

Analysis result of Fukushima Daiichi NPS reactor building explosion

1 . Introduction

Videos of explosions at Unit 1 and 3 of Fukushima Daiichi NPS have been released, and thus the time of explosion has been identified. On the other hand, the blast sound confirmed at Unit 2, and the damage of Unit 4 reactor building are considered to have occurred some time past 6 am on 15th March, but the exact time has not been identified. In order to understand the situation at the time of Unit 2 and 4 explosion, we analyzed the observed seismic data recorded at the seismograph (Figure 1) installed on the surface level within the site.

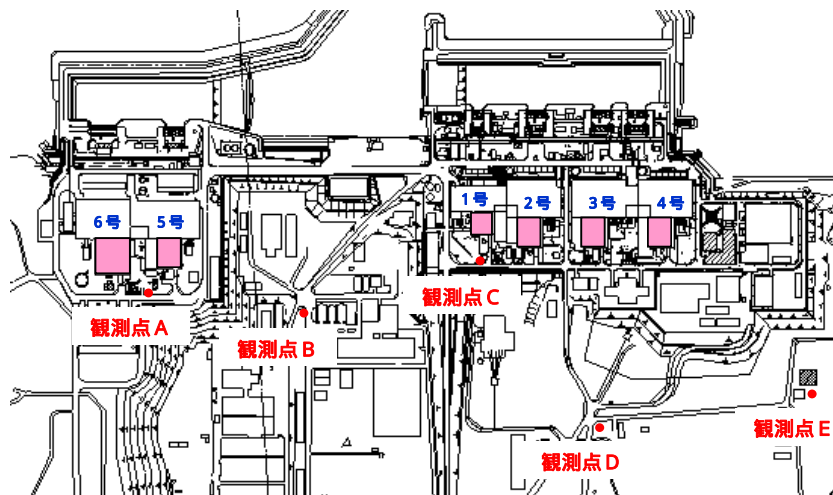


Figure 1 . Collection point of Fukushima Daiichi NPS observed seismic data (*)

2 . The time of explosion

From continuously recorded acceleration waveform, the time which the vertical shake occurs (the time P wave arrives) and the time horizontal shake occurs (the time S wave arrives) can be identified. In general, as P wave is faster than S wave, when observed at one location, there will be a difference in arrival time of each wave. This difference in arrival time of P wave and S wave relates to observing point and origin of the seismicity. As the time difference will be within a several second with earthquakes, while it will be within a second with explosion seismicity, it is possible to distinguish the two (Figure 2).

As a result of this distinction, we analyzed seismic record between 6:00 am and 6:15 am of 15th, when the unit 2 and 4 explosion is considered to have occurred. As a result, the seismicity considered to have resulted from the explosion, is the one recorded at 6:12, and the others were earthquakes and heavy equipment seismicity, etc.

【Example of acceleration waveform at the time of Unit 1 explosion】 【Example of acceleration waveform of an earthquake (Earthquake offshore of FukushimaM4.7)】

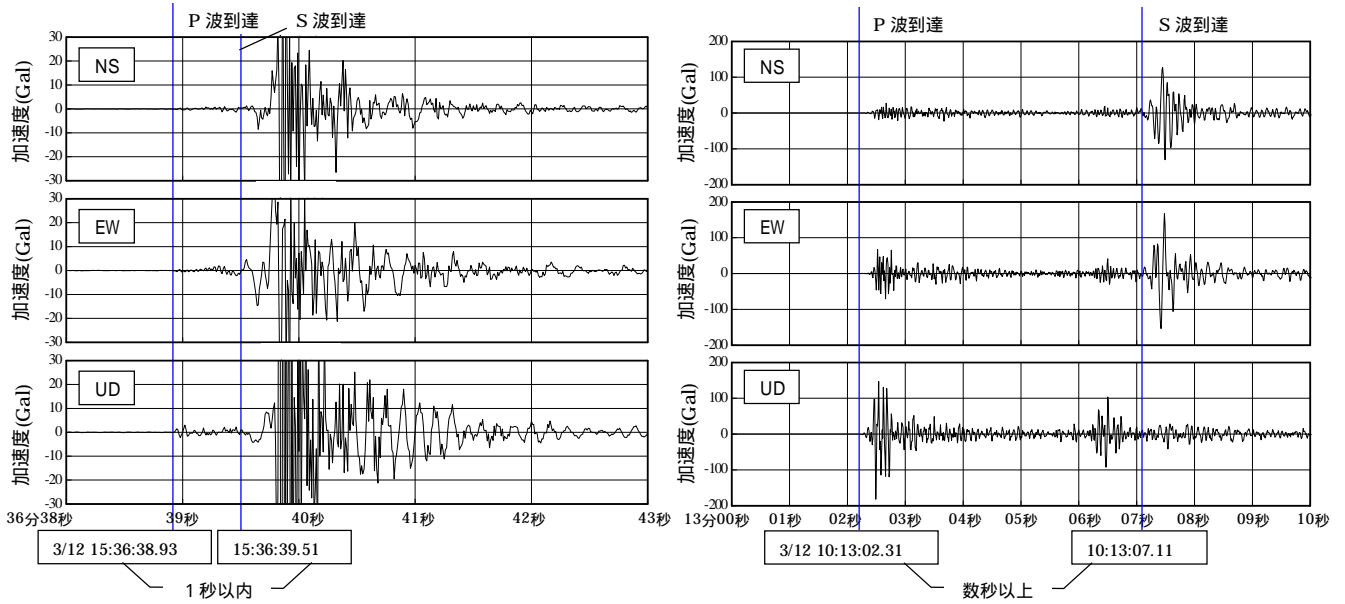


Figure 2 . Example of acceleration waveform of explosion and earthquake (Observation point D) (*)

3 . The location of explosion

Figure 3 and 4 shows the relation between arrival time of P wave and S wave considered to be the seismicity of Unit 1 and 3 explosion, and the distance between Unit 1 and 3 to each observation point. Both Unit 1 and Unit 3 is organized to P wave and S wave, and shows that the seismicity was transmitted at the same speed from the seismic center of each unit, where the explosion occurred.

Similarly, regarding the 6:12 seismicity considered to be caused by the explosion as stated earlier, we organized the arrival time of P wave and S wave into the distance from Unit 2 and Unit 4. As a result, the records organized by the distance from Unit 4 is much clear, compared with that of Unit 2. From this result it is presumed that this seismicity originates from Unit 4 explosion (Figure 5, Figure 6).

With regard with Unit 2, we are continuing to check the data of the time before and after, to conclude the occurrence/ non occurrence of the explosion.

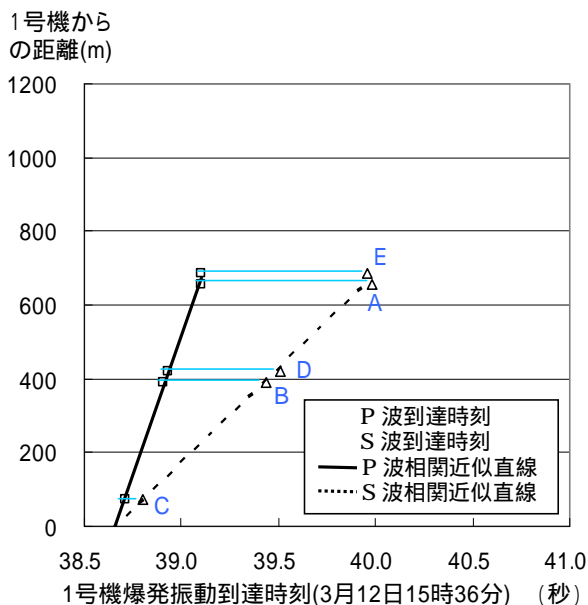


Figure 3. Unit 1(*)

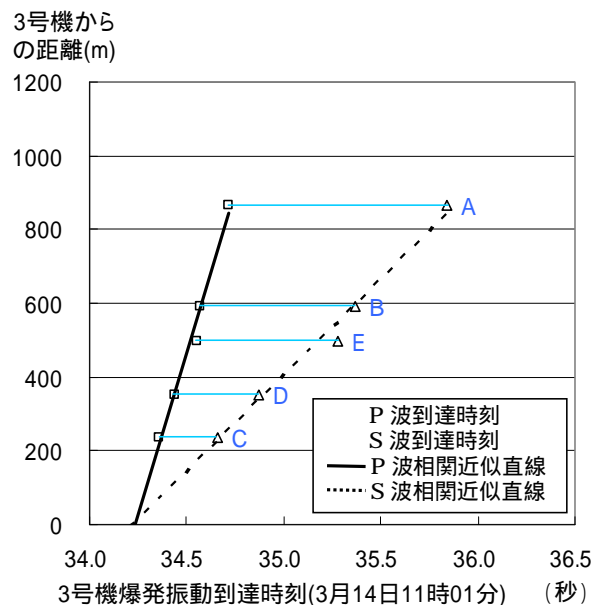
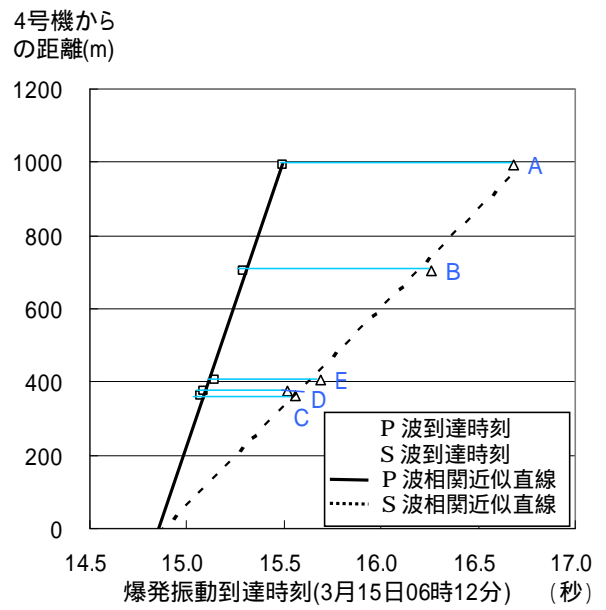
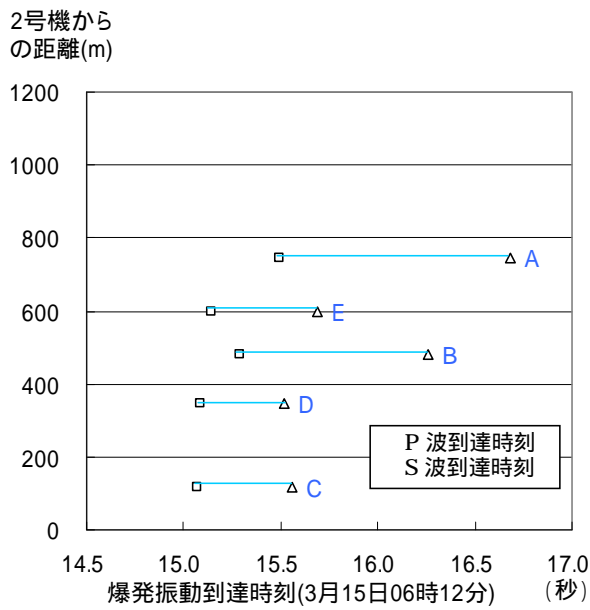


Figure 4. Unit 3(*)

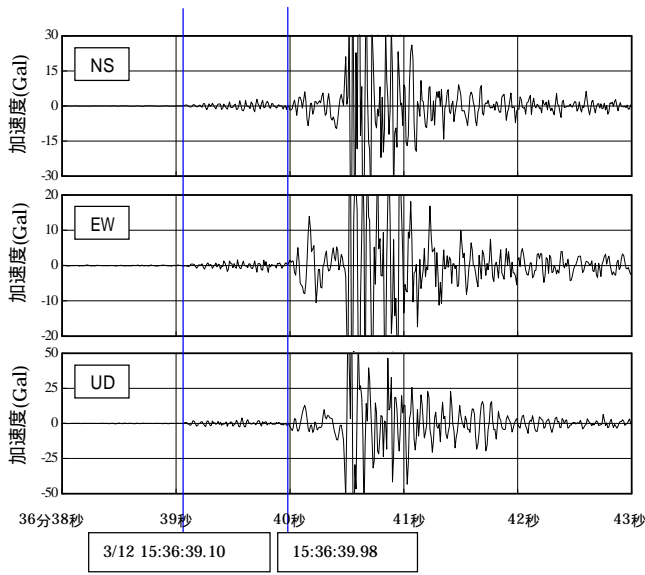


Correlation chart of the arrival time of P wave and S wave of seismicity presumed to be created by the explosion, and the distance from each unit

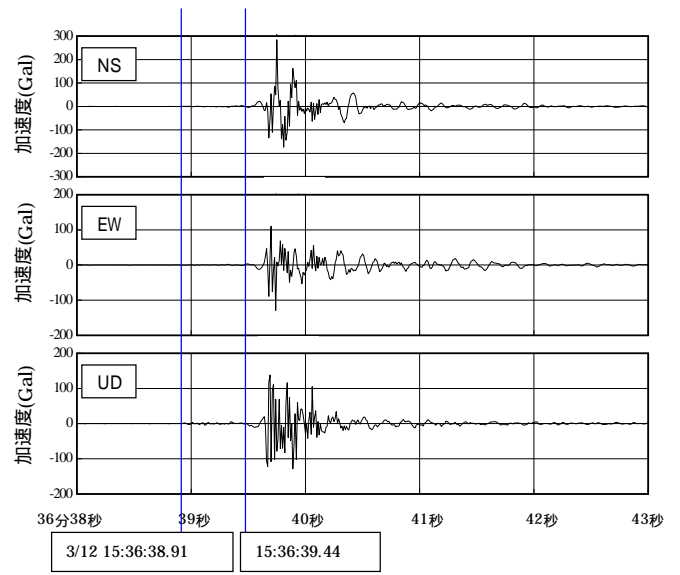
(*) The Japanese on the Figures are to be translated within several days.

(Reference)

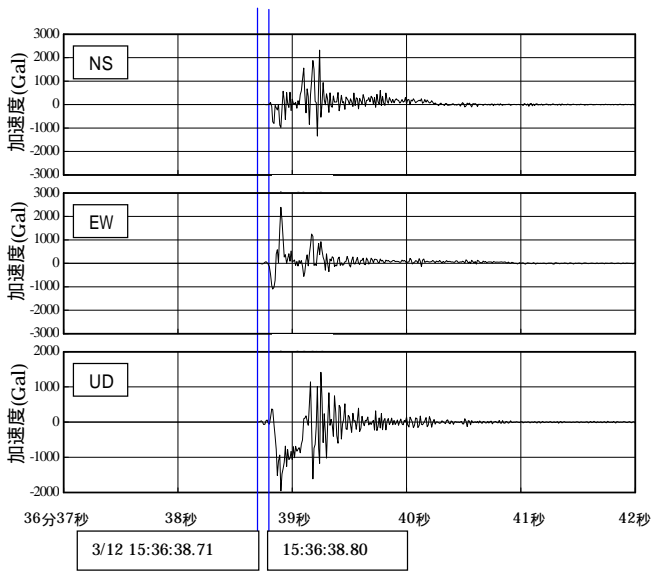
Acceleration waveform at each observation point at the time of Unit 1 explosion
(3:36 pm 12th May)



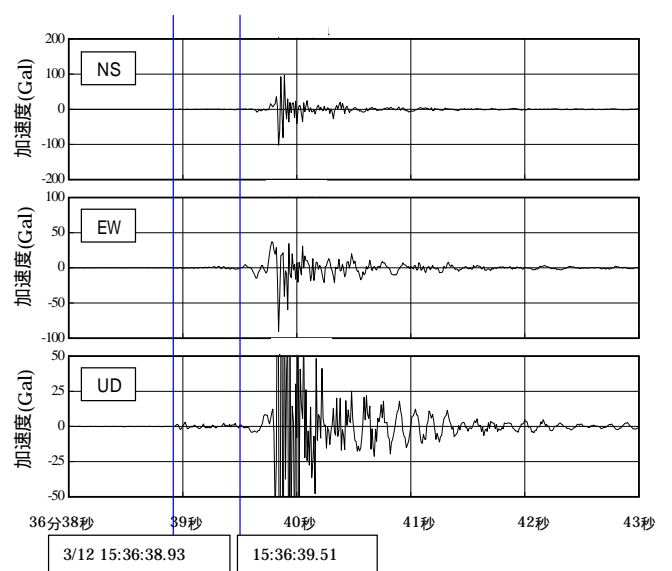
Acceleration waveform at observation point A



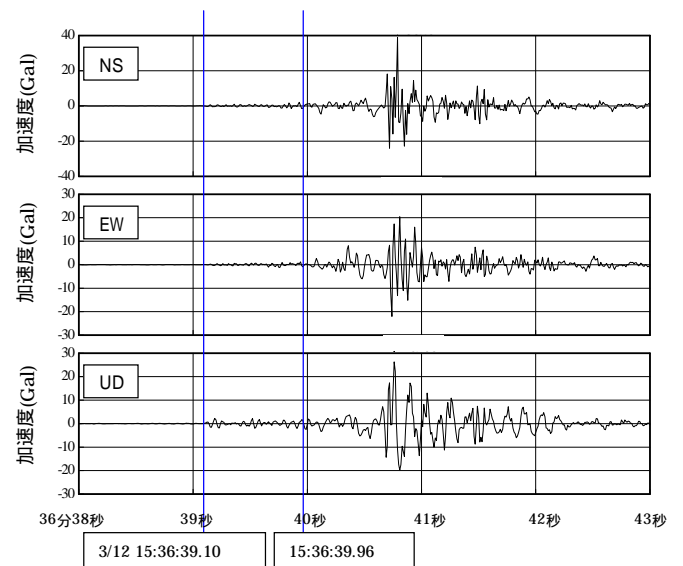
Acceleration waveform at observation point B



Acceleration waveform at observation point C

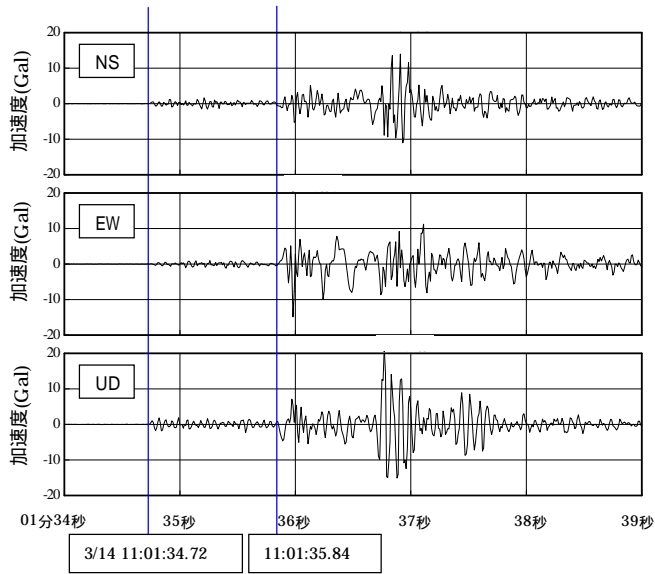


Acceleration waveform at observation point D

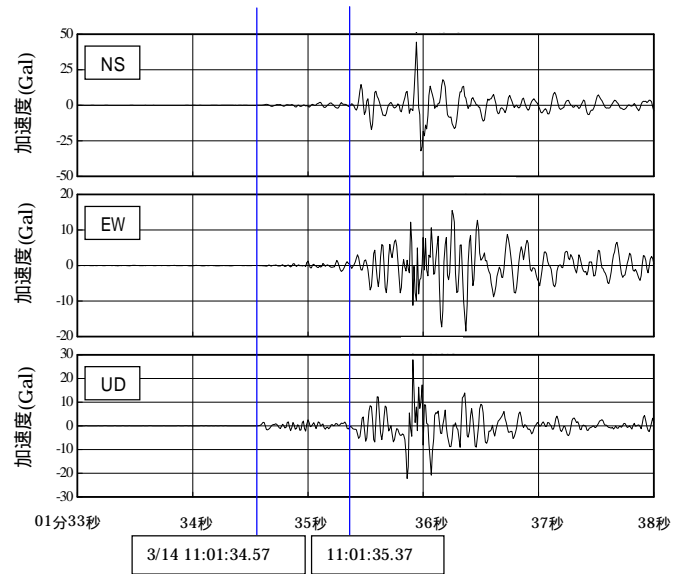


Acceleration waveform at observation point E

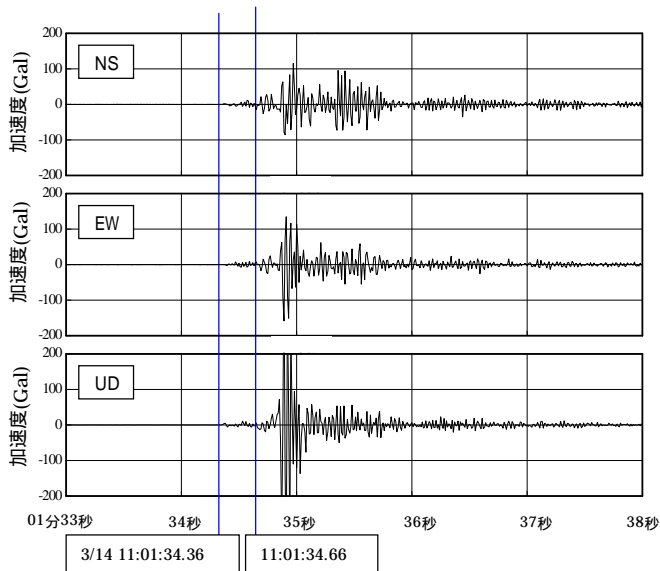
Acceleration waveform at each observation point at the time of Unit 3 explosion
(11:01 am 14th May)



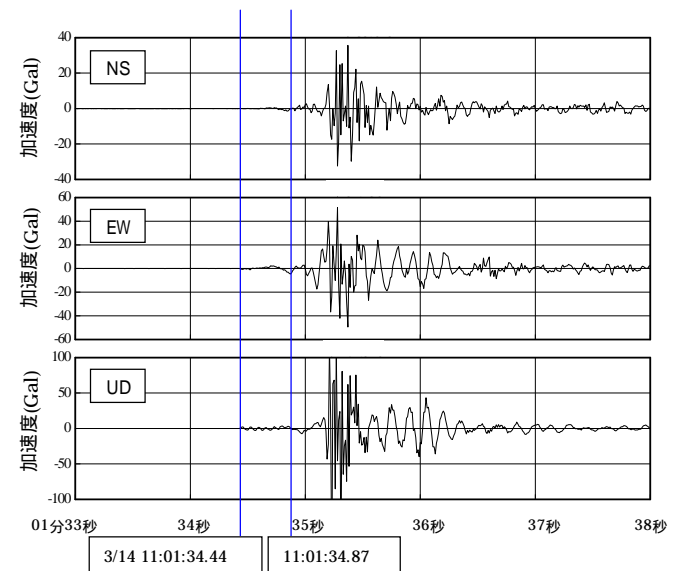
Acceleration waveform at observation point A



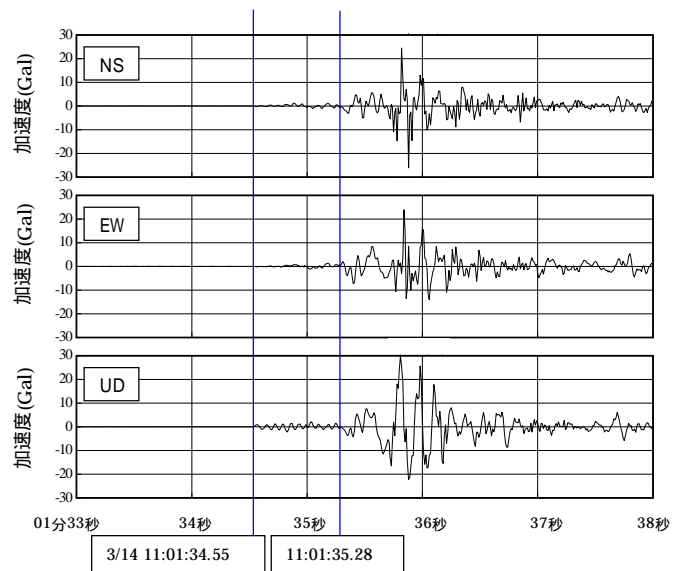
Acceleration waveform at observation point B



Acceleration waveform at observation point C

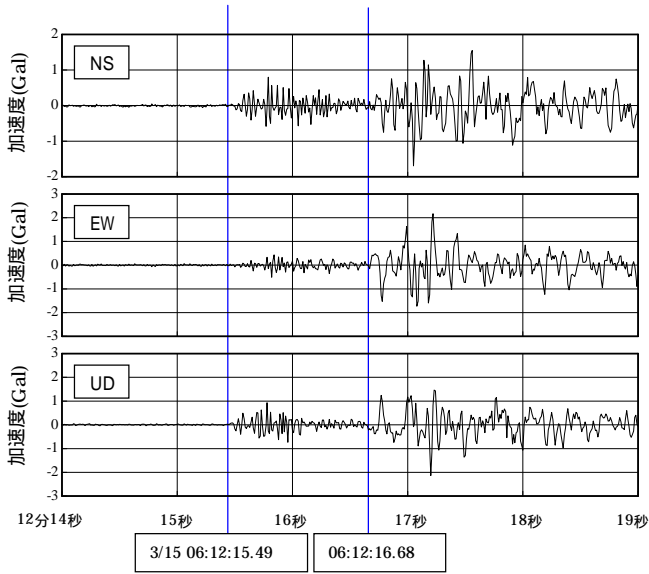


Acceleration waveform at observation point D

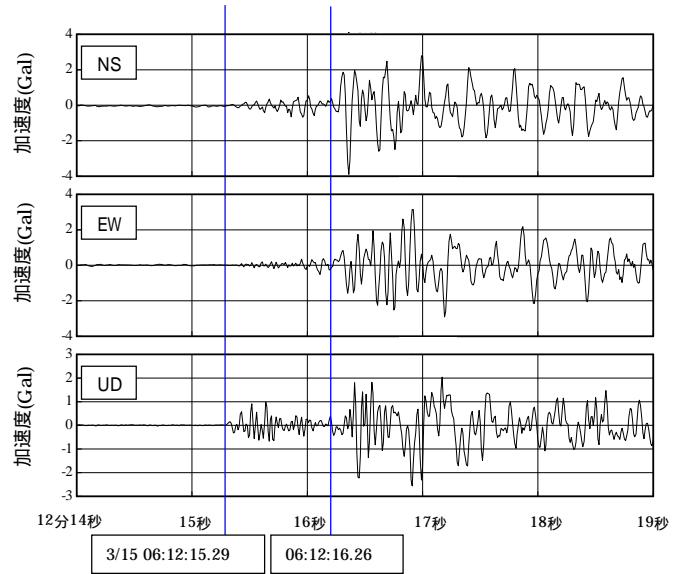


Acceleration waveform at observation point E

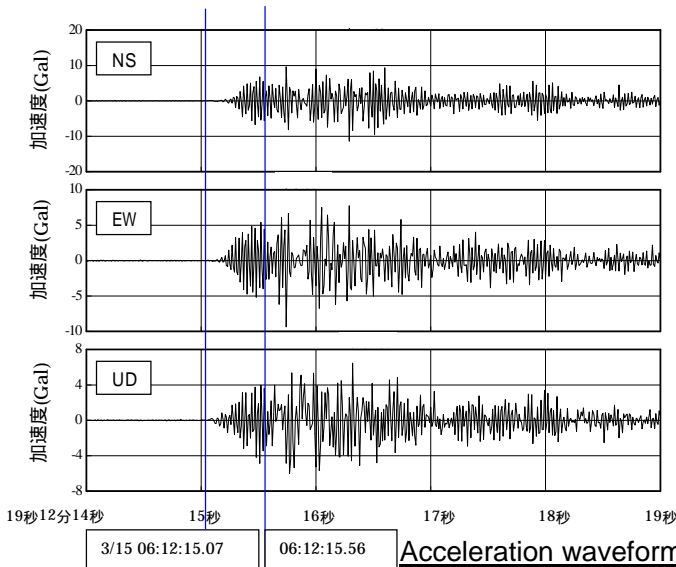
Acceleration waveform at each observation point at 6:12 am 15th May



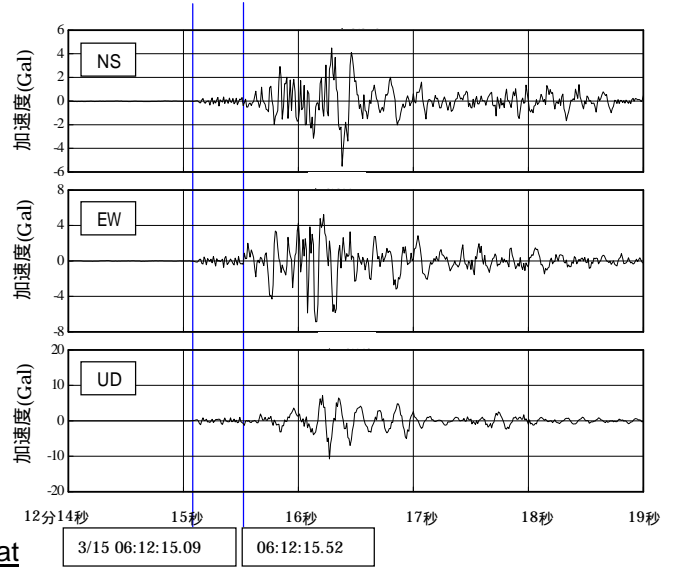
Acceleration waveform at observation point A



Acceleration waveform at observation point B

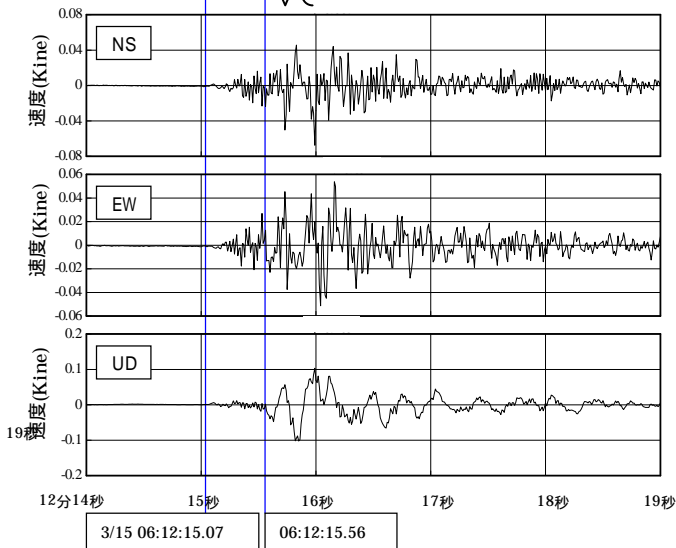


Acceleration waveform at observation point C

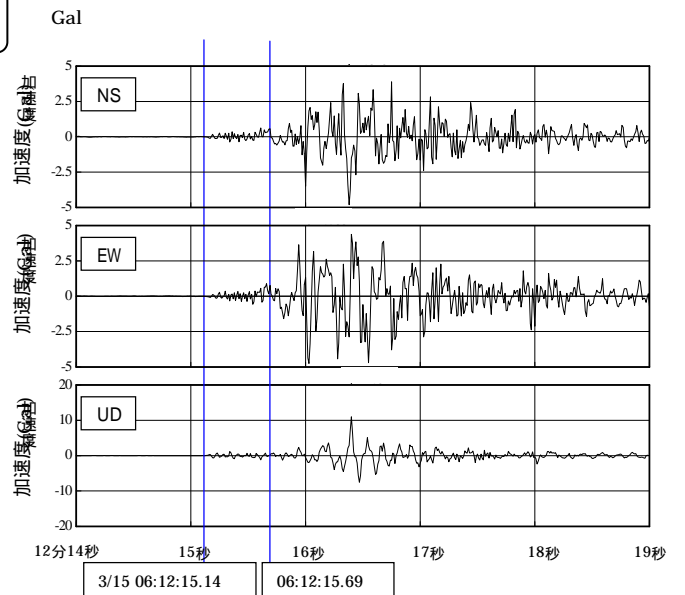


Acceleration waveform at observation point D

Due to difficulty to evaluate the acceleration waveform, it is converted to velocity waveform, evaluated



Velocity waveform at observation point C



Acceleration waveform at observation point E

(*) The Japanese on the graphs are to be translated within several days.