

The 2011 Tohoku-oki tsunami in Sendai and its neighborhood

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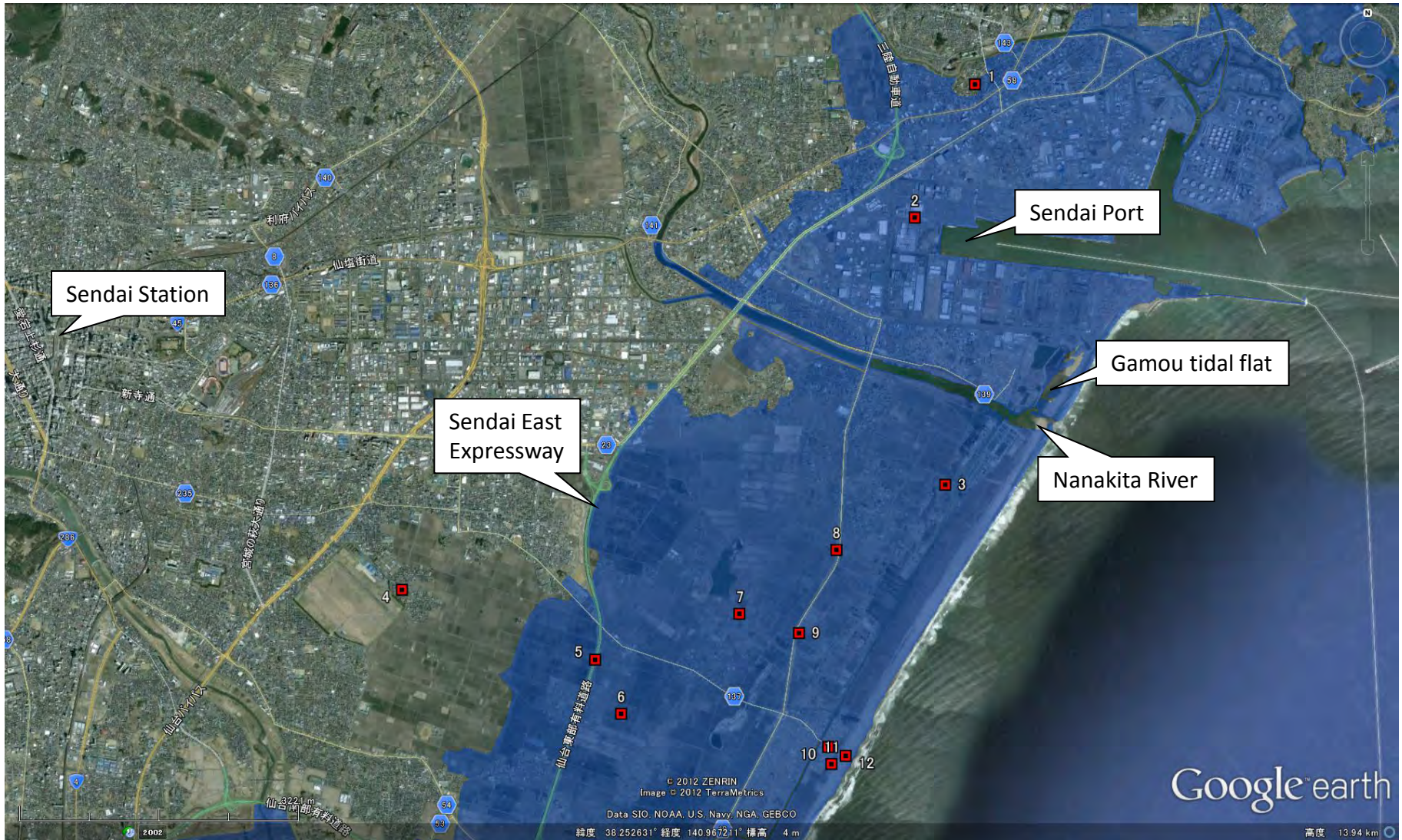
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Field guide in Sendai on 12th Nov. 2012 (Mon)

North area (Sendai & Tagajo)



Inundation area is based on Japan Society of Geoinformatics (<http://www.jsgi-map.org/tsunami/>)

South area (Sendai & Natori)



Inundation area is based on Japan Society of Geoinformatics (<http://www.jsgi-map.org/tsunami/>)

[1] Tsunami evacuation hill

- The small hill, called *Sueno-matsuyama*, has been well known from legends of the Jogan tsunami
- The hill was not flooded by both the AD869 Jogan and the 2011 Tohoku-oki tsunamis



2011.03.31



2011.03.31

[2] Sendai Port

- Numbers of cars were washed and piled up everywhere around this area
- These cars were drifted even inside the exhibition hall
- Container traffic in Sendai Port was restarted 3 months after the tsunami (8th June)



2011.03.18



2011.03.18

[3] Neighborhood of Nanakita River

- Destruction of sewage works brought hygienic matters to Sendai City
- Tidal flat of Gamou area was buried by sand.
- The mouth of Nanakita River was recently closed due to sand drift by coastal current



2011.03.17



2011.03.18

[4] A shrine with tsunami legend

- Name of the shrine (*Nami-wake*, dividing a wave) implies some connection with past tsunamis
- The shrine was established during Edo Period (AD1702), although no historical tsunami has been documented at that time



2010.01.29



2010.01.29

[5] Sendai East Expressway

- Embankment of the roadway worked as a breakwater
- Damages of the east side of the road is quite severe, in contrast to that of the west side



2011.03.12



2011.03.12

[6] Rice paddies

- Sendai Plain is an alluvium (flood) plain, and people developed the rice paddies on the back marshes
- The AD869 Jogan tsunami deposit can be found around 50cm below the ground surface



2010.01.29



2011.04.14

[7] Neighborhood of pond

- Many trenches and holes due to liquefaction and erosion are found along the shore-parallel artificial constructs, such as roadway
- The tsunami deposited a 20-cm-thick sand layer
- Soils were washed out and plow sole of the paddies are exposed



2011.06.05



2011.06.05

[8] Outcrop of the Jogan tsunami deposit

- The 2011 tsunami excavated the paddies and created many trenches, which is deep enough to reach sediments deposited over 1,000 years ago
- ~~The Jogan tsunami layer can be seen on the wall of a trench~~
- Now the old tsunami deposit is exposed on the surface



2011.06.05



2011.06.05

[9] Small shrine

- A small wooden shrine is located at 1.2km from the coast
- Although inundation depth around this shrine is 1.6m (tsunami height of 3m), it survived without any notable damage



2011.03.17



2011.04.06

[10] Ruins of Arahama community

- The community was located at 200-300m from the beach
- Almost all houses were washed away (now everything has been removed by clearing work, and what one can see is foundations of the houses)
- Photos below were taken at same locations before and after the tsunami



2010.01.29



2011.04.05

[11] Control forest

- Coastal areas in Sendai Bay was characterized by broad (500-700 m width) forests of pine trees
- They were planted during Edo Period to prevent salt damages
- Many of them were knocked down and were drifted inland by the tsunami



2010.01.29



2011.03.17

[12] Sandy beach

- Geomorphologic change of the beach side of Arahama community seems to be moderate, in contrast with the damages of the backland
- Breakwaters (blocks) were not moved even the tsunami reached around 10 meters above the sea level



2010.01.29



2011.03.18

[13] Lagoon (Ido-ura)

- The lagoon was once separated by a 2 km-long sand bar
- ~~The sand bar was completely broken and now the lagoon is connected directly with the open sea~~
- The lagoon is now going to be buried by drifted sands



2011.06.05



2011.05.14

[14] Ruins of Fujitsuka community

- The scene of the tsunami attack and destruction of the community was taken by the aerial-live of NHK
- Flow velocity on land estimated from the video is around 6 m/s (22 km/h)



2011.03.12



2011.03.12

[15] Ruins of Yuriage community

- The fishery town was totally flattened due to the tsunami
- Many fires happened probably due to the gas leak from collapsed houses
- The tsunami flooded the 5-6 m high mound, which was built by dredged sediments from Teizan Canal



2011.06.24



2011.06.24

[16] Inland of Yuriage community

- The aerial live also took the scene of the tsunami invasion, which came up with numbers of cars, boats, houses with fire, and debris
- This area was flooded and occupied by longer time by debris and many other things



2011.04.22



2011.04.22

[17] Sendai Airport

- Full-inundation lasted around 2 weeks after the tsunami
- Operation of Sendai Airport was restarted on 1 month after the tsunami (13th April)
- Farmlands are severely damaged by massive erosion and deposition

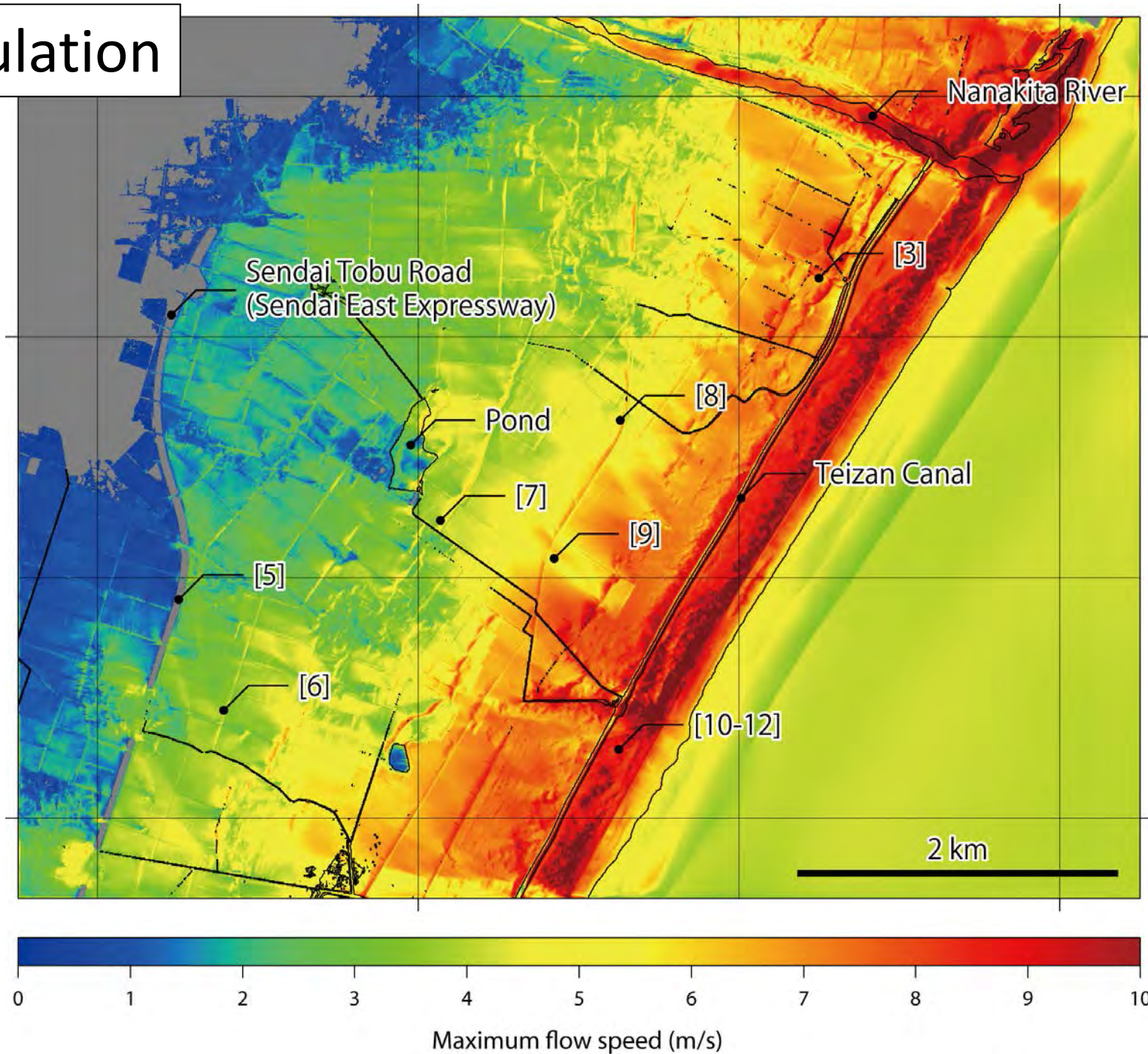


2011.03.17

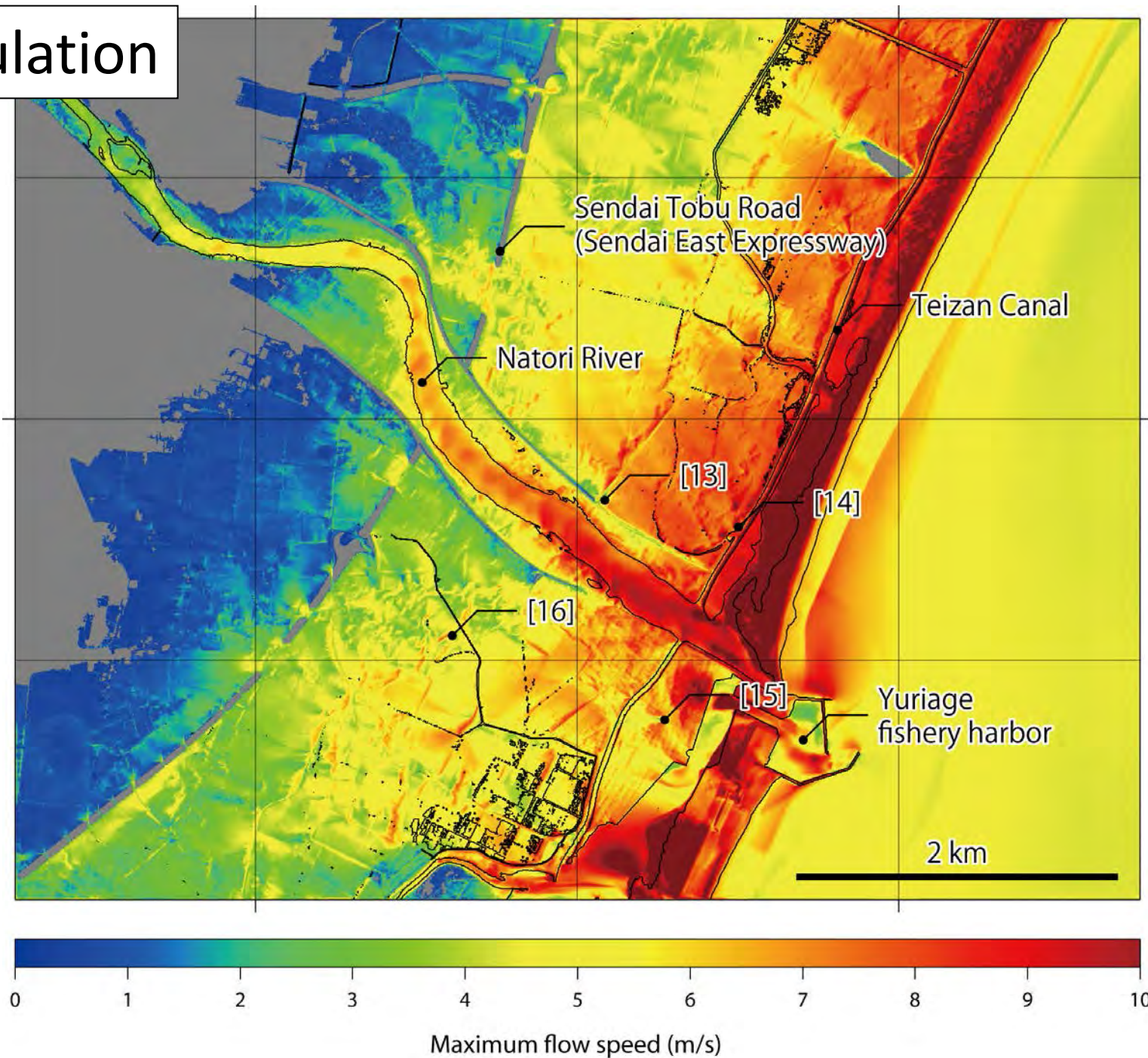


2011.05.26

Simulation



Simulation



Simulation

