

**JHOD's activities
against
the catastrophic disaster
caused by
huge earthquakes and tsunamis**

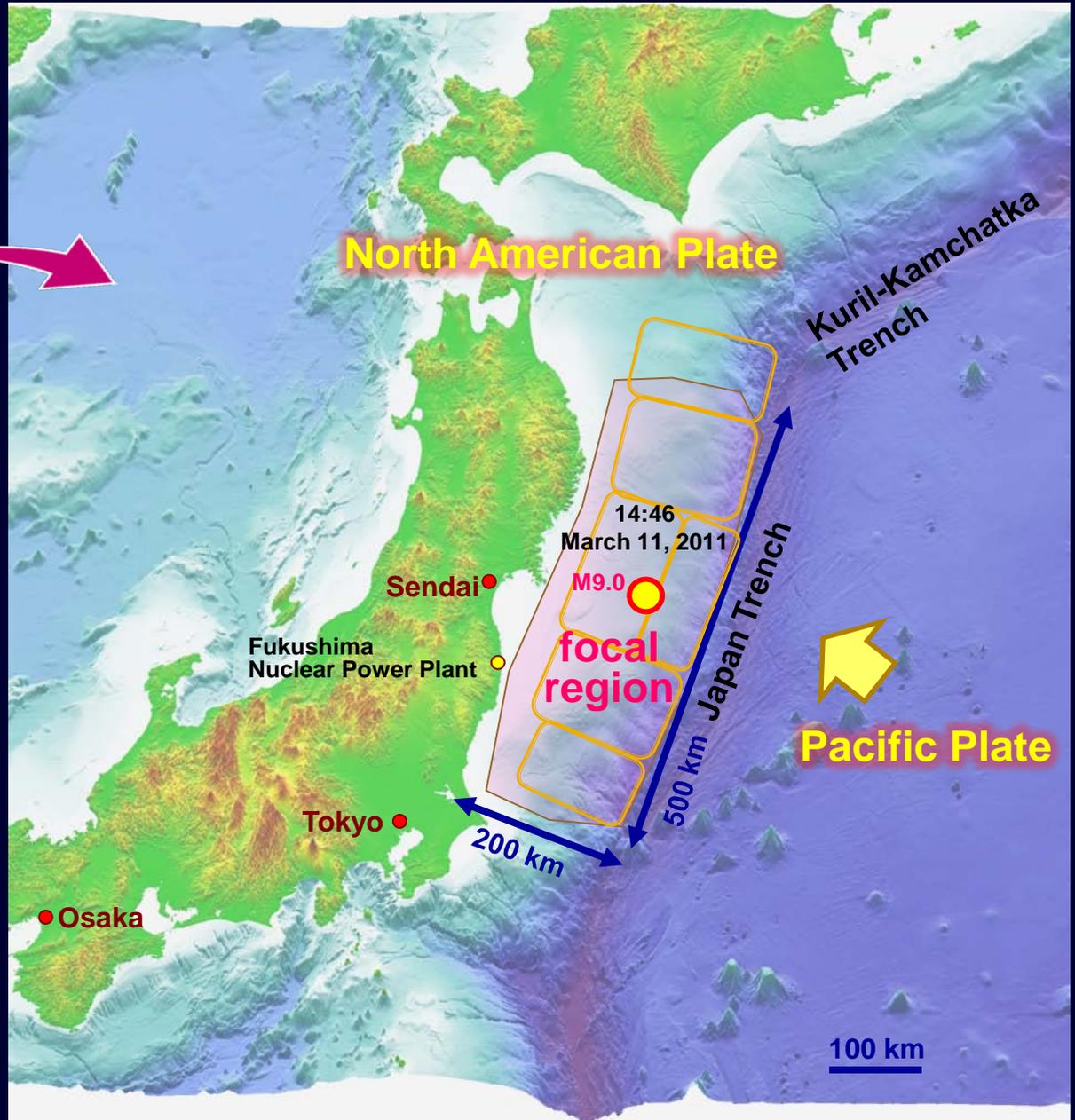
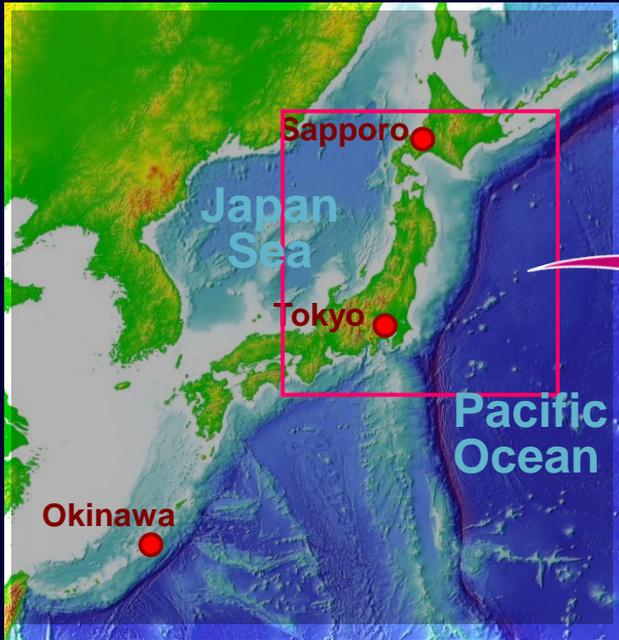


**Taisei MORISHITA, Hiroaki SAITO and Shin TANI
Hydrographic and Oceanographic Department (JHOD)
Japan Coast Guard**

Contents of my talk

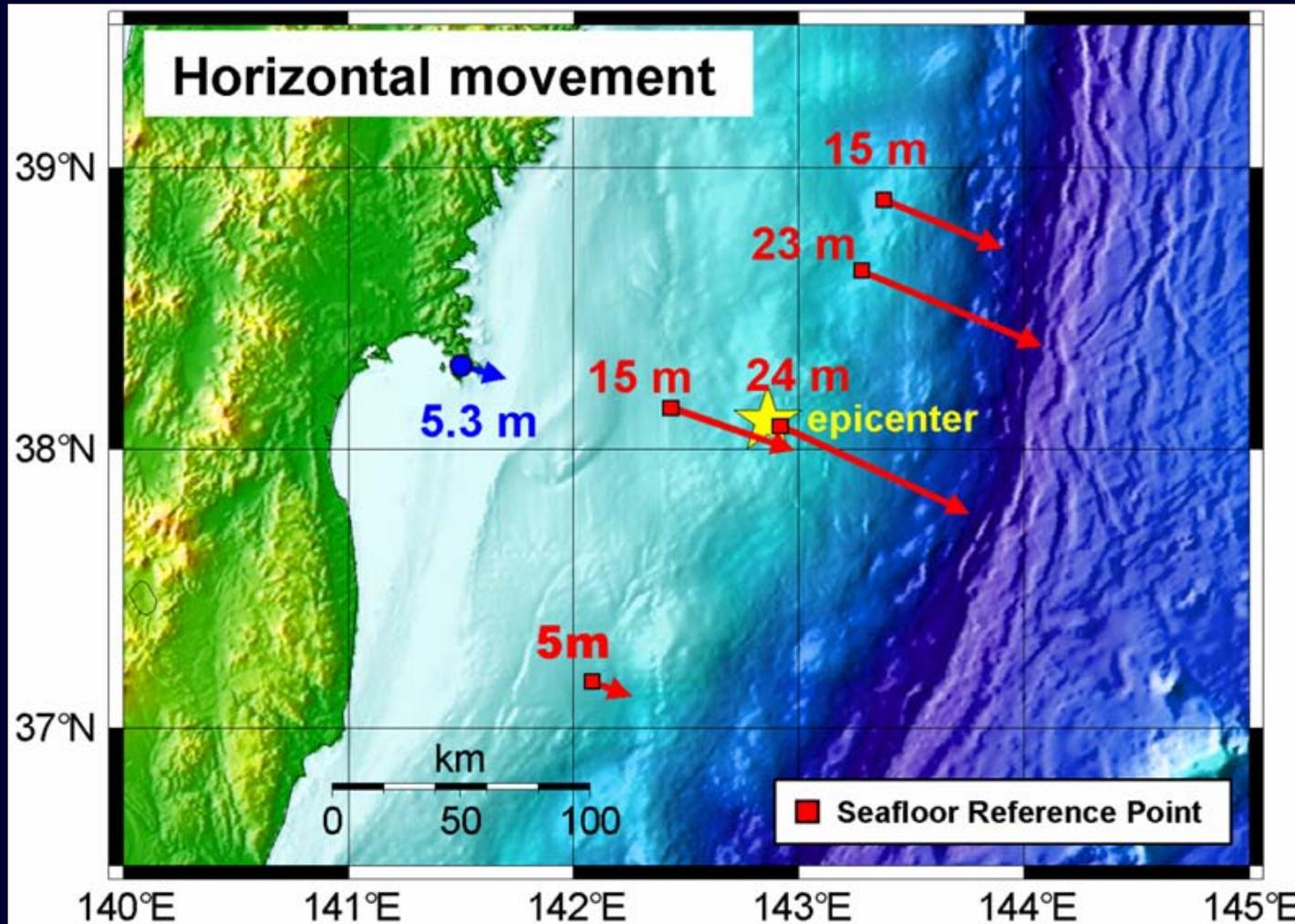
- 1. Earthquake and Tsunami (review)**
- 2. JHOD's Response Activities (overview)**
- 3. Hydrographic Surveys**
- 4. Progress and Future**

Earthquake



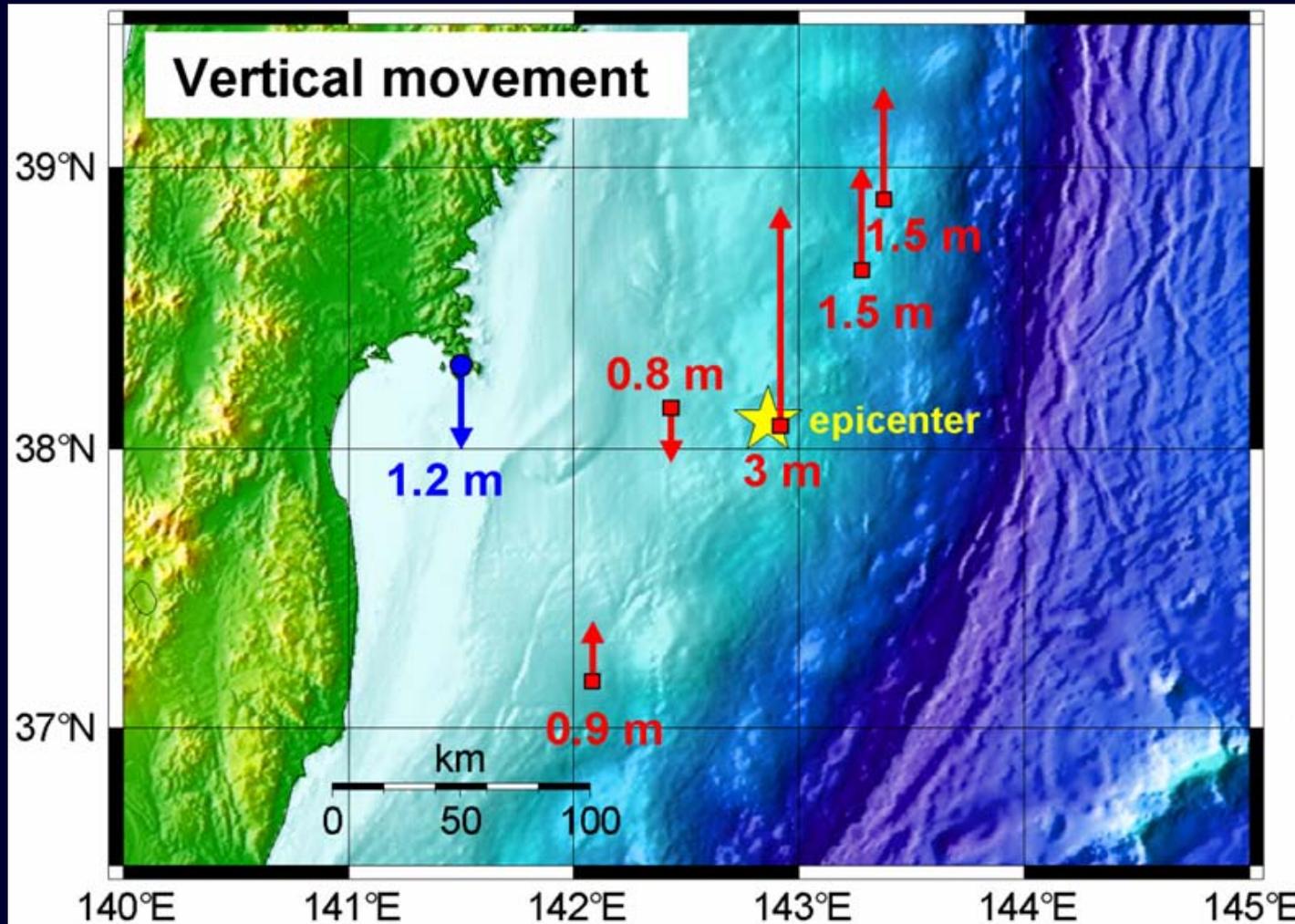
Crustal movement

Seafloor geodetic observation by JHOD



Crustal movement

Seafloor geodetic observation by JHOD



Tsunamis



JHOD's response activities

- Navigational warning



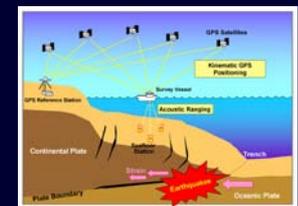
- Drift trajectory prediction



- Hydrographic surveys



- Seafloor geodetic observation



- Revision of nautical charts



Hydrographic surveys

- **Phase 1** (from March to April)
 - surveys for access to ports and harbors
- **Phase 2** (from May)
 - surveys for revision of nautical charts

Urgent needs for access to ports



- geographical condition of devastated areas
 - spotted along the long east coast
 - failures of on-land transports

➔ **isolated**

needs for delivery of relief supplies by sea

JHOD's Survey Fleet

HL01 *Shoyo*



GTN: 3,000 t
Completed: 1998

HL03 *Meiyo*



GTN: 550 t
Completed: 1990

HL02 *Takuyo*



GTN: 2,400 t
Completed: 1983

HL04 *Tenyo*

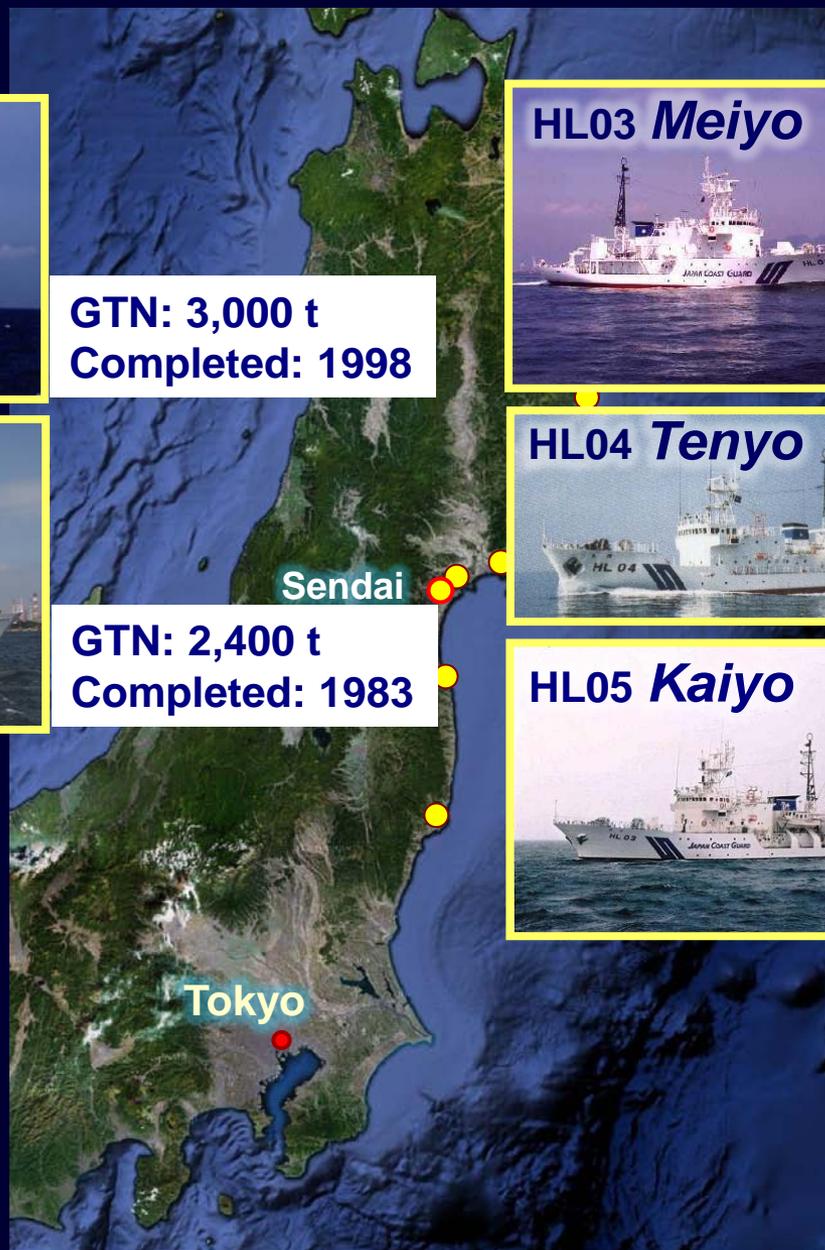


GTN: 430 t
Completed: 1986

HL05 *Kaiyo*



GTN: 550 t
Completed: 1993



When the earthquake occurred ...

HL01 *Shoyo*



HL02 *Takuyo*



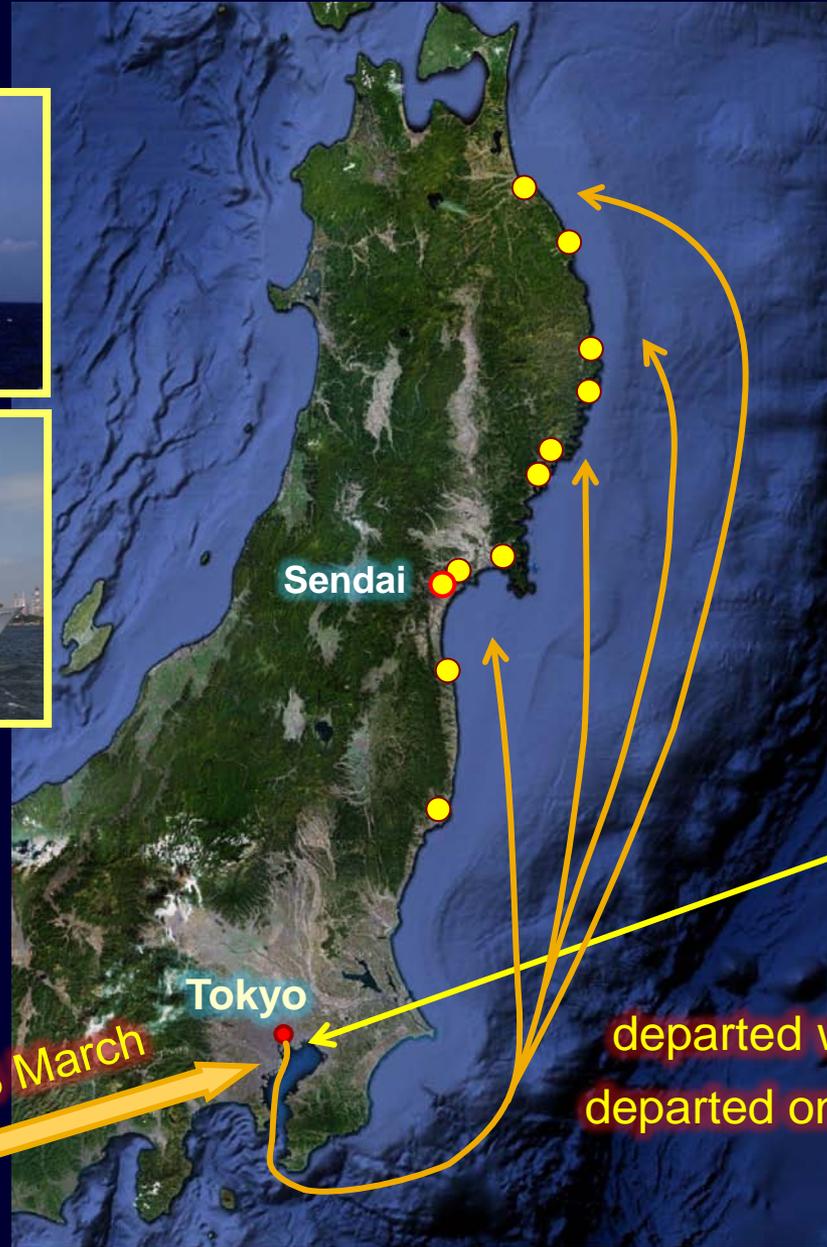
HL03 *Meiyo*



HL04 *Tenyo*



HL05 *Kaiyo*



got back on 13 March

departed within 24 hours.
departed on 14 March

Obstruction survey



Used instruments

■ Side scan and interferometric sonar

SYSTEM 3000, SYSTEM3900, CM2

■ Multibeam echo sounder

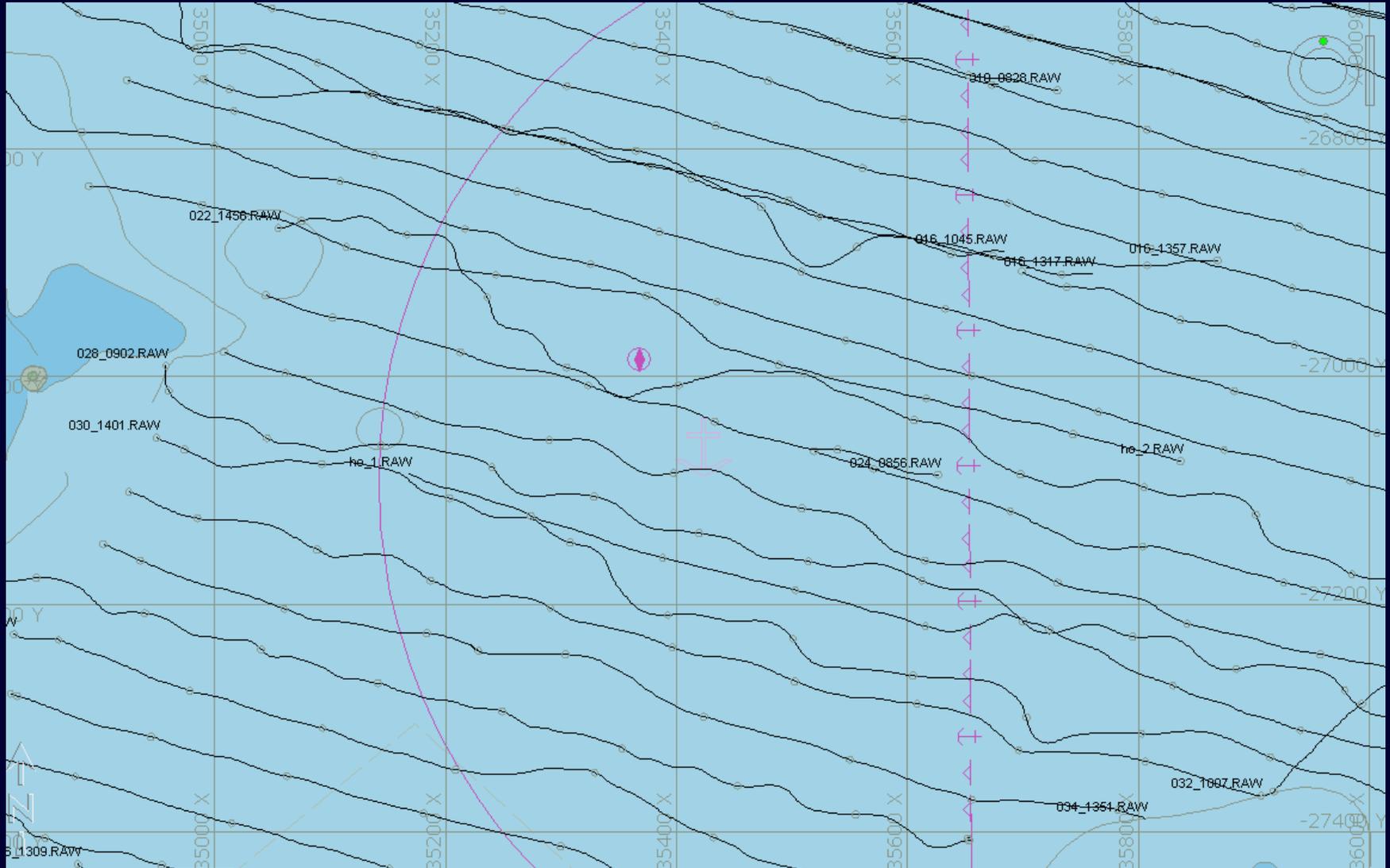
(onboard craft) SEABAT8125

(mother vessel) SEABEAM1180, EM710S, EM302, SEABEAM2112

■ Single-beam echo sounder

(onboard craft) PDR-601, PDR-8000

“Meandering” ship tracks



What annoyed us

fishing net



tangled rope



“Strong Buddy”

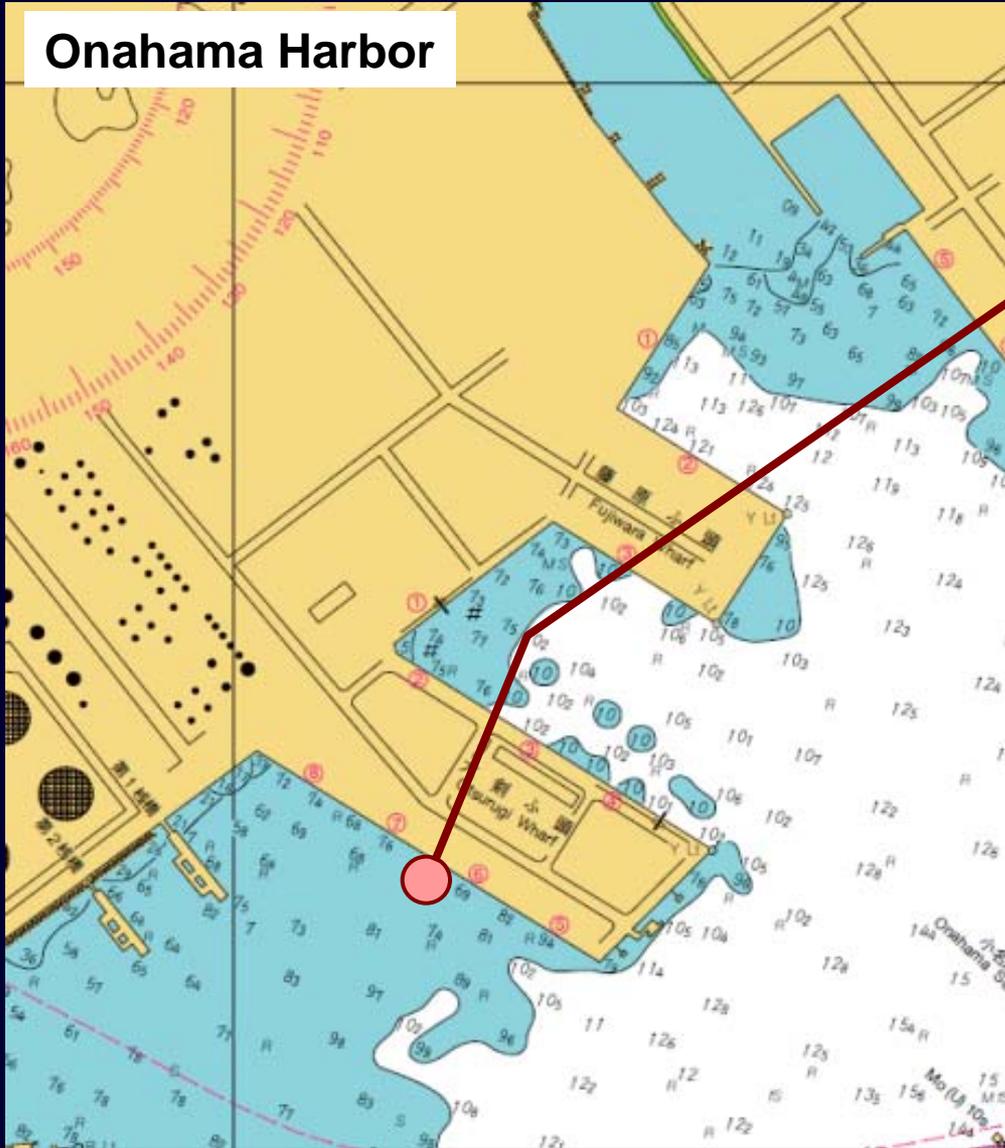


**Divers from Maritime Self-Defense Forces
(to remove tangled nets and ropes)**

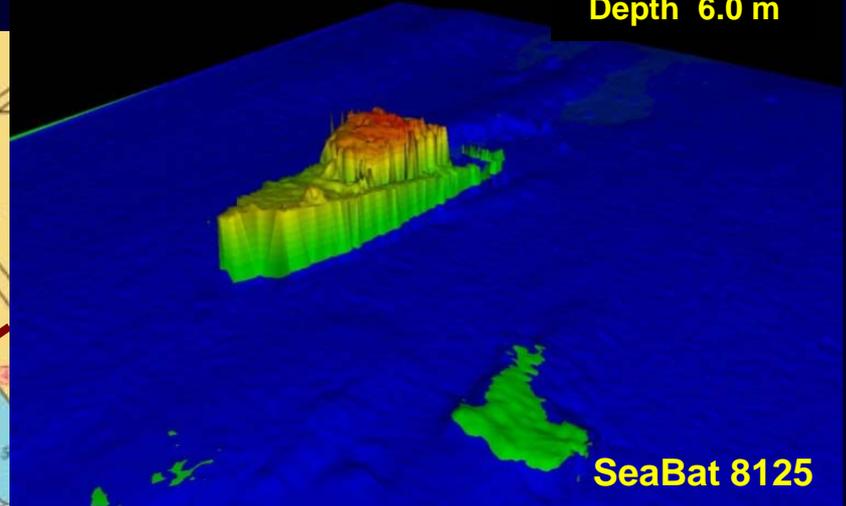
@Shiogama

Detected obstructions

Onahama Harbor

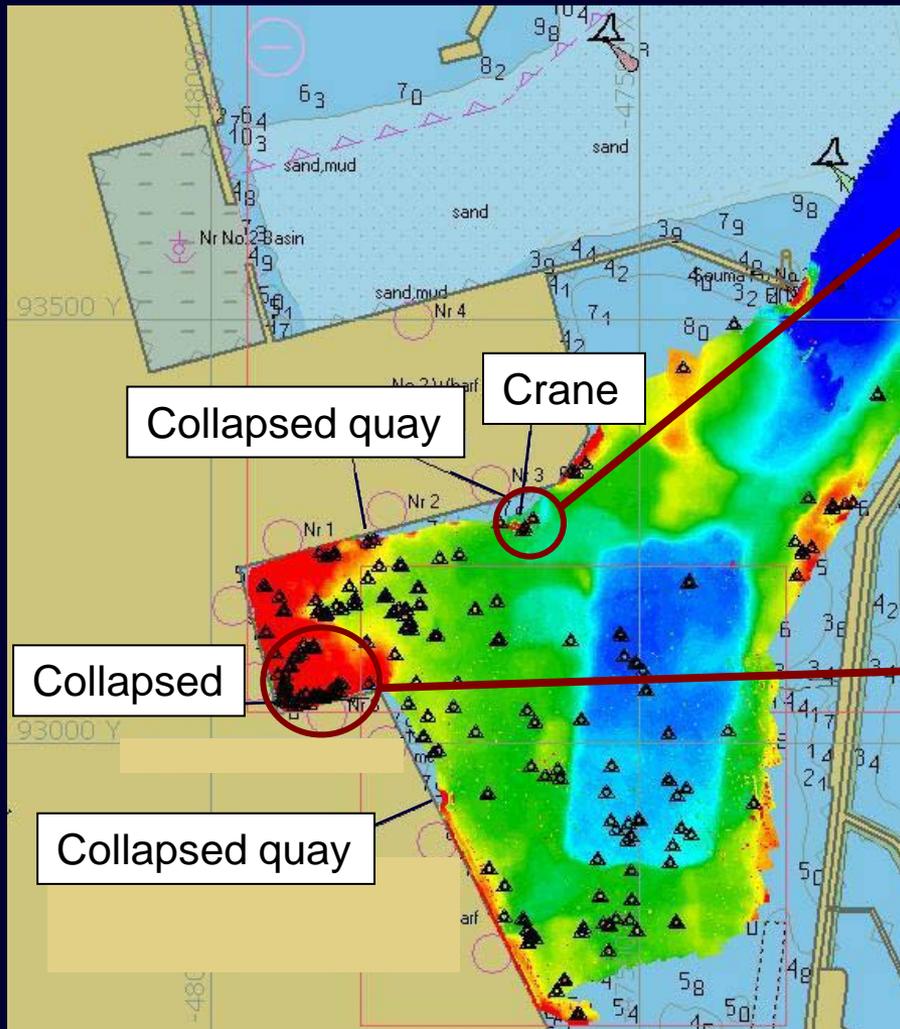


36-55-24.2 N
140-52-10.7 E
Height 2.4 m
Depth 6.0 m

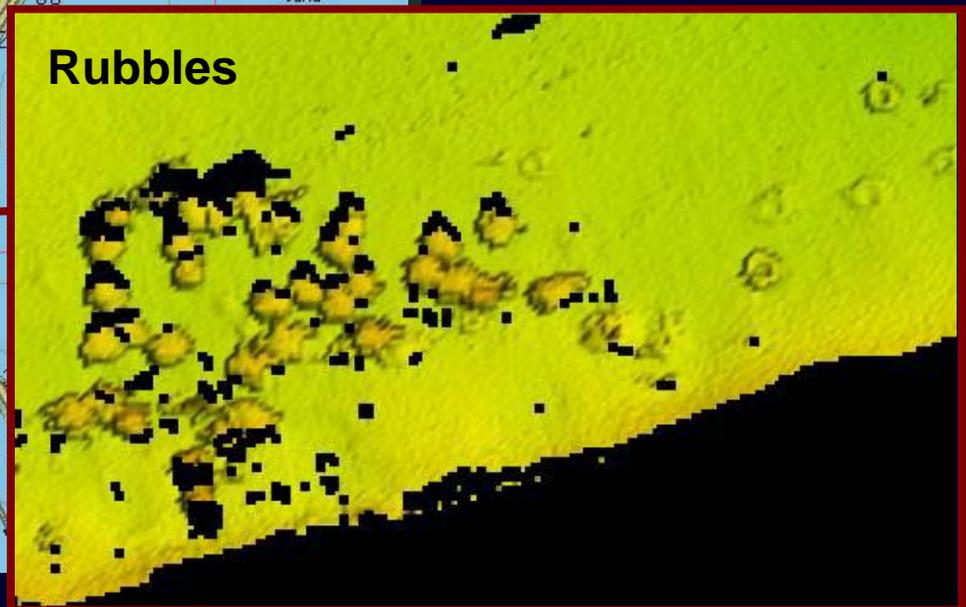


Detected obstructions

Soma Harbor, Fukushima

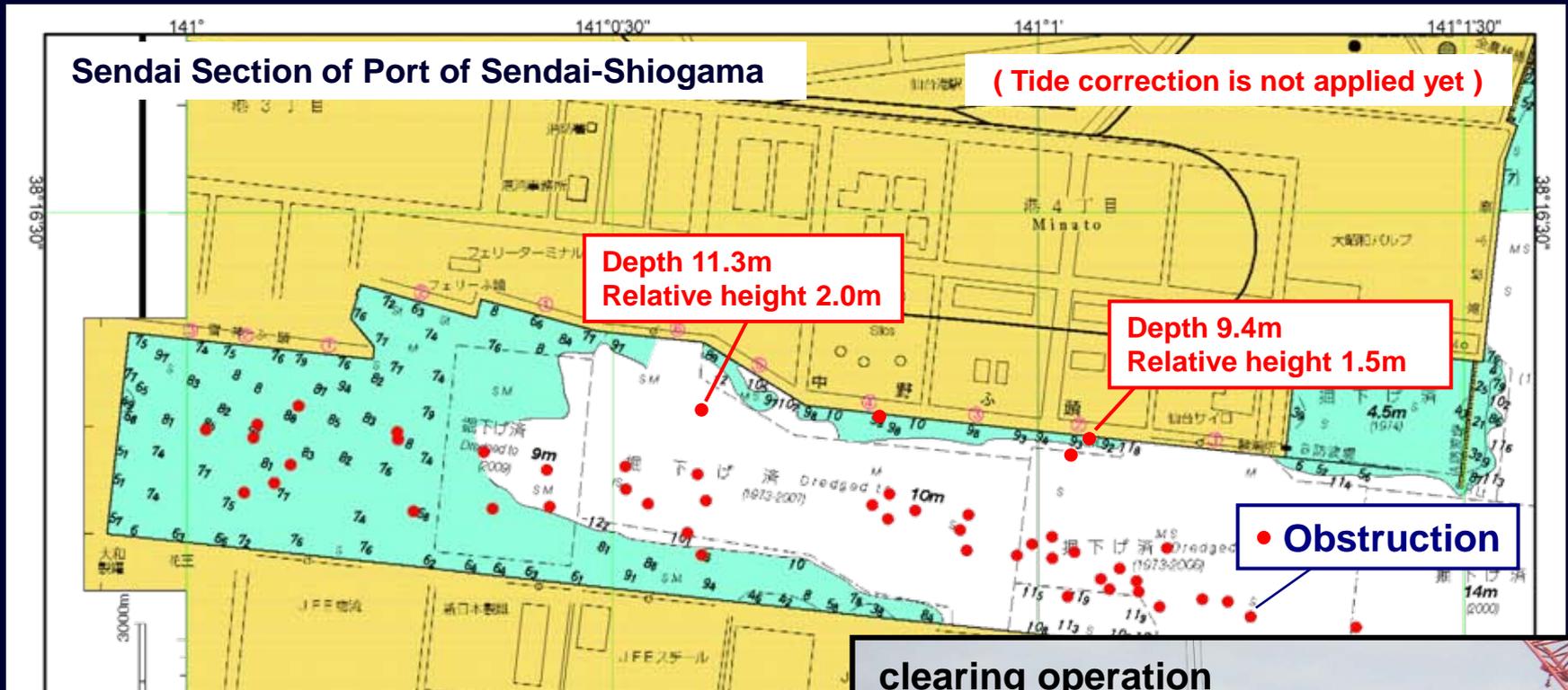


Fallen crane from the quay



Rubbles

Report to the Port Authority



Plotting the detected sea-bottom obstructions on a nautical chart

Informing the results to the port authority

Find them and clear a channel



March 15, 2011

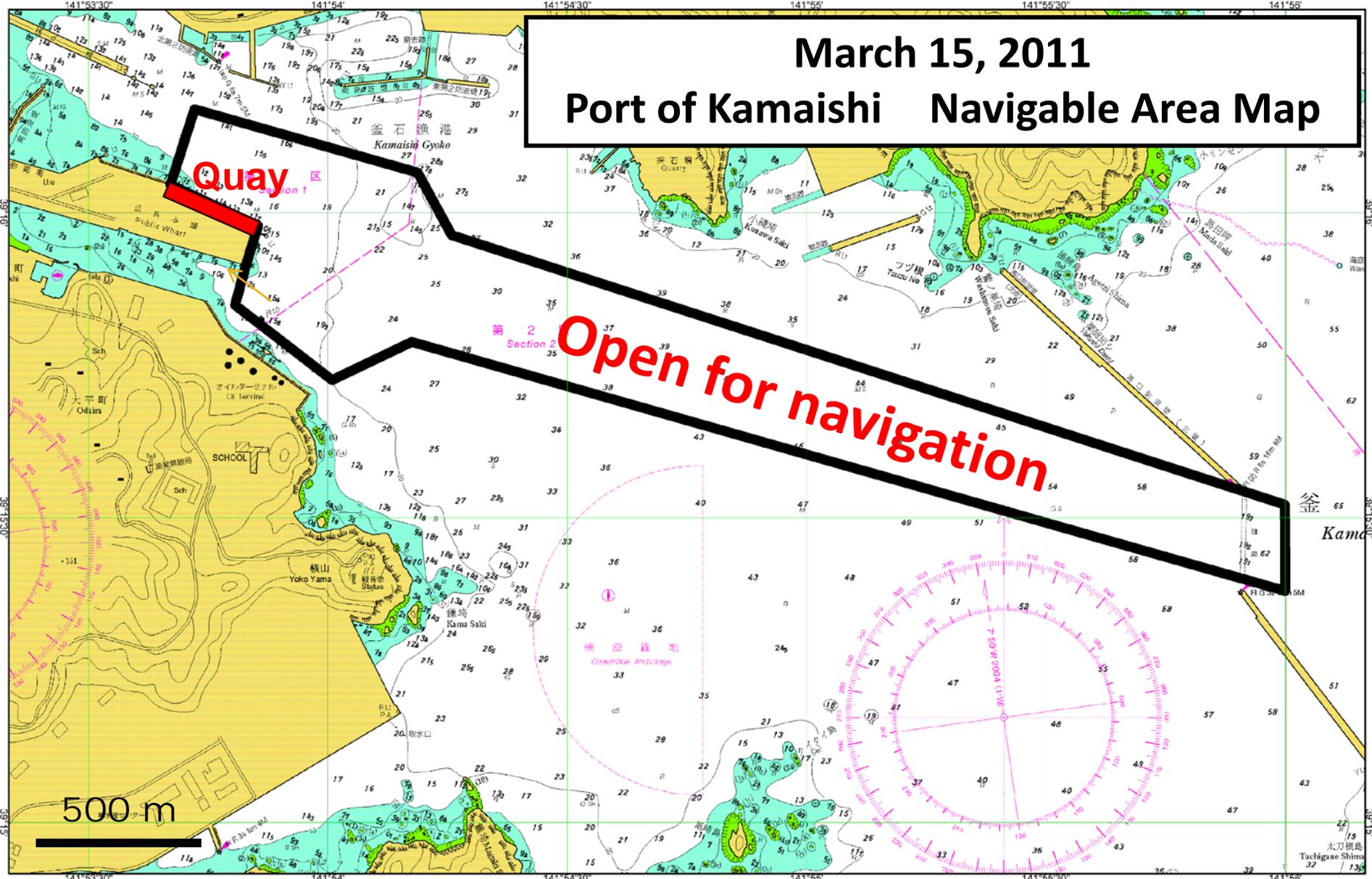
Port of Kamaishi Navigable Area Map

Quay

第 2 Section 2 **Open for navigation**

500 m

200 0 200 400 600 800 1000 1200 1400 1600 1800 2000 meters



Major ports got to revive on...

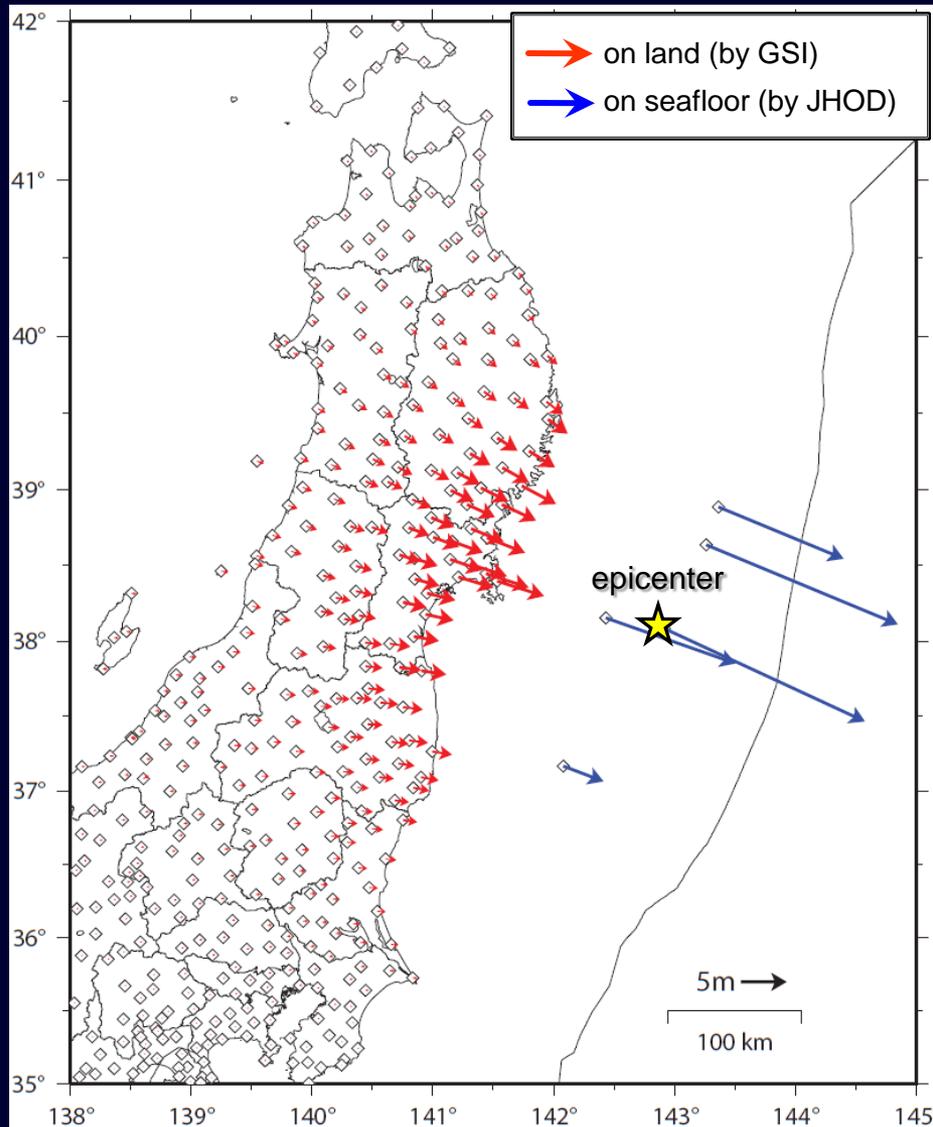


Hydrographic surveys

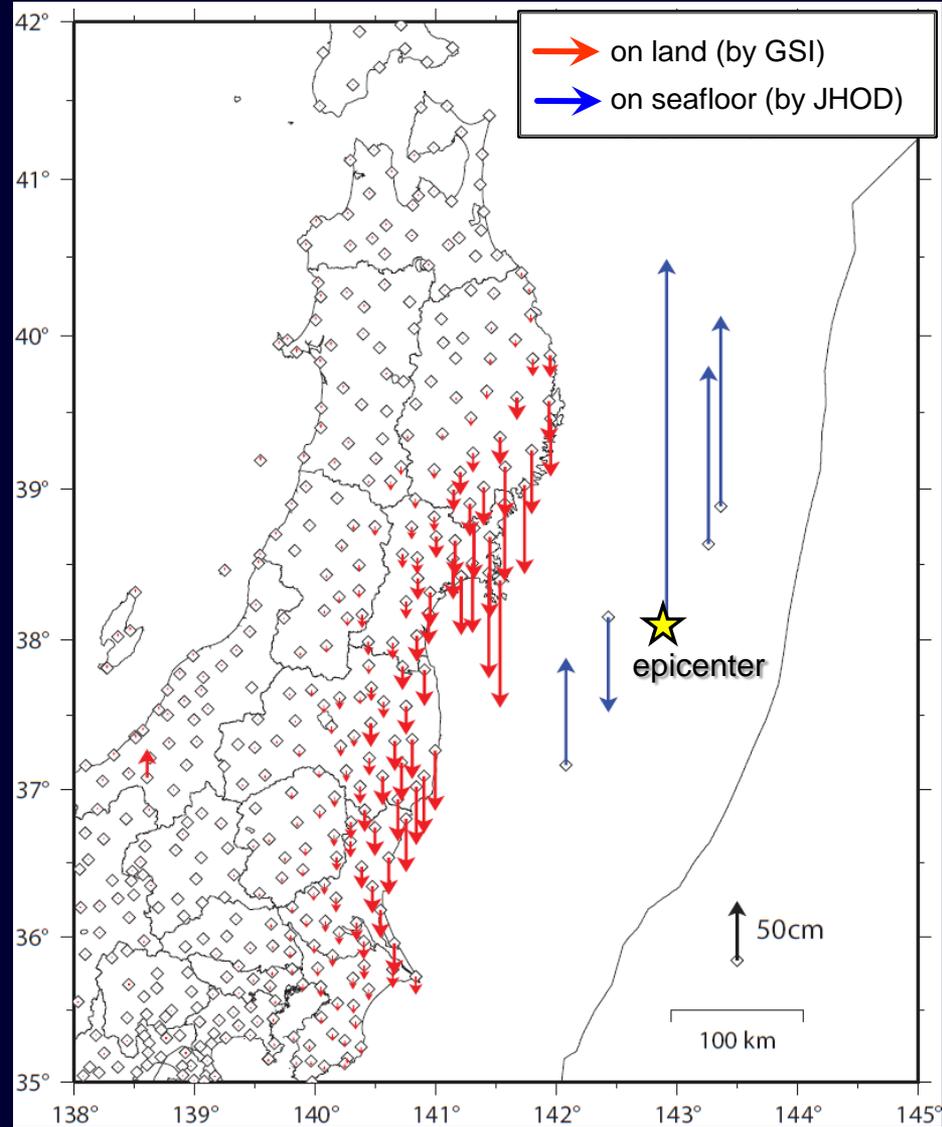
- **Phase 1** (from March to April)
 - surveys for access to ports
- **Phase 2** (from May)
 - surveys for revision of nautical charts

Crustal movement

Horizontal

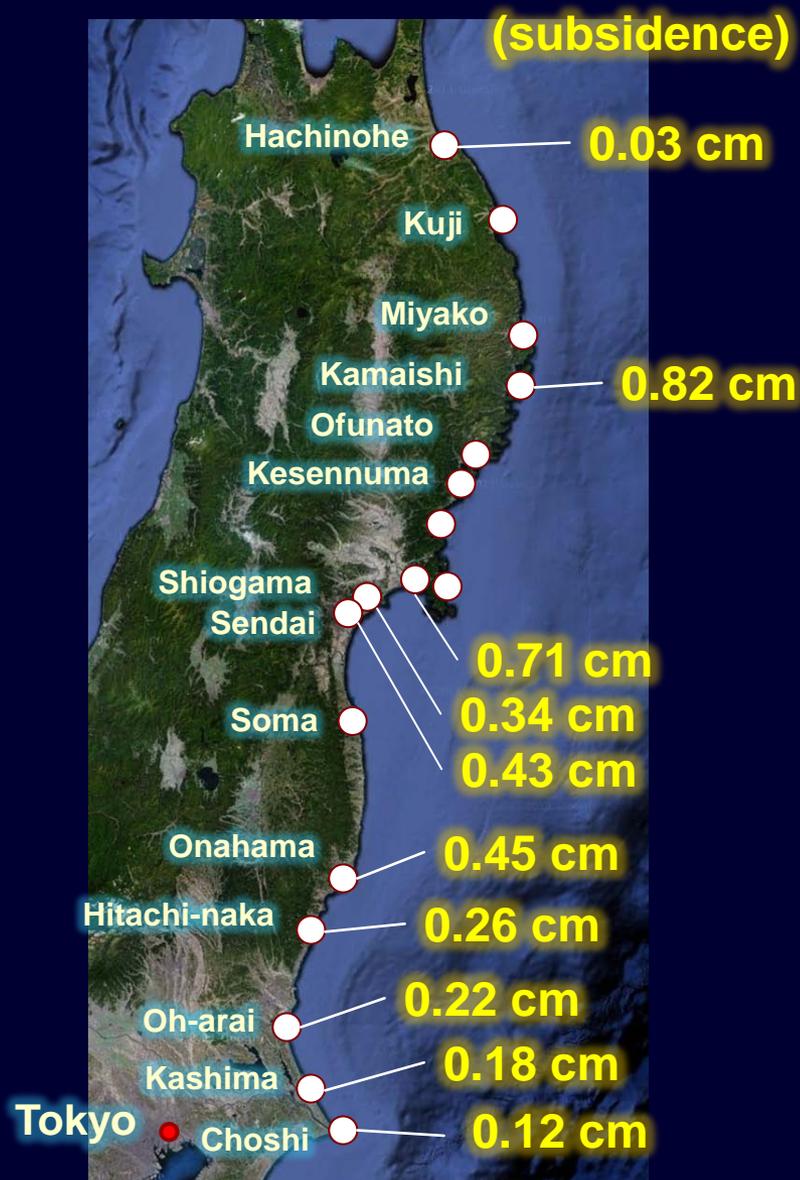
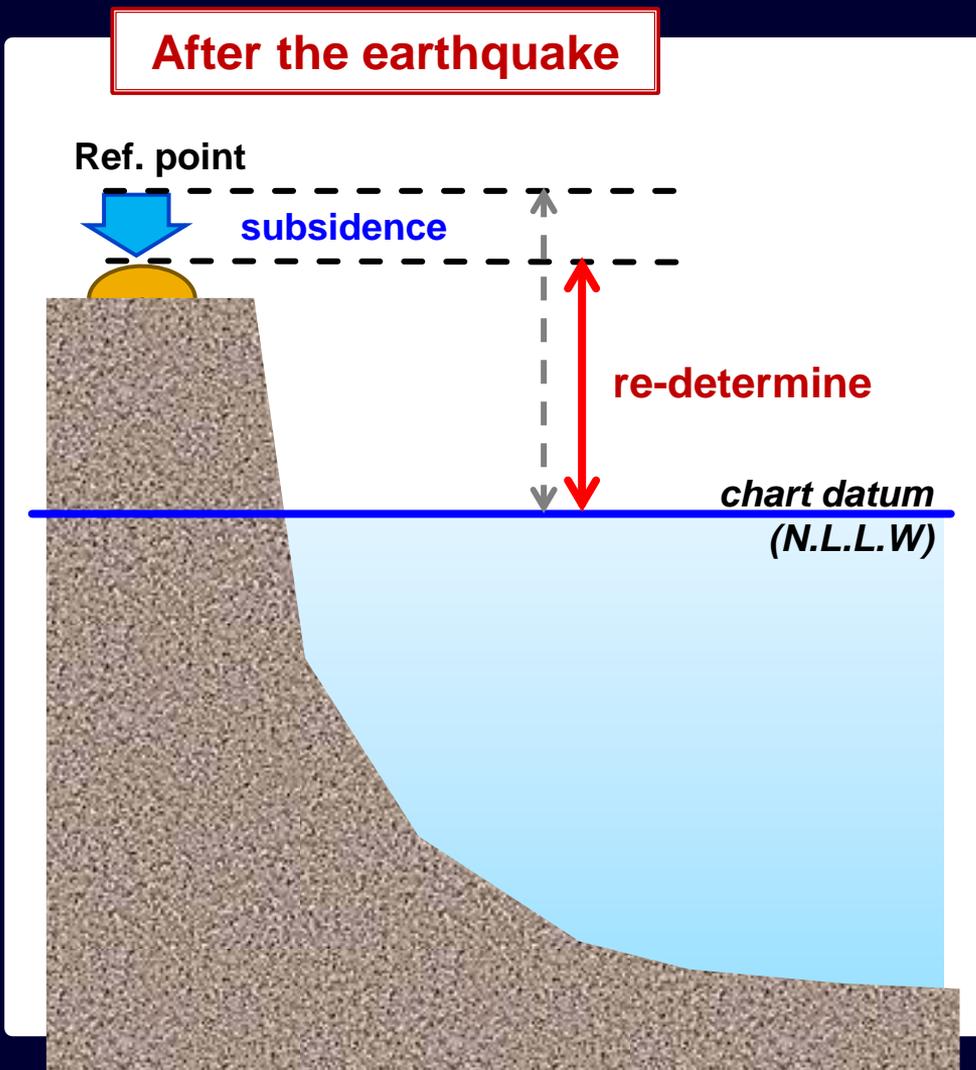


Vertical

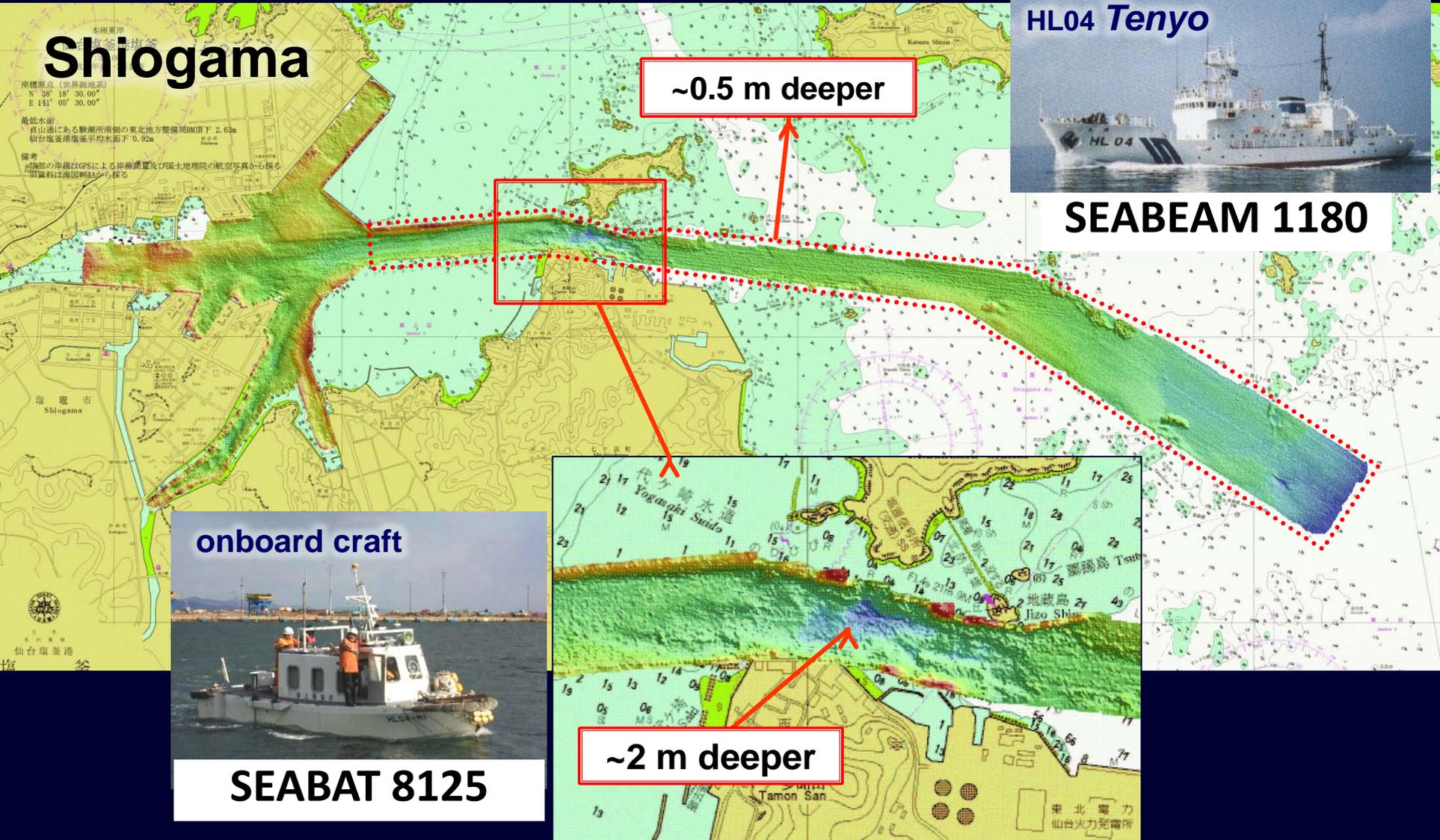


Revision of chart datums

(from April)

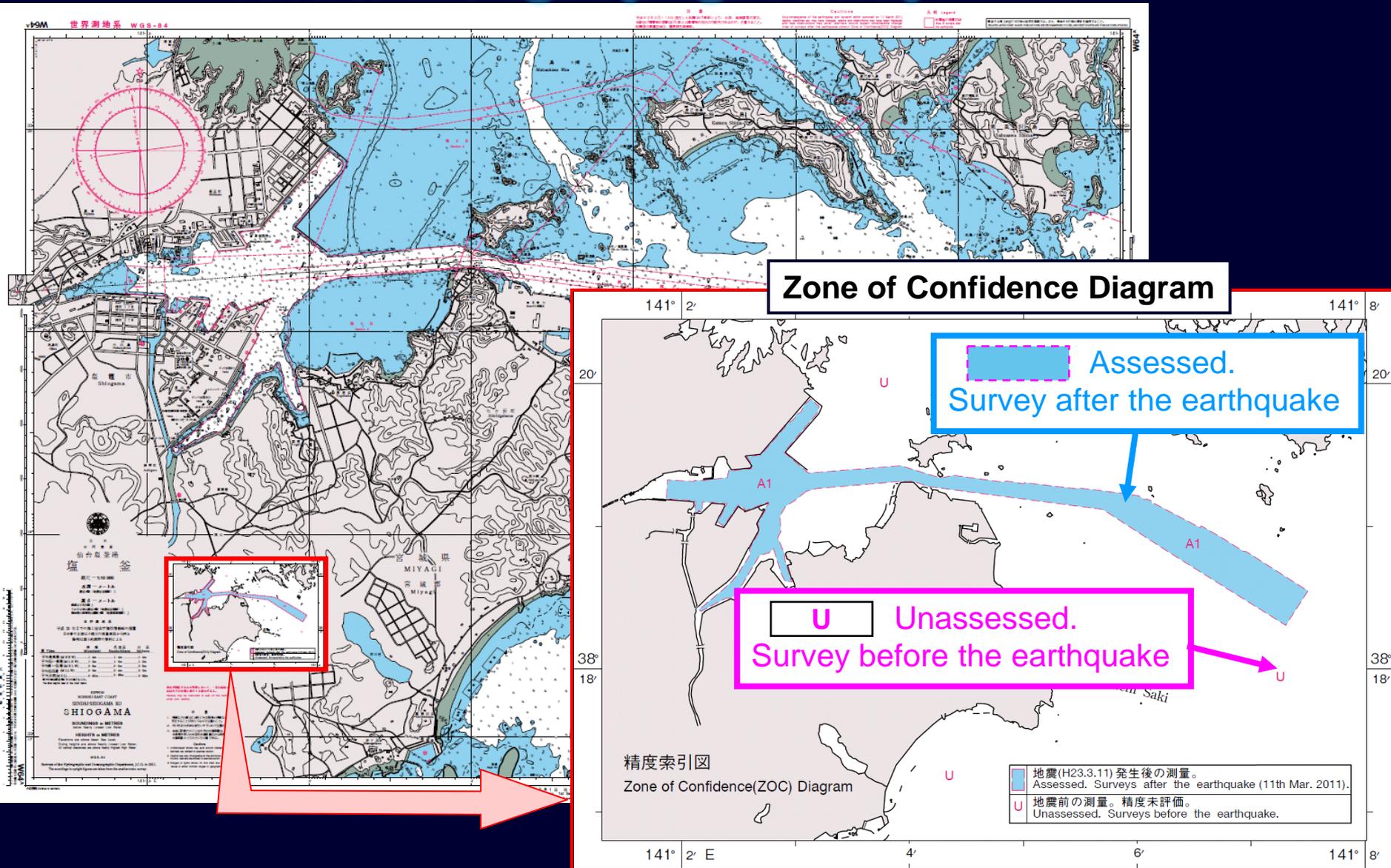


A result of multibeam survey



New edition chart (from September)

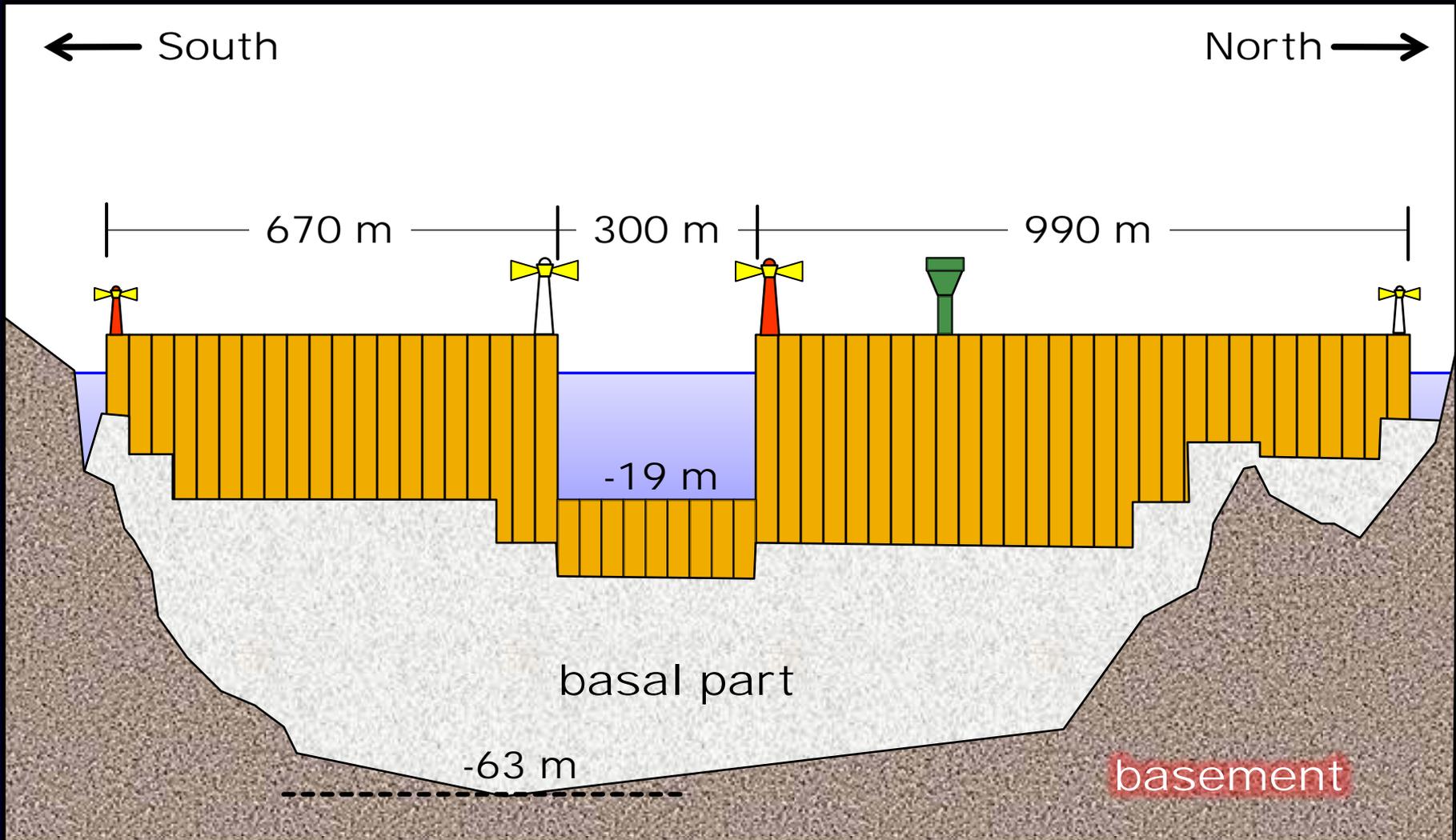
Port of Sendai-Shiogama (Shiogama Section)



Kamaishi Port

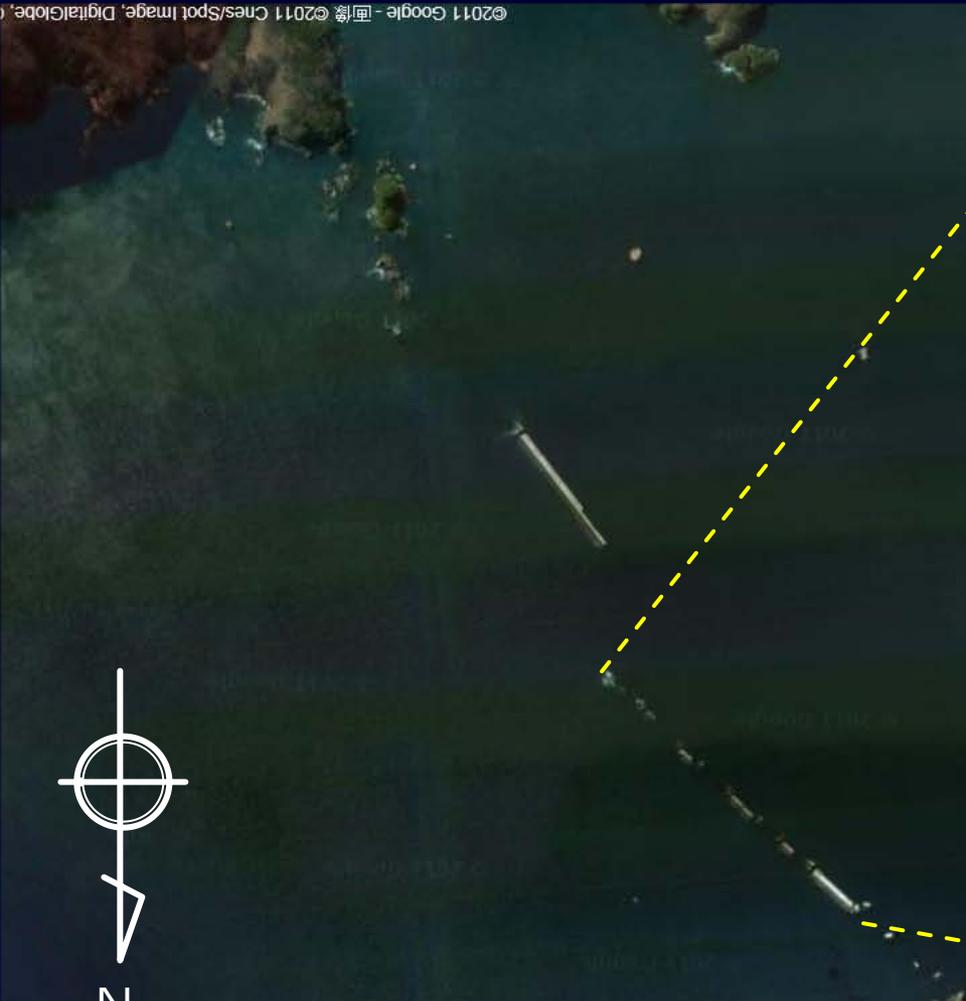


"Deepest" breakwater in the world



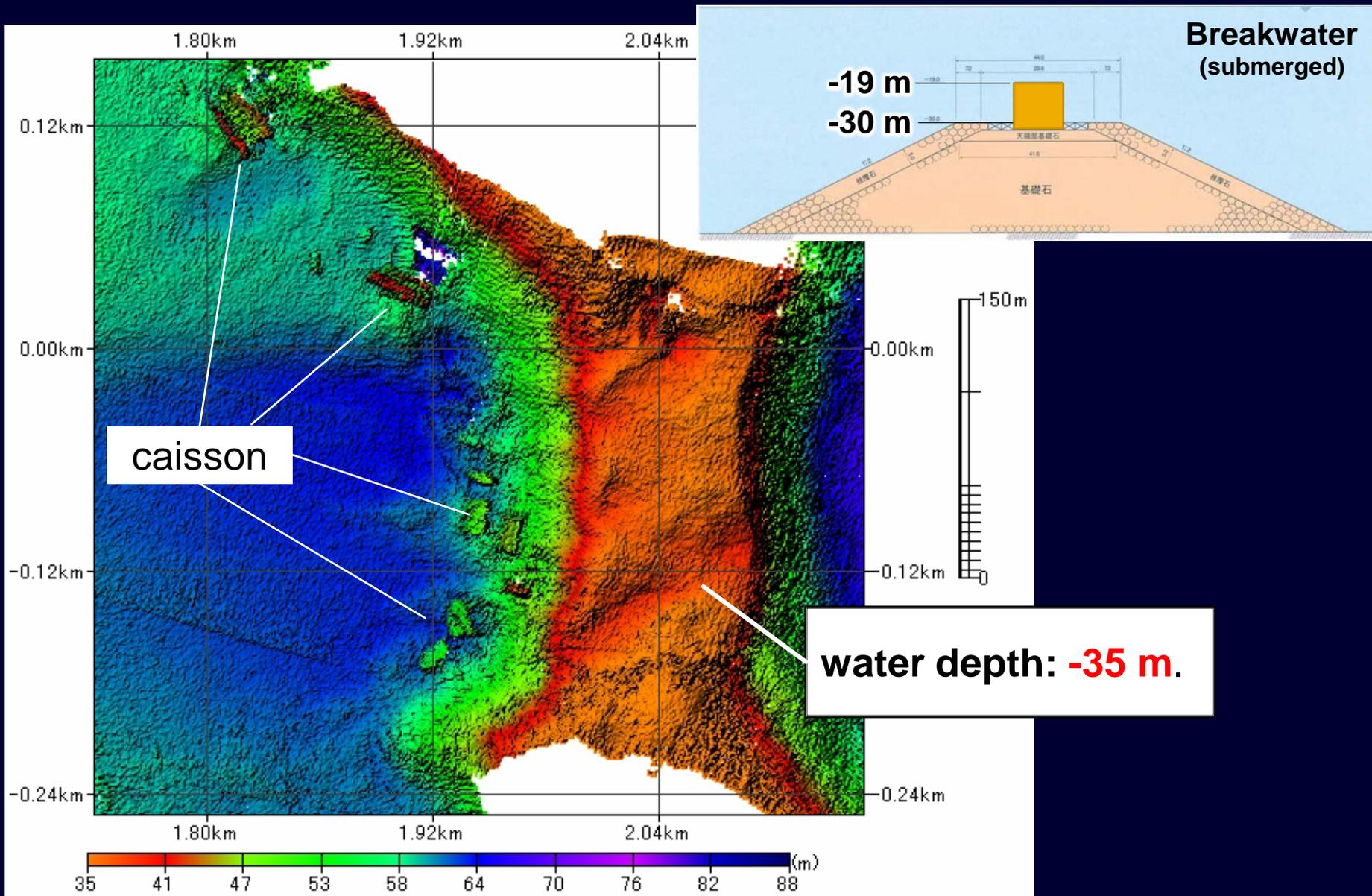
After the tsunamis

©2011 Google - 画像 ©2011 Cnes/Spot Image, DigitalGlobe,

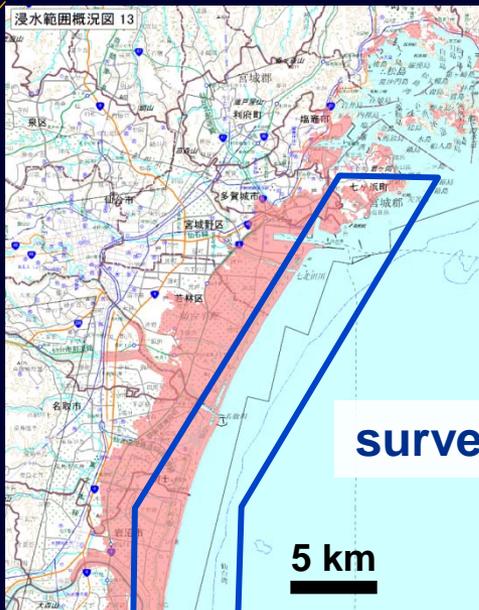
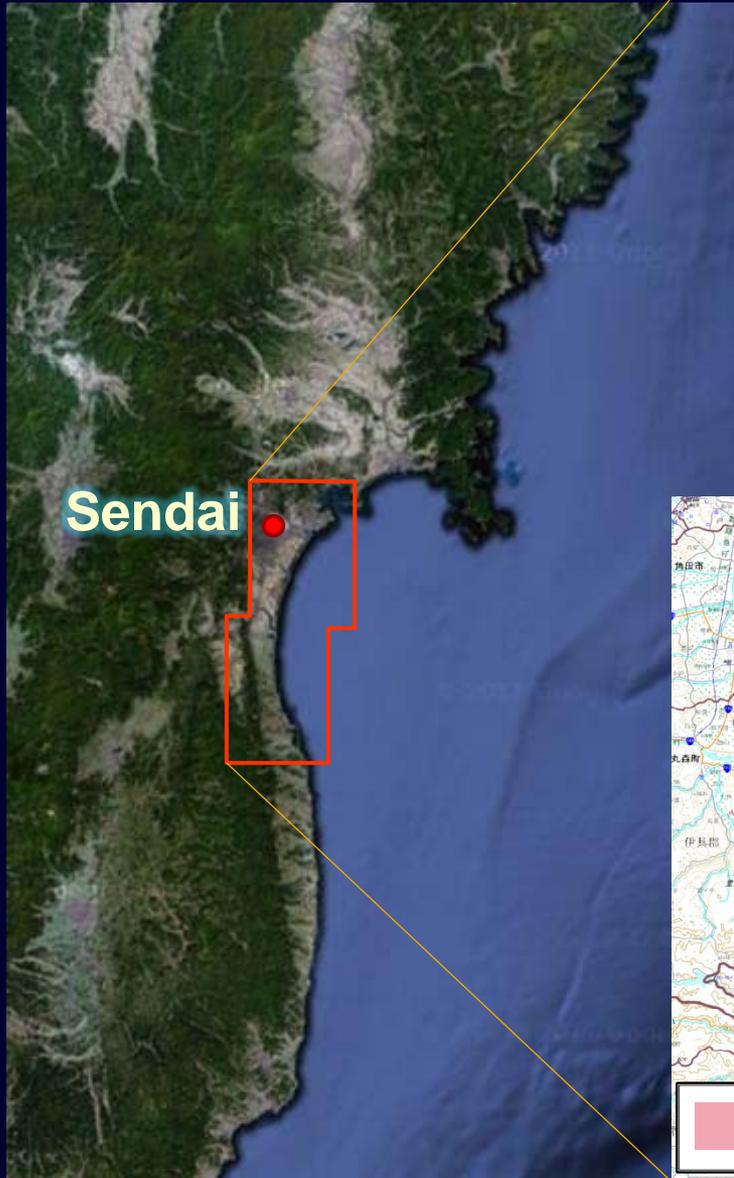


The breakwater was BROKEN by WATER!!

Opening portion of the breakwater



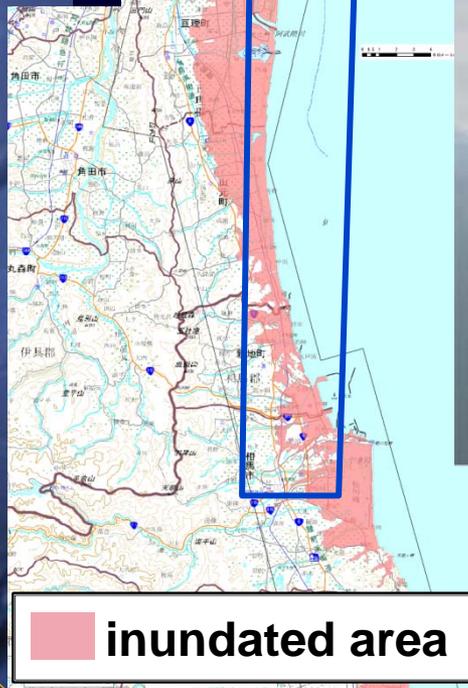
LIDAR survey



Data request from the authority for water and disaster management

surveyed area

5 km



inundated area



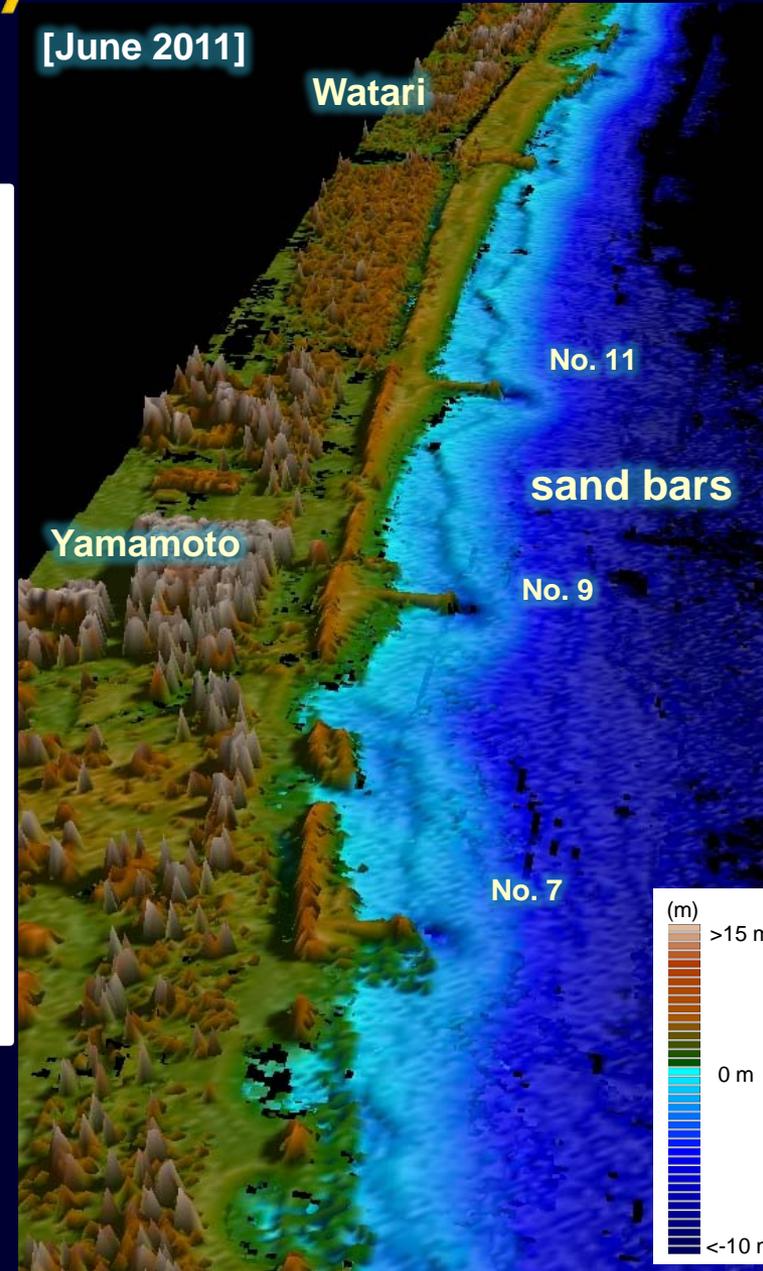
LIDAR

SHOALS-1000

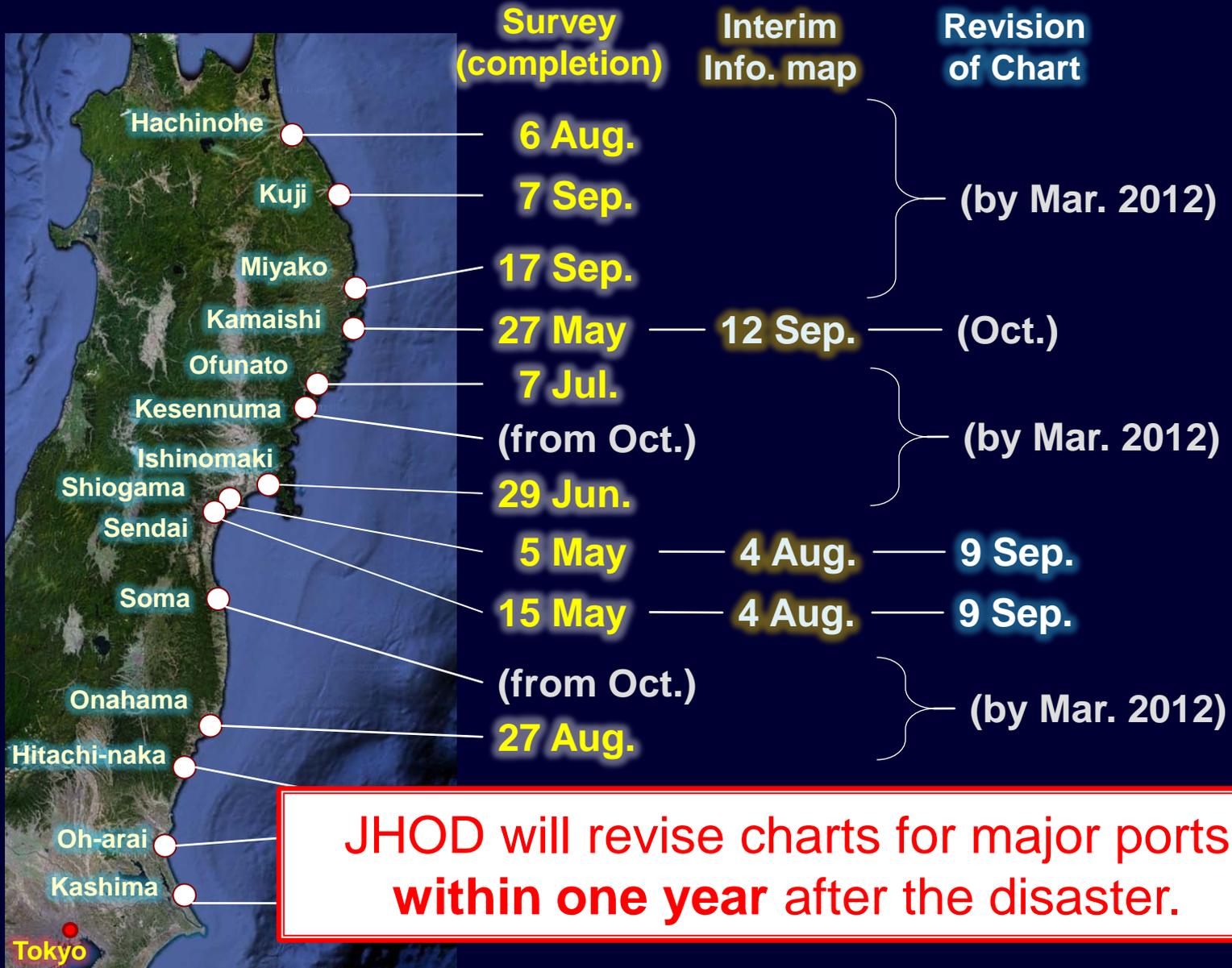
Along-coast topography

LIDAR topography

Aerial photos



Progress and future



JHOD will revise charts for major ports within one year after the disaster.

Concluding remarks

- Indispensable role of hydrographic surveys in natural disasters
 - to provide information necessary to ensure the safe navigation as soon as possible
- To keep and share lessons from the past
 - prompt and appropriate actions
 - flexible nationwide allocation of resources
 - interorganization cooperations
- To keep survey skills and resources in an ordinary time



Thank you for your kind attention!

