Vol. 46 No. 1 Journal of the Communications Research Laboratory March 1999
Printed in Tokyo, Japan p. 221

10. CONCLUDING REMARKS
—KEY STONE PROJECT UNDER THE INTERNET REVOLUTION—

By
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ABSTRACT

Key Stone Project (KSP), using major space geodetic techniques, has been started and promoted since 1993 by Communications Research Laboratory (CRL). The KSP works at four observation sites at Koganei, Kashima, Miura, and Tateyama inside and around Tokyo Metropolitan area. The KSP utilizes modern space geodetic techniques at each site, such as the Very Long Baseline Interferometry (VLBI) and Satellite Laser Ranging (SLR). The KSP also uses the latest info-communications techniques, such as giga bit-rate optical fiber networks. The real-time VLBI system of the KSP were facilitated under the strong cooperation of NTT in 1995, when the Internet technology in Japan just shifted to general business use as well as conventional academic use. The KSP started the measurements of crustal deformation in 1995 and accumulates the data for the earthquake research. The papers on this issue are the research results both of the development of most modern space geodetic facilities and the info-communication network technology. They also include the scientific results in geodesy, seismology and radio astrometry. They will show the perspective of the next-generation space geodesy in 21ST century.
Keywords: Internet, Real-time VLBI, KSP, SLR

After the "Western Pacific Very Long Baseline Interferometer Project (1988-1993)", CRL started the next generation space geodetic program "Key Stone Project (KSP)" in 1993. The KSP has at least five-year observation plan from 1997 to 2001. This new program utilizes the space geodetic technology for the monitoring of the crustal deformation for the earthquake research.

Tokyo Metropolitan Area locates above the North American Plate, the Philippine Sea Plate, and the Pacific Plate as mentioned in the papers in this issue. The major purpose of the KSP network was to observe and to detect the very small crustal deformation just relating to the earthquakes.

Before starting the KSP, the CRL participated in the program under the Scientific and Technology Agency (STA): "Earthquake modeling beneath the Tokyo Metropolitan Area" between 1990 and 1996. The first CRL's STA project name was "Metropolitan Diamond Cross (MDX)". After CRL succeeded getting the KSP fund from the government, CRL shifted the program from MDX to the KSP in 1993. This means that the KSP had long and sufficient amounts of feasibility studies more than three years with seismological researchers of Japan for the preparation of the KSP. This is one of the reasons why the KSP could produce the cross-related result with seismological field effectively.

The Kobe Earthquake in January 1995 accelerated the implementation of the KSP's full facilities at these four stations dramatically. In 1996, the KSP VLBI system has begun the historical operational real-time VLBI observations using gigabit-optical fiber network under the cooperation of NTT. Also in 1997, CRL's the KSP project team has started to perform the KSP and to make the missions completed in stead of the CRL's usual research section system. The real-time VLBI produces the quickest VLBI results in the world for the period more than two years. These data is open to the world via World Wide Web: http://ksp.crl.go.jp/. It is not a coincidence that the KSP history above mentioned shows strong relation with the epoch years (1993 and 1995) of Internet in Japan about using Internet sub-network technology and full implementation of Internet Protocol (IP) on the KSP network system, in Japan. The KSP shows the future figure of space geodesy in the scheme of info-communication research field under the Internet revolution.

The KSP is a very good example of networked science. And the future space geodesy should be more network-oriented.

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