI experiments have been conducted by radio telescopes in the East Asia VLBI Network (EAVN) in which 14 telescopes in China, Japan, and Korea participated. One of the aims of the EAVN is to obtain higher angular resolution that is provided by the 6,000 km baseline between China and Japan and better sensitivity by adding large telescopes. Data were recorded at 1 a Gbps recording rate at all stations and processed on the Korea-Japan Joint VLBI Correlator (KJJVC) at the Korea-Japan Correlation Center (KJCC) after experiments. Fringes were obtained from these experiments conducted at 8 GHz and 22 GHz and post-correlation data analysis of the experiments is undergoing. The outcomes of these experiments open the possibility of conducting EAVN observations with global VLBI networks. In this presentation, the recent status of these experiments and future prospects are presented.

Key words: VLBI:Radio astronomy

1. OVEVIEW

The East Asia VLBI Network (EAVN) consists of existing radio telescopes in the east Asia region. There has been increasing interests in radio astronomy and VLBI astronomy in this region. It is therefore felt that we need our own VLBI facility through international collaboration. To realize EAVN, we organized a large VLBI network in east Asia region by combining the VERA, the Japanese VLBI Network (JVN), the Korean VLBI Network (KVN), the Chinese VLBI Network (CVN), and some other telescopes. The new hardware correlator, jointly developed by KASI and NAOJ, is located and operated in Daejeon. EAVN will provide a means for exploring physical phenomenon in astrophysical objects such as relativistic jets, magnetic fields of active galactic nuclei (AGN), and masers in massive stars and AGN.

2. EAVN TIGER TEAM

We organized a task force (EAVN Tiger Team) to start up EAVN in 2013. The Tiger Team works to conduct the VLBI experiments that are necessary for constructing the EAVN. Members are appointed from each observatory and responsible for the experiments, until they are satisfied with the results. The Tiger Team members are T.An, W.Baan, W.Jiang, N.Kawaguchi (SHAO), M.Zhang (XAO), L.Hao (YAO), Y.Hagiwara, H.Kobayashi (NAOJ), K.Fujisawa (JVN/Yamaguchi Univ.), J.Kim, D.Roh, T.Jung,and K.Wajima (KVN/KASI). The team is chaired chaired by Y.Hagiwara.

Table 1
Parameters of fringe test

Frequency bands	8 GHz, 22 GHz
Telescopes	14 telescopes[a]
Data recording rate	1024 Mbps
Recording Terminal	Mark5B (CVN/KVN) OCTADISK (VERA/JVN)
Polarization	LCP (22 GHz), RCP (8 GHz)
Correlation	KJCC[b] (Daejeon)

[a] 11 telescopes participated to 8 GHz observations and 9 telescopes participated to 22 GHz observations.
[b] KJCC (Korea-Japan Correlation Center) is being operated jointly by KASI and NAOJ for processing data of KaVA (KVN and VERA Array) and EAVN.

3. EAVN EXPERIMENTS

The Tiger Team aims at successful fringe detections in the initial stage of the EAVN experiment. The parame-

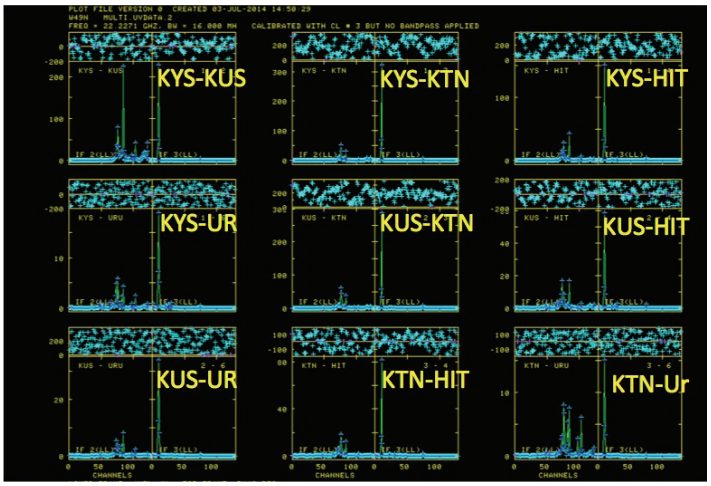

Figure 1 22 GHz fringe plots of water maser emission in W49N recorded at 1024 Mbps rate. We show only two IFs out of 16IFs having strong maser lines. KYS: Yonsei 21m (KVN) KUS: Ulsan 21m (KVN) KTN: Tamna 21m (KVN) UR: Urumqi 25m at XAO HIT: Hitachi 32m (JVN)

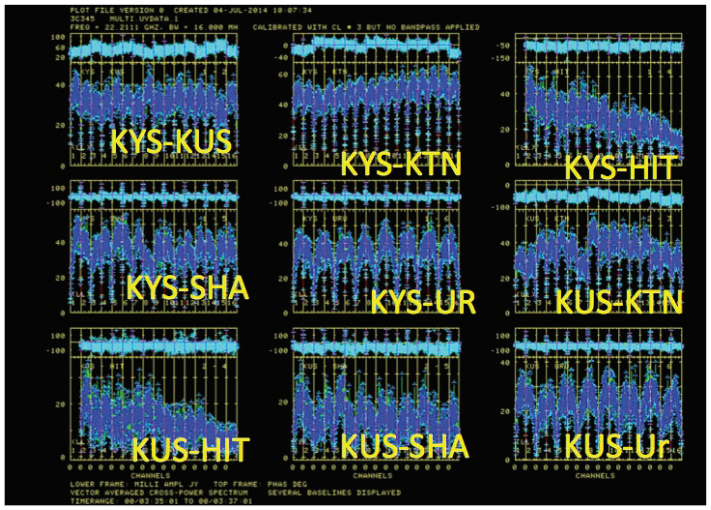

Figure 2 22 GHz fringe plots of continuum emission of 3C 345 at 1024 Mbps rate of four telescopes. Fringes of long baselines between UR and HIT are detected. SHA denotes Shesan 25m at SHAO.

ters of the fringe test are listed in Table 1. Four experiments have been made since 2013 September.

4. RESULTS OF THE EXPERIMENTS

We obtained the results of the third fringe experiment held on 28 January 2014, made with CVN, KVN, VERA, and JVN. The 22 GHz fringes were detected from KVN, Urumqi, Shanghai, and Hitachi stations, while no data of VERA baselines at 22 GHz were obtained due to errors in telescope operation. Fringes were seen at 22 GHz both in the H_2O maser line and radio continuum emission. In this experiment, continuum or line fringes of a few telescopes were not detected. We are trying to figure out why these problems occurred at some stations or baselines and to determine solutions 8 GHz fringe plots of VERA, Urumqi, and Tianma 65m are presented. KVN-Ulsan failed in fringe detection at 8 GHz. Thus, we feel that further experiments are required to sort out these issues.

5. TIMELINE OF ACTIVITIES

Until the end of 2014, we plan to repeat fringe tests to obtain feedback from the outcomes of earlier fringe tests. Conducting more frequent experiments (at one month intervals) with fewer telescopes telescopes is expected. From early 2015, we are planning to conduct imaging performance experiments (8/22 GHz). Fringe tests at 6.7 GHz (CH_3OH maser line emission) are also being planned. From mid 2015, hopefully, we can begin science commissioning observations.

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ical Observatory, Korea Astronomy and Space Science Institute, XinJiang Astronomical Observatory, Yunnan Astronomical Observatory, Yamaguchi University and Ibaraki University for their understanding and support during VLBI experiments.