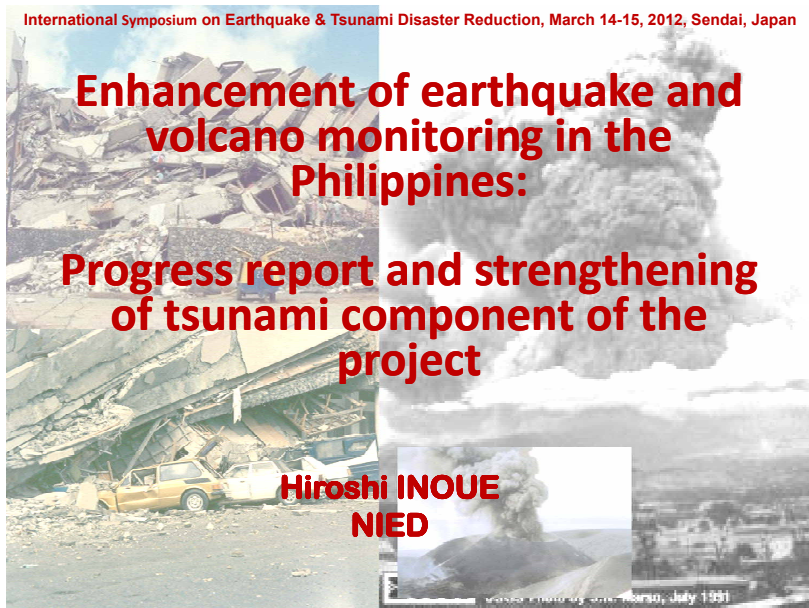


International Symposium on Earthquake & Tsunami Disaster Reduction, March 14-15, 2012, Sendai, Japan

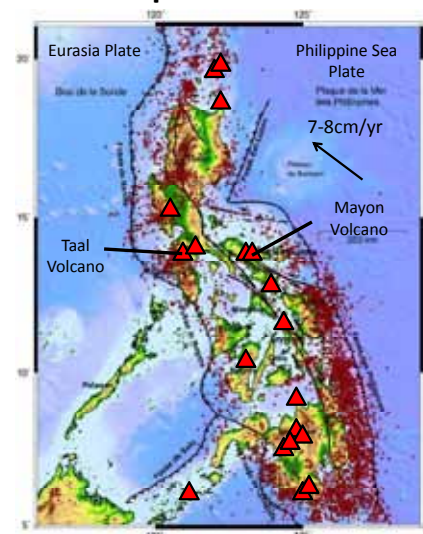
Enhancement of earthquake and volcano monitoring in the Philippines:

Progress report and strengthening of tsunami component of the project

Hiroshi INOUE
NIED



Earthquakes and Volcanoes in the Philippines



Past large earthquake(casualty) 1954
M8.3 Bacon, Sorsogon(13)
1955 M7.5 Lanao (291)
1968 M7.3 Casiguran (270)
1970 M7.3 Baler (15)
1976 M7.9 Moro Gulf (3,739)
1990 M7.8 Luzon (1,283)
1994 M7.1 Mindoro (83)

Past large eruptions(casualties)
1911 Taal (1300)
1948 Hibok-Hibok(68)
1965 Taal (190)
1991 Pinatubo(870)
1993 Mayon(77)

Modern earthquake and volcano network was established by the Japanese Grant-Aid project in 1999 and 2002



34 manned earthquake observatories (off-line, short period, broadband, SMS)



29 VSAT short-period seismometers



6 Volcano Observatories



3 wireless telemetry short period x 6 volcanoes

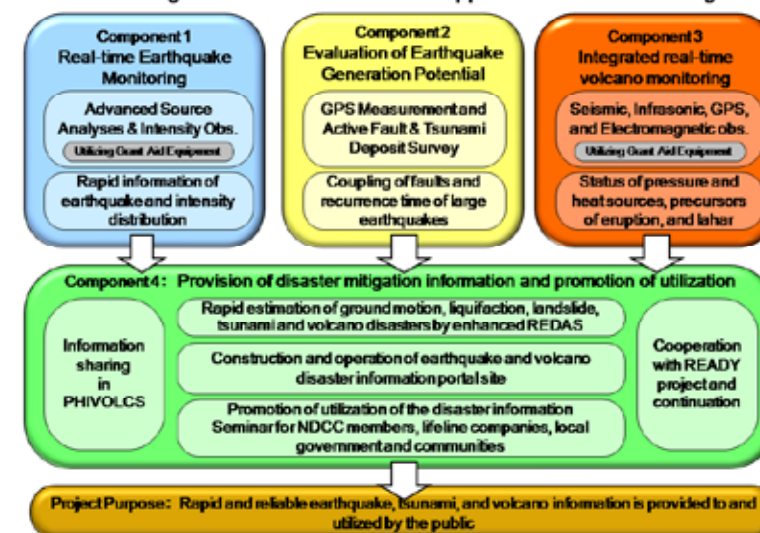


Data Processing Center

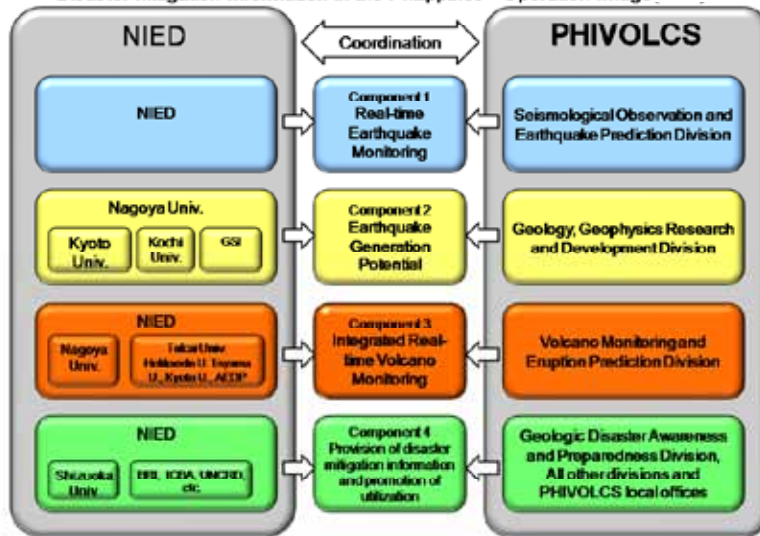


Manual Analysis

Enhancement of Earthquake and Volcano Monitoring and Effective Utilization of Disaster Mitigation Information in the Philippines: Master Plan Image



Enhancement of Earthquake and Volcano Monitoring and Effective Utilization of Disaster Mitigation Information in the Philippines: Operation Image



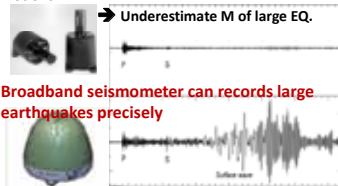
The 1st Joint Coordination Meeting and Kick-off Workshop February 2010, at PHIVOLCS, Manila



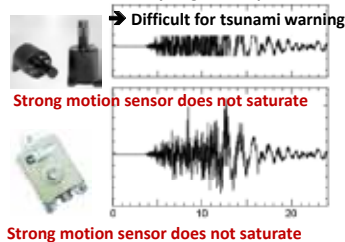
1. Real-time earthquake monitoring

1.1 Advanced earthquake source determination system

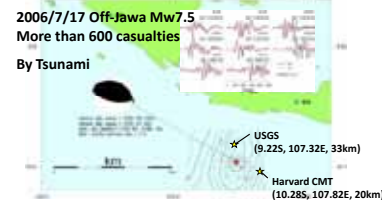
SP sensor is sensitive only to short period ground motions



SP sensor saturates by large earthquake

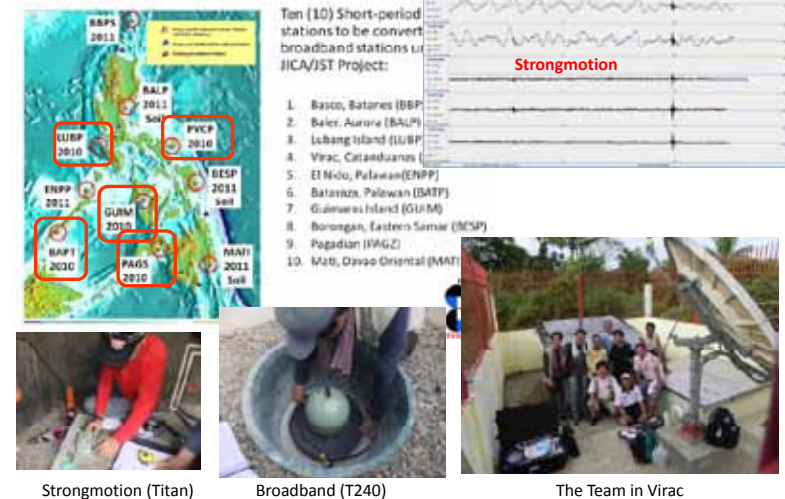


SWIFT source inversion by NIED



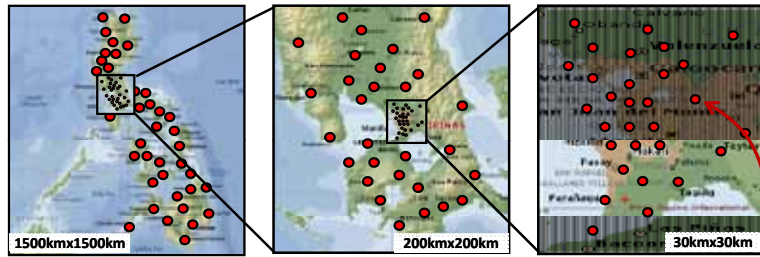
More precise information of the source of large earthquakes

Installation of broadband seismometers, Nov.-Dec., 2010



Rapid Earthquake Intensity Notification System

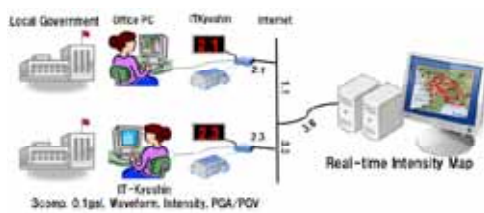
100 Locations at Local Government Building/PHIVOLCS obs.



40 nationwide as the 2nd experiment

30 in Luzon as the 2nd experiment

30 in Manila as the 1st experiment



Marikina City Government

Test run in PHIVOLCS

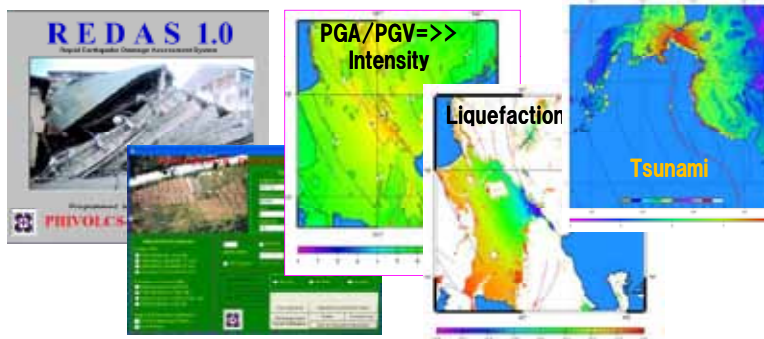


Rapid Damage Estimate: Utilization and enhancement of REDAS

REDAS (Rapid Earthquake Damage Assessment System)
Developed by PHIVOLCS (2002-)

- Hazard estimation(Ground motion, Liquefaction, Landslide, Tsunami)
- Promotion of utilization is ongoing by PHIVOLCS

•Enhance REDAS to Real-time REDAS by PHIVOLCS in this project



2. Evaluation of earthquake generation potential

Mindanao

Frequent occurrence of large earthquakes
⇒Need to evaluate the potential

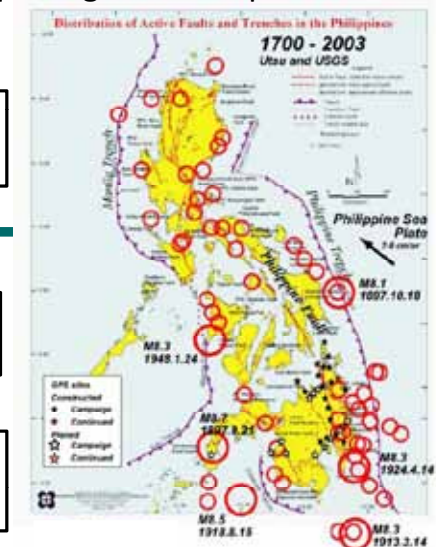
Currently

Inland Earthquake

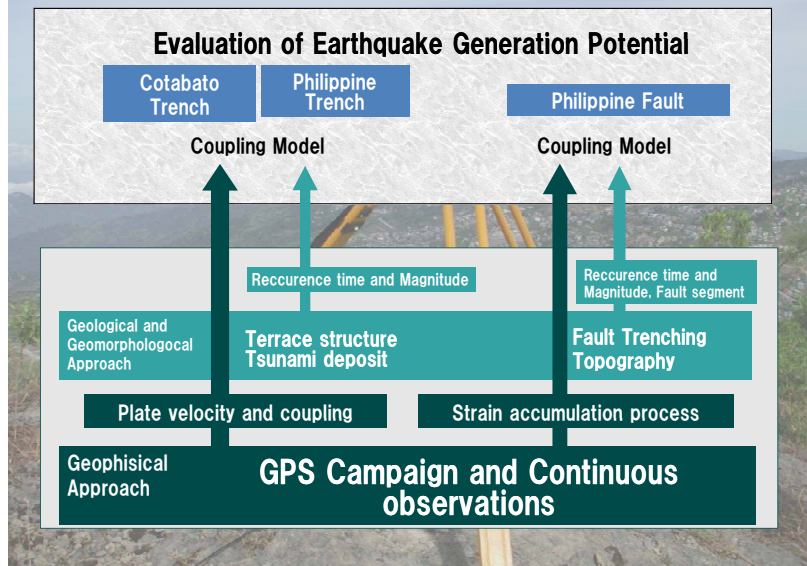
Philippine Fault in Mindanao
•Fault-generated topography
•Quiescence

Subduction earthquakes

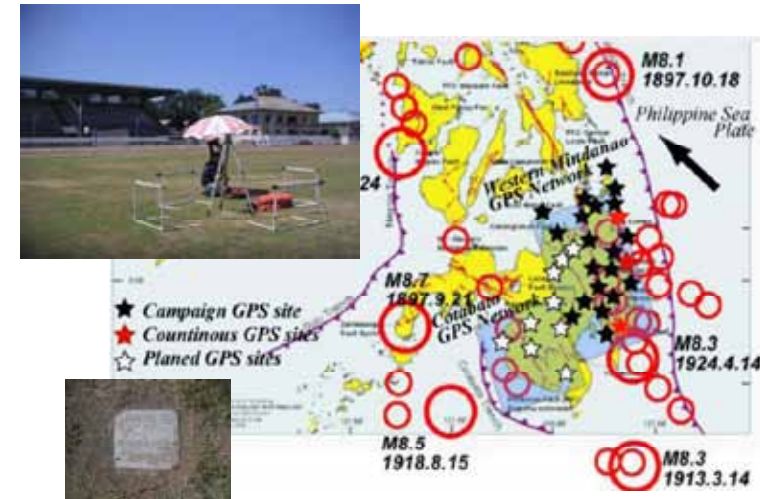
Philippine Trench, Cotabato Trench
•Large events in the past
•No large events in recent years



2. Evaluation of earthquake generation potential



GPS Campaign Observations March 2010



3. Integrated real-time volcano monitoring

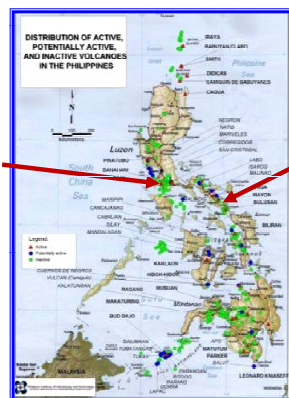
Activities in the past

Taal



Erupting every 10-20 years, but no eruption since 1977.

Ready to erupt.



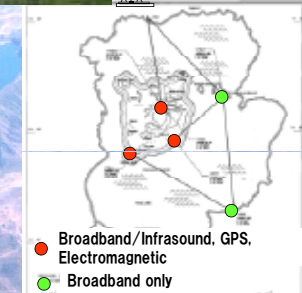
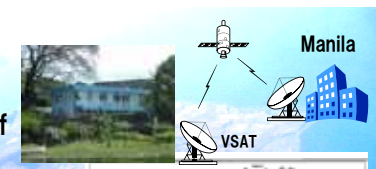
Mayon



Continuous activities since 2003

Taal volcano

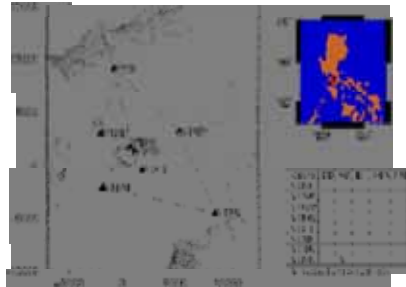
- Broadband seismic monitoring of underground magma movements
- Infrasound observation for detection and size estimation of eruptions
- GPS observations for estimation of deformation and pressure source
- Electromagnetic observations to monitor thermal structure
- CCD Live cam
- Satellite telemetry to Manila



Installation of a system of comprehensive monitoring of the precursors



Installation of Seismic & Infrasound sensors in Taal



Broadband Seismometer



Infrasound sensor



船で移動・運搬



Solar Panel

Installation of GPS and EM sensors in Taal



GPS



Fluxgate magnetometer



Data logger



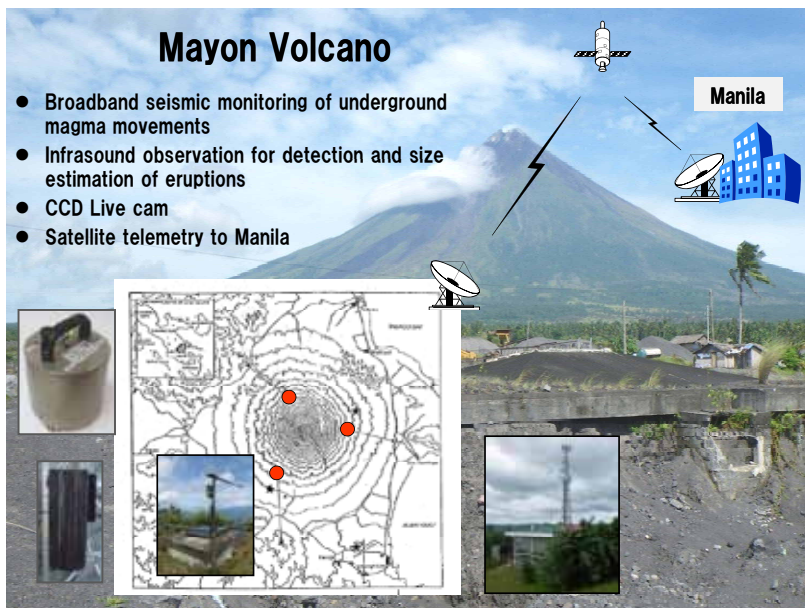
Data logger



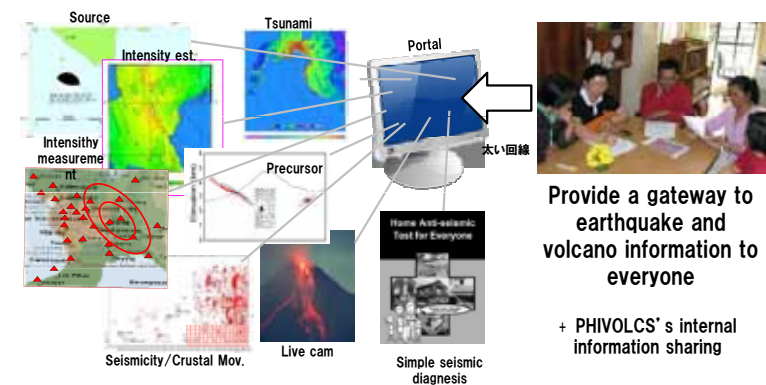
Overhauser magnetometer

Mayon Volcano

- Broadband seismic monitoring of underground magma movements
- Infrasound observation for detection and size estimation of eruptions
- CCD Live cam
- Satellite telemetry to Manila



4.1 Development of disaster mitigation information portal site



Survey of non-engineered houses for Developing Seismic Diagnosis for Everyone



Panpanga



Panpanga



Mindanao



Makati



Marikina



Mindanao

February , 2011, in Tsukuba Japan Full-scale shaking table experiment of Philippine CHB masonry houses

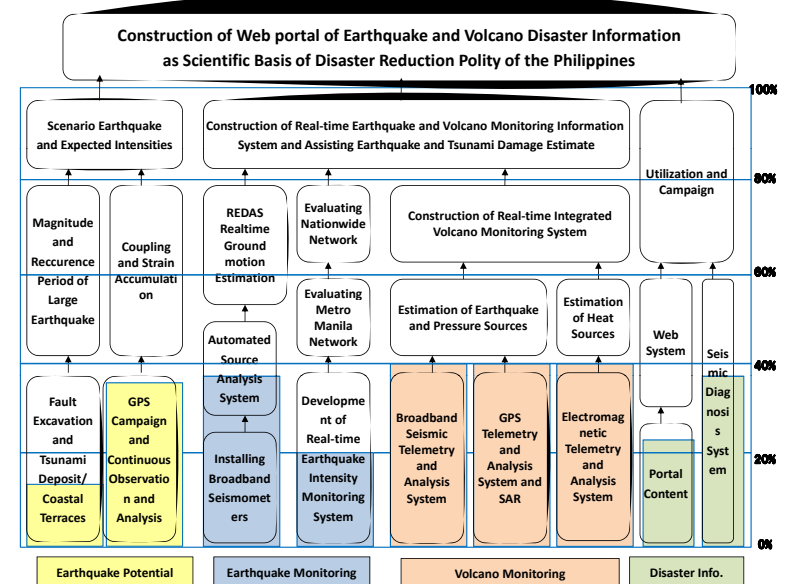


Promotion of utilization of the portal site

Holding Seminars for NDCC members Local government Communities



Capacity Building through Provision and Training on the Use of a Hazard and Risk Assessment Software (REDAS)



After March 11, 2011 Great East Japan Earthquake

Strengthening of Tsunami Component

Seismic and Sea Level
Monitoring

**(1) Sea Level
Monitoring**

Forecasting and
Dissemination

(2) JMA's advisor

People's Awareness, Evacuation Plan and Drill

(3) Video Interviews of Phillippino Victims

Sea Walls, Evacuation Buildings

Video Interviews with Filipino victims of the Great East Japan Earthquake



Strengthening PIVOLCS's Tsunami Forecasting and Decision Making System with JMA's Advisory



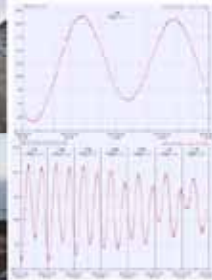
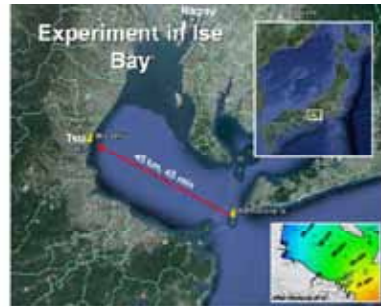
JMA



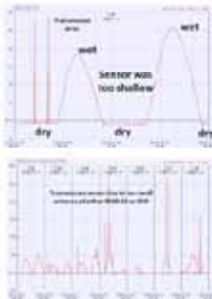
PIVOLCS

Sea Level Monitoring for the Last Minutes Tsunami Warning for Cities in Bay Areas





Sea-level monitoring
at sand beach



Thank you very much