Preliminary Report:
Mexico City UrEDAS detects Colima earthquake on 02:06:35, January 22, 2003

1. Introduction

System and Data Research, Co., Ltd., SDR, has installed UrEDAS in Mexico City as a cooperation of centro de instrumentación y registro sísmico, CIRES.   CIRES has observing earthquakes around Acapulco and warned to Mexico City.   UrEDAS earthquake information is sent to UrEDAS Center at CIRES headquarter via radio transmission and received by the system of CIRES immediately. CIRES server soon provides the information via Internet.   Mexico City UrEDAS had started observation at October 30, 1999.   Because the former site had high traffic noise, the system was moved to another strong motion station #78 on hard ground at December 14, 2001.   After this the network connection has been established and more than 100 earthquakes, mainly locates at the Guerrero, are detected and informed.

As a result of observation, at the time of P wave detection, the hypocentral distance tends to be estimated far and also underestimating magnitude about one is confirmed.   At the time of S wave detection, the result of estimation is almost correct.   The system will be adjusted by the result of observation.

2. Detect Situation

Earthquake parameters of the Colima earthquake are following (USGS).

Time: Wed Jan 22 02:06:35 2003 (UTC)
              Wed Jan 21 20:06:35 2003 (local time)
              Wed Jan 22 11:06:35 2003 (JST)
Magnitude: Mw7.8
Location: 18.807N, 103.886W (400km West from Mexico City)
Depth: 5 km

E-mail information for this earthquake was delivered at around 11:08:30 (JST) for a server in Japan. The result of detection is following.

Detect time:	Wed Jan 22 02:07:51 2003 (UTC)	
Estimation with P wave	Received time at CIRES	Wed Jan 22 02:07:56 2003 (UTC)
	Magnitude	M6.8
	Azimuth	280 (deg.)
	Hypocentral distance	232 km
	Depth	134 km
	(Between Mexico City and Colima)	
Estimation with S wave	Received time at CIRES	Wed Jan 22 02:08:53 2003 (UTC)
	Hypocentral distance	442 km
	Depth	255 km
	(60 km North East from Colima)	

Around 20:07:50, the observation station of UNAM near Mexico City detected earthquake motion. Because of more than 400 km hypocentral distance, p-s time, duration from the P wave detection of

UrEDAS to large earthquake motion, seems more than one minute. See following UrEDAS waveform.

UrEDAS says that, at the time of the preliminary tremor detection, occurrence of M6.8 earthquake hundreds km west was estimated. And after one minutes, at the time of the large earthquake motion detection, the location became clear to the near of Colima.

Mexico City UrEDAS is on the way of adjustment and not tuned to detect only for large events. However, from the detect situation of this earthquake, it is clear to be effective to decrease the hazard. Of course, although suitable employment is required, while correcting the parameters immediately from now on and raising presumed accuracy, it is considered that the employment method wants to talk with CIRES.
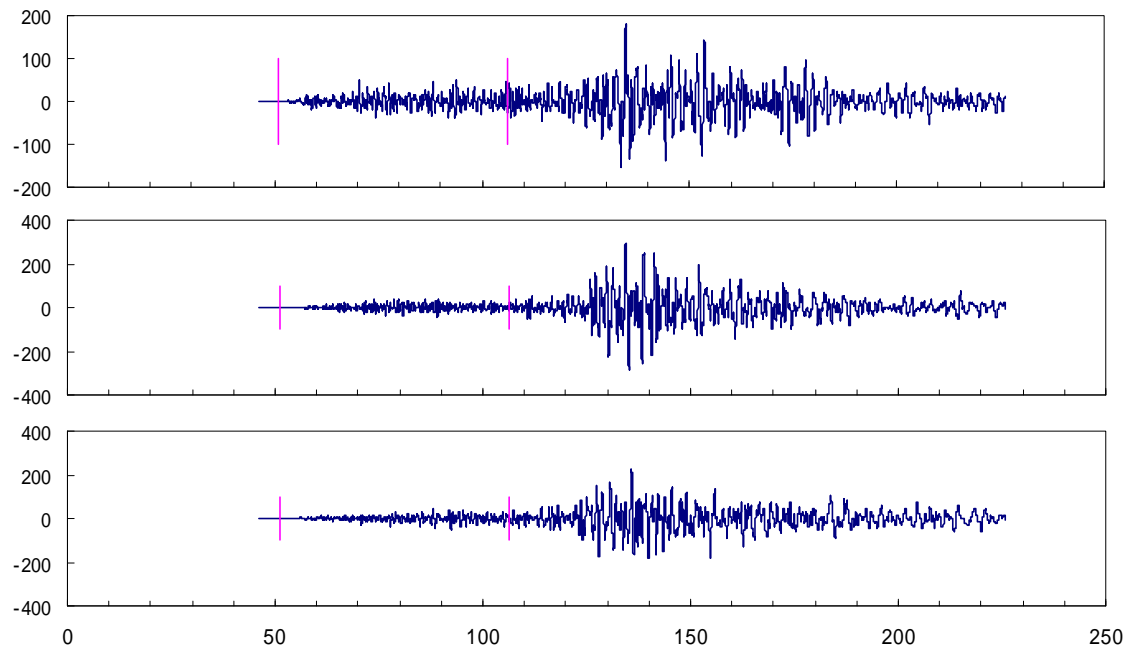

3. Waveforms

Following figures show the waveforms of Mexico City UrEDAS with the order of UD, NS and EW in 1/1000 cm/sec.   Time scale in seconds is counted from 02:07:00 (UTC) and may include error of about 0.5 sec in maximum.   The lines around 51 sec and 105 sec indicate P wave detection and S wave detection, respectively.

These waveforms show the first preliminary motion is relatively small for four seconds and after this, large P wave motion was arrived.   UrEDAS detected this preliminary P wave motion and sent the first information after three seconds.   And just after S wave detection, secondary information was also sent.   The system at CIRES received these information one second later.   This S wave detection was 10 seconds earlier than the real S wave arrival.
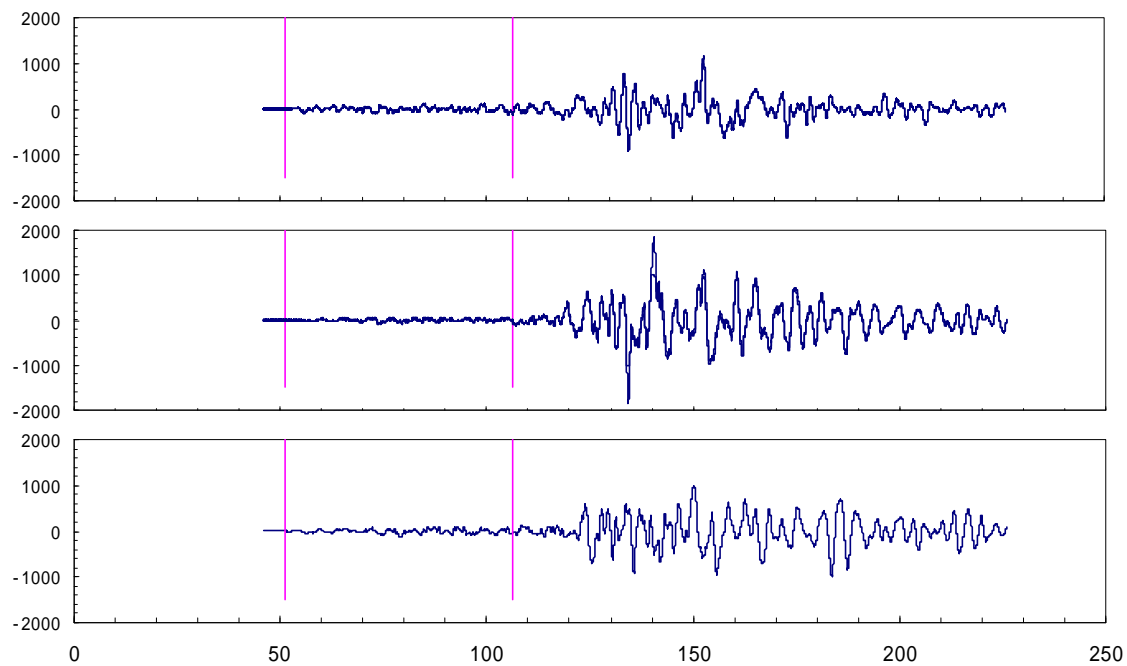
The time with large motion was 40 seconds or more, and it shows this earthquake was a big event, too.   A local person at the relatively hard site in the city felt the vibration continued more than two minutes.

Waveform of the 02:07, January 22, 2003 earthquake observed by Mexico City UrEDAS
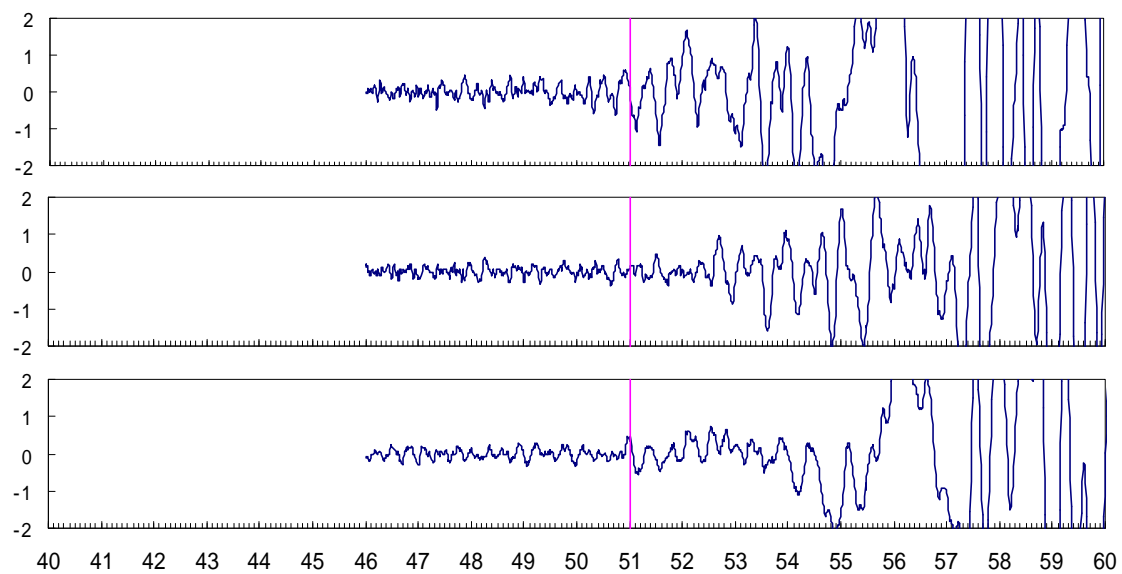
Short period velocity waveform (1 Hz – 10 Hz)

Long period velocity waveform (0.1 Hz – 10 Hz)

Enlarged short period velocity waveform (1 Hz – 10 Hz)

(end)