The K-NET — a year after —

by

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ABSTRACT

We started to release the K-NET strong-motion data from June, 1996 and about one year passed. In this article, we report the development of K-NET and some applications using the K-NET information released on the Internet.

Key Words : K-NET, Strong-motion

1. Development of K-NET

1.1 K-NET information on the Internet

We offered the K-NET information through graphical user interface on the World-Wide-Web in 1996. From April, 1997, the text pages of K-NET are available on the Internet for more quick distribution of the K-NET data.

1.1.1 Strong-motion records

We released the strong-motion records obtained by the K-NET on the Internet. However, the Internet capacity in this country is so poor that it becomes impossible to get the K-NET data on the Internet just after moderate earthquakes occurred. For example, in case of the Izu-Hanto-Toho-Oki earthquake swarm occurred in March, 1997, a part of users did not connect to the K-NET Internet site. To settle this problem, we constructed two mirror sites of our control center and started to release the K-NET information from these mirror sites from April, 1997. Now, users can get the K-NET data from the following three Internet sites.

(1) control center:
http://www.k-net.bosia.go.jp/
(2) mirror site #1:
http://www.k-net.ostec.co.jp/
(3) mirror site #2:
http://www.k-net.geophys.tohoku.ac.jp/

The mirror sites #1 and #2 were installed in Osaka and Sendai cities, respectively. Also, from April, 1997, users can download all strong-motion records obtained from a specific event in a lump sum. Such a data retrieve is possible for events selected by users.

1.1.2 Site information

We set up K-NET ftp site at October, 1996. From the ftp site, users can get all the soil data of K-NET stations in a lump sum. Also, the two mirror sites set up the ftp sites and started the service of K-NET data release from April, 1997. The address of these ftp

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sites are obtained by changing the header part of Internet address from http to ftp. The ftp sites are also possible to release the K-NET strong-motion data. In this case, the data set is constructed with data directories which correspond to earthquake origin times.

1.1.3 Maximum acceleration map

Usually, we make a maximum acceleration map when we get more than 50 three-component seismograms for an earthquake. Figure 1 shows an example. This map was obtained from the Hiuganada earthquake of October 19, 1996. The JMA magnitude is 6.6. The contour lines of acceleration are calculated by using Splines interpolation. From these maps, we can interpret the local characteristics of maximum acceleration.

1.1.4 Application software

In 1996, we released a viewer program which plots the K-NET seismograms. In 1997, we are going to revise the viewer program and release the following application programs:

(1)program for the calculation of velocity and displacement seismograms,

(2)program for the calculation of Fourier and Power spectra,

(3)program for the calculation of response spectra, and

(4)program for the calculation of JMA seismic intensity defined by JMA in 1996.

These programs can plot the calculated results.

1.2 Off-line release of the K-NET information

From April, 1997, user can copy the K-NET strong-motion data to user's MO and/or DAT at the control center and mirror site #2. This is a self-servise. Also, we distributed the strong-motion data obtained in 1996 by CD-ROM. Such a service is going to be done every half year. The recording characteristics of accelerograph used in the K-NET was also published.

1.3 Use of K-NET

The K-NET started to release the strong-motion data on the Internet from June 3, 1996. Figure 2 shows the number of accessed pages for every day. Usually, the release of K-NET data on the Internet is made within 24 hours after an earthquake occurred. For example, in case of the earthquake of March 16, 1997(M=5.6), we obtained 209 three-component seismograms and released these data within about 3 hours. In such a case, the number of accessed pages became from 1,000 to 3,000 pages.

2. Applications

Since the K-NET starts, about one year passed. Some application studies using the K-NET data were reported during this period. Representative applications are as follows.

2.1 Monitor for strong quake

The K-NET95, an accerelograph used in the K-NET, has two communication ports. One is directly connected to a modem belong to a local municipal government. Among them, about 600 seismographs were incorporated in the Seismic Intensity

Information Network of the Fire Defence Agency (FDA). This network consists of about 3,400 stations. Just after an earthquake, the FDA may get the seismic intensity information in the hypocentral area within several minutes. The data will help local governments to assess the extent of the affected area and to manage their disaster response efficiently. This network is going to start in 1997.

The students of Tokyo University are opening the seismic intensity information on the Internet by using the K-NET data. The address is http://yagamo.u-tokyo.ac.jp/426/shindo.html. They show seismic intensity map just after the K-NET data are released. They used a formula for calculation of JMA seismic intensity defined by the JMA in 1996.

2.2 Utilization as a buck up network

Many research institutes are performing small-scale array observation on the basis of their original purposes. The K-NET supports these observations as a backbone network. Namely, the K-NET supports the data which can not be covered in their arrays. For example, the K-NET data obtained from the earthquake of December 21, 1996(M=5.4) helped an array observation deployed in Tama area, Tokyo, to interpret the existence of remarkable S-waves totally reflected in the Philippine Sea Plate.

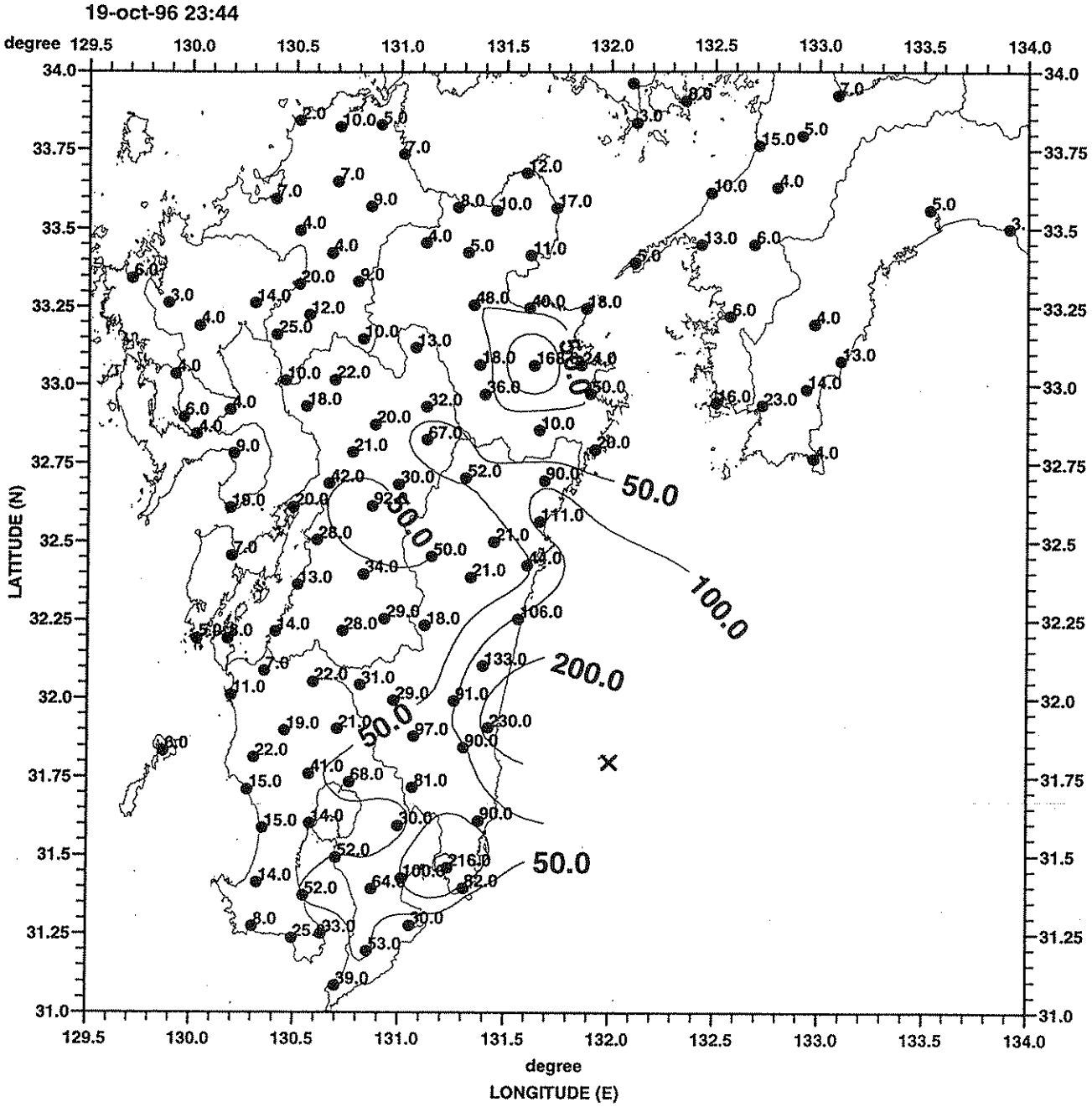
2.3 Studies on seismic wave propagation

The K-NET is suitable on the seismic wave propagation in a hypocentral area with a radius of about several hundred kilometers. Study on the regional attenuation of seismic wave is one of the reasonable research subjects. For example, the K-NET data obtained from earthquake of September 11, 1996(M=6.2) showed that S-waves severely attenuate when they pass through the volcanic front in Kanto area as shown in Figure 3. Solid circles in this figure show the triggered stations during the earthquake.

2.4 Studies on near field seismograms

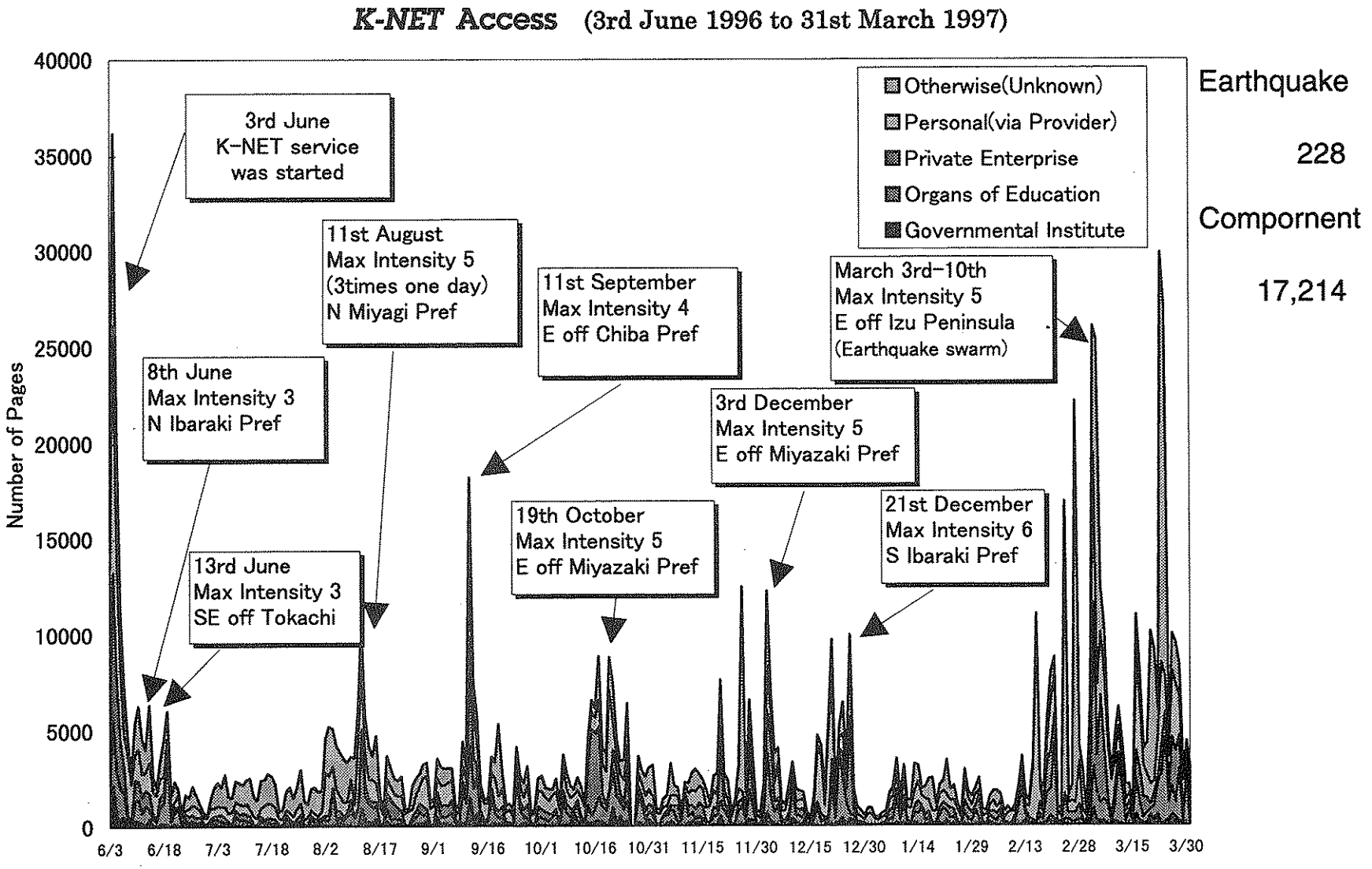
As the K-NET seismographs are distributed all over Japan with a station to distance of about 25 kilometers, they have the opportunity which obtains near field seismograms. In 1996, the K-NET95 installed at the Naruko station recorded the main and after shocks during the Miyagi-ken Hokubu earthquake. The JMA magnitude of main shockis 5.9. The largest acceleration is over 700 Gals at the site. Some research institutes tried to get the after shock records around Naruko site and tried to interpret the main shock seismogram obtained at the Naruko station.

Fig . 1



MAXIMUM ACCELERATION (N-S or E-W or U-D)

Fig . 2



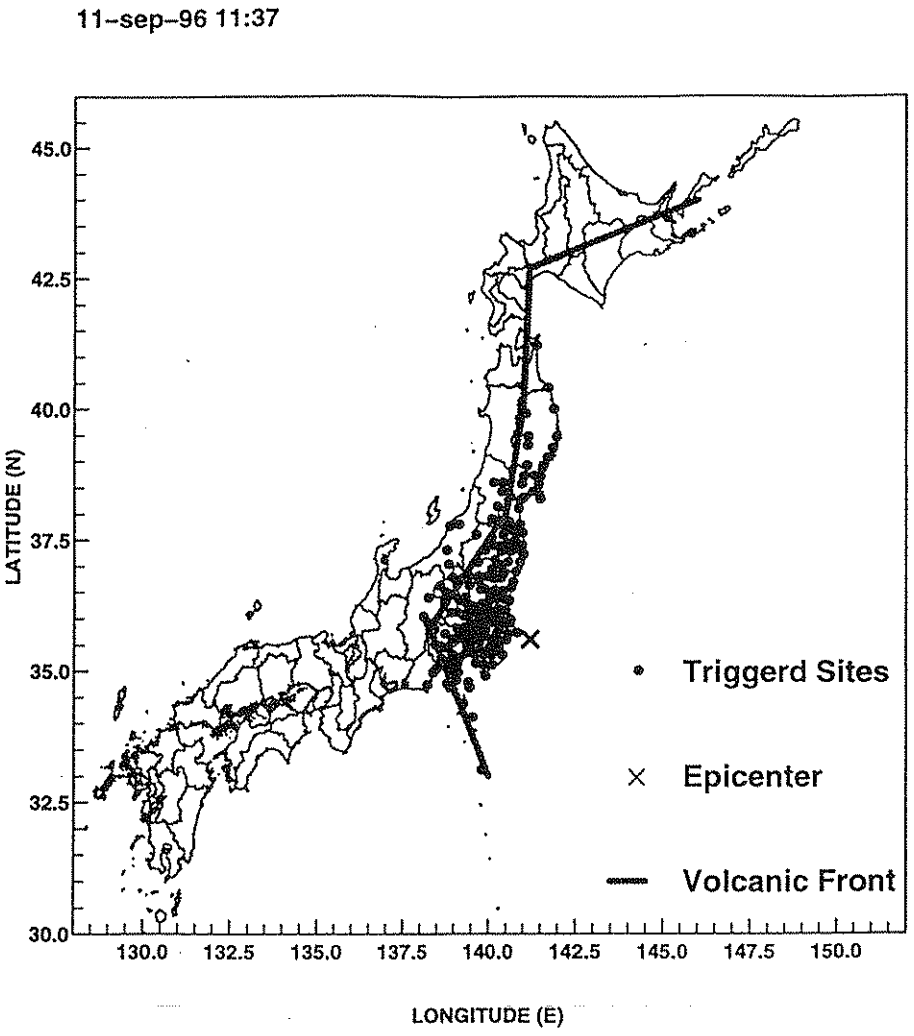
Earthquake

228

Compornent

17,214

Fig . 3


11-sep-96 11:37
45.0
42.5
40.0
37.5
35.0
32.5
30.0
LATITUDE (N)
130.0
132.5
135.0
137.5
140.0
142.5
145.0
147.5
150.0
LONGITUDE (E)
Triggerd Sites
Epicenter
Volcanic Front