

# Sentinel Asia Tsunami Working Group

Co-Chairman:

Prof. Shunichi Koshimura

Abdul Muhari, PhD

3<sup>rd</sup> Joint Project Team Meeting:  
Sentinel Asia STEP 3 (JPTM 2016)

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Ministry of Marine Affairs and Fisheries  
Republic of Indonesia  
January 2016

# Background:

## Tsunami Disaster and its impacts



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## Tsunami Disaster and its impacts



~minutes



~hours



~days



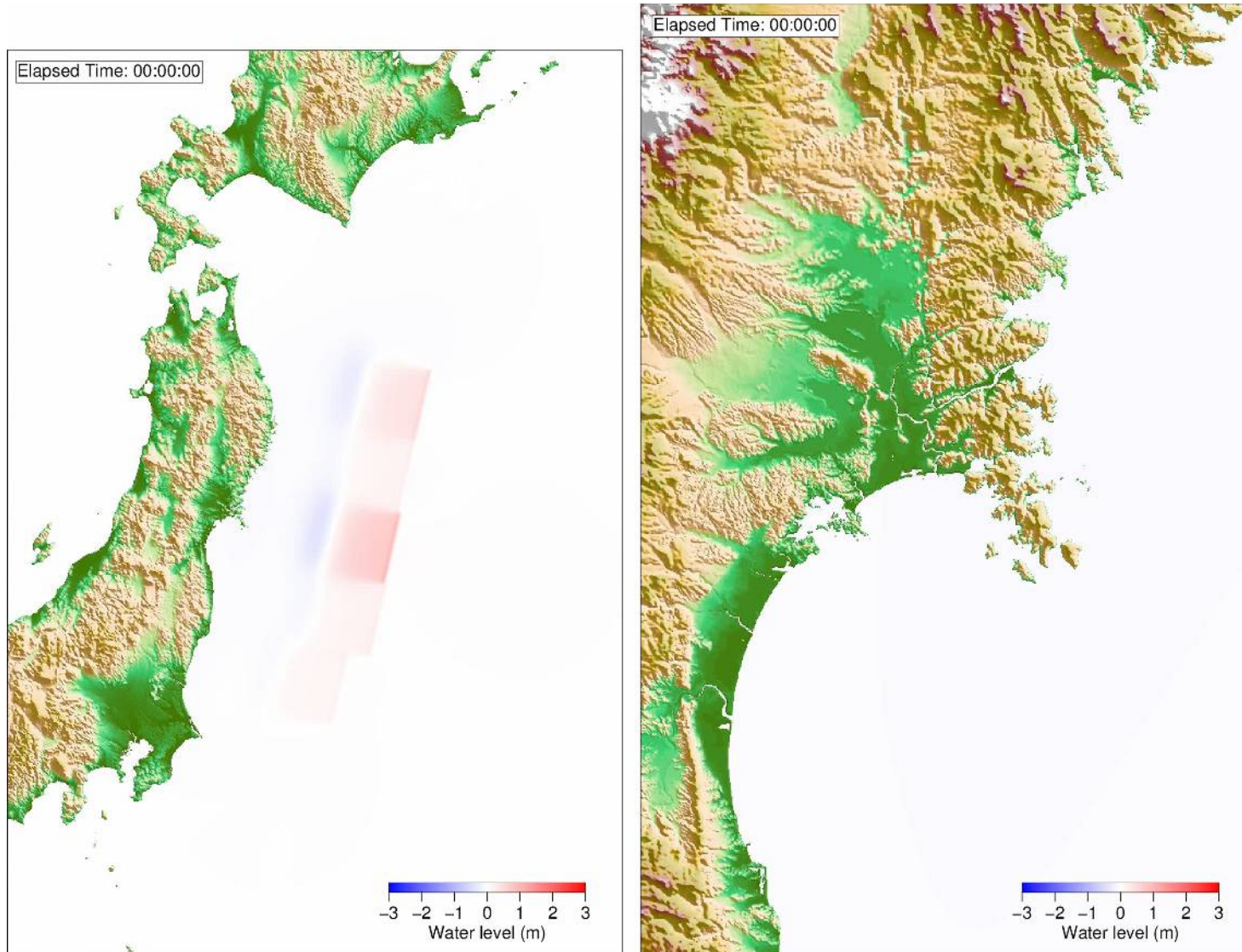
~weeks



- ❖ How extensive the tsunami penetrates? Where is the most affected areas?
- ❖ How many people are exposed, killed, and injured ?
- ❖ How many structures/infrastructures are damaged ?
- ❖ How extensive disaster relief activities should be deployed ?
- ❖ How much amount of tsunami debris need to be removed ?
- ❖ How much economic losses are ?

# Background:

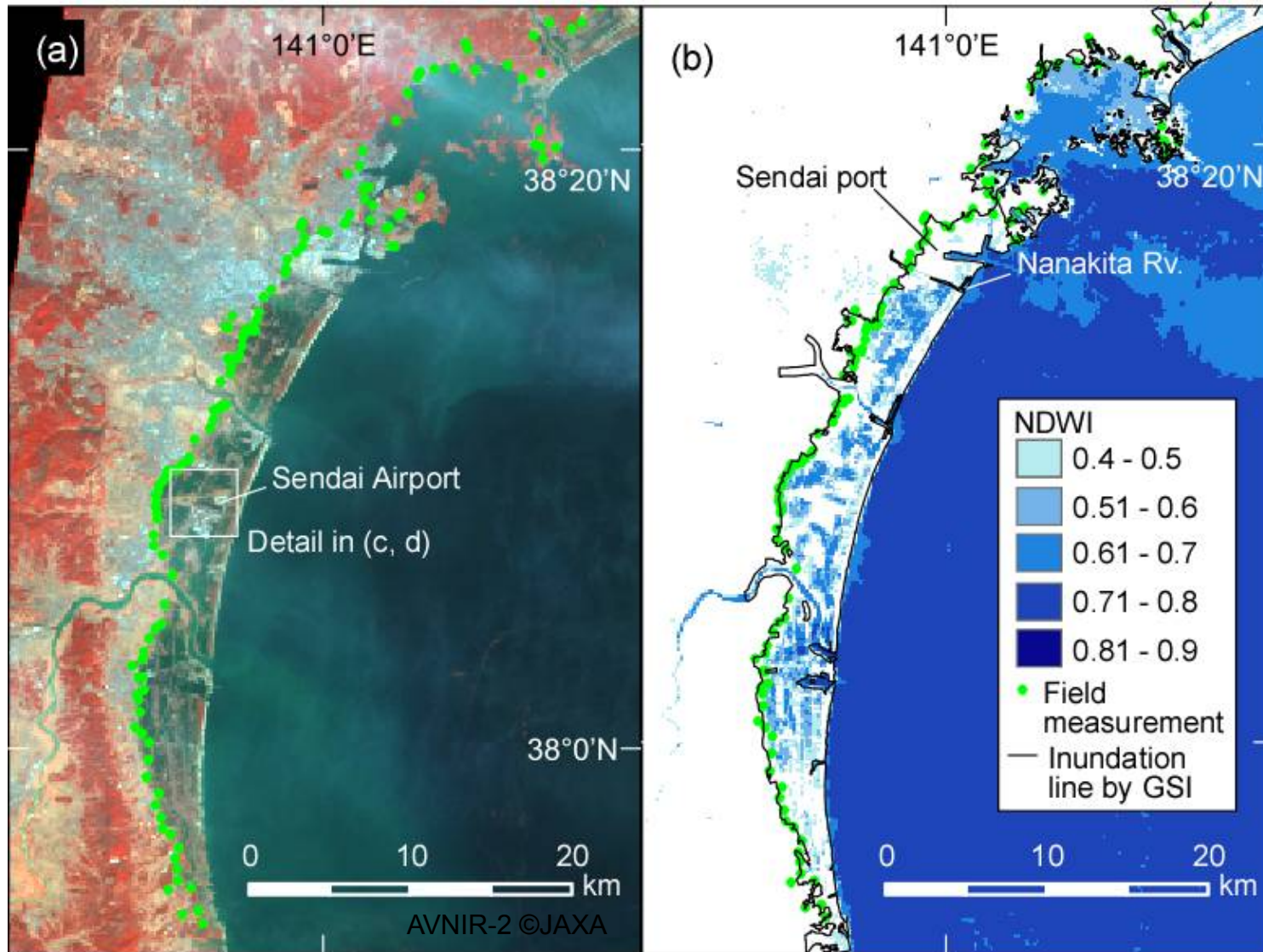
## Tsunami Disaster and its impacts





# How extensive the tsunami penetrates ?

## Optical satellite remote sensing (JAXA ALOS/AVNIR-2)





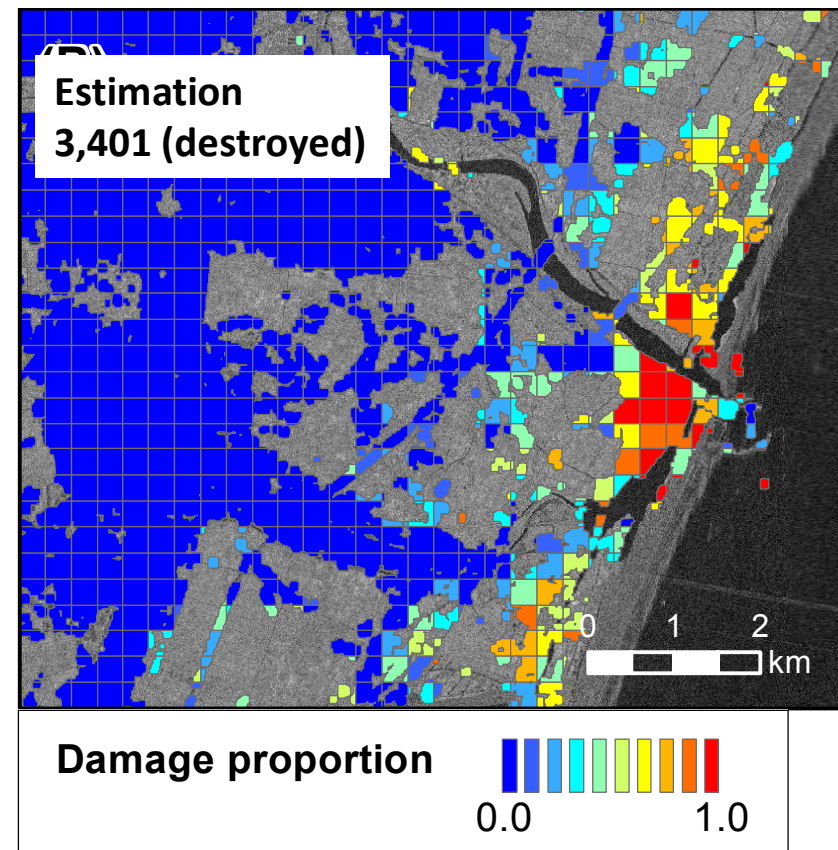
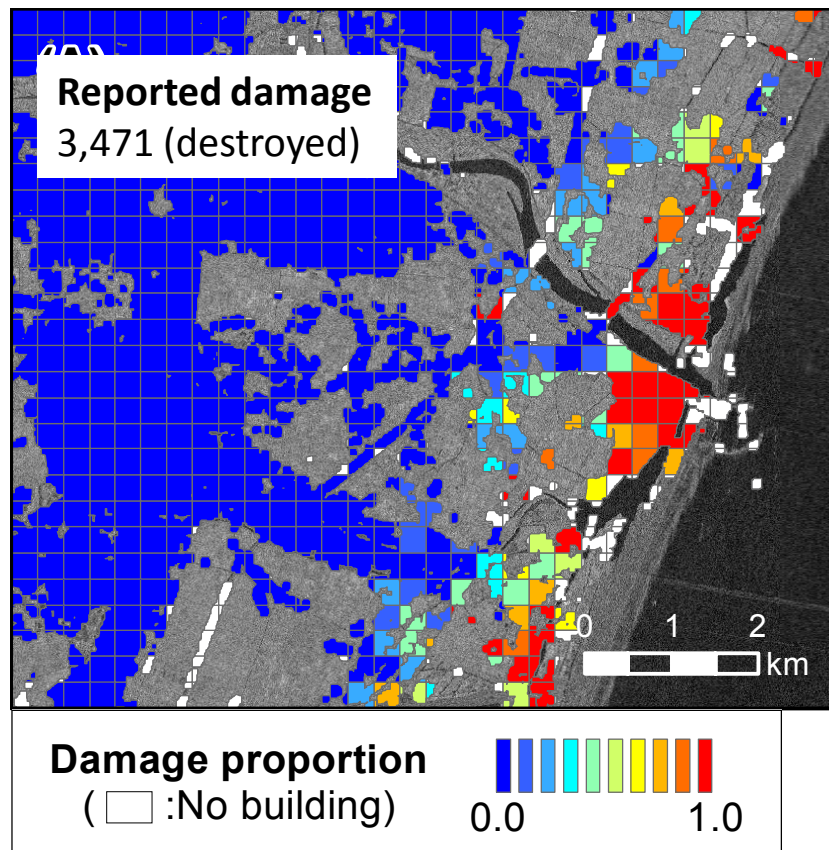
# Structural damage interpretation using aerial photos GSI (Geospatial Information Authority of Japan)





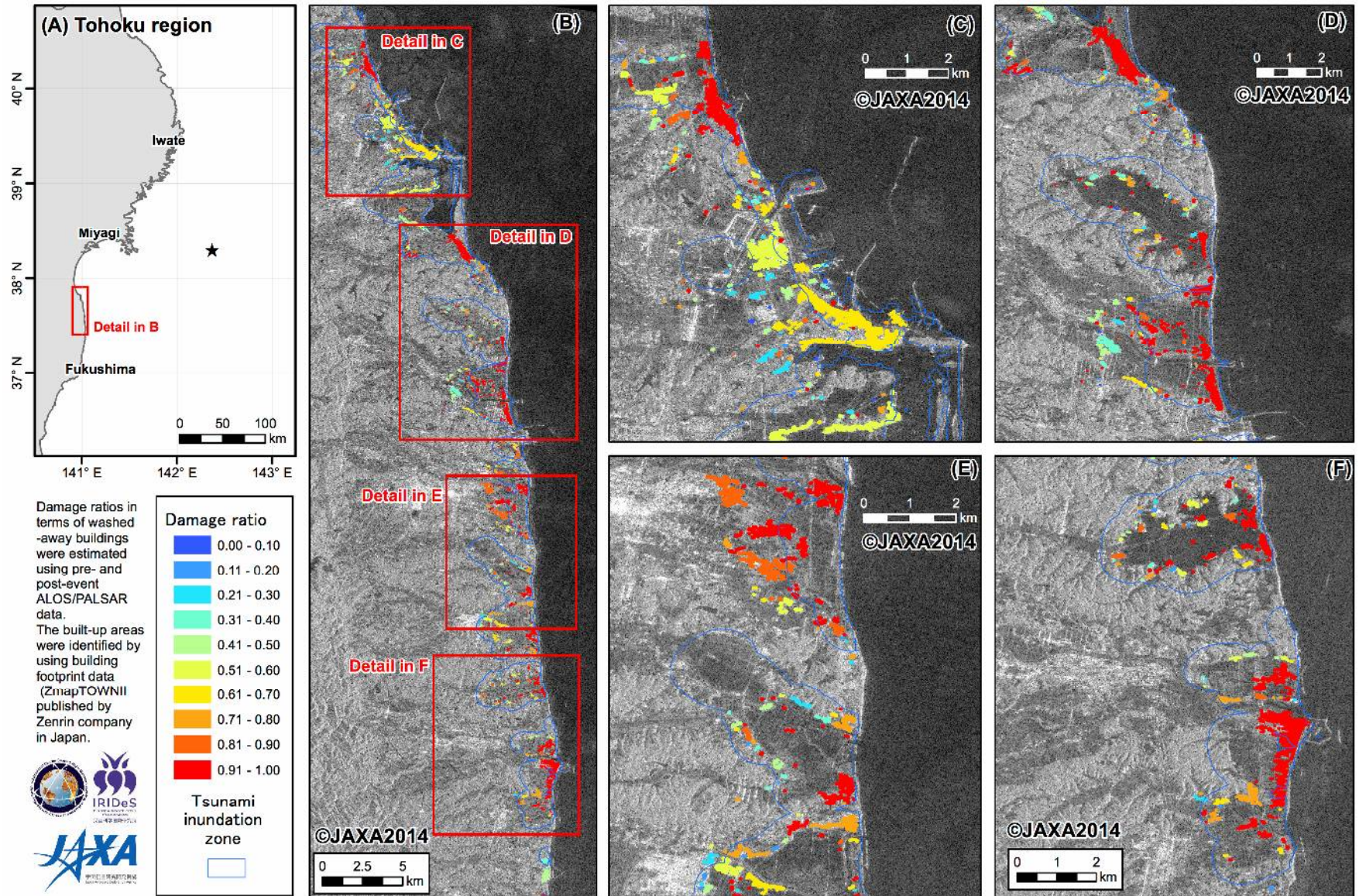
# Towards Quantitative Estimation of Structural Damage using SAR data

- Pre and post event satellite data (TSX, CSK, RS-2, PALSAR-2, ...)
- Digital elevation models (ASTER GDEM, SRTM)
- Building footprints



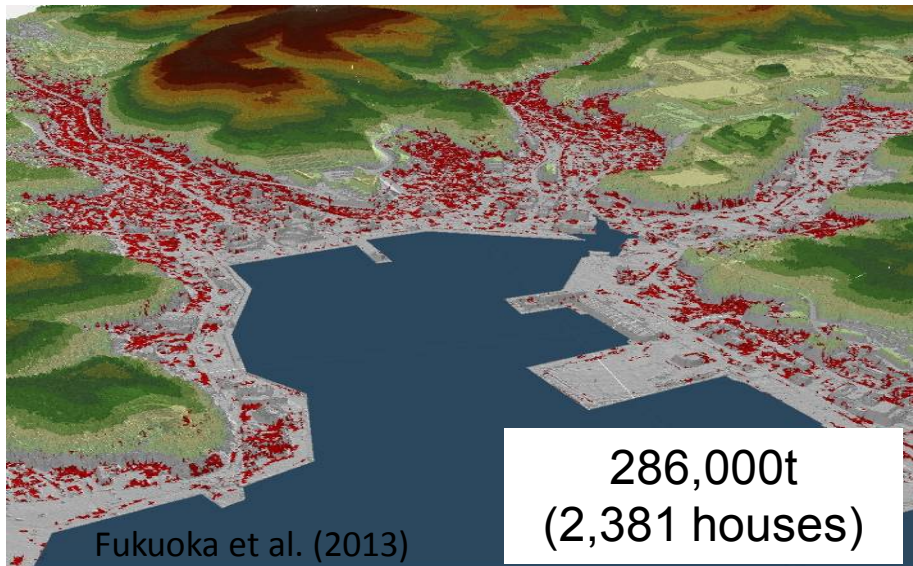
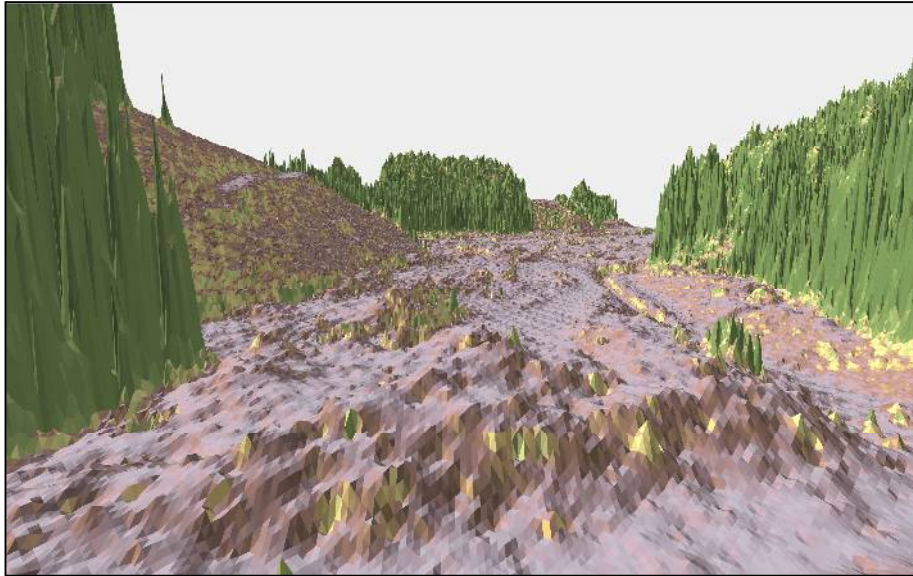


# Tsunami Damage Detection using PALSAR





# Tsunami Debris Mapping using LiDAR (Light Detection and Ranging)



Fukuoka et al. (2013)



# Challenges:

towards real-time tsunami inundation forecasting and damage mapping for near-field tsunami events

1. Rapid determination of tsunami source model (Rapid estimation of coseismic fault model).
2. Acceleration of tsunami inundation simulation with high-performance computing infrastructure (HPCI) or methodology.
3. Establishing quantitative damage estimation and mapping methods to provide responders with mapping products.
4. Robust information dissemination to the public.



# Challenges:

towards real-time tsunami inundation forecasting and damage mapping for near-field tsunami events

Complete tsunami source estimation

in **10 minutes**

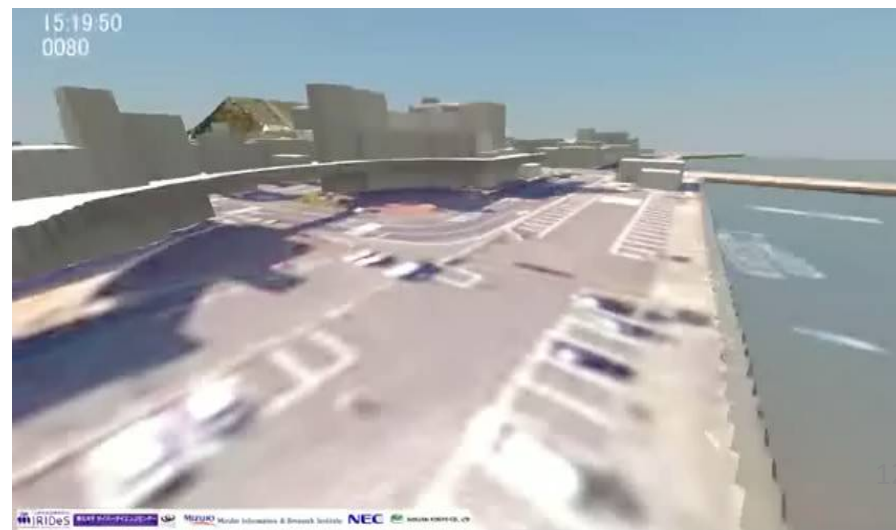
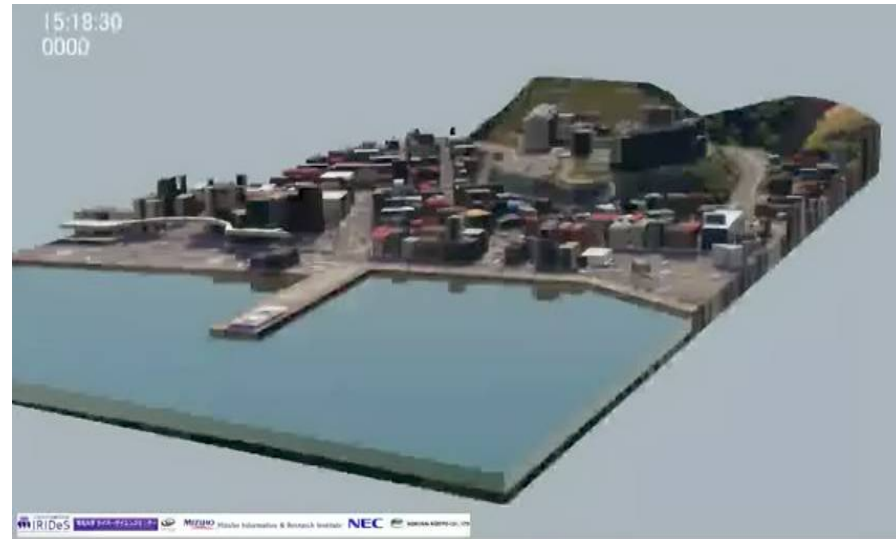
Complete inundation simulation

with **10 m grids**

in **10 minutes**

# Challenges:

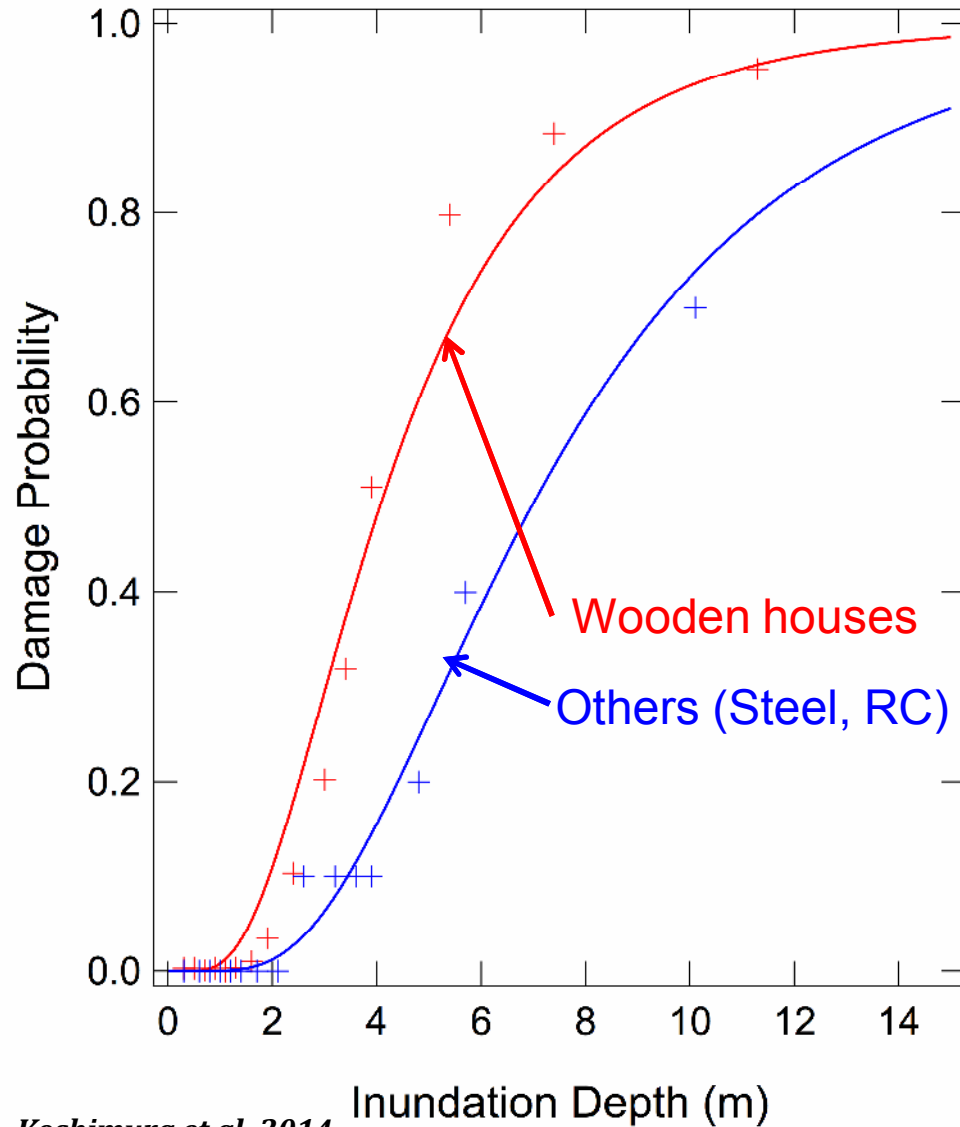
towards real-time tsunami inundation forecasting and damage mapping for near-field tsunami events





# Challenges:

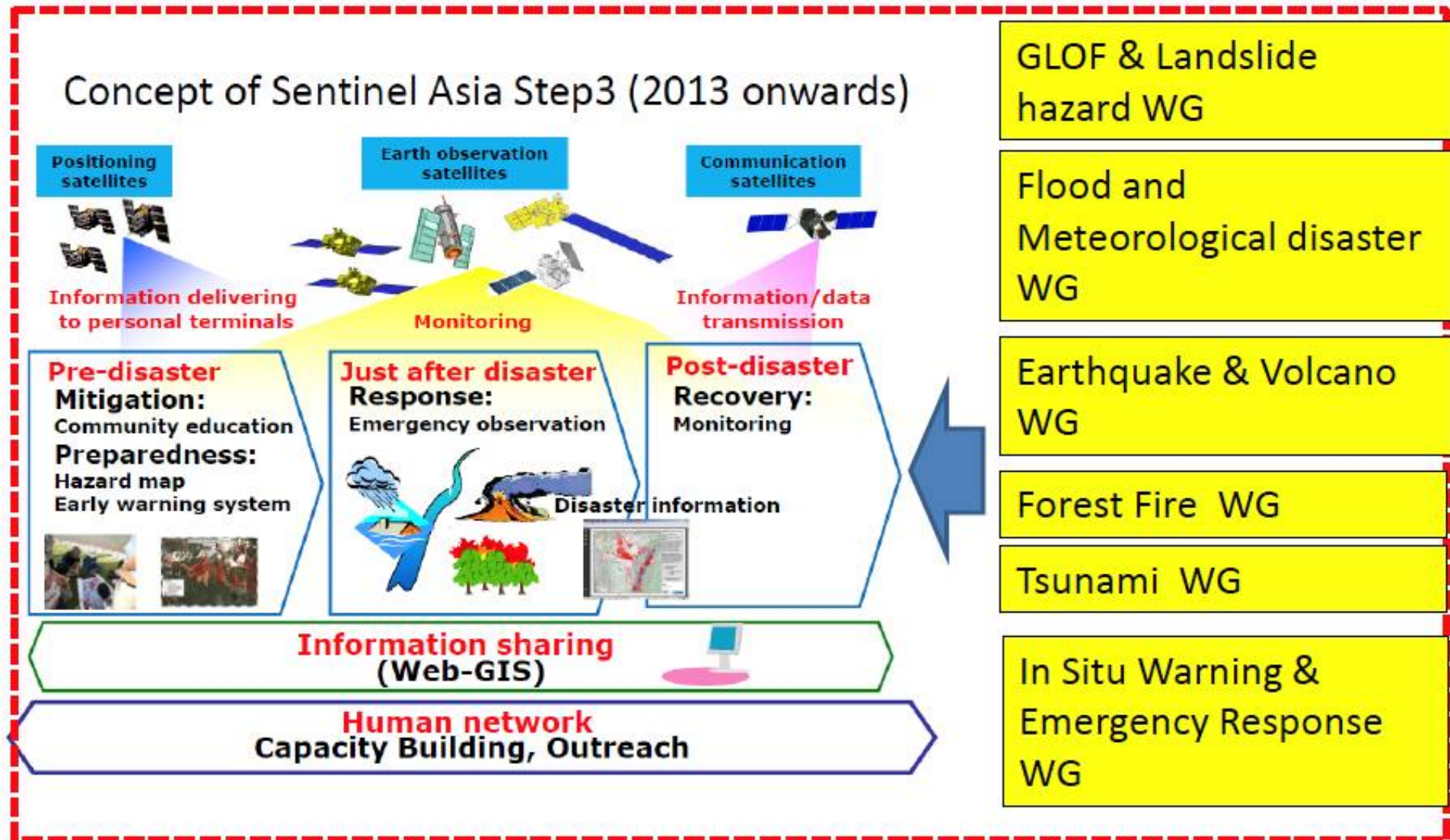
towards real-time tsunami inundation forecasting and damage mapping for near-field tsunami events



Koshimura et al. 2014



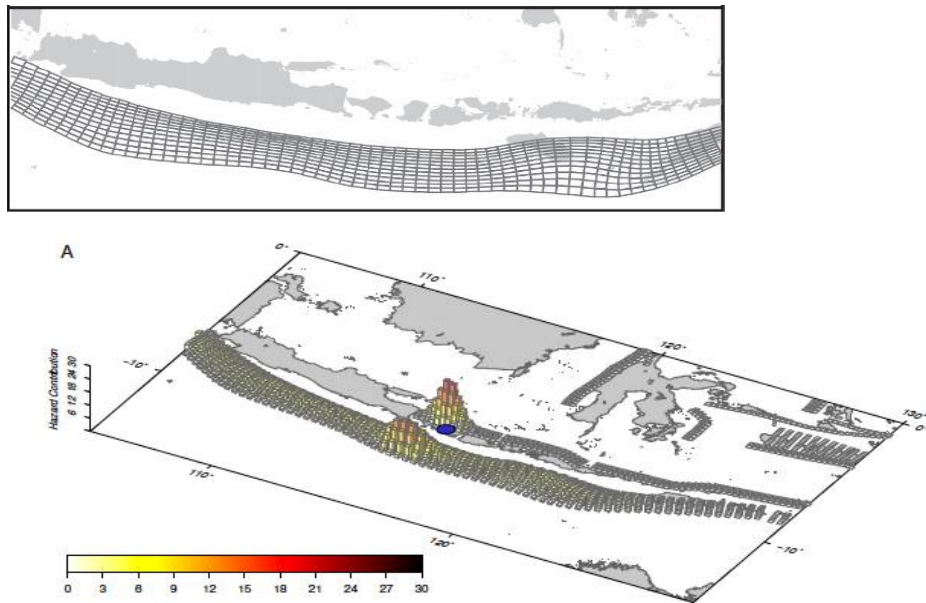
# Sentinel Asia STEP3 Evolution





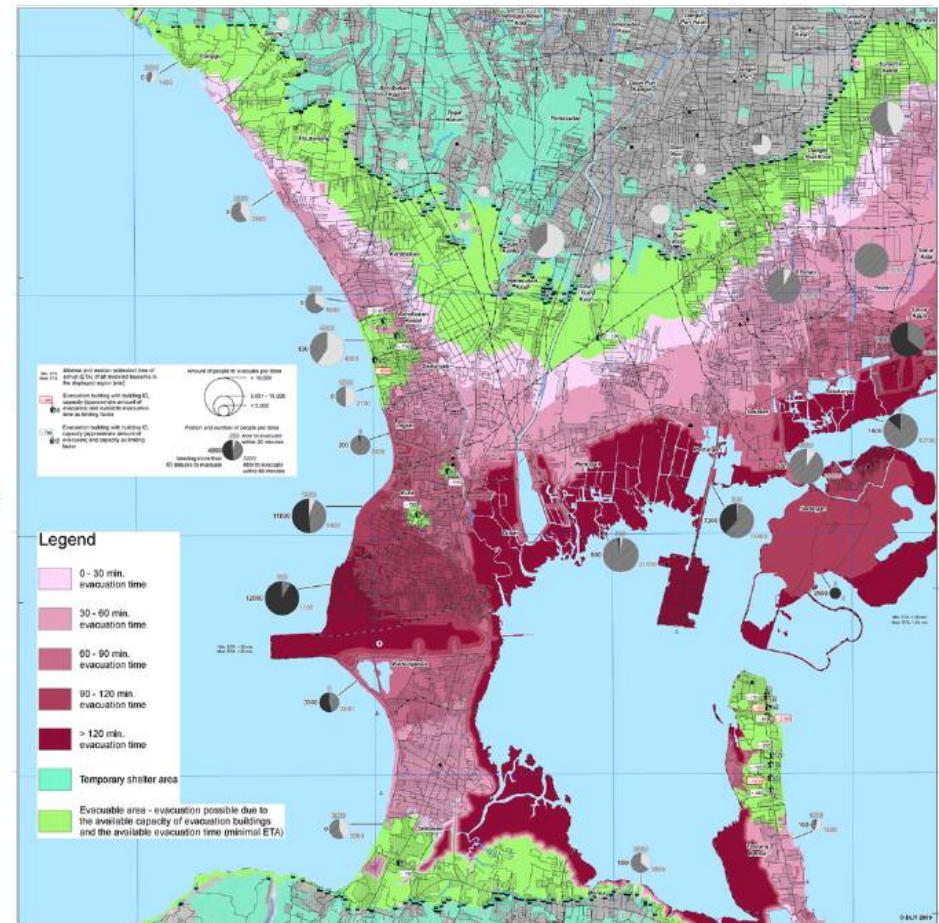
# Implementation:

## Pre-disaster situation, estimating exposed people



Horspool et al. 2014

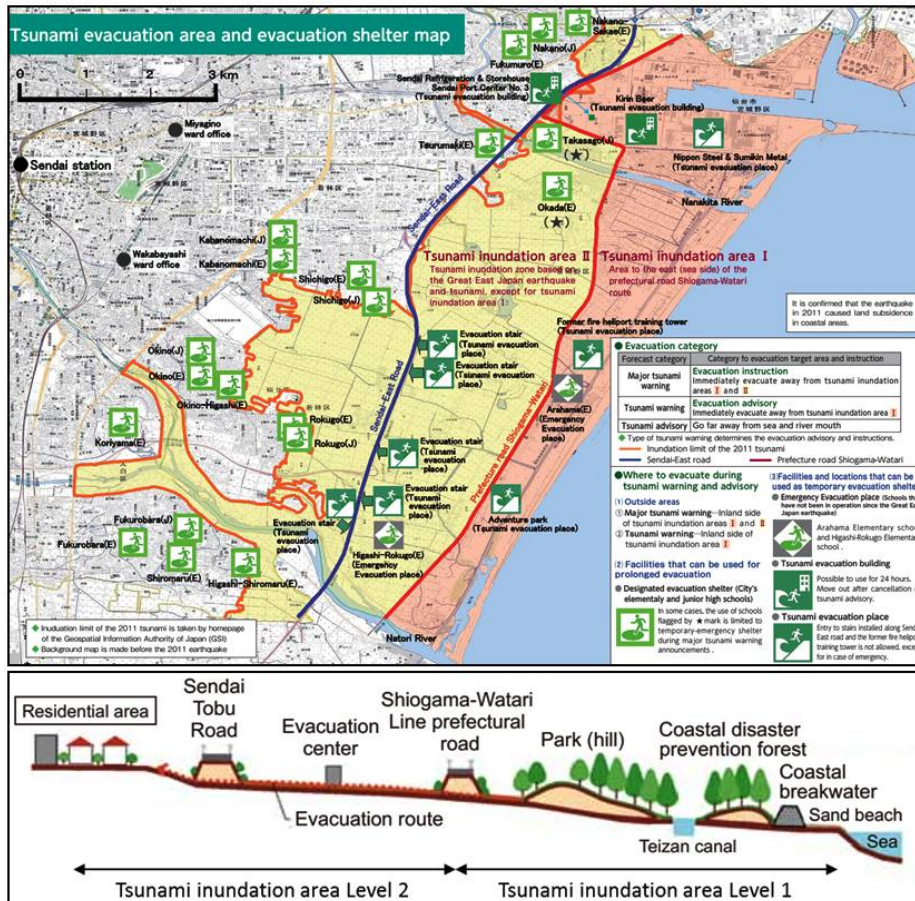
- Multi scenario hazard analysis
- Identification of influential source area
- Number of simulation ~ 500 simulations



Strunz et al. 2010, Wegscheider et al. 2011, Muhari et al. 2014

# Implementation: Post-disaster situation

What was missing in 2004 process? **Land use regulation!**  
An example of the reconstruction after 2011 Japan tsunami



Muhari et al. 2014

Banda Aceh





Sentinel Asia Tsunami WG

Proposal for  
Sentinel Asia Tsunami WG

Kickoff Meeting Results  
30 Nov. 2015

# Purpose/Goal

Contribution to enhancing capabilities of tsunami disaster management in Asia-Pacific countries

- Tsunami Risk Assessment
- Tsunami Forecasting/Warning
- Mapping Tsunami Inundation/Impact
- Tsunami Evacuation Plan
- Emergency Observation
- Tsunami Risk Awareness/Education
- Training Program/capacity building



# Activities of WG

- Review of tsunami disaster response protocols of each country (including forecasting, early warning, emergency observation, monitoring, mapping)
- Review of past tsunami events
- Making plan of emergency observation for mapping impact in disaster response
- Making plan of using archive data for disaster response and recovery
- Making plan of success story (Definition of success story)
  - End to end system/services for tsunami disaster mitigation
- Web-based information sharing (Activities/Efforts/Outcomes) in Sentinel Asia web site

# To Do & comments

- To invite related inst. to be the WG members
- Be more comprehensive (increasing members from different organization, but needs to nominate at least one focal point from each country)
- Define Users of the information, more specific. Each member should define the users. Sentinel Asia's definition ... User is basically national organization.
- Keep in mind “User-oriented approach”, not “Providers-oriented”.
- Collaboration with developing agencies (ADB, JICA) and national project
- Classifying the implementation phases.
- Sharing information including slides via Sentinel Asia Server
- Exchange, collaborating with other organizations, groups
- Next web-meeting, beginning of 2016 (not all members).
- Needs WG webpage for outreach.



# Thank you

Abdul Muhari, PhD

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