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EAST ASIA VLBI CONSORTIUM AND ITS COMMITTEE

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ABSTRACT

We had the first committee meeting of the East Asia VLBI Consortium during the EAMA6 meeting held in Seoul. A VLBI network composed of telescopes in the East Asia region could provide extreme properties, and the coordination of them has been expected. The Committee of the East Asia VLBI Consortium is a standing committee to promote activities of the consortium, in which participating countries at present are China, Japan, and Korea over eight institutes/observatories. Here we introduce the Consortium and Committee.

Key words : East Asia VLBI Network, Committee of VLBI Consortium

I. INTRODUCTION

Recent activities of the Very Long Baseline Interferometry (VLBI) are remarkable in the East Asia region. Based on these activities, an idea that we could achieve more progress when these were well coordinated. Under the circumstance, we had discussion on this and agreed to establish a standing committee for the coordination of the East Asia VLBI Consortium, which consists of relating institutes/observatories.

As a nature of VLBI, it is essentially required to collaborate telescopes as many as possible, and telescopes are welcome to participate in VLBI-network observations. The concept of VLBI consortium is, then, generally not so strict. However, the coordination and management of the collaboration are tough jobs, and it is an important step to establish the standing committee in the consortium.

Here we will briefly review present activities and plans in each country in section II, and in section III, we will discuss anticipated characteristics of the East Asia (EA) VLBI network, and its committee.

II. VLBI ACTIVITIES AND PLANS IN EACH COUNTRY

In the East Asia region, there are many VLBI relating facilities and networks, in addition to newly appearing projects and future plans. We overview briefly such activities in each country in alphabetical order.

(a) In China

Two 25-m radio telescopes have been operated at Shanghai and Urumqi, deeply involved in the Asia-Pacific Space Geodynamics (APSG) program, and European VLBI Network (EVN) for astrophysical observations. In addition to these active VLBI telescopes, a millimeter telescope at Delingha is planning to make mm-VLBI experiments together with the 45-m telescope at Nobeyama, Japan, and the 14-m telescope at Taeduk, Korea. Large aperture telescopes are under construction, the 40-m and 50-m telescopes at Kunming and Miyun, respectively, for a lunar mission of China, and expected to be used as high sensitive elements of the EA VLBI network. Finally, a 500-m telescope is planned as a Chinese proposal of the Square Kilometer Array (SKA).

(b) In Japan

Key Stone Project (KSP) was the first optical-fiber linked and realtime correlation VLBI network with four 11-m telescopes around the Tokyo area. After the completion of the KSP mission, some of the telescopes were distributed to universities which are now forming a VLBI network in Japan together with the other telescopes. In 2000, KSP detected relative movements due to the penetration of magma up to the surface south of the Tokyo area. In 1997, an 8-m telescope was launched in space to be the first space VLBI mission, the VLBI Space Observatory Program (VSOP). The telescope in space was operational with many ground telescopes in the world, and provided fine images of active galactic nuclei (AGNs) with very high spatial resolution. Now the second space VLBI mission, VSOP-2 has been being submitted. Very recently the four 20-m telescope system, the VLBI Exploration of Radio Astrometry (VERA) has completed. VERA has a unique dual-beam system to make the phase referencing technique. Fig. 1 shows the location of VERA telescopes and baseline lengths between them.

(c) In Korea

Three 21-m telescope system, the Korean VLBI Network (KVN) is now under construction. KVN has a

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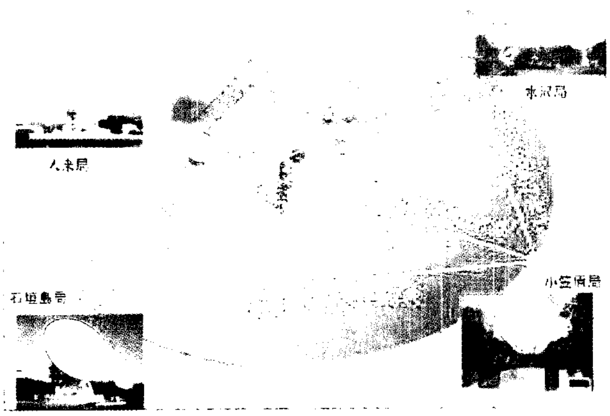

Fig. 1.— The location of the four VERAtelescopes and the baseline lengths between telescopes. The geodetic measurements have been done several times a month to get the accurate baseline lengths and monitor the variation of them. The geodetic observation is done using the standard geodetic frequencies at 2 and 8 GHz.

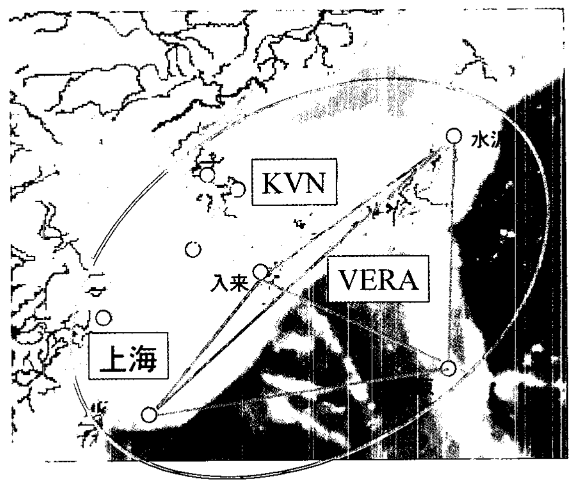

Fig. 2.— A part of the EA VLBI network composed of KVN, VERA, and the Shanghai telescope. West side of this figure, several telescopes are there in China.

capability at higher frequencies with common frequencies with VERA at 2, 8, 22, and 43 GHz, installing the multi-frequency receiver system which enables us to observe several frequencies simultaneously. This system is expected to be a new method of the phase referencing techniques. Furthermore, the construction of a large correlator has started to correlate the KVN data, which is also expected to correlate the joint observations as the EA VLBI network. Correlator is one of the essential elements of a VLBI network system, and the whole construction would be done collaboratively in the EA VLBI consortium. In Fig. 2, the geometry is shown for KVN, VERA, and one (Shanghai) of the Chinese telescopes .

III. EA VLBI NETWORK AND THE COMMITTEE

(a) Network Characteristics

As seen before, we have two major VLBI networks which are both operational at higher frequencies of 22 and 43 GHz, in addition to the 2- and 8-GHz receiving capability for the standard geometrical application. More than 10 telescopes including the two VLBI telescopes in China have this 2- and 8-GHz receiving capability, and also the 22-GHz capability. As seen in Fig. 3, these telescopes are densely distributed in the East Asia region, and also a few telescopes are properly separated. Spatial resolution of a baseline of 5000 km at 22 GHz achieves less than 1 milli arcsec, and hence the EA VLBI network has a pretty good spatial resolution, in addition to the very high imaging quality.

Furthermore, both KVN and VERA have their own unique system, that are the multi-frequency receiver system and dual beam system, respectively, for the phase referencing system. The phase referencing technique has been known useful in VLBI, and these capabilities would be strong tools in the EA VLBI. Finally, this network is anticipated to be the ground counterpart of VSOP-2 which will have receiving systems at 22 and 43 GHz. Hence, the EA VLBI network should be a very promising and unique VLBI network in the world. This is why we wish to make the EA VLBI network a reality.

(b) Committee of the EA VLBI Consortium

In the mm-VLBI workshop held in November 2003 at Shanghai, the idea of a standing committee was proposed to promote the collaboration, and several people from three countries have been discussing the charter and structure of the committee for almost one year. In a meeting held during the period of the EAMA6 meeting, we agreed on the establishment of the committee and its members. Executive members of the committee (Chair: H. Kobayashi, Vice Chair: M-H. Choi, and Secretary: Z-Q. Shen) was elected by the members. The four members from each country were appointed by each individual country. Main roles of the committee are as follows:

- Coordination of joint VLBI observations in the consortium
- Promotion of VLBI system developments
- Set-up a VLBI central facility
- Coordination of scientific meetings, exchange programs of staff and students, and any other activities

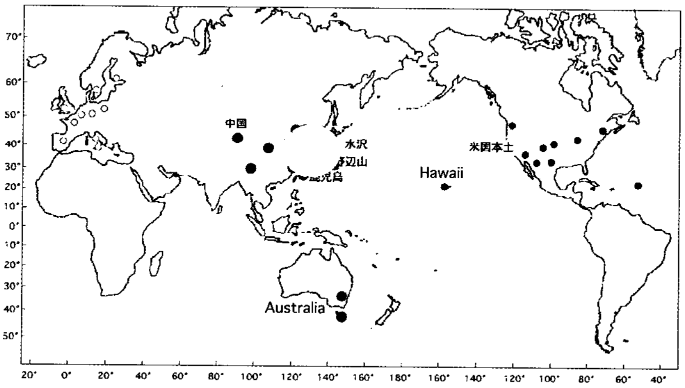

Fig. 3.— International VLBI networks. EVN is in Europe and VLBA in US. Compared to these networks, telescopes of our EA VLBI network are dense and nicely distributed. The extension to Australia is very exciting, and an inclusion of one of the VLBA in Hawaii expands the capability of the network further.

Discussion and coordination on some of these items have already started. For example, a large correlation facility is required to correlate such a large VLBI network data, and the construction of the facility is one of the crucial issues in the consortium, relating to the VLBI central facility.

ACKNOWLEDGEMENTS

The author is grateful to the people who have been actively discussing on the committee into work.

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