

## Korea Geodetic VLBI Station Sejong

*Sangoh Yi, Younghyun Moon, Seunghun Kim, Jungil Lee, Hyunhee Joo, Hongjong Oh*

*National Geographic Information Institute*

*Contact author: Sangoh Yi, e-mail: [sangoh.yi@korea.kr](mailto:sangoh.yi@korea.kr)*

### Abstract

The Sejong VLBI station has been constructed by the National Geographic Information Institute (NGII) in the Republic of Korea. It took approximately four years from 2008 to the end of 2011. In February 2012, we successfully carried out a fringe-test with the Kashima 11-m antenna of the National Institute of Information and Communications Technology (NICT) in Japan. In March, the Sejong station was accepted as an IVS network station by acceptance of the IVS Directing Board which was held at the 7th IVS General Meeting in Spain. This report summarizes activities of the Sejong station as a new IVS Network Station.

### 1. General Information

The Sejong station is the first geodetic VLBI station in the Republic of Korea which is solely dedicated to geodetic purposes. The station is located approximately 120 km south of Seoul at longitude  $127^{\circ}18'12''$ , latitude  $36^{\circ}31'12''$ , and height 153 meters in the middle of Sejong City where a new administrative capital will be located in the near future.



Figure 1. The Sejong station site (photos from left to right on the bottom: GNSS station, main building, gravimeter (FG5), and co-location facilities).

The name of “KVG” (Korea VLBI system for Geodesy) was the previous name of the Sejong station. It was named after the project’s purpose in its initial stage. We will use only the name of “Sejong Station” to prevent confusion about the name of our VLBI station.

This station aims at both maintaining the Korean geodetic datum accurately in the ITRF and at research for various geodetic purposes.

## 2. Component Description

The antenna has been constructed on bedrock at the top of a small mountain. It means that the antenna construction site is stable.

The antenna slew speed is  $5^\circ/sec$  in both azimuth and elevation. It is quite fast compared to similar classes of antenna.

The main specifications of the antenna and receivers are summarized in Table 1 and Table 2.

Table 1. Main specifications of Sejong antenna.

Parameters	Antenna
Diameter of main reflector	22 m
Antenna type	Shaped Cassegrain
Aperture efficiency	about 60%
Pointing accuracy	0.0131°
Reflector surface accuracy	86 $\mu$ m
Operation range	AZ: $\pm 270^\circ$ EL: $0 \sim 90^\circ$
Slew speed	5°/sec (AZ and EL)

Table 2. Receiving system of Sejong VLBI system.

Bands	S	X	K	Q
Freq. [GHz]	2.1-2.6	8.0-9.0	21-23	42-44
Receiver noise temp.	< 20K	< 30K	< 50K	< 80K
Polarization	R,L	R,L	R,L	R,L
1st LO Freq.	NONE	NONE	13.5GHz	33.9GHz
1st IF Freq.	NONE	NONE	8-10GHz	8-10GHz
IF Pout/BW	-50dbm/500MHz	-50dbm/500MHz	-50dbm/500MHz	-50dbm/500MHz
Phase noise@1KHz	-120dBc/Hz	-120dBc/Hz	-120dBc/Hz	-120dBc/Hz
Reference Freq.	100MHz	100MHz	100MHz	100MHz

## 3. Current Status and Activities

The Sejong station successfully carried out VLBI test observations with the Kashima 11-m antenna of the National Institute of Information and Communications Technology (NICT) in February 2012.



Figure 2. The Sejong 22-m antenna.

In March 2012, the station officially has been accepted as an IVS component, specifically as a new Network Station, by the IVS Directing Board. The major contents of the Sejong application form are summarized in Table 3.

We are preparing to participate in IVS regular session starting in early 2013. We wish to join R1, T2, and APSG sessions in the beginning, and we plan to extend observing gradually.

Table 3. Summary of items from Sejong’s application to become an IVS Network Station.

Co-located techniques	GNSS, Gravimeter
Desired session participation	R1, T2, APSG
Purposes (Geodesy / Astronomy)	100/0
Data acquisition rack	K4
Recorder	K5
FS version	9.10.4
H-Maser type	VCH-1003M

We also carried out a ground survey to tie the VLBI antenna axes’ cross point to other geodetic techniques. Four pillars at the Sejong site are used for co-location. As a first step, we performed a test ground survey for co-location. Figure 3 shows the co-location layout at the Sejong site. We need more study and a field survey this year.

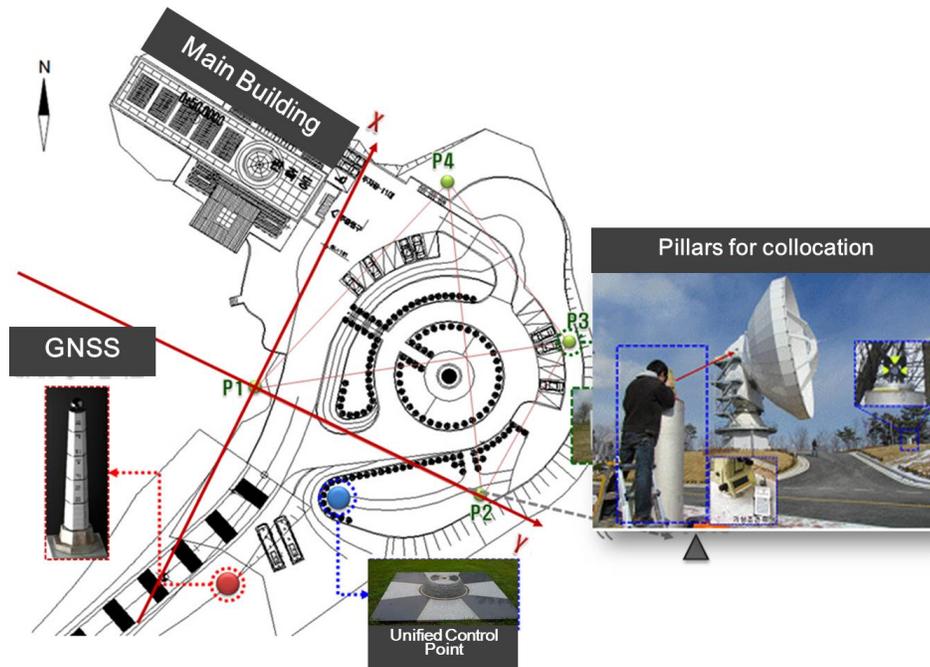


Figure 3. Co-location layout at the Sejong site.

#### 4. Future Plans

The Sejong station will work towards system optimization in order to be able to join the IVS sessions without any problems by the end of this year. More test observations with other stations will provide good experience for us. Thus we will try to contact some of the IVS Network Stations. An additional co-location survey will be performed. A study of the next-generation VLBI system will be carried out in 2012.