



Engineering Services Group Manager's Report

Engineering and Operations Committee
Item 7b
January 9, 2012

7th U.S.-Japan-Taiwan Workshop on Water System Seismic Practices

- Purpose: Technical exchange on risk reduction, seismic-resistant design, & earthquake recovery
- Held October 12-14, 2010, in Niigata, Japan
- Included lessons learned from Japanese earthquake & tsunami

2011.10.12.

Lessons from the 2011 Great East Japan Earthquake and Tsunami Disasters

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Kanazawa University, Japan

Outline of Earthquake (1)

- * Origin Time : 11 March 2011, 14:46 (JST)
- * Moment Magnitude : 9.0
- * Location of Epicenter : 38.103N, 142.860E
- * Focal Depth : 24km
- * Mechanism : Strike 203 deg., Dip 10 deg.
Rake 91 deg. Reverse type

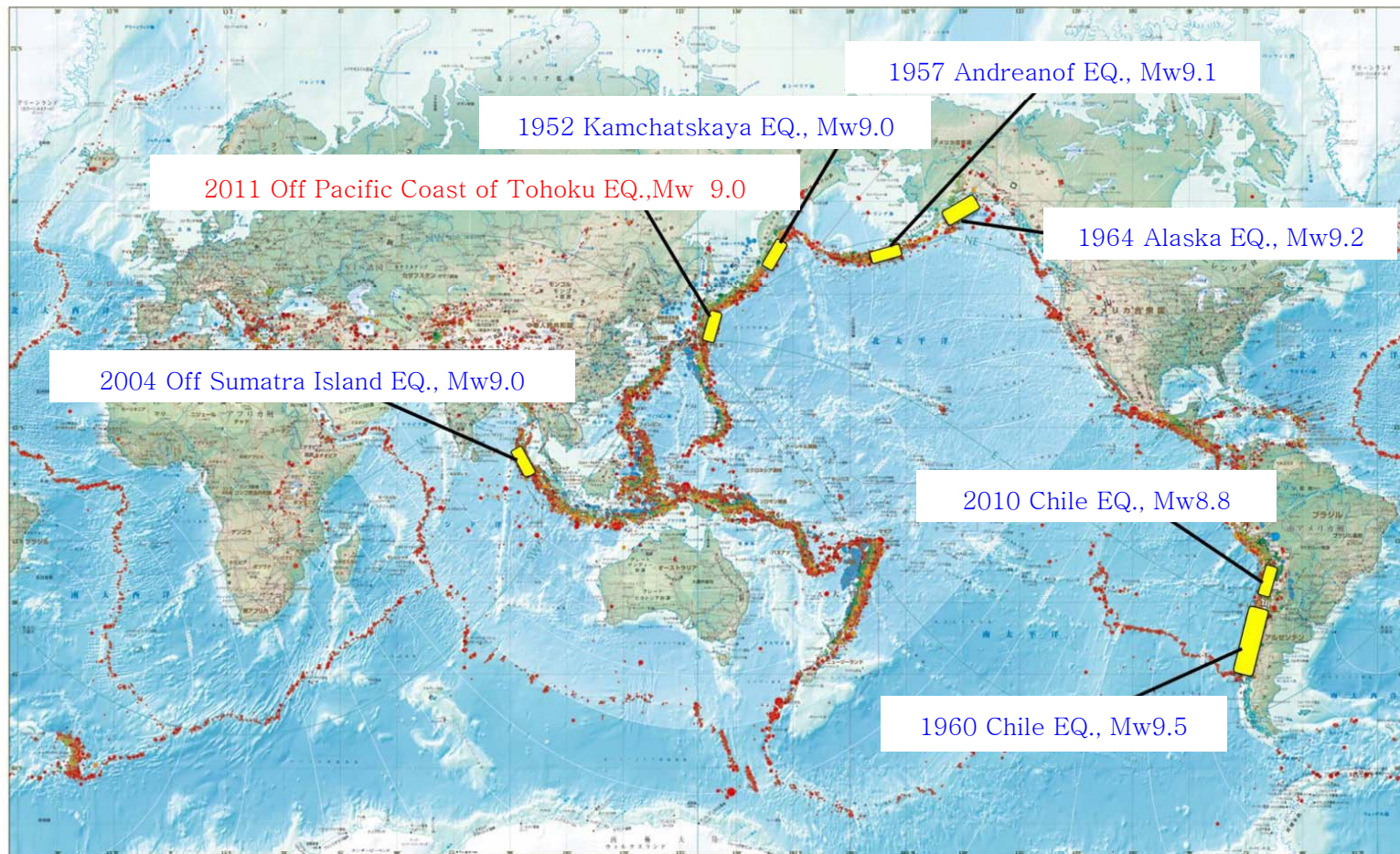
- * Number of deaths : 15,821
- * Number of missing persons : 3,931
- * Number of injured persons : 5,940
- * Number of complete destruction buildings
and houses : 118,480

(Based on the report of FMDA on 4, October, 2011)

Outline of Earthquake (2)

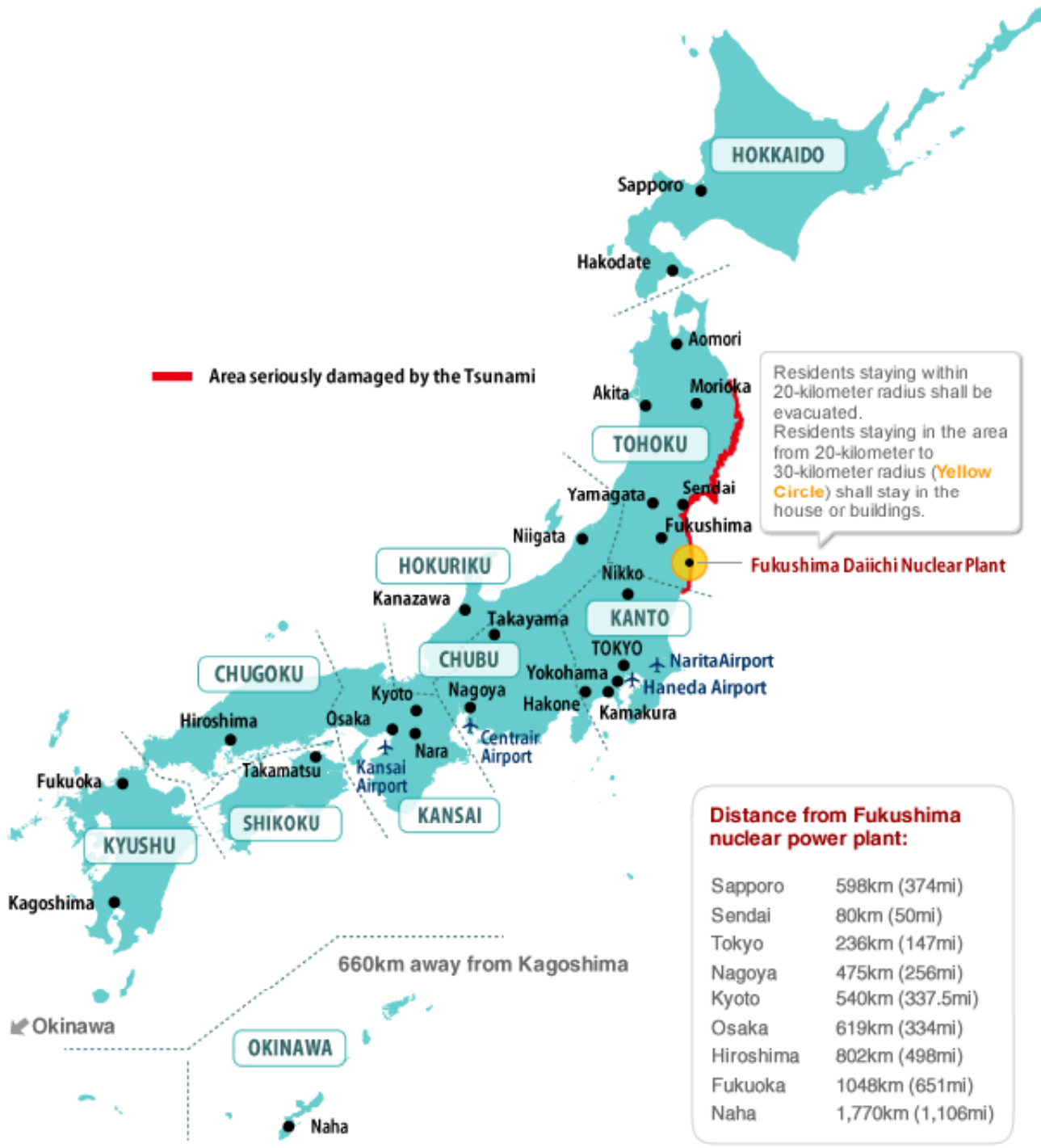
Distribution of epicenters

(After ERI, Tokyo Univ.)



マグニチュードは理科年表による

Source area of past mega earthquakes

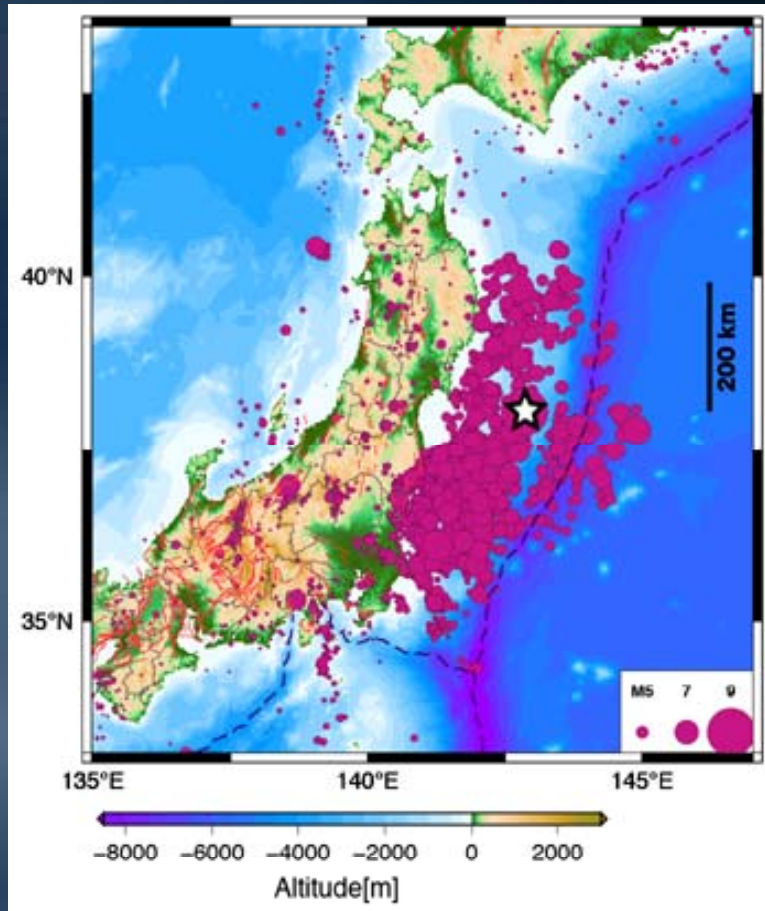


Okinawa

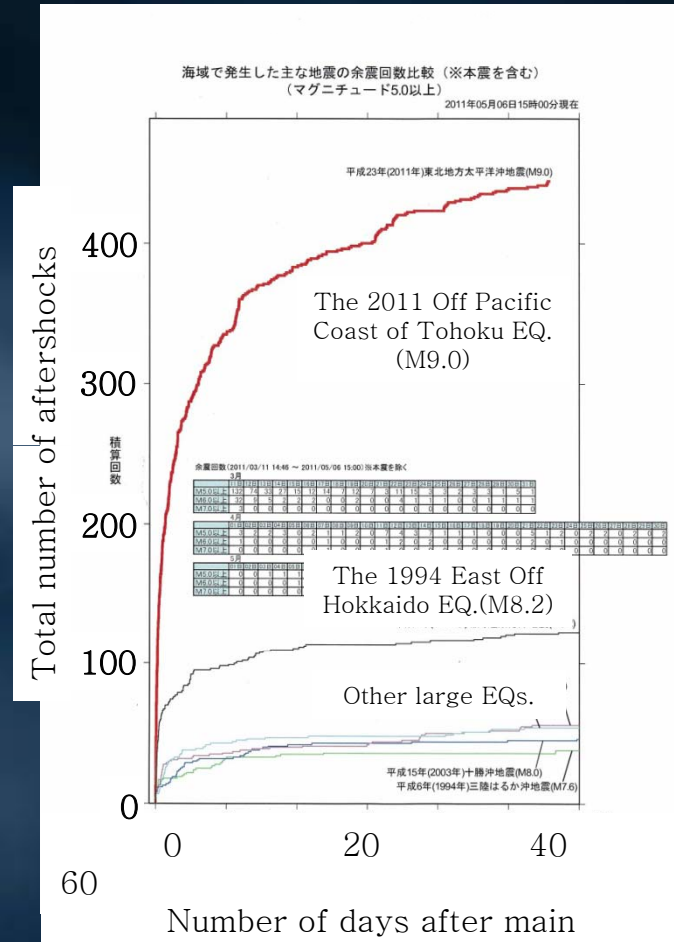
OKINAWA

Naha

Aftershocks



Distribution of aftershock's epicenter (2011.03.11-03.27)

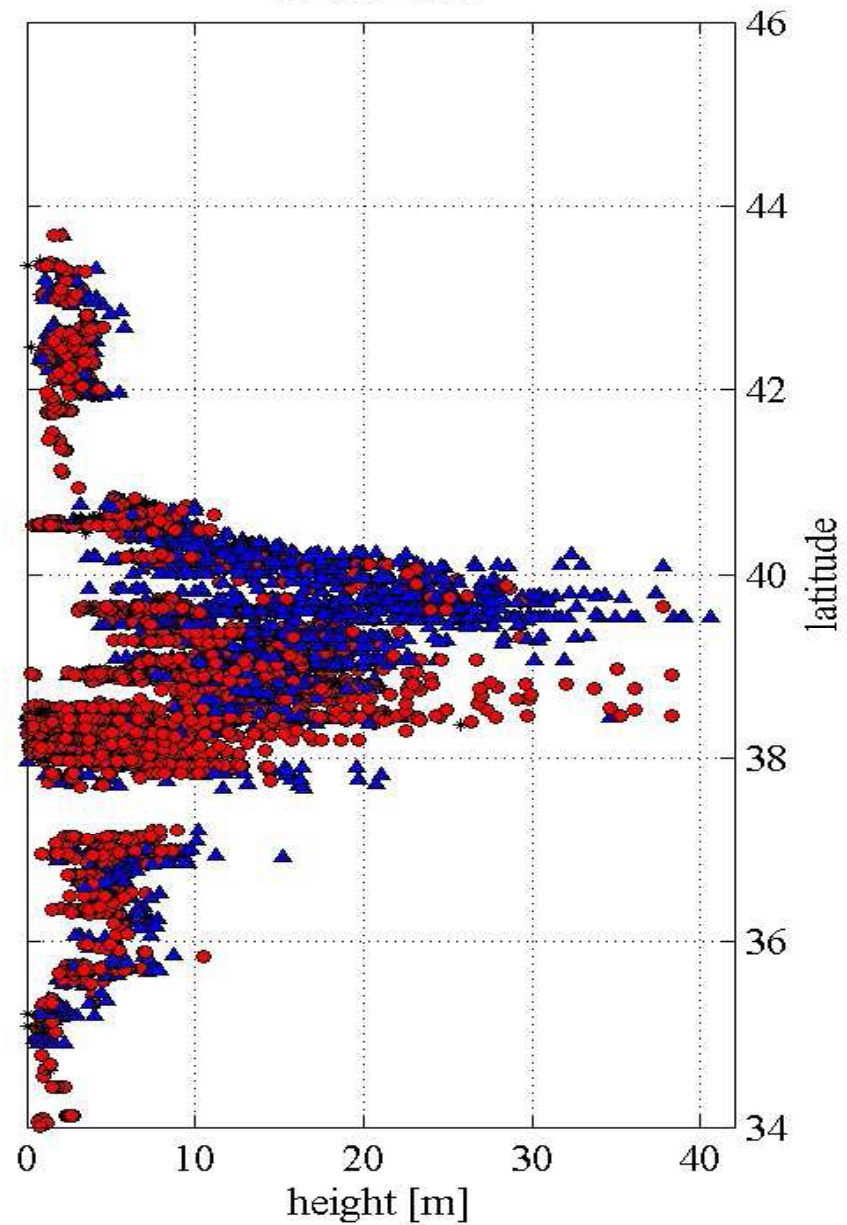
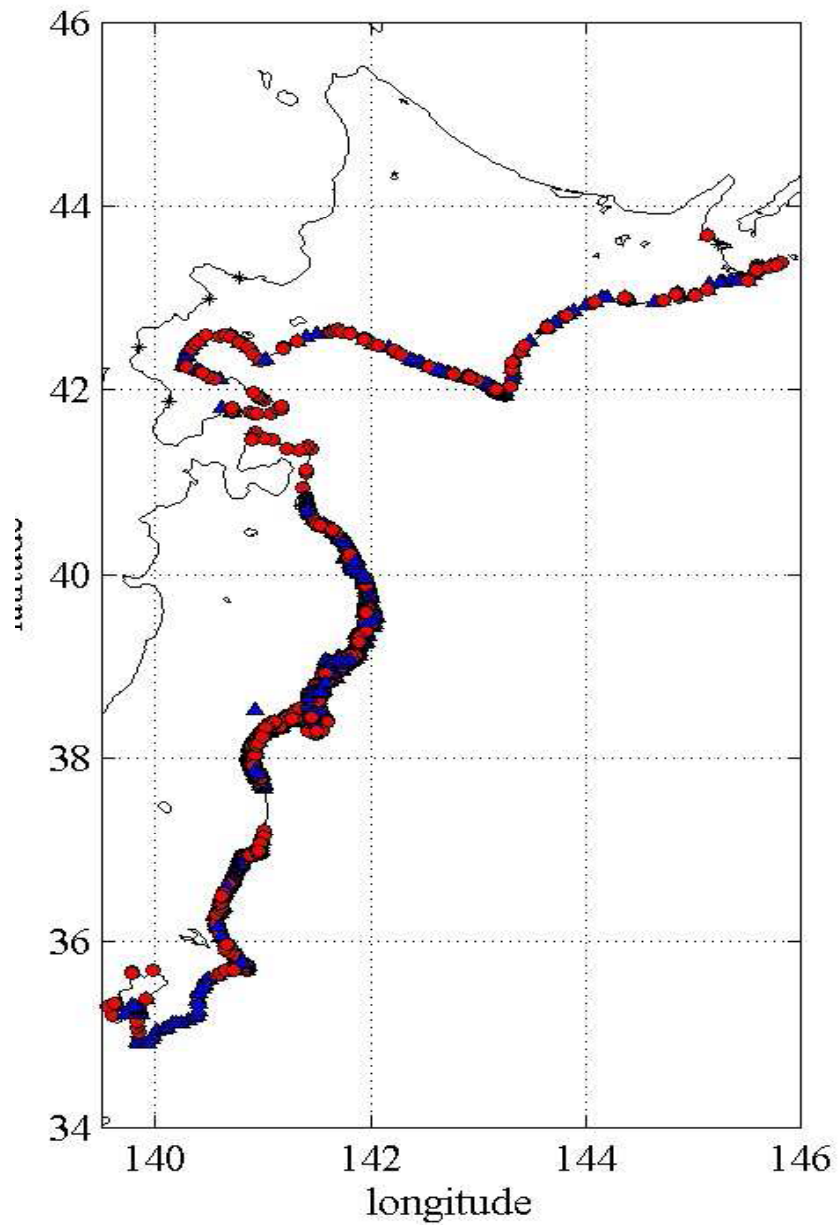


Total number of aftershocks (M>5.0, 2011.03.11-05.06)

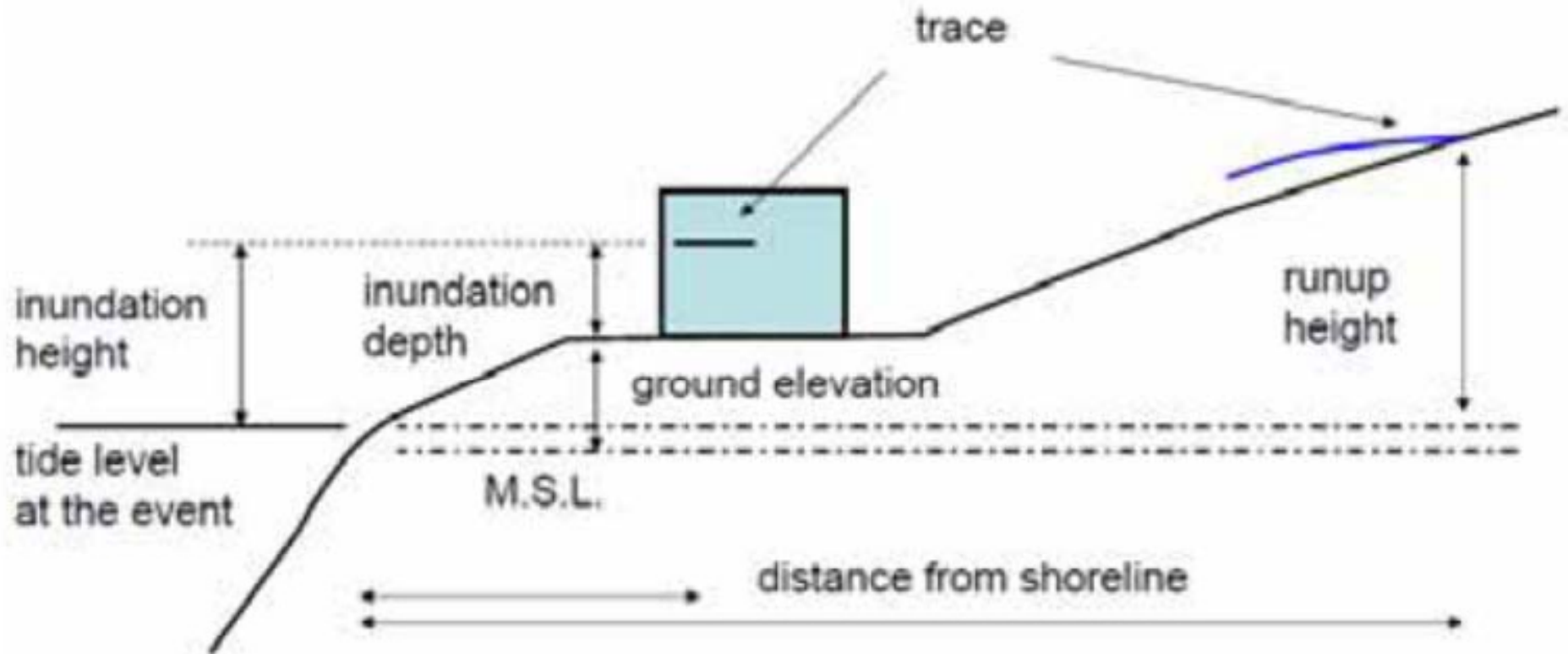
Total number of aftershocks of this EQ is 4 times that of the 1994 East Off Hokkaido EQ.

Inundation and run-up heights of tsunami

05-Jul-2011



Tsunami terminology



Maximum run-up height at Miyako City: 39.7m

Maximum inundation height st Sendai plain: 19.5m

Great tsunami hit residential area.



3月11日15:55撮影；共同通信社ヘリ

Overturn of building





Most of RC buildings were not damaged severely even in coast area.

Damage by ground shaking and liquefaction



Damage by tsunami (Scouring and washing away)



福島県新地町



No damage to earthquake-proofing pipe



No damage to earthquake-proofing pipe



Lessons Learned

- Prediction of recurrence intervals and magnitude of earthquakes is imprecise
- Disaster planning should consider extreme events
- Earthquake-resistant products and design practices continue to improve
- The “unthinkable” can happen

Next Steps

- Continue to assess seismic vulnerability of Metropolitan facilities
- Support WRF with technology transfer on water system seismic practices
- Continue disaster recovery planning with member agencies
- Evaluate innovative products and design techniques for applicability to Metrooolitan