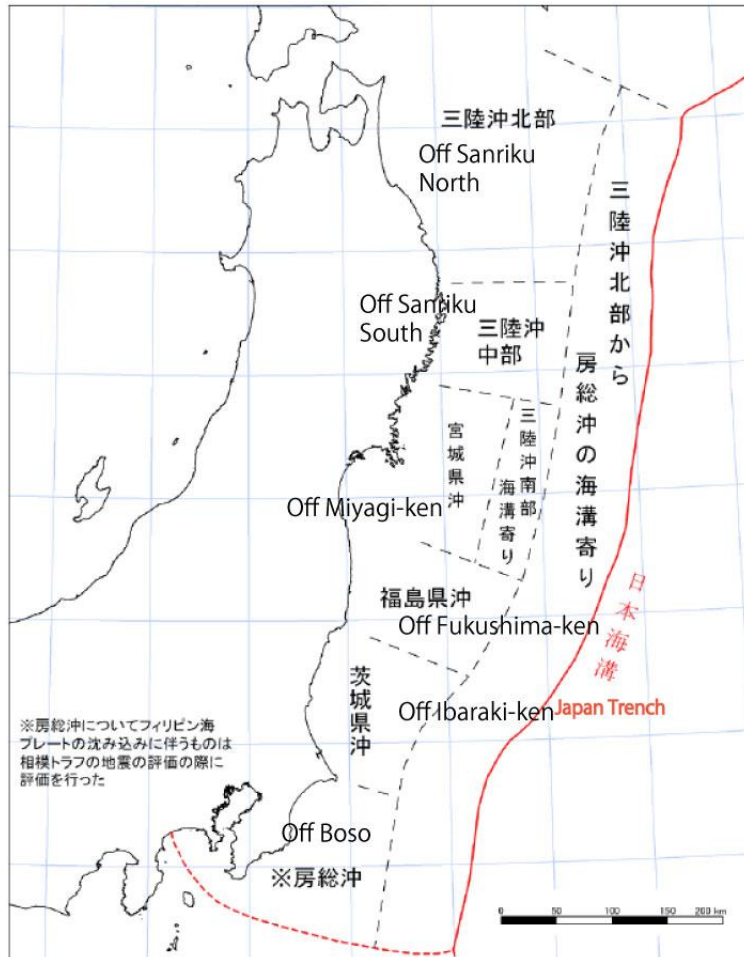


Important Aspects of the 2011 Tohoku, Japan Earthquake

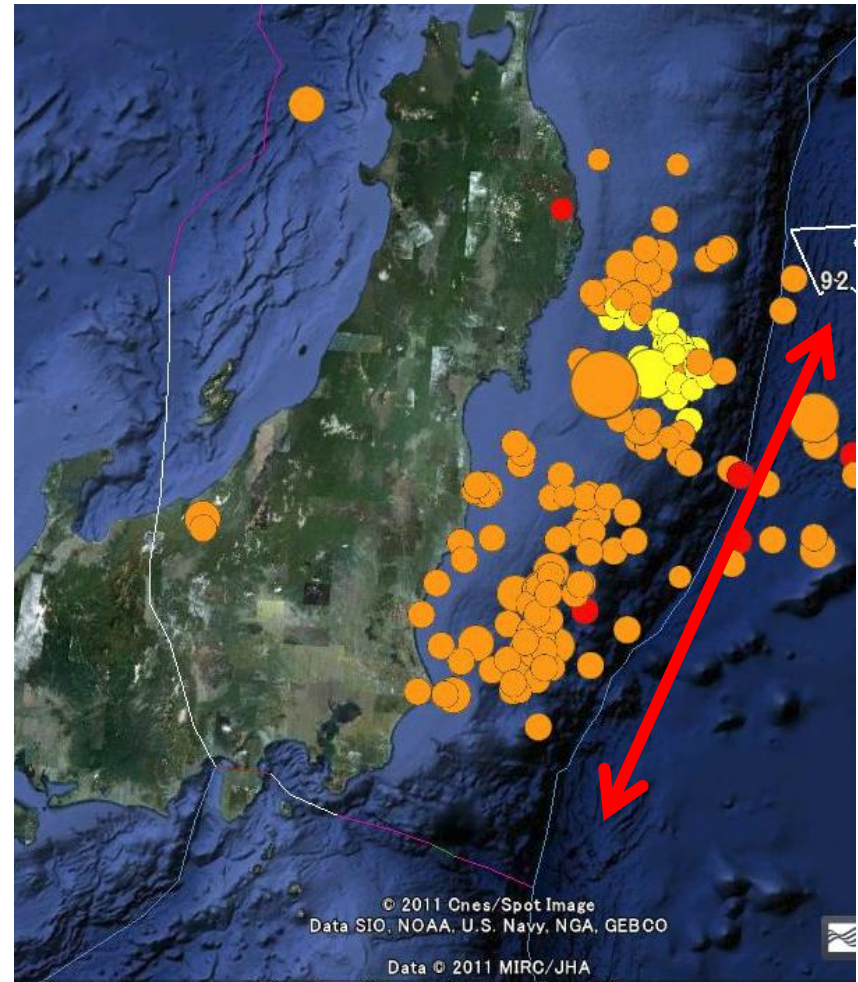
Jim Mori

Disaster Prevention Research Institute
Kyoto University

Earthquake much bigger than expected !



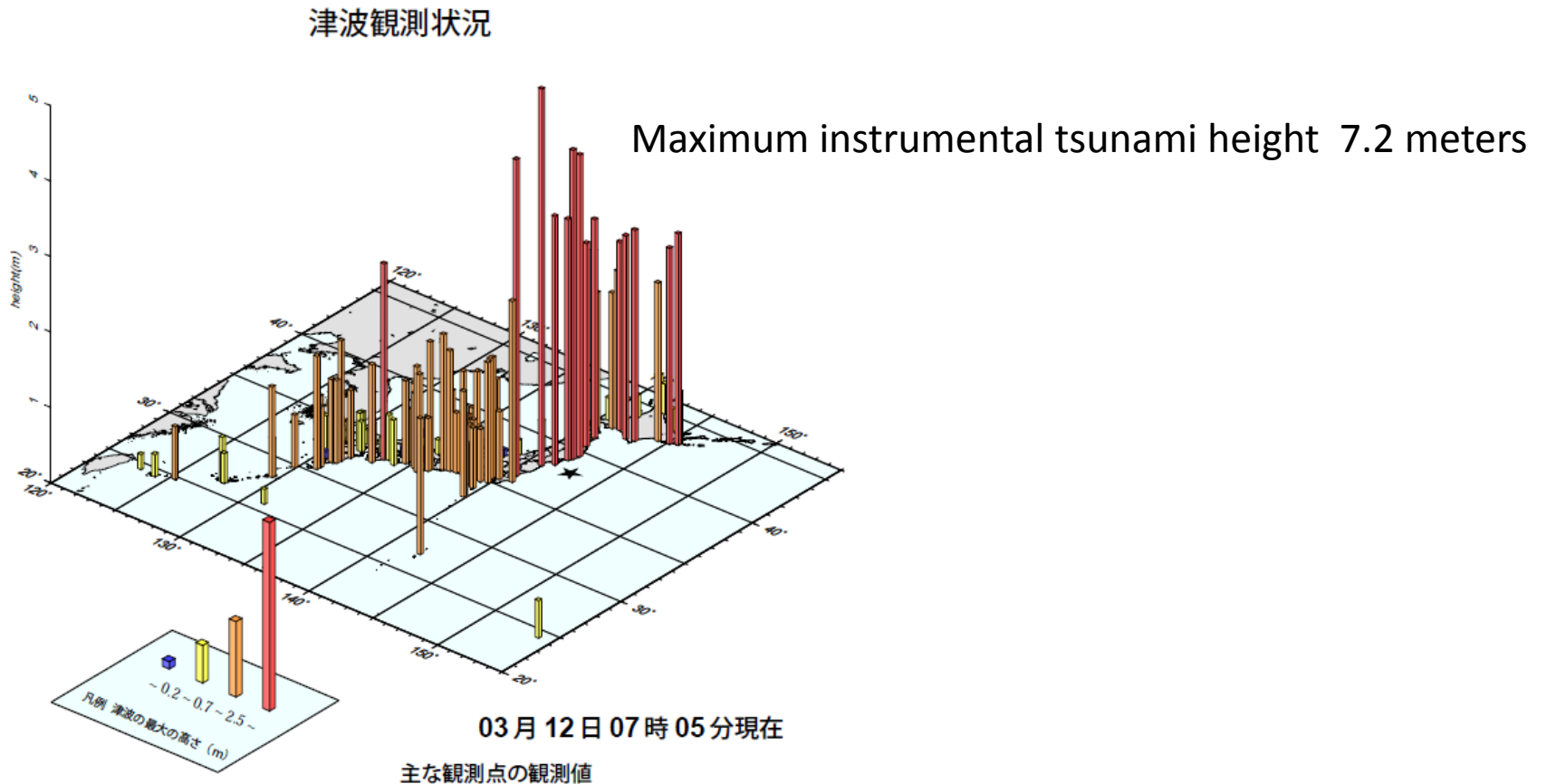
Expected earthquake sources
50 to 150 km segments
M7.5 to 8.2
(Headquarters for Earthquake Research Promotion)



2011 Tohoku Earthquake
500 km long fault, M 9.0
(Aftershock map from USGS)

Severe Tsunami Damage

Tsunami related to fault area and amount of slip
Large fault area -> Large tsunami



Long-period Ground Motions

Long-period (5-20 sec) motions are Larger for Large Earthquakes
Short-period (0.1 to 1 sec) motions do not scale as strongly



Large fire at oil refinery

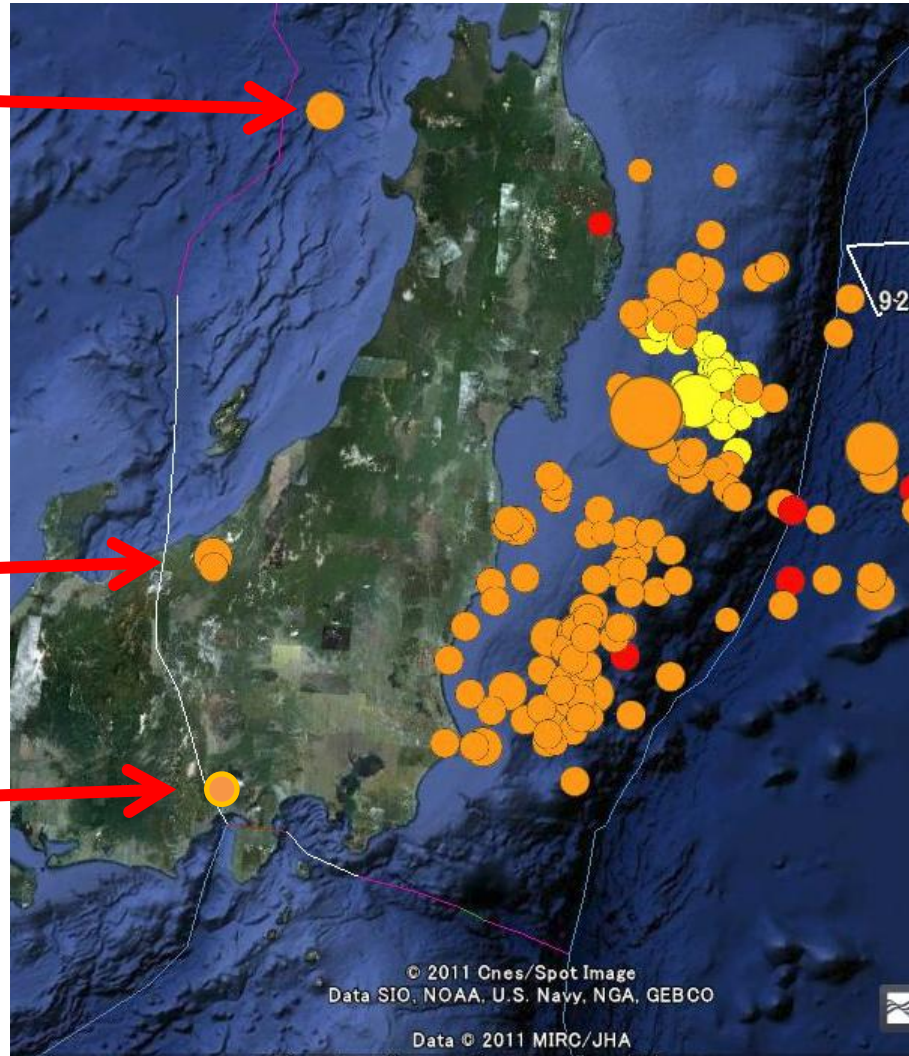
Large tanks, tall buildings, large bridges are vulnerable to long-period motions

Triggered Earthquakes Can Cause Damage

M6.6
March 11 19:46 UTC

M6.2, M5.5
March 11 18:59 UTC
JMA 6強
(MM X-XI)

M6.2
March 15 13:31UTC
JMA 6強
(MMX-XI)



(Aftershock map from USGS)

Explosions at nuclear power plant on March 12 and 14



Explosions caused by overheating because cooling systems did not have power. Vessel containing radioactive material was not ruptured. People within 30 km have been evacuated. There are several other power plants at the site that currently have overheating problems.

(Photo from <http://174.143.24.167/home/green-living/206356-reconsidering-the-nuclear-option>)