ION Minutes
IUGG Meeting
July 2, 2011, 6:00-7:00PM
IASPEI Office, Melbourne Convention Center
Melbourne, Australia

Attendees:

Stephen (Chairman)
Best
De Santis
Lee
Yun
Tsuboi-san
Araki-san
Ito-san
Baba-san
Grenard
Howe

1) The minutes of the 2010 AGU Breakfast Meeting were accepted.

2) This was Ralph Stephen's last meeting as ION Chair. The Chairmanship has rotated to Kaneda-san from JAMSTEC.

3) We might be able to get some financial support from IASPEI to cover expenses of our meetings.

4) The next Joint IAHS-IAPSO-IASPEI Scientific Assembly will be held in Gothenburg, Sweden, July 22-26, 2013. Proposals for special symposia or workshops should be sent to Peter Suhadolc by 31 January, 2012.

5) In order to encourage cooperation with international scientists the CTBTO has a mechanism, through $0 contracts, to provide access to data at their International Data Center.

6) DS3F (Deep-Sea and Sub-Seafloor Frontiers) Conference will be held in Barcelona, 11-14 March, 2012.

7) Bruce Howe reported that John You from the University of Sydney was leading an effort to install geophysical monitoring equipment on seafloor telecommunications cables. You and Howe had an accepted paper at SENSORCOMM 7 in Saint Laurent du Var, August 23, 2011. Neither can attend this meeting but Angelo De Santis volunteered to present their paper (after the ION meeting). Howe also notified us that there is a Cables for Ocean/Climate Monitoring and Disaster Warning workshop in Rome, 5-9 Sept 2011. More information is given in Appendix A.

8) Bruce also reported that the ALOHA cabled observatory is up and running.

9) Mairi Best reported that there is an effort to beef-up the seismic systems on the next phase of Neptune Canada.

10) Patrick Grenard reported that the CTBTO is evaluating the next generation of acoustic sensors. Now is a good time to introduce new ideas.

11) Tsuboi-san presented a report on the Tohoku earthquake as observed on the DONET system. See Appendix B.

12) Membership: We added Won Sang Lee and Sukyoung Yun from KOPRI (Korean Polar Research Institute). See our charter for membership criteria.

APPENDIX A:

-------- Original Message --------

Subject: Rome 5-9 Sept 2011 submarine cable workshop
Date: Tue, 05 Jul 2011 20:22:00 +1000
From: John You <yuzhu.you@gmail.com>
To: Ralph Stephen <rstephen@whoi.edu>
CC: Bruce M. Howe <bhowe@hawaii.edu>

Dear Dr. Stephen:

Thank you for the message about the Rome 5-9 Sept 2011 cable workshop which was sent to Bruce Howe. Recently, a new idea to integrate sensors into submarine cable repeater housing to form a harnessing real-time global climate change monitoring network including tsunami warning, sea-level rise and seismic monitoring as well as nod functionality with a low cost is presented in a Nature article:

http://www.nature.com/nature/journal/v466/n7307/pdf/466690a.pdf

an ITU white paper (Tech Watch Report):

http://www.itu.int/en/ITU-T/techwatch/Pages/submarinenetworks.aspx

and a Submarine Telecoms Forum Magazine paper:

http://www.subtelforum.com/issues/STF_54.pdf

Future generation of submarine cables and systems should be turned to a multipurpose/multilayer system to meet the demand for ocean/climate monitoring and disaster warning. The idea has received a wide attention and response from UN agencies, telecommunication industry, telecom companies and the scientific community. A workshop "Submarine cables for ocean/climate monitoring and disaster warning: science, business, engineering and law" is planned to be held in Rome 5-9 Sept 2011 as part of Green Standards Week conference, organized jointly by ITU, WMO and IOC-UNESCO and hosted by Italian Telecom (a flyer attached). The program and invitation letter can be found

http://www.itu.int/ITU-T/climatechange/gsw/201102/programme.html
http://www.itu.int/ITU-T/climatechange/gsw/201102/index.html

Several Steering Committee (member list attached) teleconferences have held and decided to have 1) an outcome document of the workshop ready online in November 2011, 2) a roadmap for 2012 developed, 3) a working group of interested parties to develop a pilot project and 4) another workshop to be organized in 2012 to report on the activities and initiatives carried out so far.

At the same time, the relevant Fifth International Conference on Sensor Technologies and Applications
(SENSORCOMM 2011) will be held soon on August 21-27, 2011 in French Riviera. Bruce and I submitted a paper (You and Howe, SESORCOMM 2011) which has passed peer reviews and accepted for presentation as well as a journal special issue

SENSORCOMM 7: Under Water Sensors and Systems
Turning submarine telecommunications cables into a real-time multi-purpose global climate change monitoring network

http://www.iaria.org/conferences2011/ProgramSENSORCOMM11.html

However, there is a condition that the paper must be presented at the conference. Unfortunately, Bruce and I are too busy to be able to present the paper. We are seeking a representative to give the SENSORCOMM paper at the conference. We would appreciate very much if someone could help.

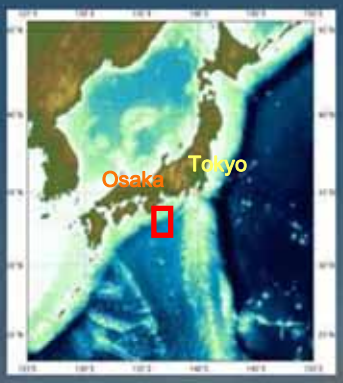
I would be grateful if you could distribute the above message to the ION members and help in promoting the idea using telecoms cables for ocean/climate monitoring and disaster warning. Also ION members are welcome to attend the Rome 5-9 Sept 2011 cables for ocean/climate monitoring and disaster warning workshop.

With best regards.

John Yuzhu You, Dr.

Appendix B: Dense Ocean floor Network system for Earthquakes and Tsunamis (DONET)

Dense Ocean floor Network system for Earthquakes and Tsunamis [DONET]

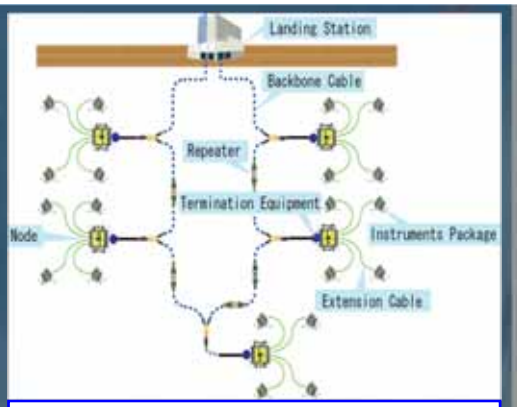


Redundancy:
Equipping redundant configuration on backbone cable and node

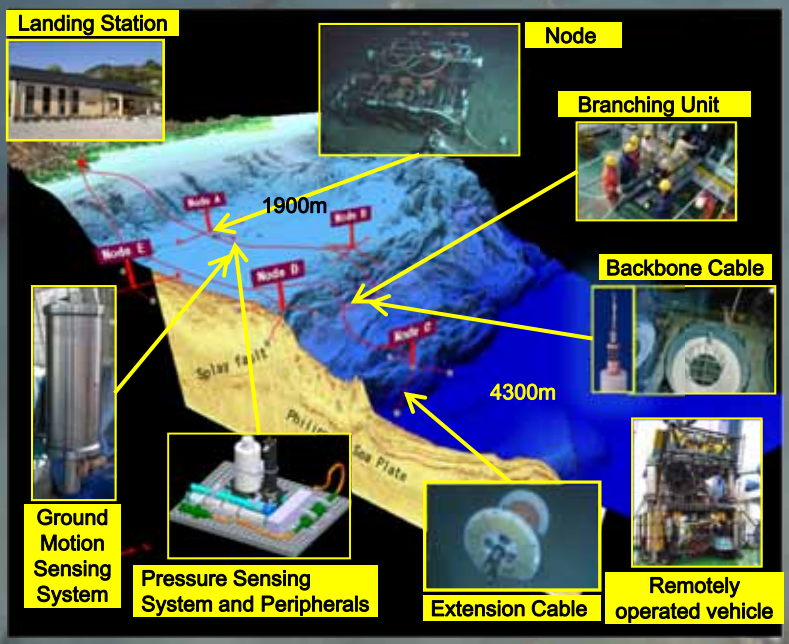
Expandability:
Branching unit enables wide-spread distribution of observation points.
Node plays the role of hub that connects underwater instruments to
the backbone cable system.

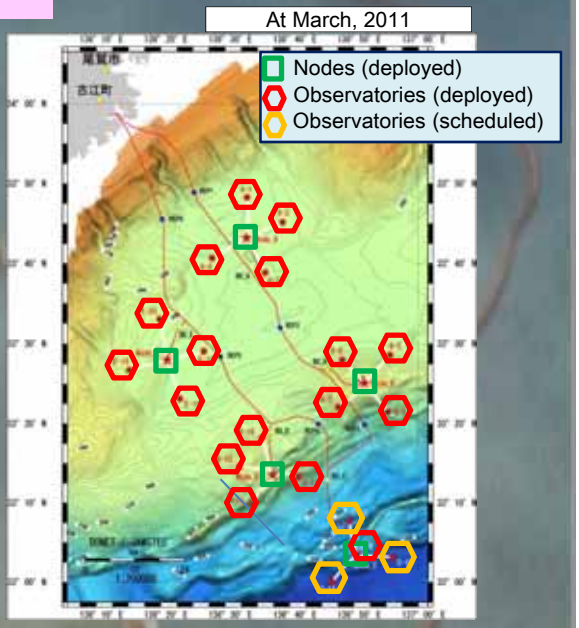
Replaceable function:
Replacing observation unit at the seafloor by using underwater
removable connector

Maintainability:
Operation on the seafloor by using Remotely Operated Vehicle (ROV)



Number of Science Node : 5 Nodes
Number of User Interface : 8 ports / Node
Power Distribution : 30 W / Port
Data Transmission : 50 Mbit / s / Port
Precise Timing Control : < 1μsec





Seventeen observatories are already working. More three observatories will be installed in this July to start full-scale operation.

Data transfer system (DONET)

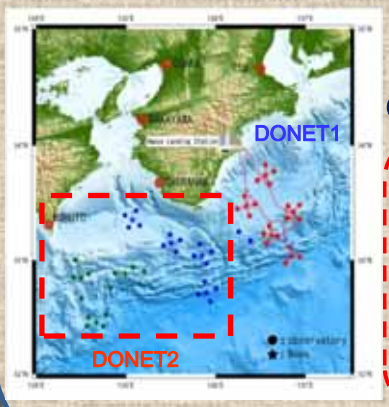
DONET data is open via the Earth LAN network which is a seismological data sharing network in Japan.

DONET Phase 2 (DONET2)

A similar seafloor network system is needed for region off Kii Peninsula and Shikoku to decrease disasters caused by the subduction zone earthquakes in the Nankai Trough. We apply a high voltage system for DONET2 so that the observational area is twice of that of the current DONET.

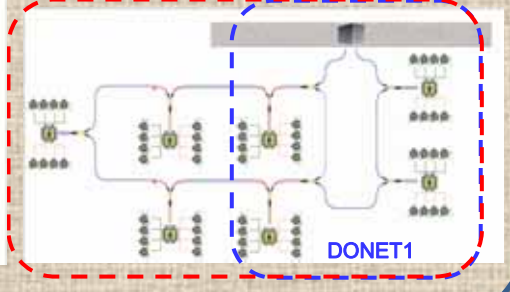
DONET1 — Middle-voltage system (3KV)

DONET2 — High-voltage system (10KV)

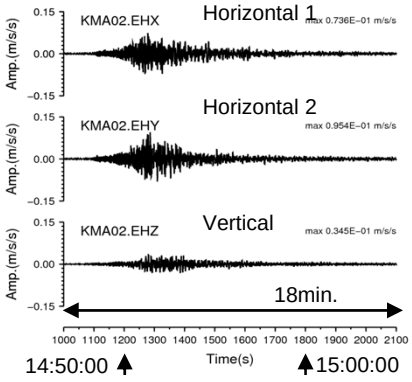


Cable length 300km + DONET type NODE 5 (40 ocean floor sites)

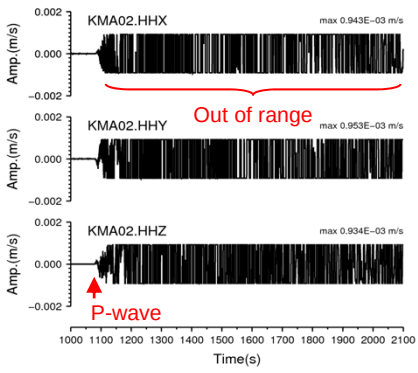
Cable length1000km + DONET type NODE over 10 (100 ocean floor sites)



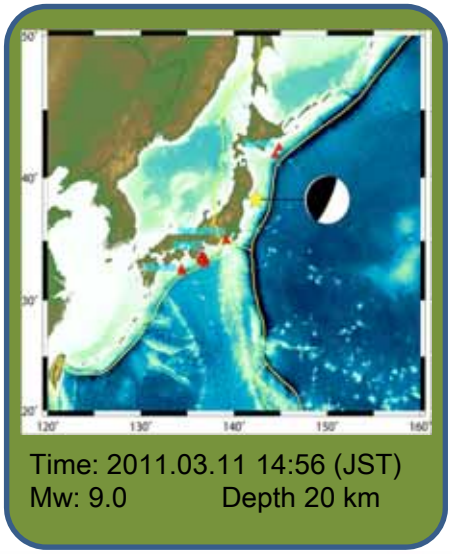
Records of the Tohoku eq. at DONET KMA02 station. [11th, March, 2011]

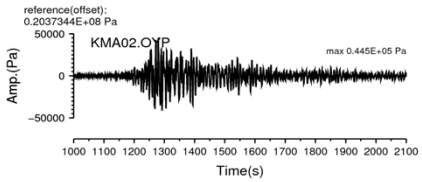


Strong-motion Seismograph

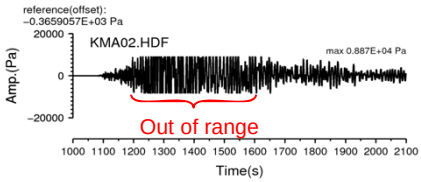


Broad Band Seismograph

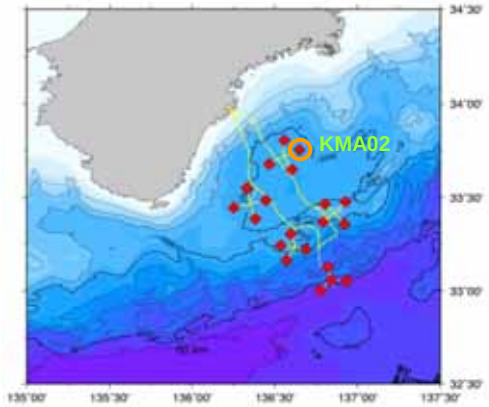


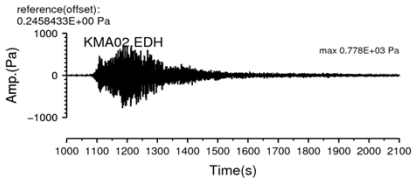


Quartz pressure gauge

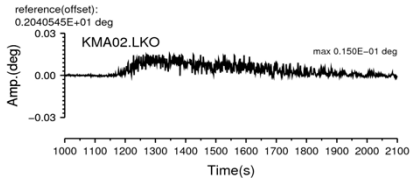


Differential pressure gauge



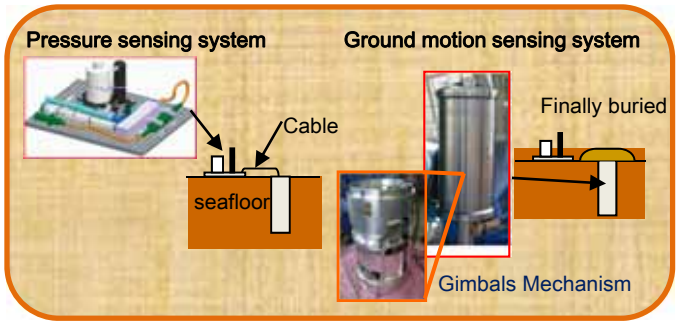


Hydrophone



Precision thermometer

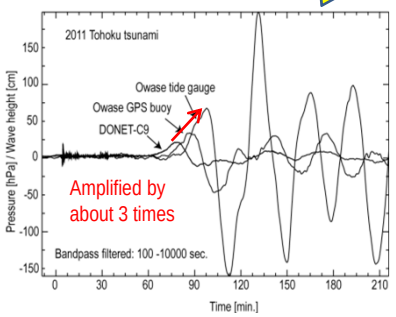
	Sensor	Type	specification
Ground motion sensing system	broadband seismometer	CMG-3T,RH (Guralp Systems)	•standard velocity output band: 120s – 50Hz •mass position output band: DC – 120s •output sensitivity: 2×750V/m/s •horizontal linearity: 107dB •vertical linearity: 111dB
	strong motion accelerometer	TSA-100S (Metrozet)	•full scale range: ±4g peak to peak •dynamic range: 160dB, at1Hz, in 1Hz bandwidth •offset: < 0.05g •non linearity: < 0.015% total non linearity •hysteresis: < 0.005% FS
	gimbals	E124-1000	•phase-control angle: ±10°
Pressure sensing system	hydrophone	HTI-99-DY (HIGH TECH, INC.)	•expected gain: 30dB •response high: 30kHz •response low: 2Hz •source capacitor: 1.467nF
	pressure gauge	8B7000-2-005 (Paroscientific, Inc.)	•pressure range: 0 ~ 68.95MPa •repeatability: < 0.005%FS •hysteresis: < 0.005%FS
	differencial pressure gauge	MA567000 (Nichiyu co. ltd) : NPH-8-007GH (GE NOVA Sensor)	•pressure range: 7kPa@1psi •linearity: 0.1%FSO @2.5kPa, 0.05%FSO @7kPa •hysteresis & repeatability : 0.05%FSO @2.5kPa, 0.05%FSO @7kPa
	thermometer	MA565-2** (Nichiyu co. ltd)	•temperature rang: -1.0 ~ +10.0°C •resolution: < 1/1000°C •accuracy: < 5/1000°C



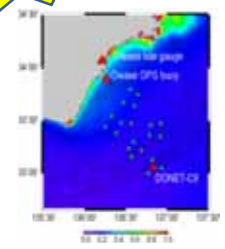
Tsunami site amplification：Comparison of offshore and near-shore tsunami waveforms from the Tohoku earthquake

Near-shore tsunami height
＝ Tsunami amplification factor
×Offshore height (DONET data)

For improvement of real-time tsunami prediction

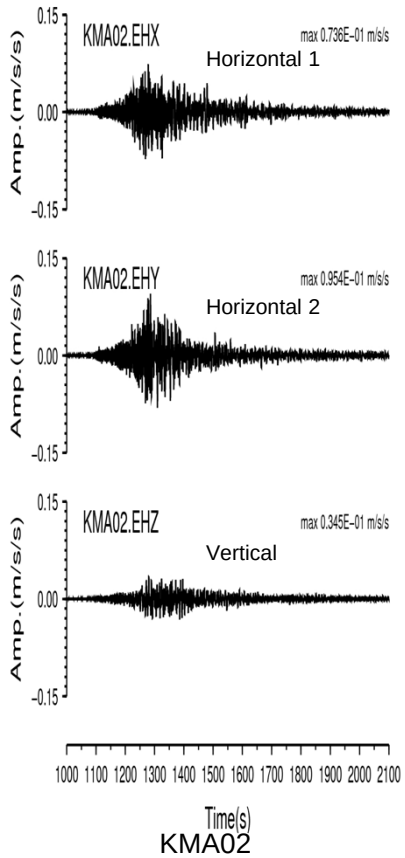


Comparison of tsunami waveforms recorded by DONET-C9, Owase GPS tsunami meter, and Owase tide gauge from the 2011 Tohoku earthquake

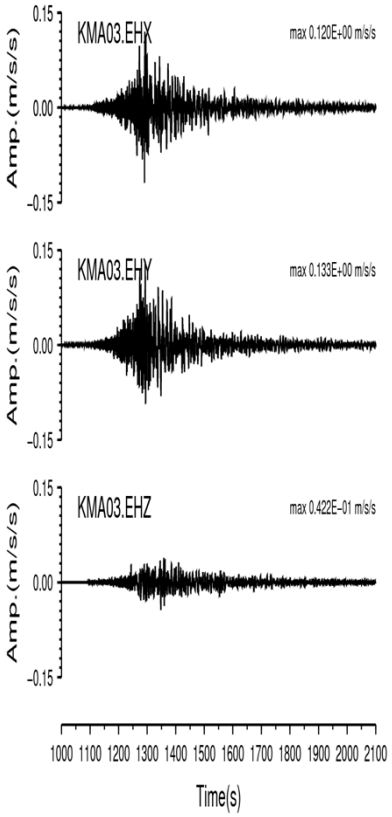


DONET-C09 detected the first tsunami wave of about 20 cm, about 20 minutes earlier than the costal tide gauge at Owase which recorded about 70cm tsunami height during the first wave.

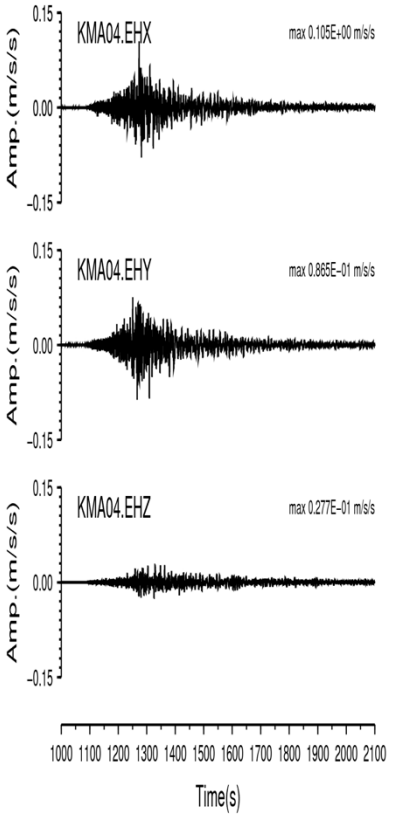
Strong-motion Seismograph records of the Tohoku eq. at DONET stations. [11th, March, 2011]



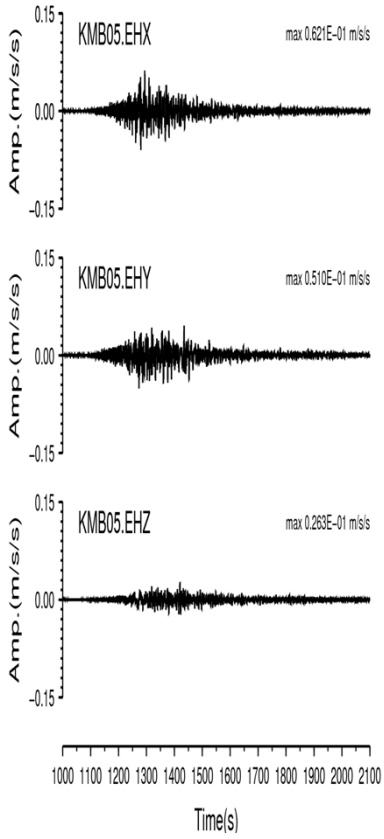
KMA02



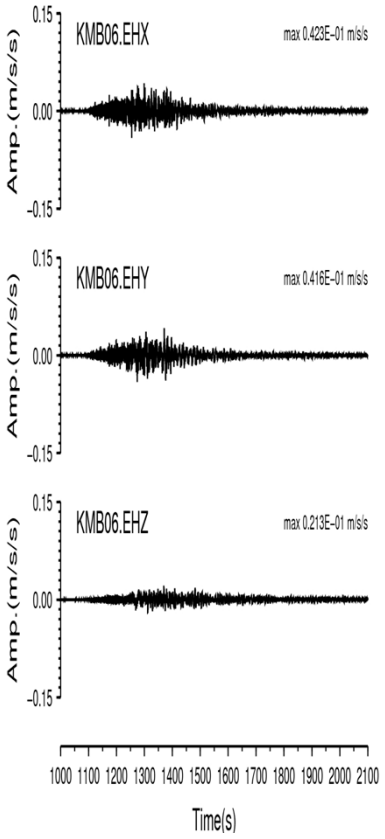
KMA03



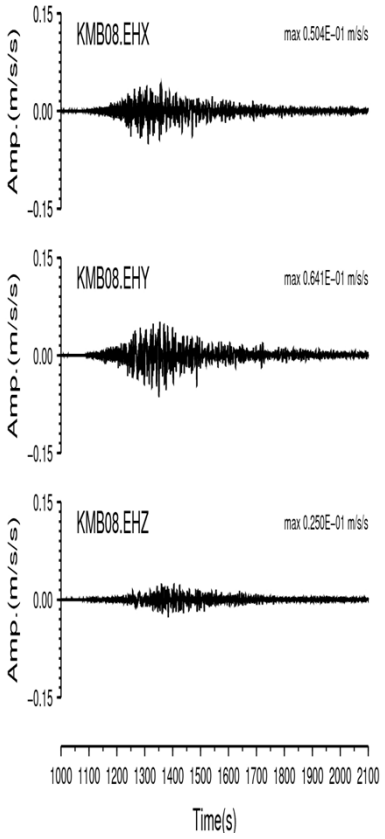
KMA04



KMB05

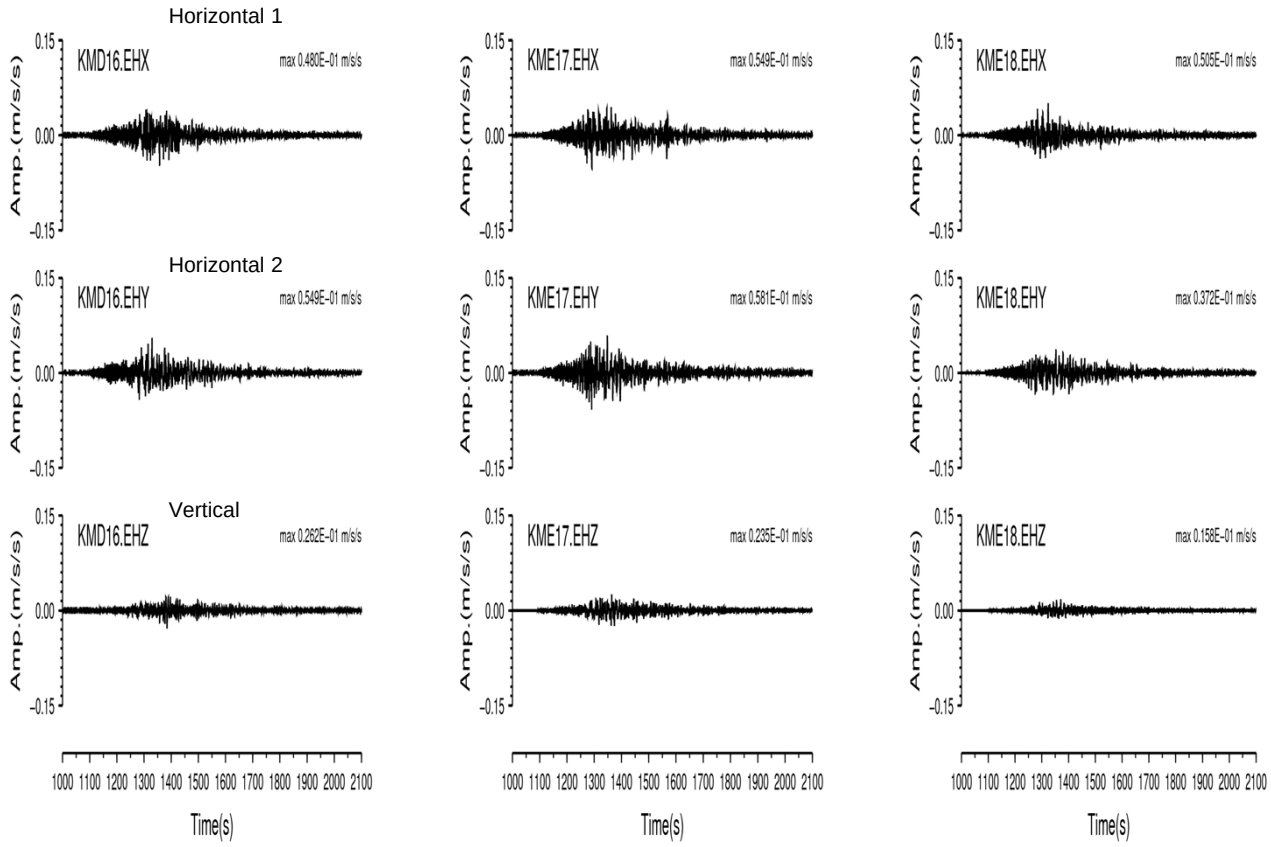


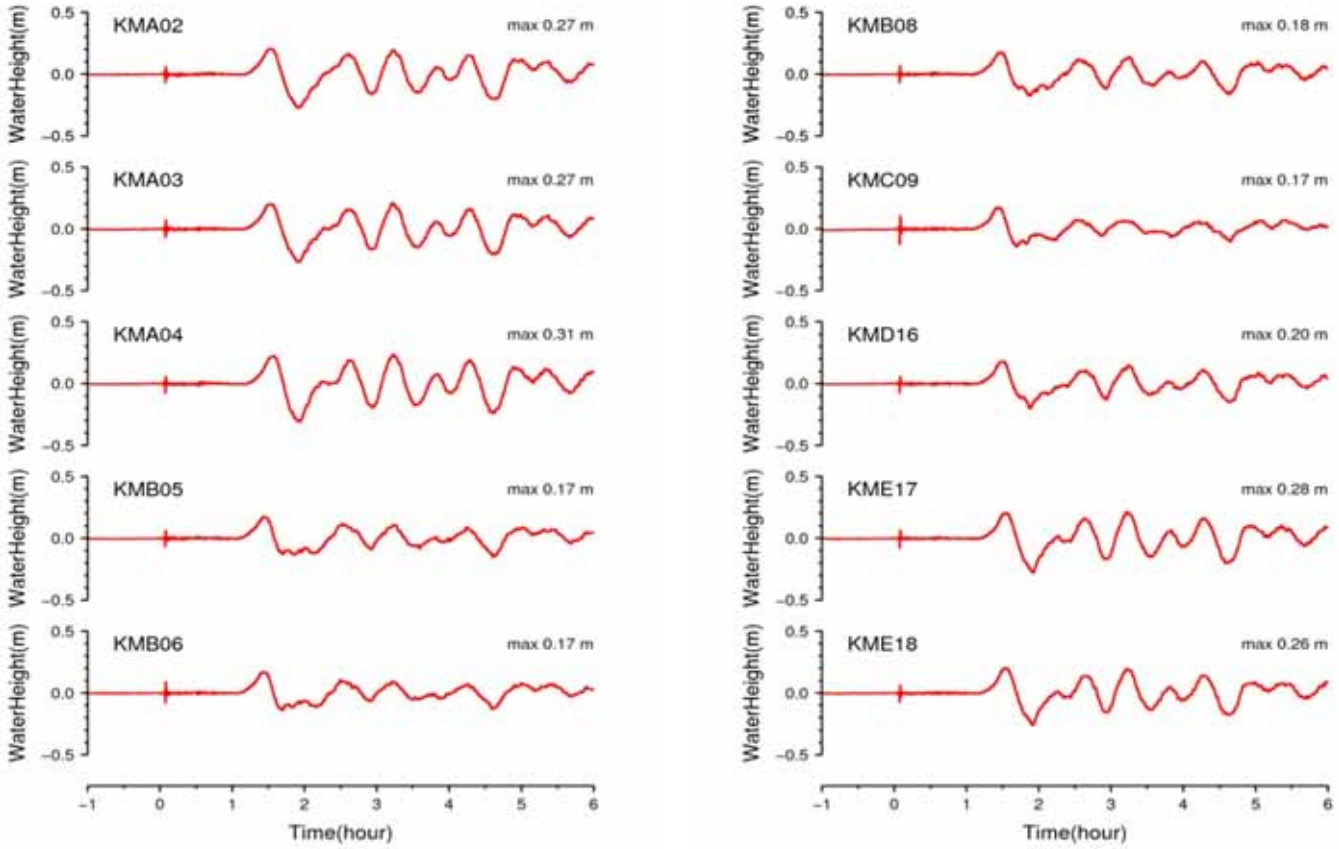
KMB06



KMB08

Strong-motion Seismograph records of the Tohoku eq. at DONET stations. [11th, March, 2011]



KMD16 KME17 KME18

Quartz pressure gauge records of the Tohoku eq. at DONET stations. [11th, March, 2011]