

Welcome Address and
Keynote Lecture

Fault Crossing Pipeline

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Japan

History of this workshop

- ◆ 1: 2000.8.8-9 EBMUD, USA
- ◆ 2: 2001.8.6-8 JWVA, Japan
- ◆ 3: 2003.8.6-8 LADPW, USA
- ◆ 4: 2005.1.26-28 Kobe City, Japan
- ◆ 5: 2007.8.15-17 EBMUD, USA
- ◆ 6: 2009.10.14-16 NCREE, Taiwan
- ◆ 7: 2011.10.12-15 Niigata City, Japan
- ◆ 8: 2013.8.21-23 EBMUD, USA
- ◆ 9: 2015.10.14-16 Sendai City, Japan

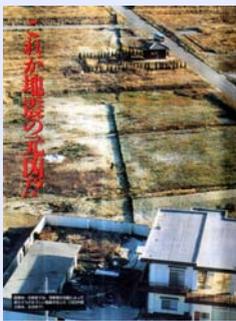
Contents

- ◆ Surface faulting in the past earthquakes
- ◆ Damage to pipelines in the 2014 Kamishiro Fault Earthquake in Japan
- ◆ Concluding remarks

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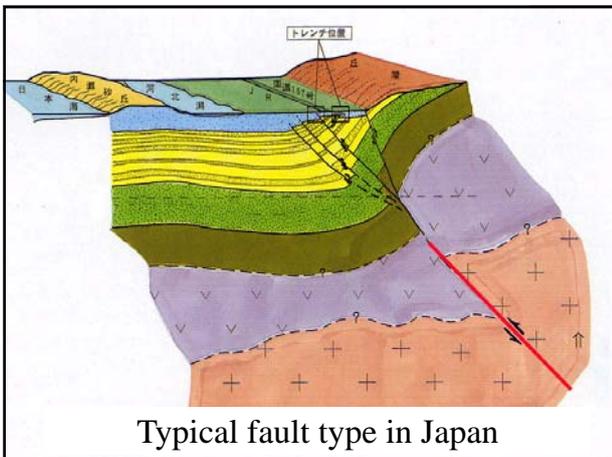
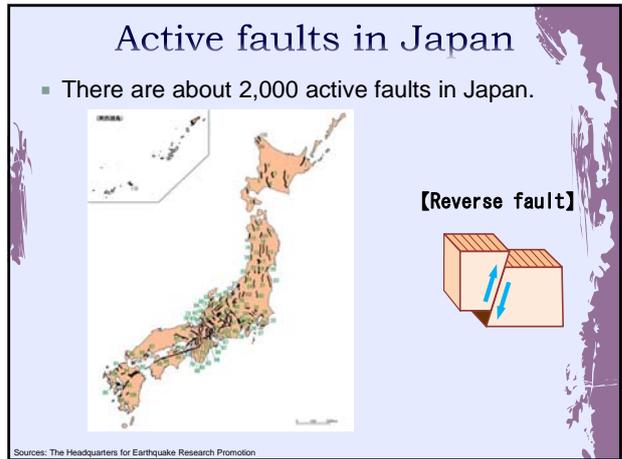
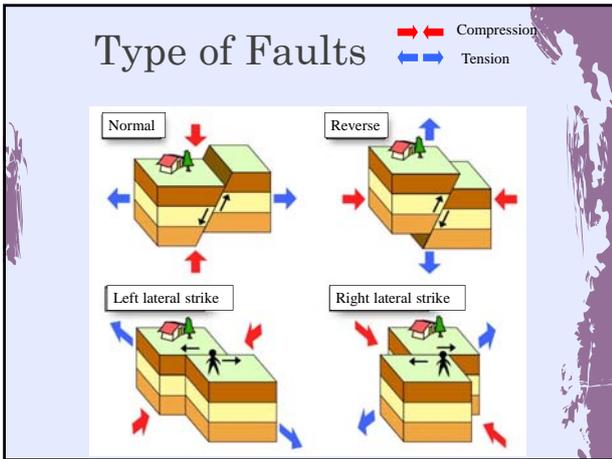
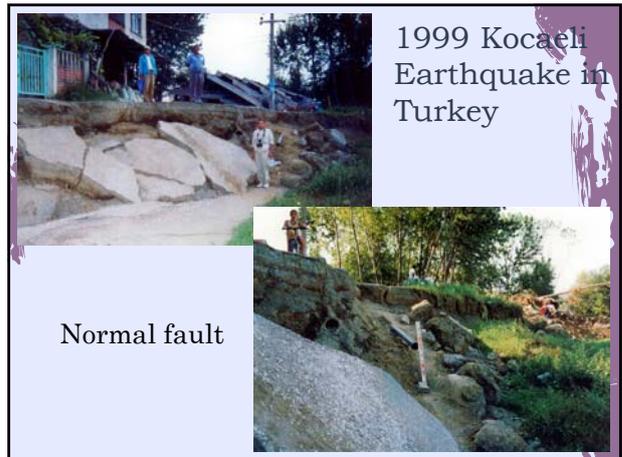
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1995 Kobe Earthquake in Japan



1995 Kobe Earthquake in Japan

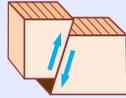




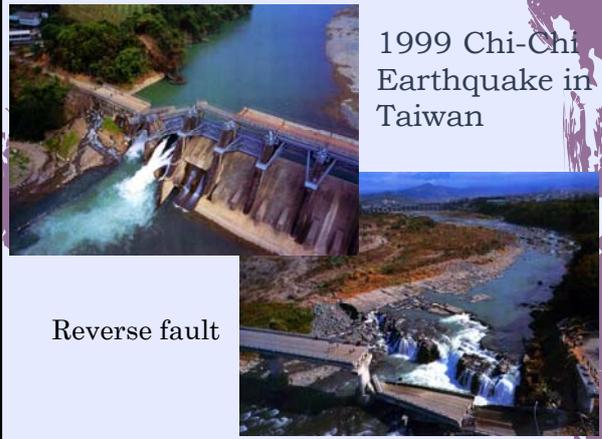
Active fault in Taiwan



【Reverse fault】



1999 Chi-Chi Earthquake in Taiwan



Reverse fault

1999 Chi-Chi earthquake in Taiwan



Damage to buried pipe by fault rupture

1999 Chi-Chi earthquake in Taiwan

Damage to buried pipe by fault rupture



1999 Chi-Chi Earthquake in Taiwan

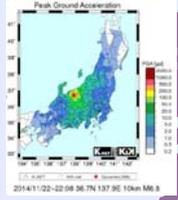


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Outline of Earthquake

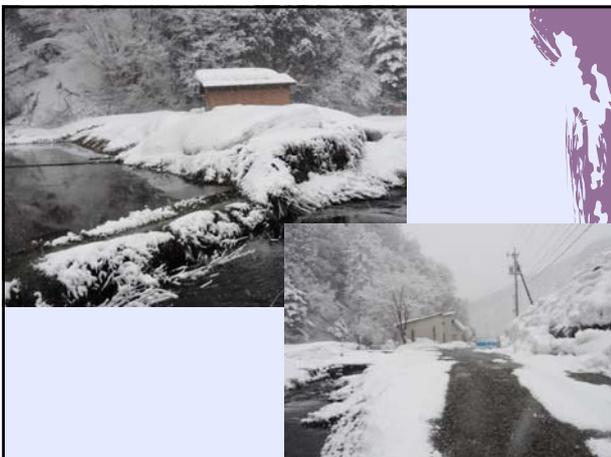
- ◆ Date, Time: 2014.11.22 日(Sat)22:08PM
- ◆ Epicenter: Nagano Pref. (N 36.7° , E137.9°)
- ◆ Depth: 5km
- ◆ Magnitude: 6.7
- ◆ to
- ◆ JMA Seismic Intensity
 - 6- Nagano City, Otari Vikkage, Ogawa Village
 - 5+ Hakuba Village, Shinano Village
 - 5- Itoigawa City, Myoko City, etc.
- ◆ No death, Serious injured:10, Totally collapse houses: 39



2014 Kamishiro Fault Earthquake



Vertical:
About 80cm
Horizontal
About 30cm



長野県神城断層地震 管路被害状況(白馬村)

②・③ 大出 断層変位(30cm) T形, PE φ100被害

Technical diagrams and photographs showing pipe damage. The diagrams illustrate the pipe layout and the location of the break. The photographs show the damaged pipe and the surrounding soil.

管割図(推定)
 写真①-1
 写真②

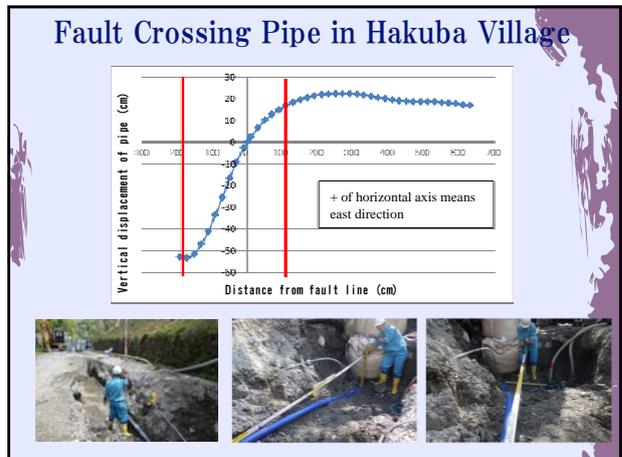
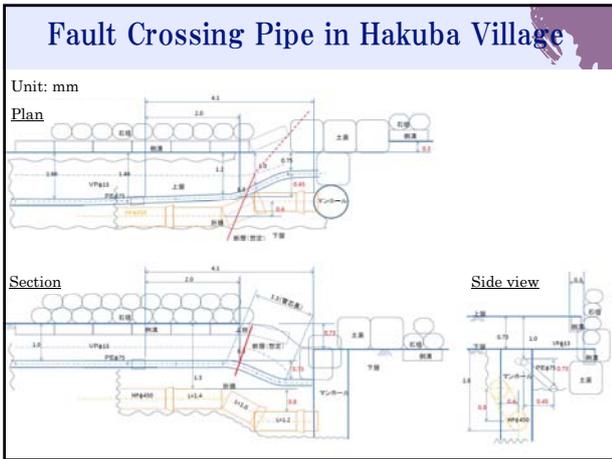


Fault Crossing Pipe in Hakuba Village

Before EQ After EQ

About 80cm of vertical displacement and about 30cm of horizontal displacement

- Sewerage pipe(HPφ450) no useable → pumping up
- Drinking water pipe(PEφ75) no water leakage



Fault crossing pipeline (15th Oct)

- ◆ Jiunn Liang Lin, Taiwan
Water main
- ◆ Keita Oda, Japan
Earthquake resistant ductile iron pipe
- ◆ Calvin Huey, USA
Water treatment plant
- ◆ Hayato Nakazono, Japan
Steel pipe
- ◆ Gee-Yu Liu, Taiwan
Water main

