

**KEY STONE PROJECT****—Crustal Deformation Monitoring System around the Tokyo Metropolitan Area—****1. INTRODUCTION**

By  
Ken'ichi OKAMOTO

This special issue of the Journal of the Communications Research Laboratory is dedicated to the Key Stone Project (KSP) that was initiated in 1993. The main purpose of the KSP is to gather data on crustal deformation around the Tokyo area almost everyday. These basic data are considered to be quite useful for the study of earthquake.

The KSP has four stations (Koganei, Kashima, Miura, and Tateyama) around the Tokyo metropolitan area and each station is equipped with a combined set of VLBI (Very Long Baseline Interferometry) and SLR (Satellite Laser Ranging) facilities. The VLBI facilities are connected by a high-speed digital network that has a maximum transmission capability of 2.4 Gbps which makes real-time VLBI observation possible.

After the construction of VLBI facilities at Koganei and Kashima in 1995, observation started in 1996. The KSP stations have GPS facilities in addition to VLBI and SLR facilities. These facilities are uniquely collocated observation systems that are found only in a few places throughout the world. It has been confirmed through experiments that the VLBI and SLR systems satisfy their expected performances. Until now they have attained a precision of up to 1 mm (horizontally) and 10 mm (vertically).

These experiments are planned to continue until 2001 and many fruitful results are expected not only in observing crustal deformation observation but also in the monitoring of the Earth's rotation, radio astronomy, and so on. The outstanding performances and their technological

potential of the KSP have been highly evaluated by the Japanese scientific community. Therefore the KSP is expected to play a large role in the recent plan entitled as the "Propelling the new observation research plan for the prediction of earthquake" that has been proposed by the Geodesy Council in Japan.

The KSP observation is performed at the local networks around Tokyo. However, VLBI and SLR techniques are also applicable to global observation. Therefore, in the future it is expected that the KSP facilities will be commonly used by geodesists and geophysicists around the world to perform various frontier research in geodynamics. Since the CRL has been nominated as a member of VLBI technical development center in the IERS (International Earth Rotation Service) since 1990 and is going to join the IVS (International VLBI Service) as one of the key research institutes in the world, many new VLBI technologies that the CRL has developed will be applied to future international KSP activities.

This special issue is planned as an interim report of the KSP to introduce the details of various facilities and some of the initial experimental results to many KSP data users in the world. In this special issue, more than 30 papers will introduce KSP-VLBI systems including real time VLBI, KSP SLR systems, some early observation results and R&D experimental results using KSP facilities. I hope that this special issue will provide useful information to readers and also stimulate their interests in using the KSP data.



Ken'ichi OKAMOTO  
Standards and Measurements  
Division  
Microwave remote sensing  
E-mail: okamoto@crl.go.jp