Examination of tsunami fault model for the 17th century great earthquake in eastern part of Hokkaido.

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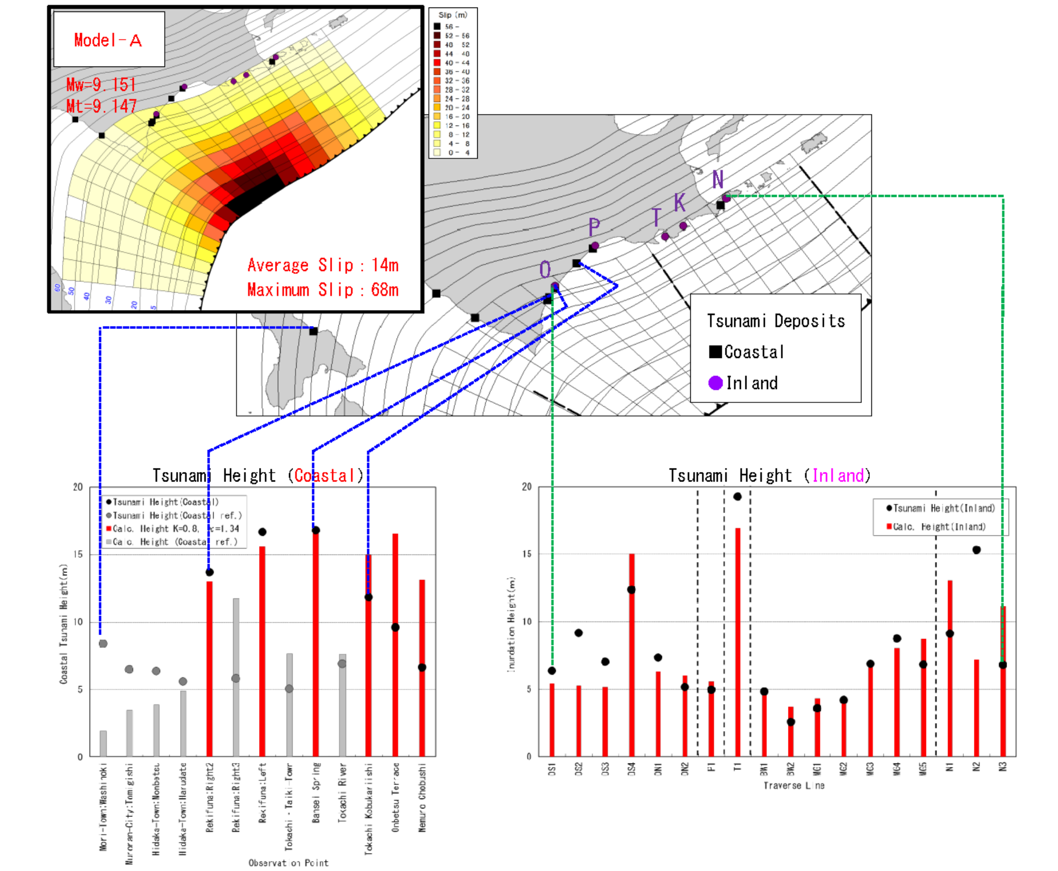
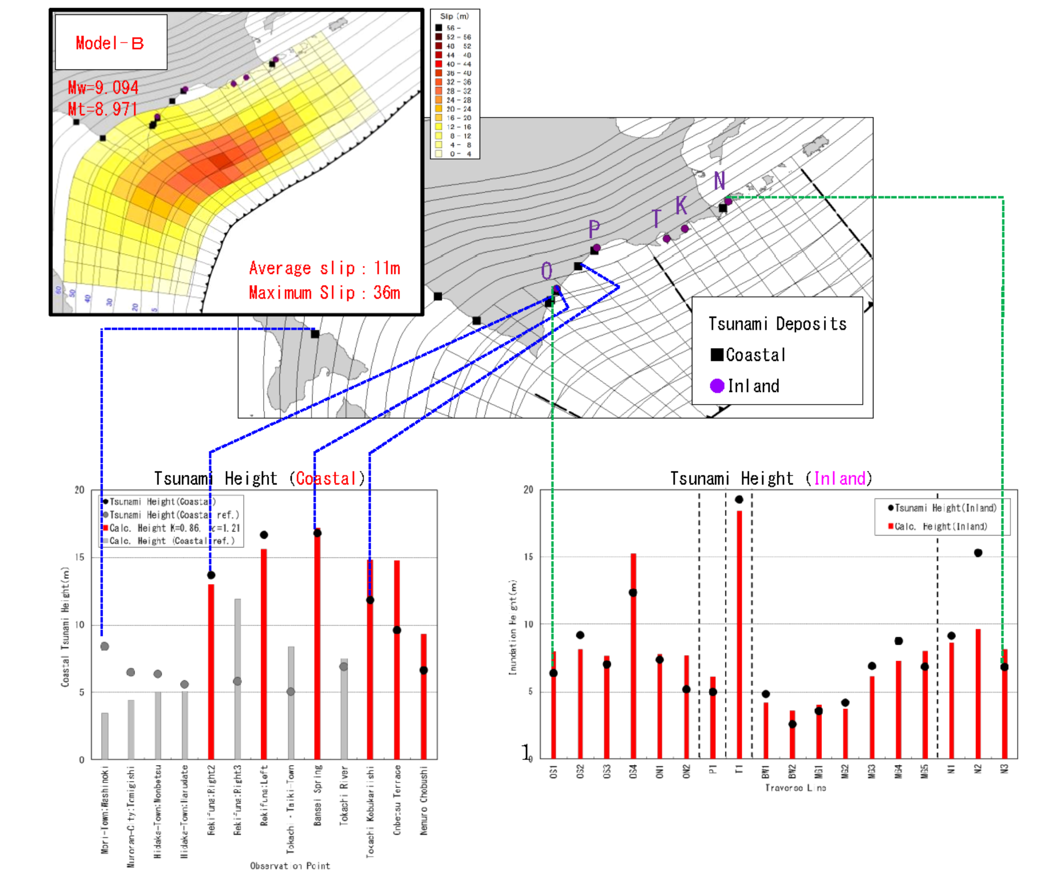
The Cabinet Office is conducting examination of the largest class earthquakes occurring in the Japan Trench and the Kuril Trench in the “Council for studying megaquake models in the Japan trench and the Kuril trench (established in February 2015)". As a part of the council, Yokota et al. (2015) re-examined tsunami fault model for the 2011 off the Pacific coast of Tohoku Earthquake and currently construct tsunami fault model for the 17th century great earthquake in eastern part of Hokkaido.
Compared with Nankai Trough, there is a small amount of historical data for the 17th century great earthquake. However, investigation of the tsunami deposits for the 17th century great earthquake has been actively carried out not only near the coast but also in inland areas (e.g. Nanayama et al. (2003); Hirakawa et al. (2005)). Some researchers (e.g. Satake et al. (2008); Ioki and Tanioka (2016)) reported the tsunami fault model that explained inundation and coastal tsunami heights estimated by the deposits data. They tried to estimate the tsunami fault model with a few rectangle fault planes that explained inundation and coastal tsunami heights using tsunami forward simulations.
In this study we estimated the fault slip distribution on the Kuril plate using tsunami inversion analysis with inundation and coastal tsunami height data. To solve the inversion, it is crucial whether the fault slip reaches to the Kuril Trench or not. Therefore we assumed two models, i.e. Model-A and Model-B. The slip of Model-A reaches to the Kuril Trench, but that of Model-B does not reach to the Kuril Trench.
Characteristics of Model-A and Model-B are as follows:
1) Model-A : Mw=9.2, Mt=9.1
Maximum slip is 68 meters and average one is 14 meters.
2) Model-B : Mw=9.1, Mt=9.0
Maximum slip is 36 meters and average one is 11 meters.
Although the two models equally reproduce inundation and coastal tsunami heights, the obtained slip near the Kuril Trench of Model-A is much larger than that of Model-B. One of the reasons for this is that the dip angle of the plate near the Kuril Trench is smaller than that of the plate at the deeper region of the fault and the slip near the Kuril Trench of Model-A must be larger to generate powerful tsunami.

Keywords: tsunami fault model, tsunami deposit, inversion, earthquake hazard assessment


Model-A
Mw=9.151
Mt=9.147
Average Slip : 14m
Maximum Slip : 68m
Slip (m)
N
K
T
P
O
Tsunami Deposits
Coastal
Inland
Tsunami Height (Coastal)
Coastal Tsunami Height(m)
Observation Point
Tsunami Height (Inland)
Traverse Line


Model-B
Mw=9.094
Mt=8.971
Average slip : 11m
Maximum Slip : 36m
Slip (m)
N
K
T
P
O
Tsunami Deposits
Coastal
Inland
Tsunami Height (Coastal)
Coastal Tsunami Height(m)
Observation Point
Tsunami Height (Inland)
Traverse Line