

Disaster Mitigation in Asia Pacific

A New Collaboration Paradigm between EGI and APAN

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2. National Central University (NCU)
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Taiwan

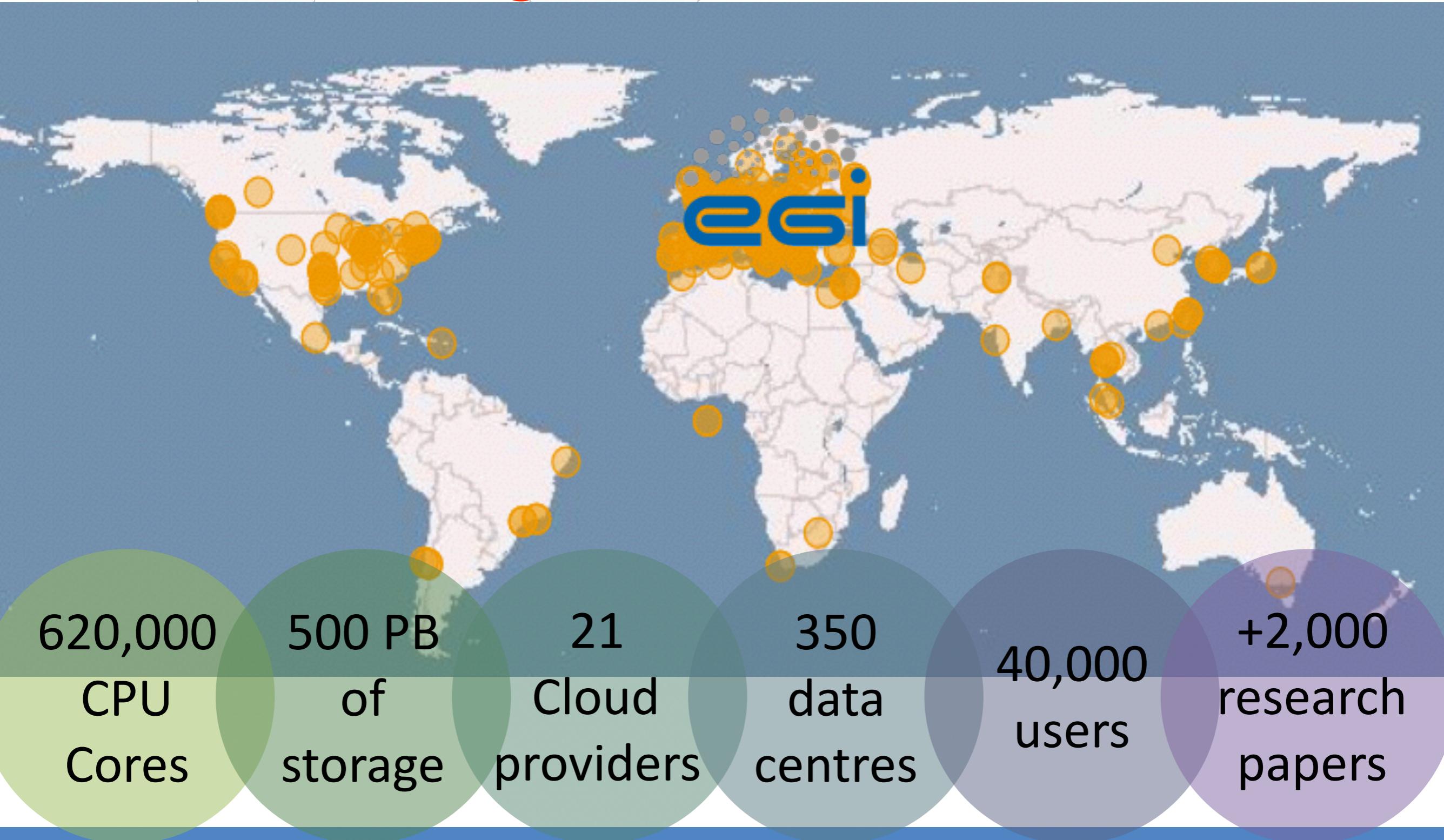
@ APAN41, PRAGMA30

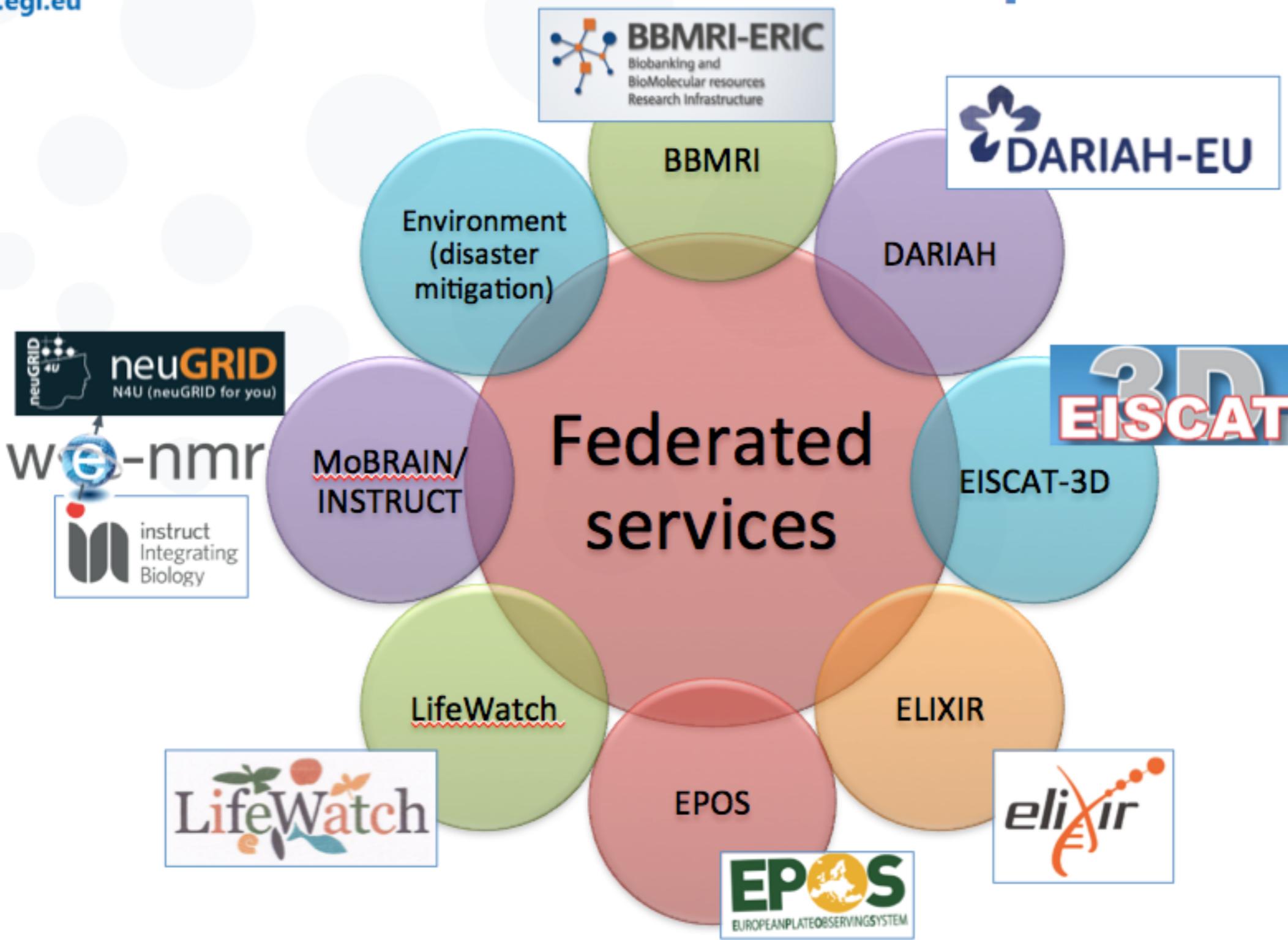
Manila, Philippine

Jan. 27, 2016

EGI today

EGI has 25 participants (23 NGI + CERN + EBI) and is connecting 340 centers in 54 countries





DMCC is Designed to Achieve Early Warning Systems

- For selected disasters: Earthquake, Tsunami, Extreme Weather, Flood, Dust Transportation and Urban Heat Island
- **Deeper understanding** of disasters is an important goal by the e-Science approach
- Generating Hazard Maps: Based on better scientific models (combining atmosphere and oceanic models) and faster simulation facilities
- Verified by historical events
- Implemented by web portals together with workflows of target cases, and local user communities
- Gap analysis of participating countries will be conducted: e-Infrastructure, user engagement, technology and user support, outreach, etc.

DMCC Collaboration

- Partnership
 - TW, PH, TH, MY, ID, KR, DE, UK
 - New partners: Nepal, VN
- Case Studies
- Common Services
 - Web Portals
 - e-Infrastructure
 - Application and user support
 - Advanced visualization
 - Training together with EGI training services
 - Dissemination and Outreach



Case Study & Collaboration Model

Partner	Selected Case	Required Data Sets	Status	Check Point	Simulation Framework
PH, TW	Typhoon Haiyan		Finish 1st numerical study by combining atmospheric and ocean model	Demo @ APAN41	gWRF, iCOMCOT
ID, TW	Tsunami cave in Lhong-Aceh Besar; Wild fires	Doppler Radar, Tidal gauge, air pressure, wind speed, typhoon path; hourly resolution	Waiting for funding confirmed by ID	Demo @ ISGC2016	iCOMCOT
MY, TW	Flooding 2014-15		First simulation by AS (global data) was done.	Demo @ ISGC2016	gWRF, Scouring
TH, TW	Flooding 2011		Simulation by NECTEC and AS (global data) were done. Aim to improve the accuracy and EWS.	Demo @ ISGC2016	gWRF, Scouring
Nepal, TW	Flooding 2014	High altitude and geographical features need to consider	Waiting for more necessary observation data	Demo @ ISGC2016	gWRF, Scouring
TW, PH	Tsunami Impact Analysis in South China Sea	Bathymetry, fault geometry, historical events,	In progress	Demo @ ISGC2016	iCOMCOT

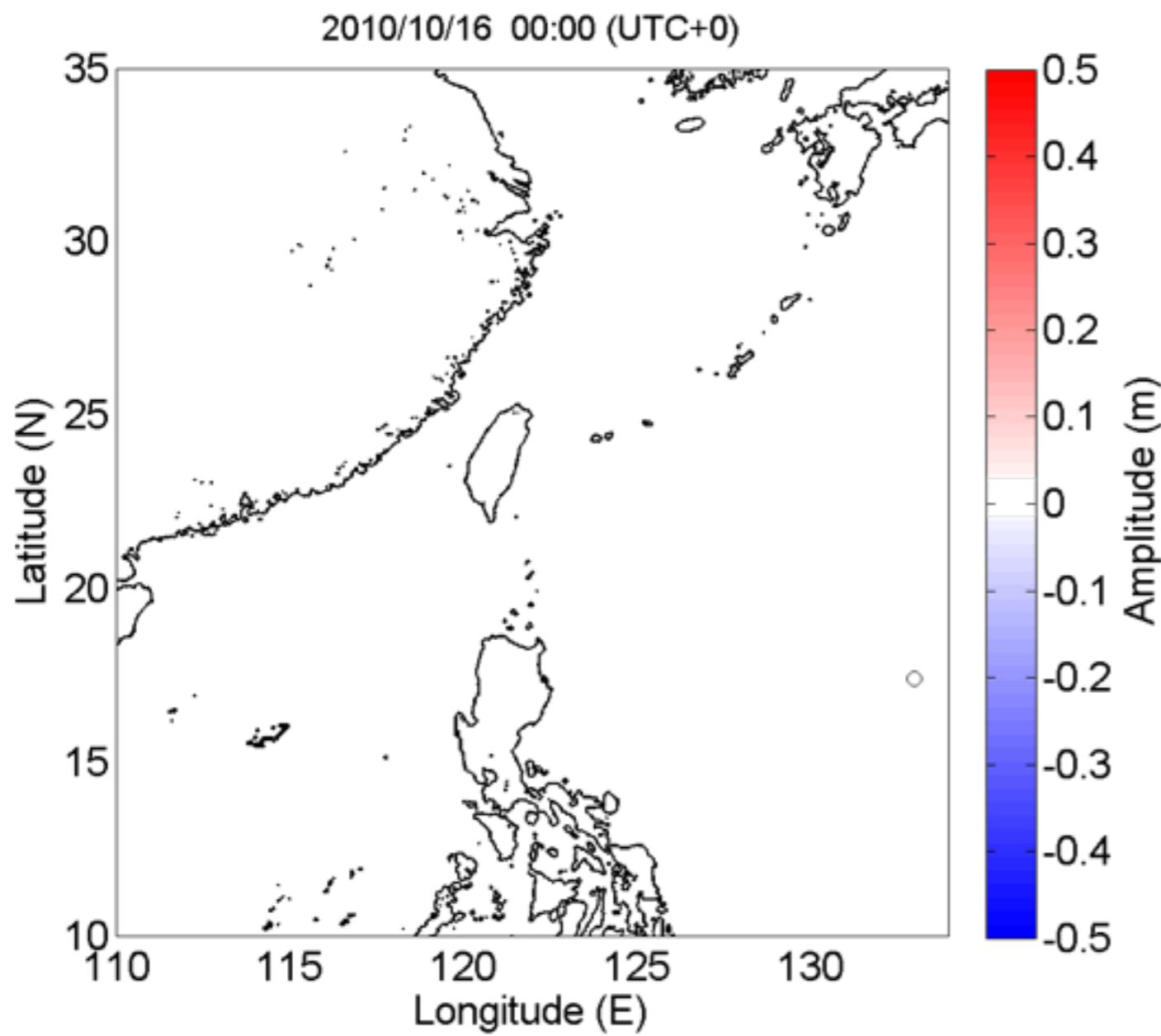
DE will provide advanced visualization support whenever it is possible

Infrastructure

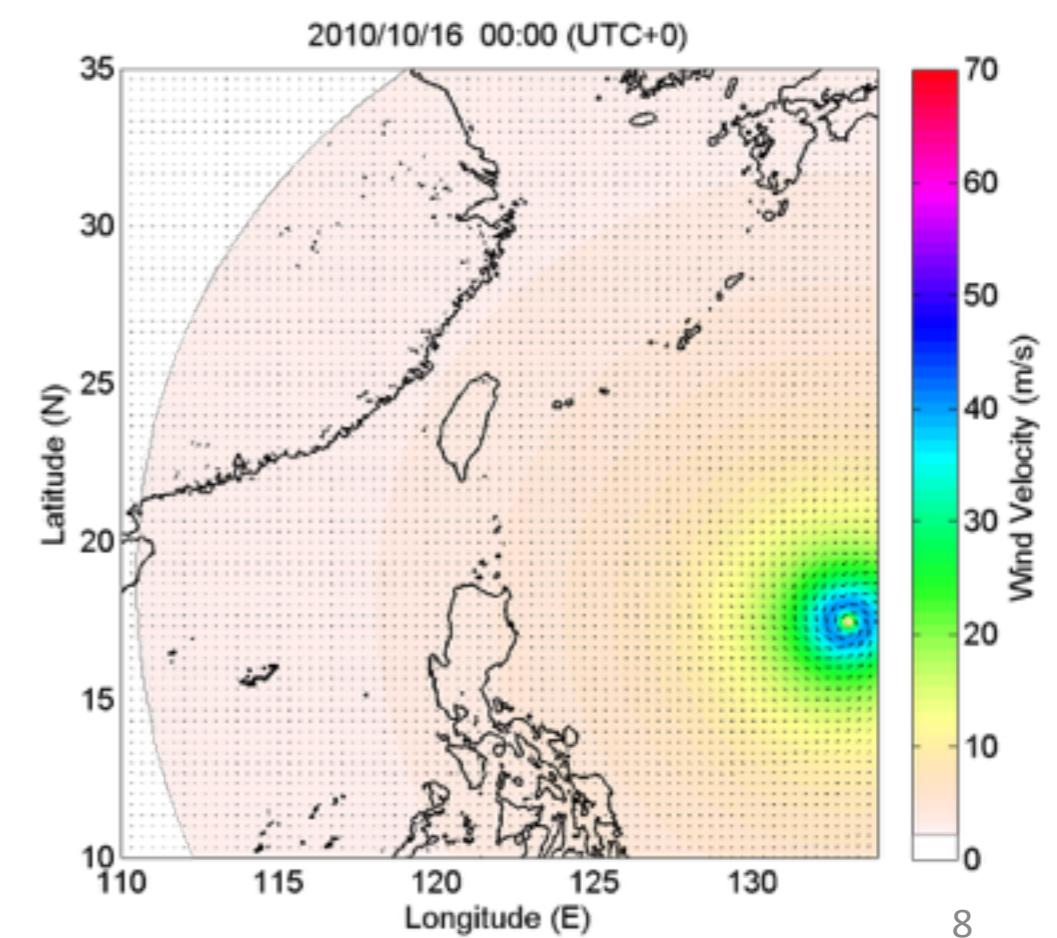
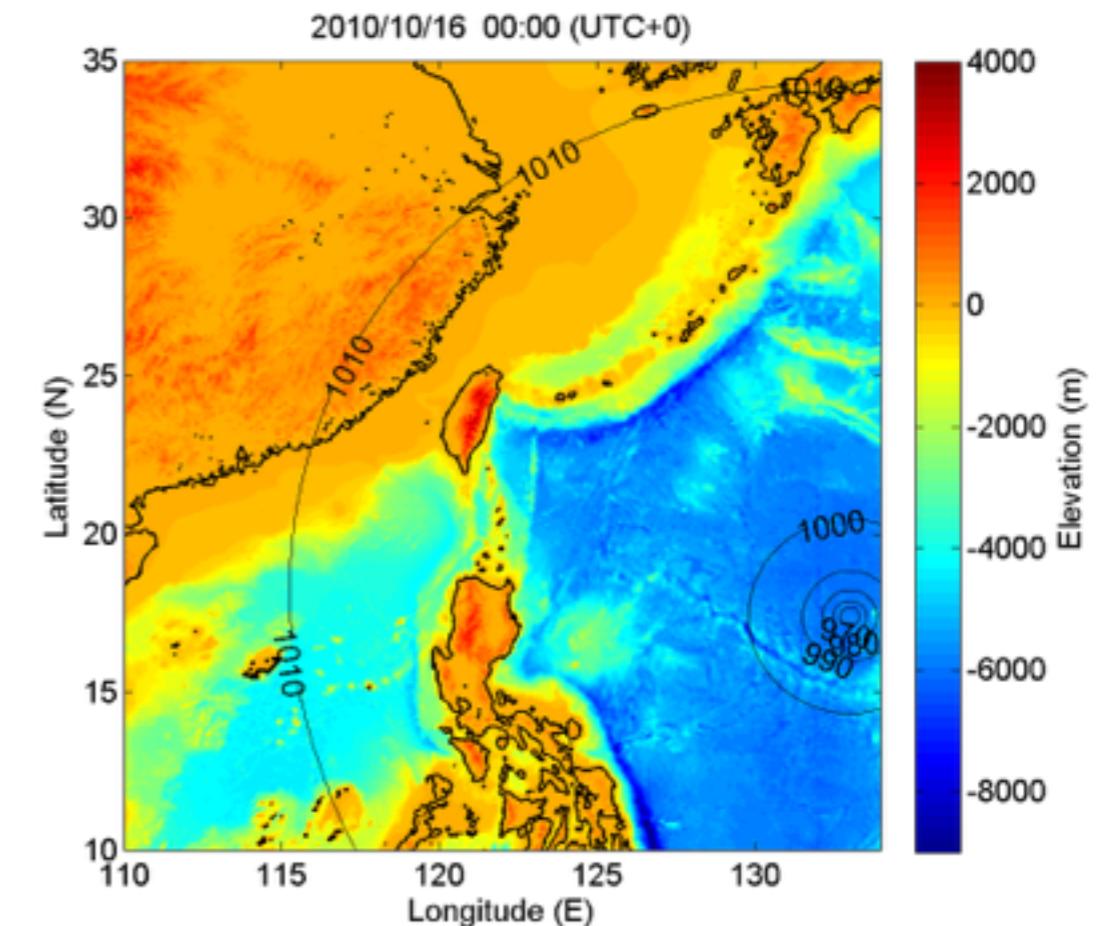
- Regional Cloud Federation based on Grid-based distributed infrastructure: undergoing
 - Web portal will make use of available resources
 - Workflow of selected case studies are implemented by the Web portal
 - Generic Web portal will be open for EGI
 - Supporting all applications by the same infrastructure
- Application Portals
 - Tsunami wave propagation simulation portal is available
 - WRF portal will be delivered by end of 2015
- Dynamic User Slice (Domain) Arrangement
 - Will try integration of SDN at ASGC if it's possible
- Next Generation Cloud
 - Integration with EGI Federated Cloud is always an option

Simulation of Typhoon Megi

2010.10.15 00:00 – 2010.10.23 12:00 (UTC+0)

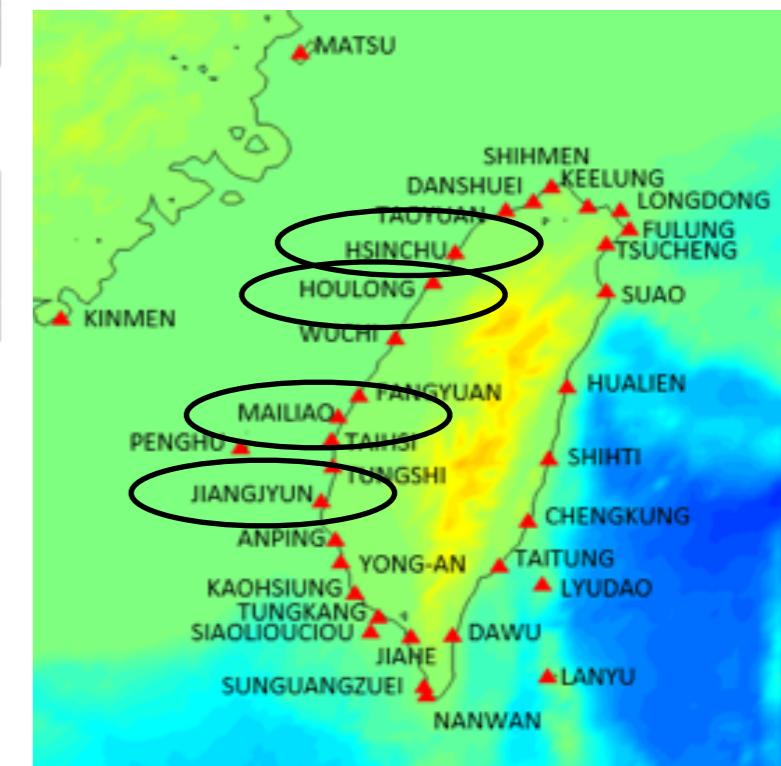
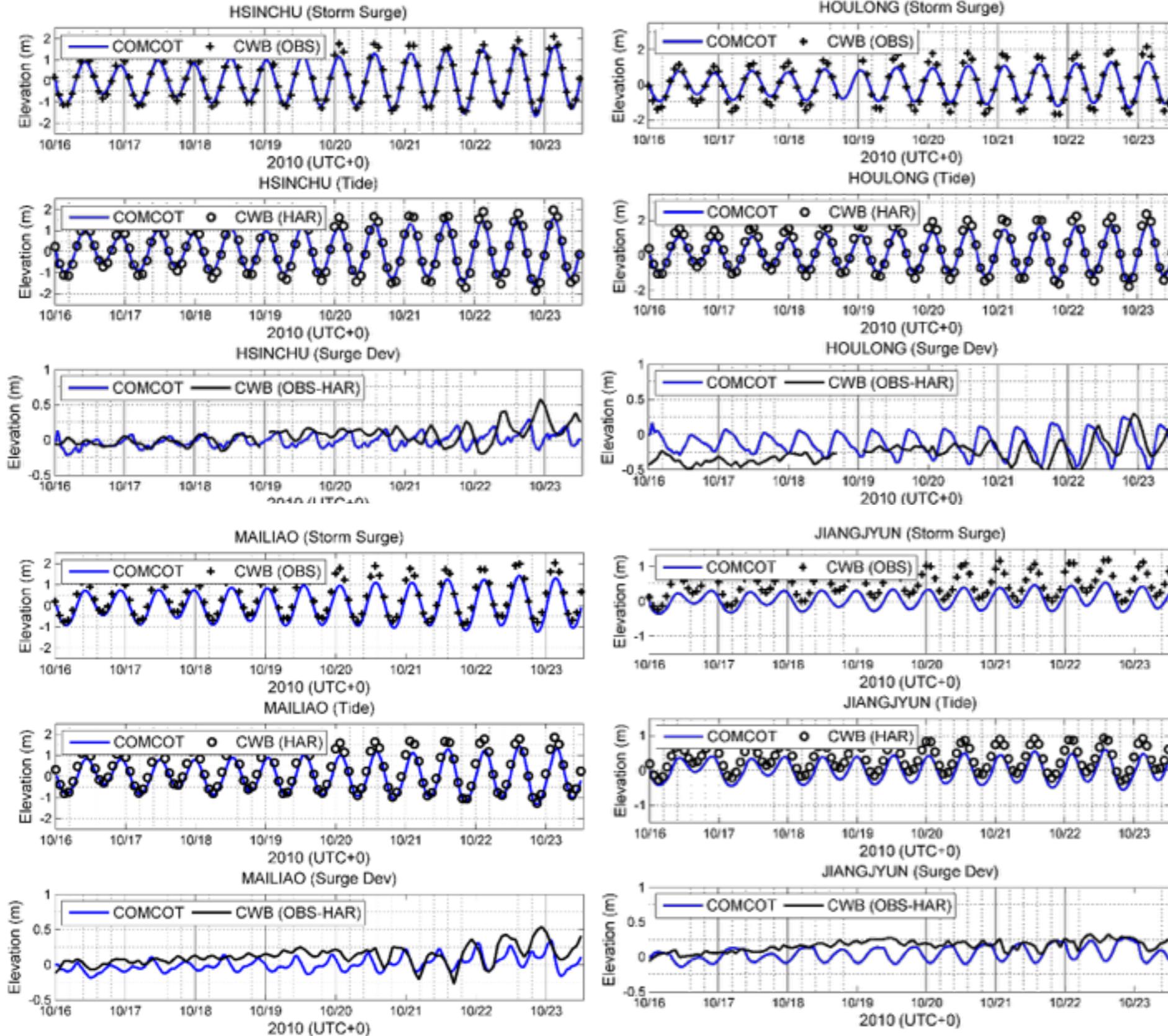


The results are storm surge, pressure field and wind field.

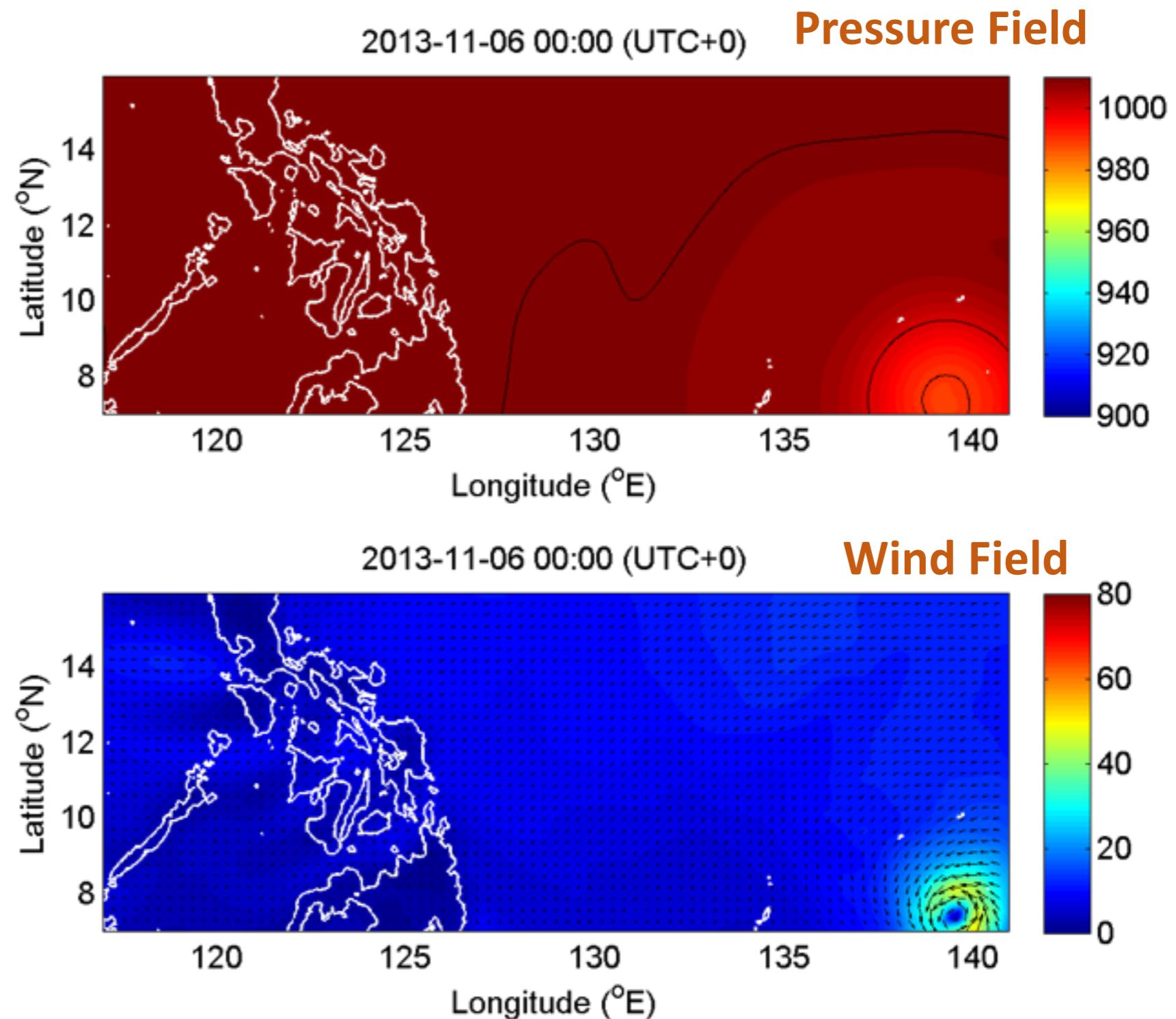
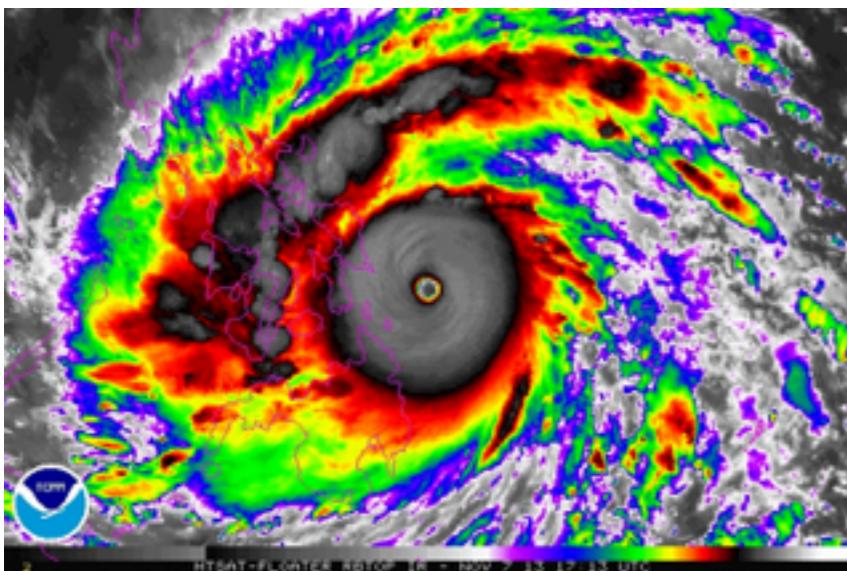


Gauge Comparison

2010.10.15 00:00 – 2010.10.23 12:00 (UTC+0)



Storm Surge Modeling on 2013 Typhoon Haiyan by Coupling Ocean and Atmospheric WRF Model

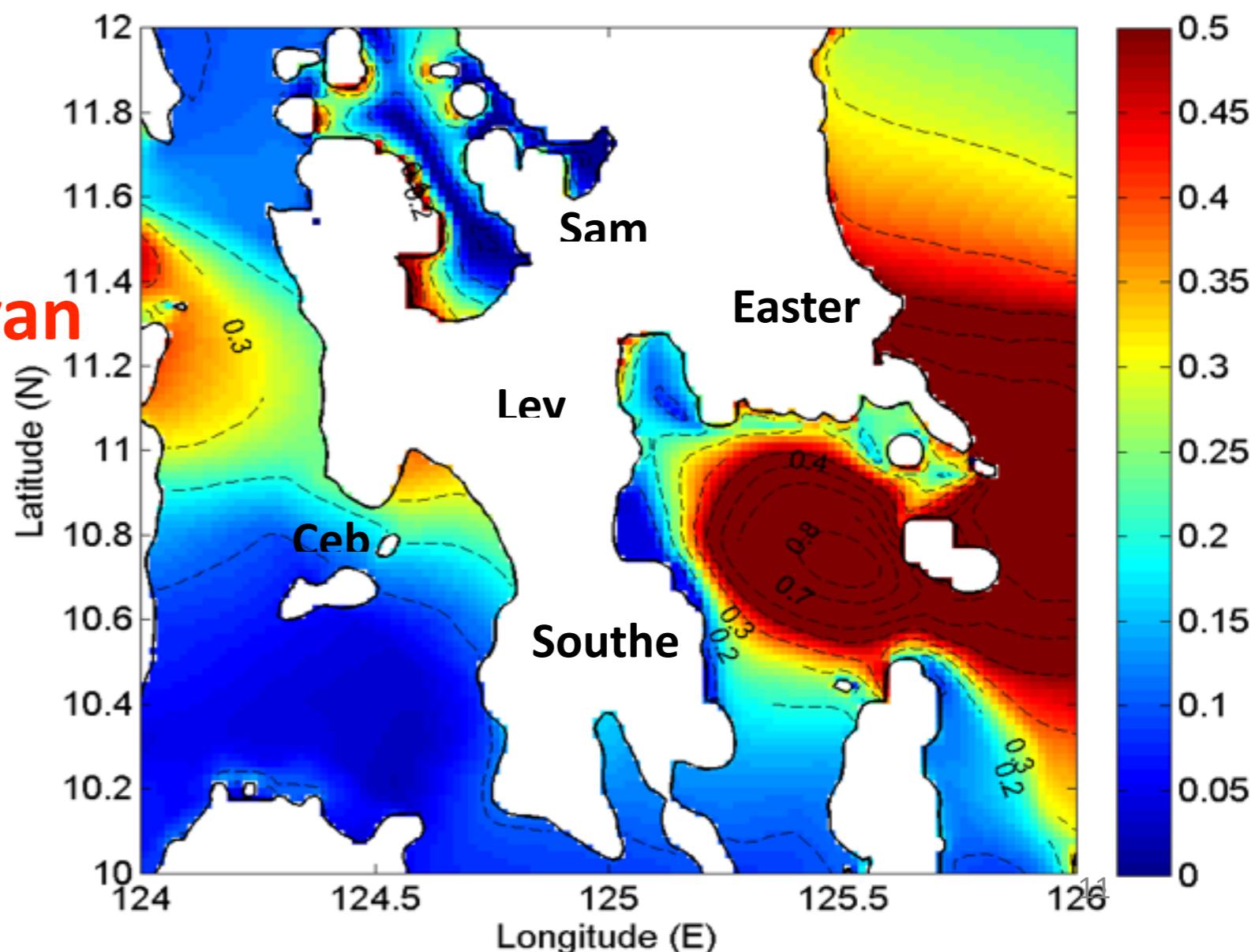


- Asymmetric effect
- Topographic effect
- Hydrodynamic Pressure

The WRF simulations are provided by Dr. Chuan-Yao Lin, AAR Modeling Laboratory (Sinica).

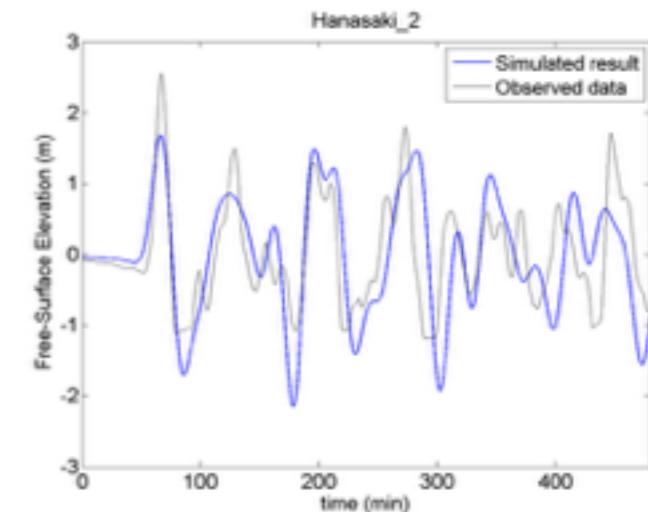
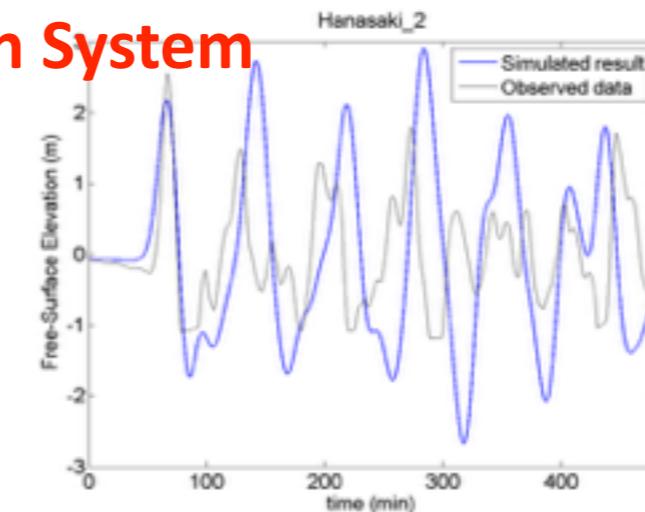
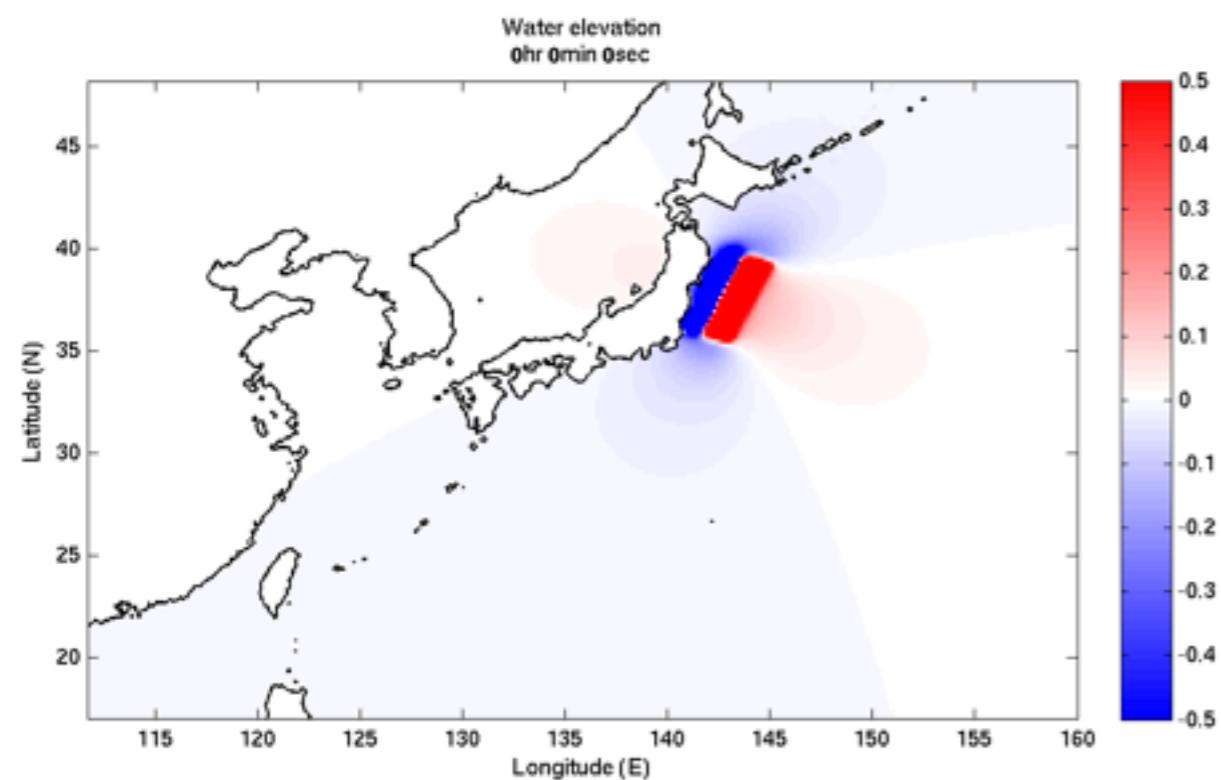
- Our storm surge model is better than ever, and have many advantages:
- Adopt the **large computational domain** to cover the complete typhoon life cycle and full storm surge propagation.
- Couple with the **dynamic atmospheric WRF model**.
- Couple with the **global TPXO model**.
- Calculate **high-resolution storm surge inundation**.
- **High-speed calculation** for the operational system.

Offshore Storm Surge Inundation Induced by Typhoon Haiyan

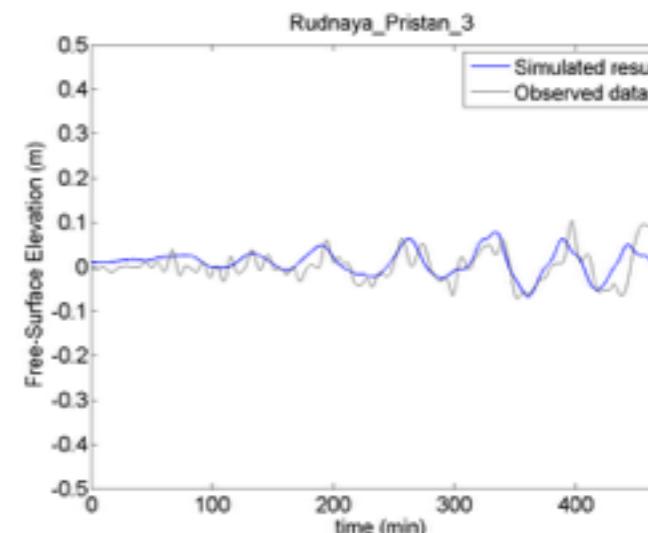
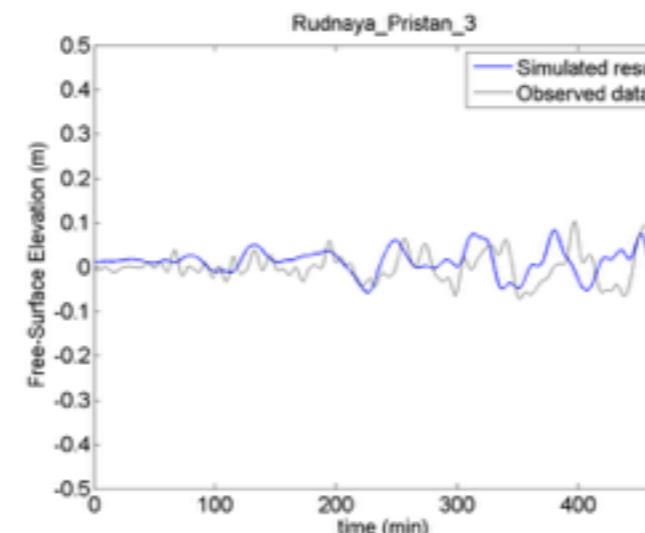


iCOMCOT: a grid/cloud-based Tsunami Fast Calculation System

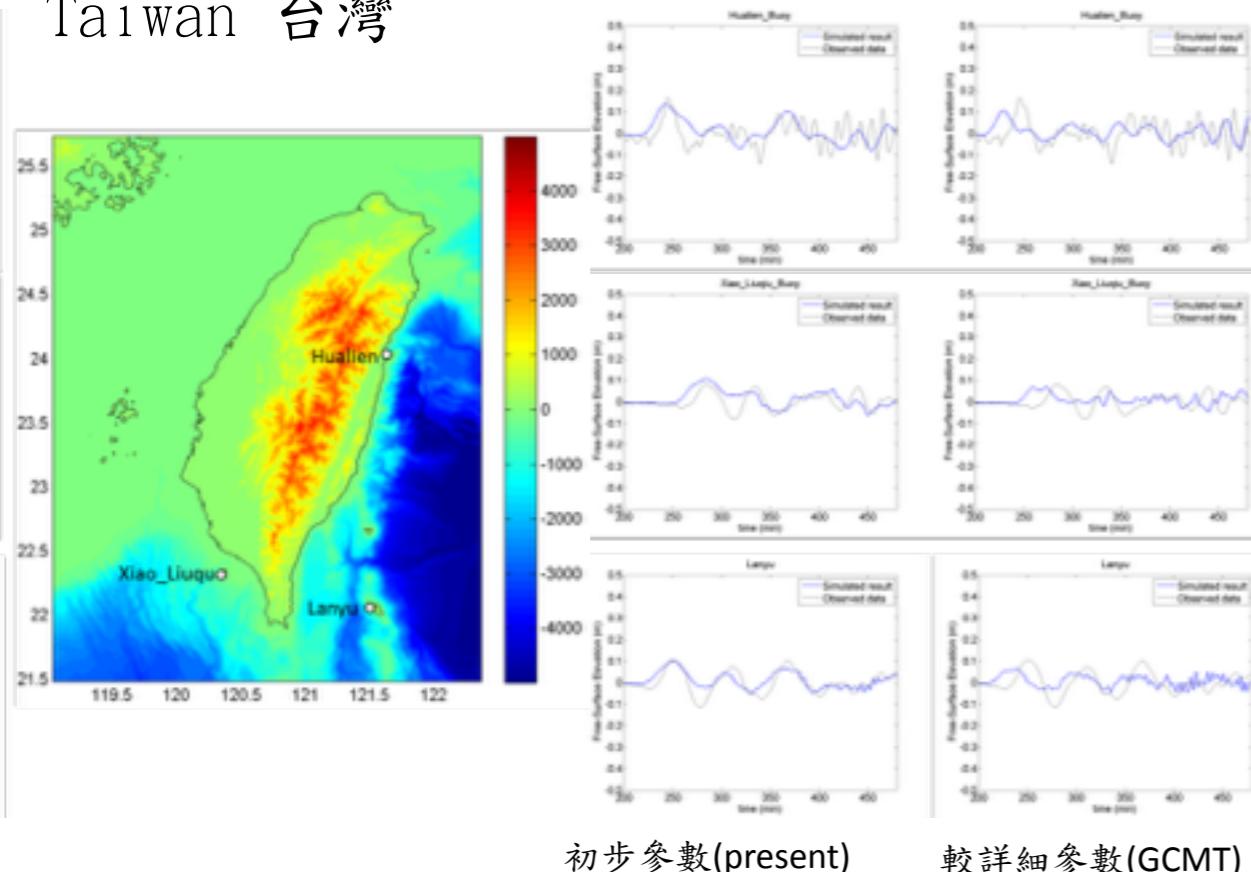
Japan 日本



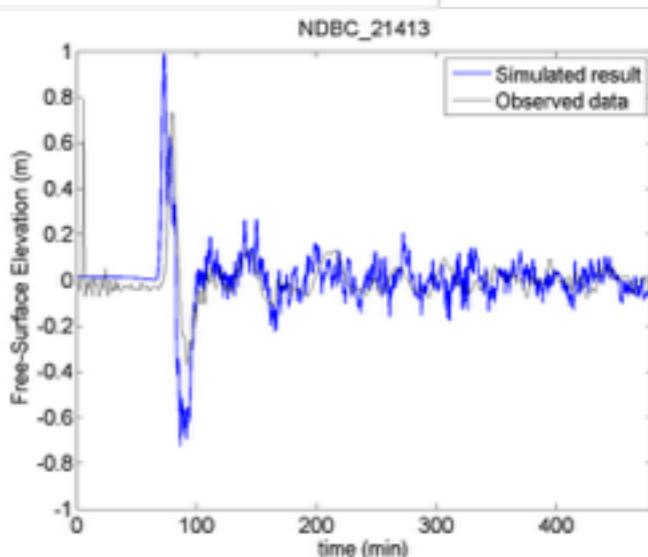
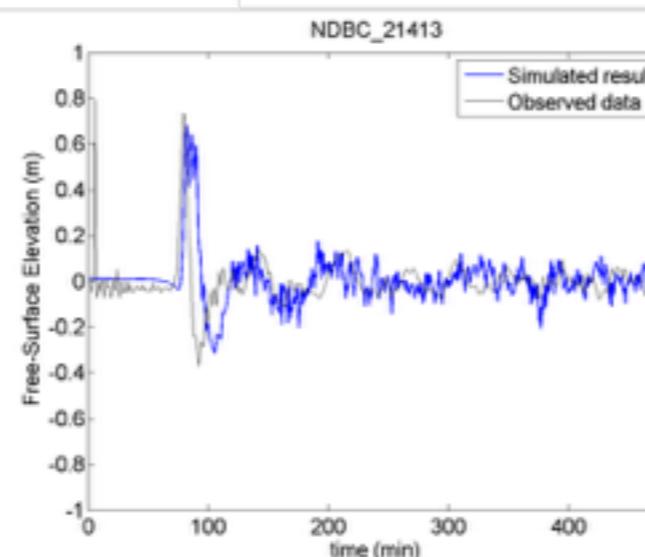
Russia 俄羅斯



Taiwan 台灣



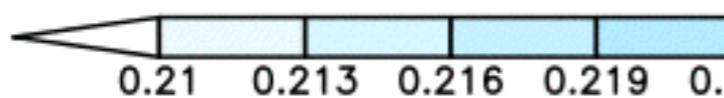
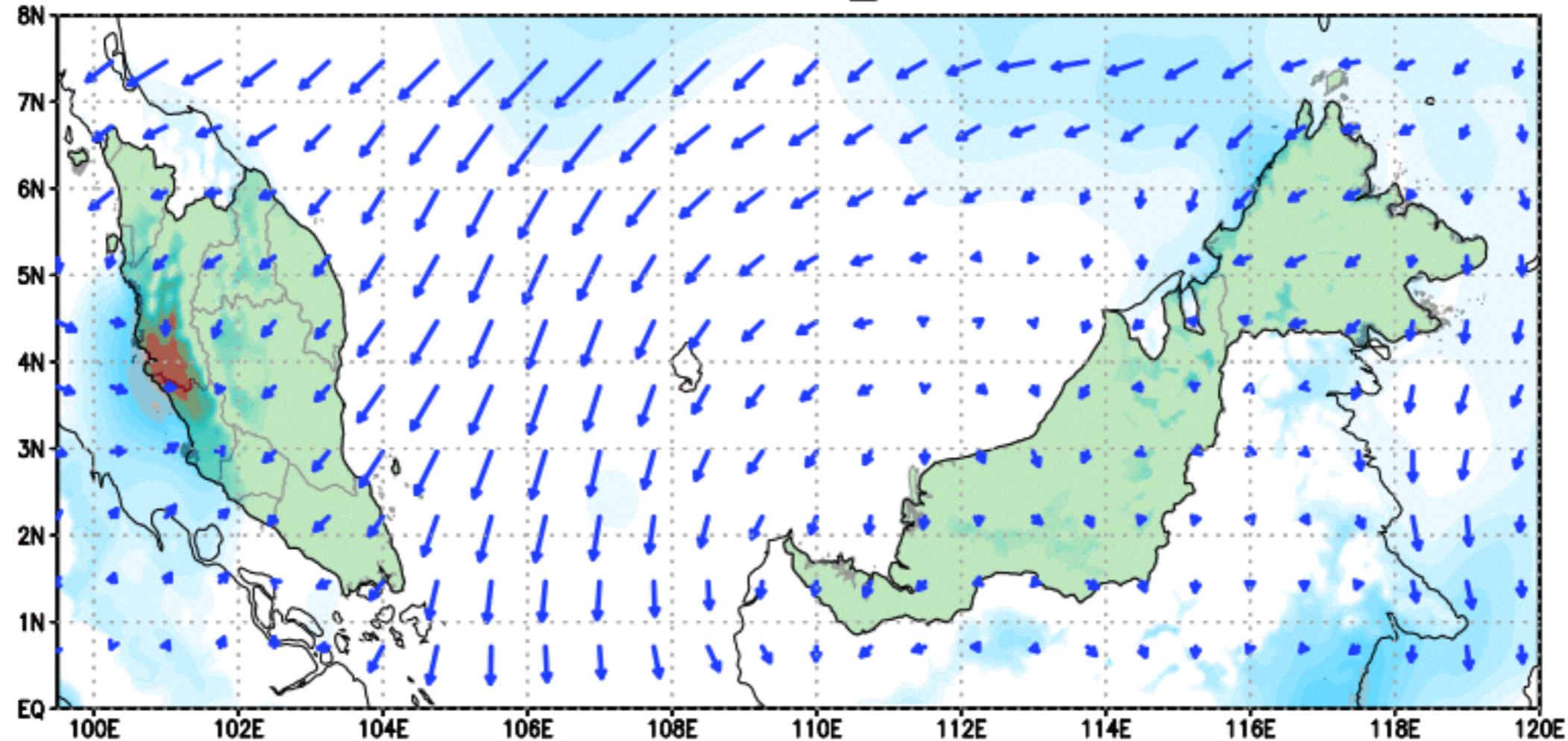
USA 美國



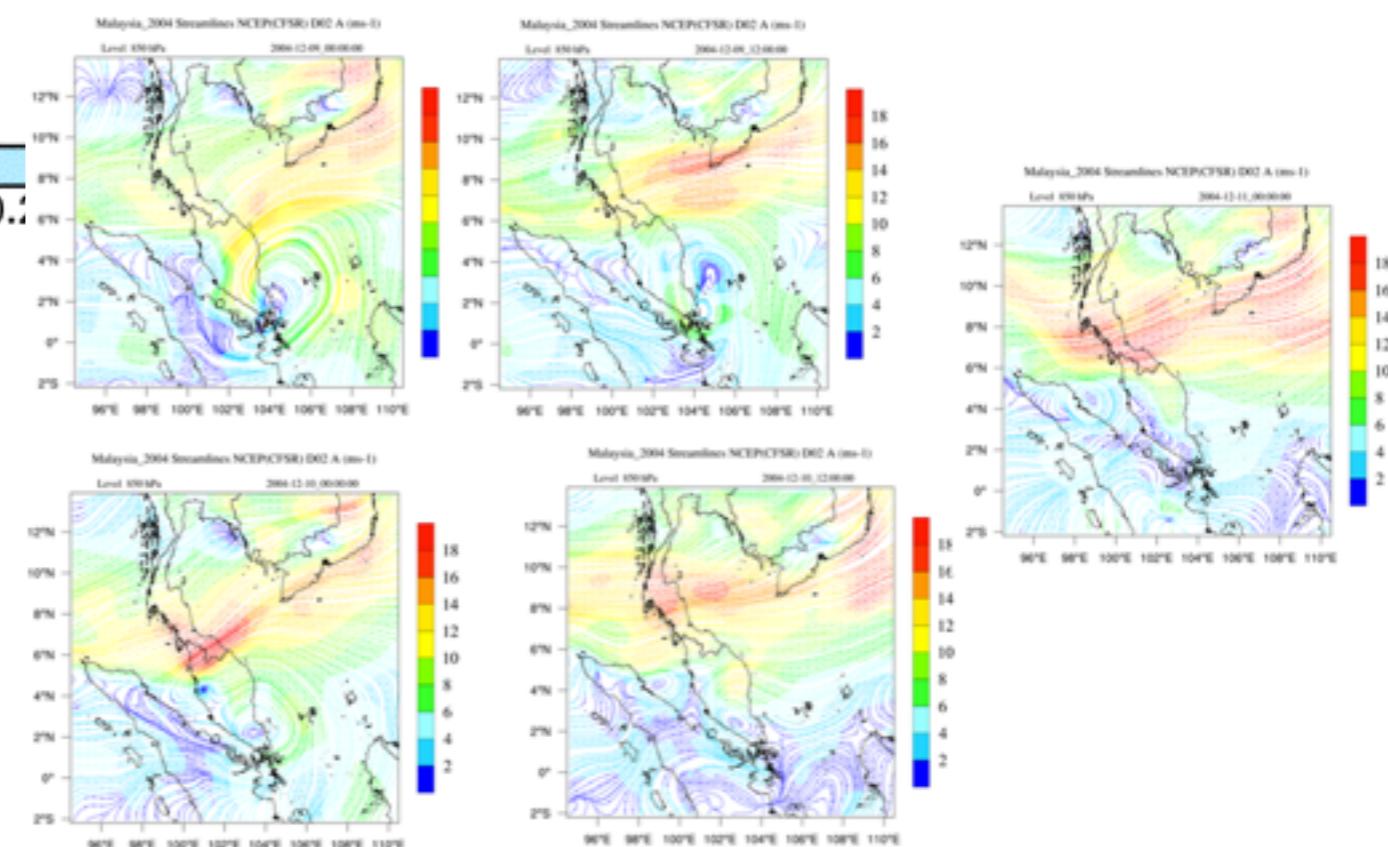
初步參數(present)

較詳細參數(GCMT)

10m Wind and Accumulated Qv under 800 hPa 2014-12-12_12:00Z

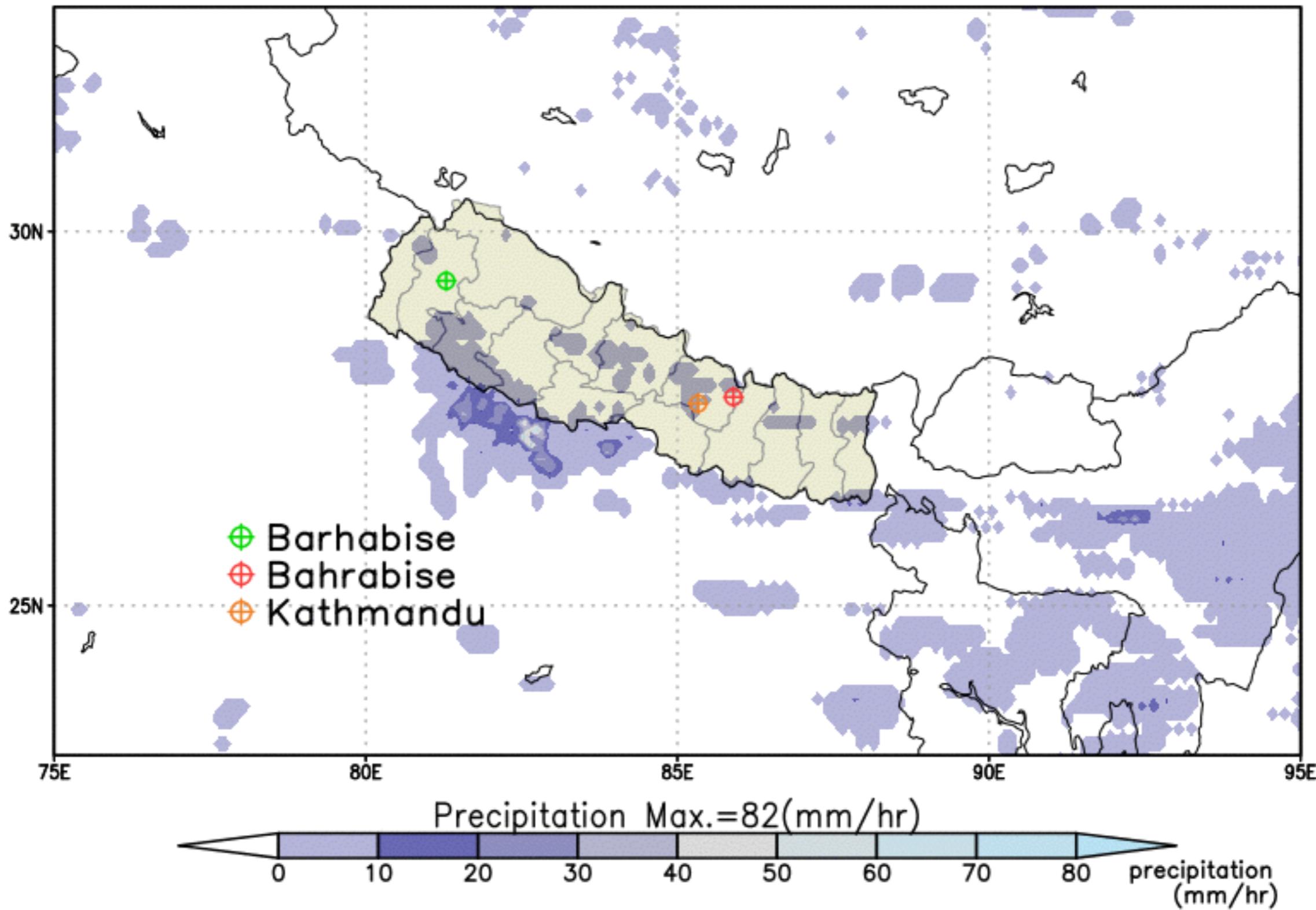


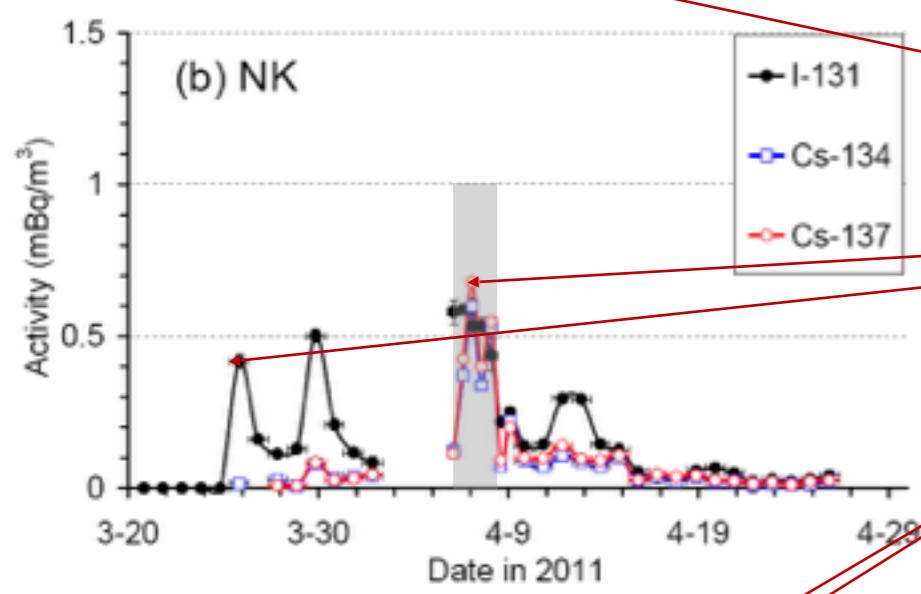
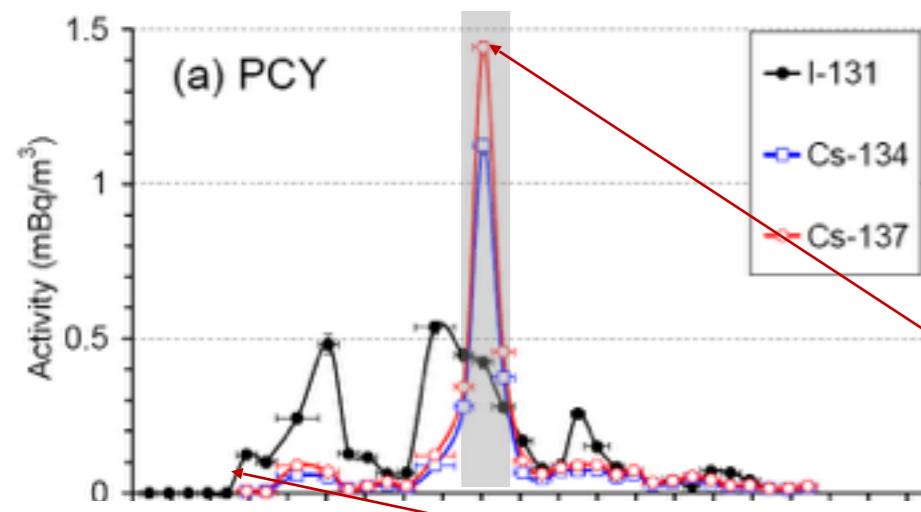
The 2014–15 Malaysia floods hit [Malaysia](#) from 15 December 2014 – 3 January 2015. More than 200,000 people affected while 21 killed on the floods.^[1] This flood have been described as the worst floods in decades



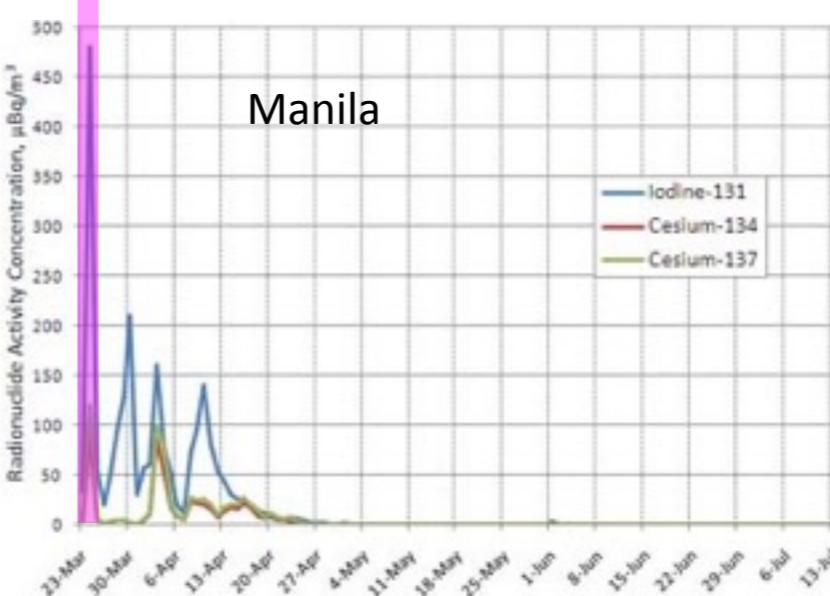
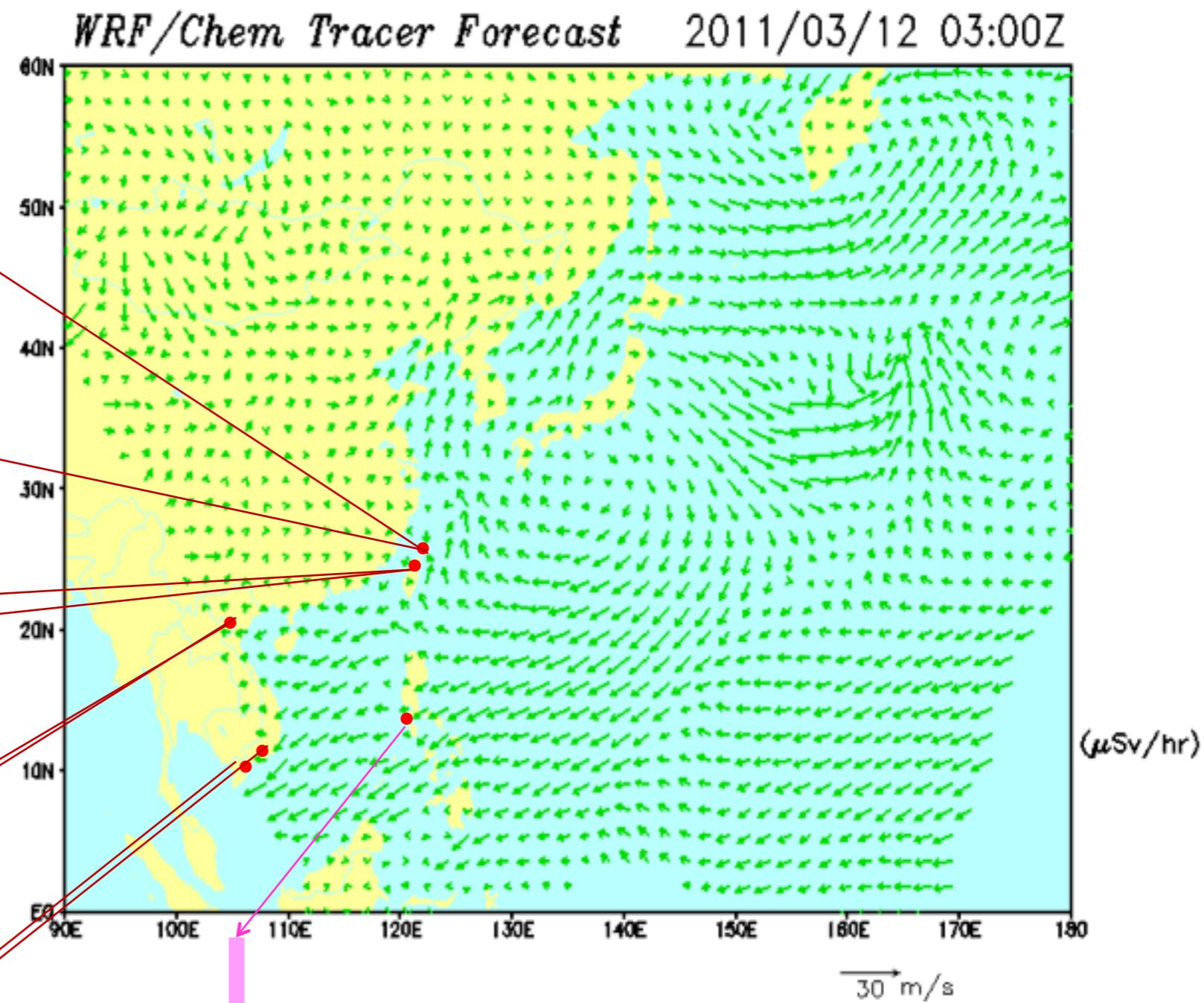
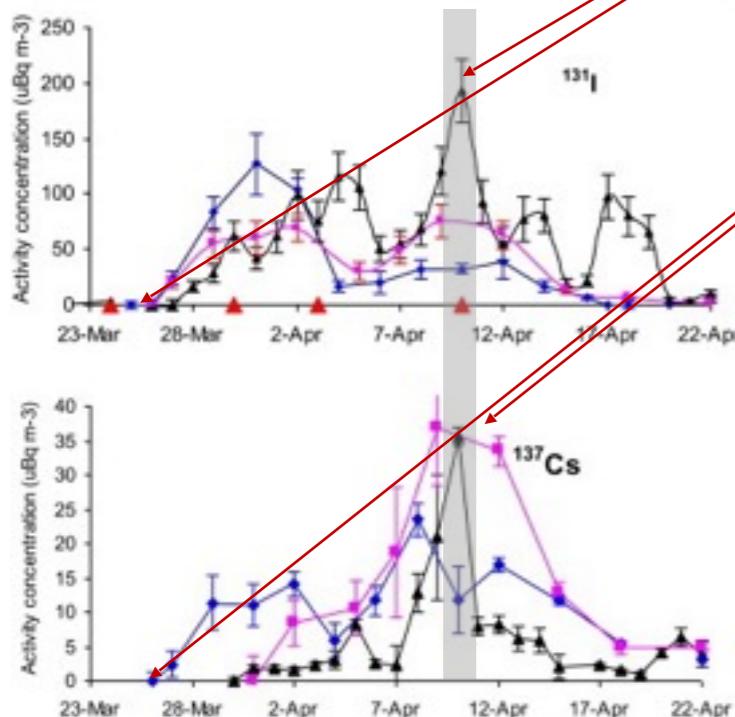
Flooding in Nepal

3-Hour Precipitation from PPS TRMM/GPM Estimate
2014-07-10_03Z



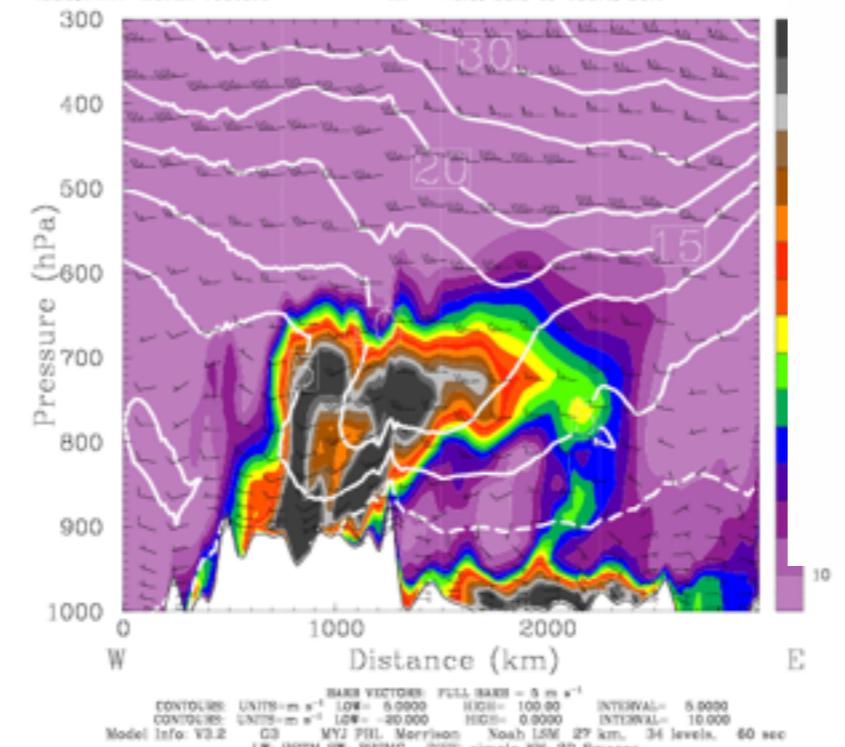
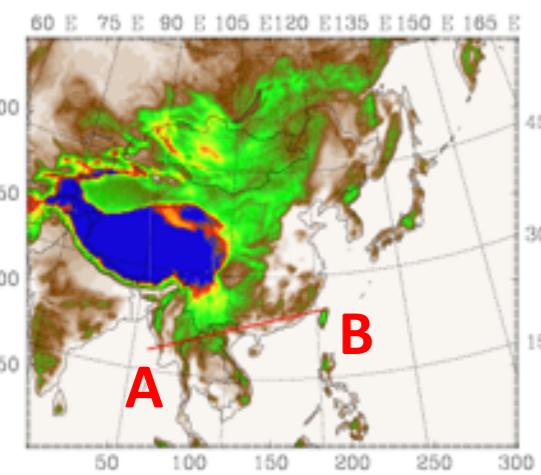
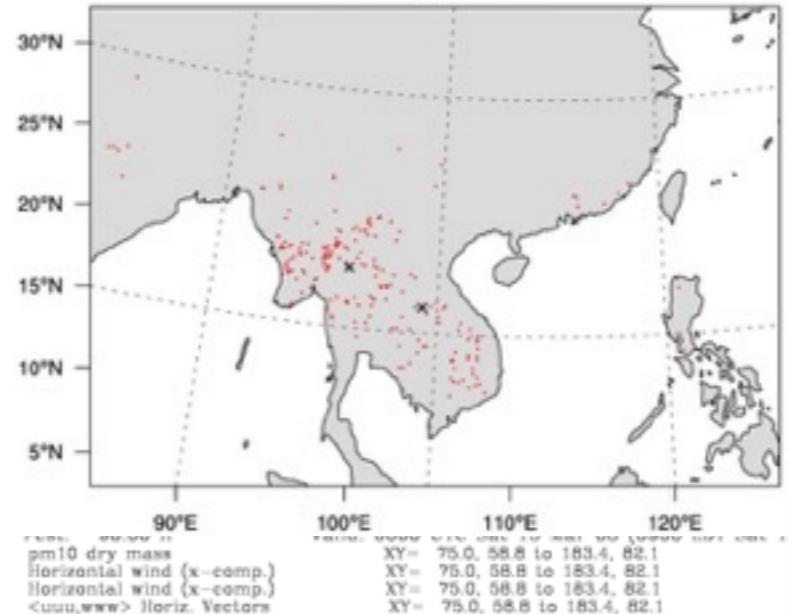
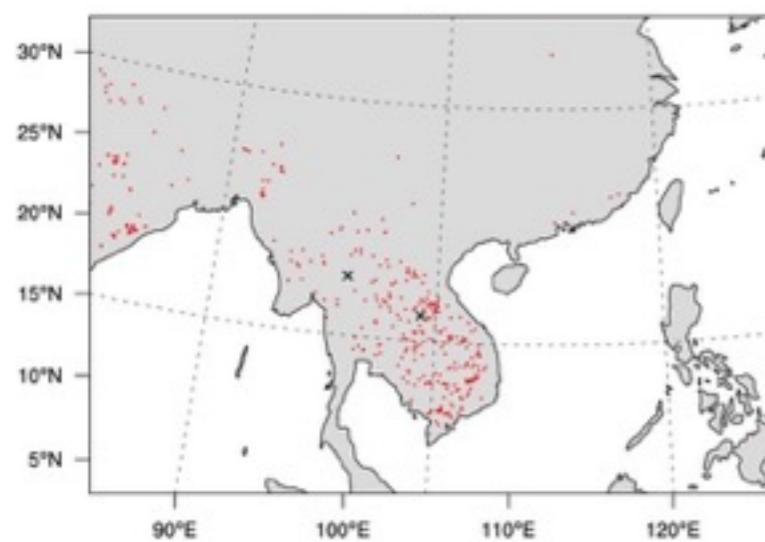


— Hanoi — Dalat — HCMC — Date of peak at Manila

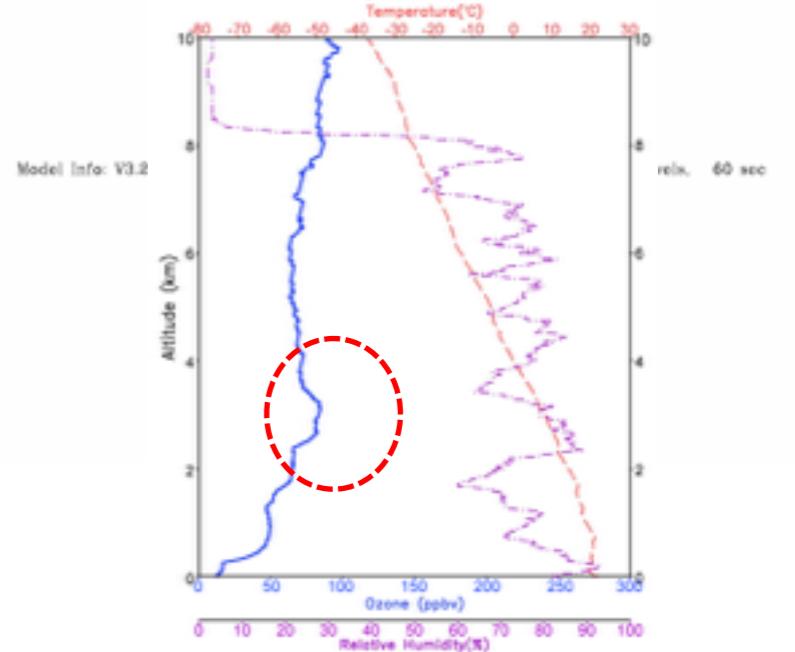
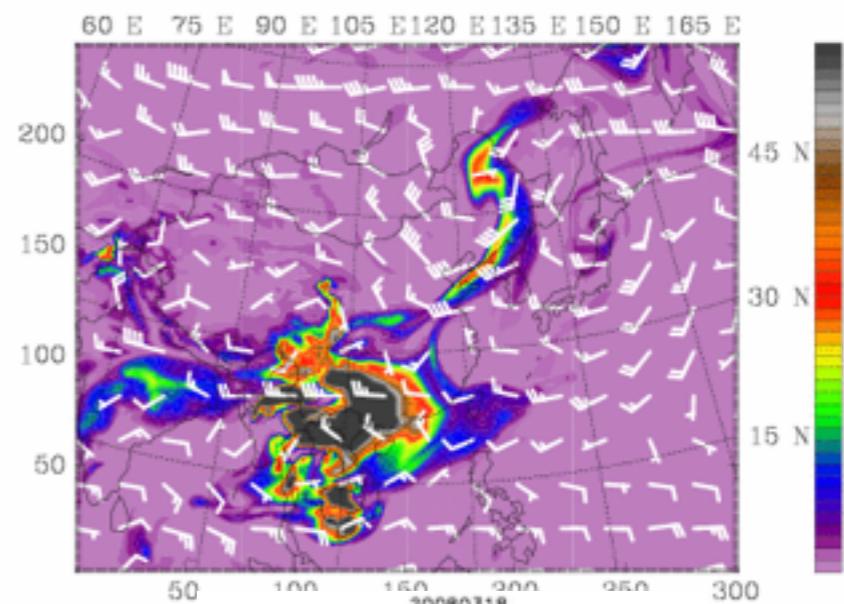


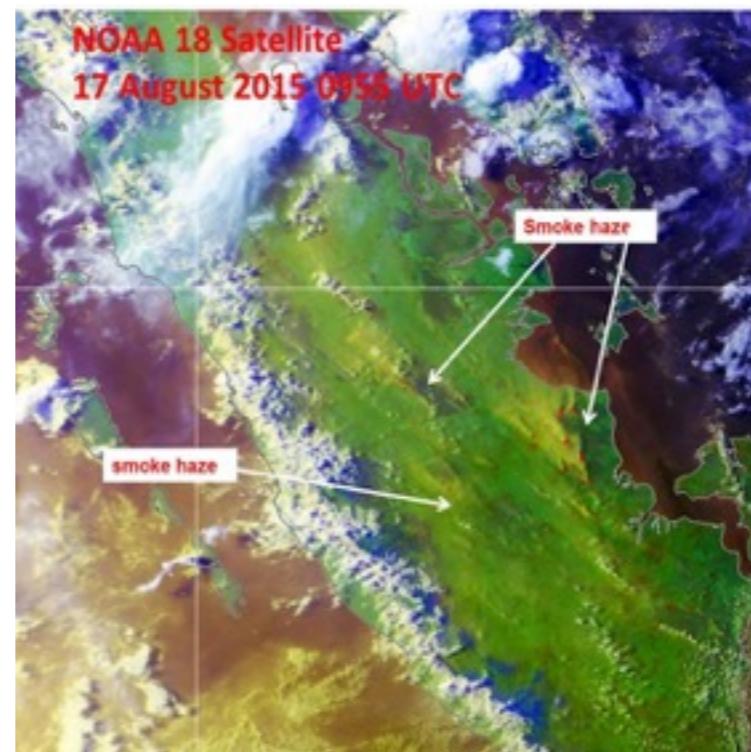
Modelling of long-range transport of Southeast Asia biomass-burning aerosols to Taiwan and their radiative forcings over East Asia

By CHUAN-YAO LIN^{1*}, CHUN ZHAO², XIAOHONG LIU^{2,3}, N WEI-NEI CHEN¹, ¹*Research Center for Environmental Changes, Academia Sinica, Taipei, Taiwan*

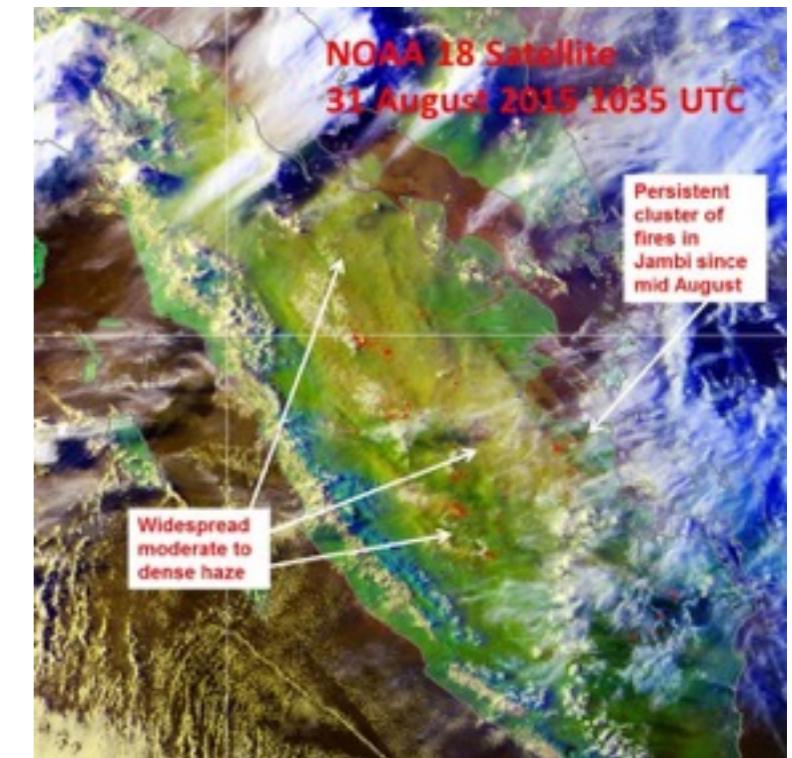


Dataset: test RIP: chun-f06-co
Pest: 96.00 h Valid: 0000 UTC Sat 15 Mar 08 (0900 LDT Sat 15 Mar 08)
CO concentration at pressure = 700 hPa
Horizontal wind vectors at pressure = 700 hPa

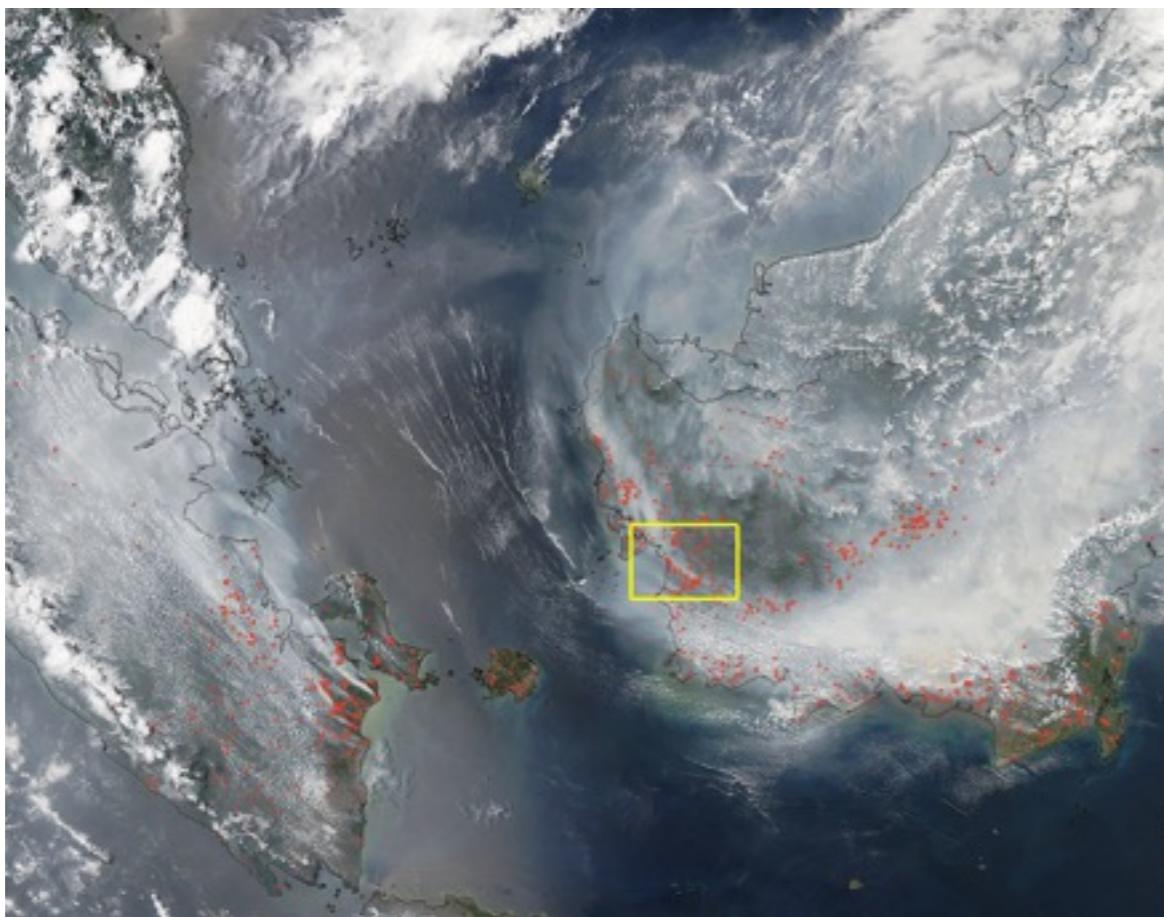




NOAA-18 satellite picture on 29 August 2015 shows deterioration of smoke haze situation in Kalimantan



NOAA-18 satellite picture on 31 Augusts 2015 shows widespread smoke haze from Sumatra spreading into the Strait of Malacca.



NASA's Aqua satellite collected this natural-color image with the Moderate Resolution Imaging Spectroradiometer, MODIS, instrument on September 22, 2015.

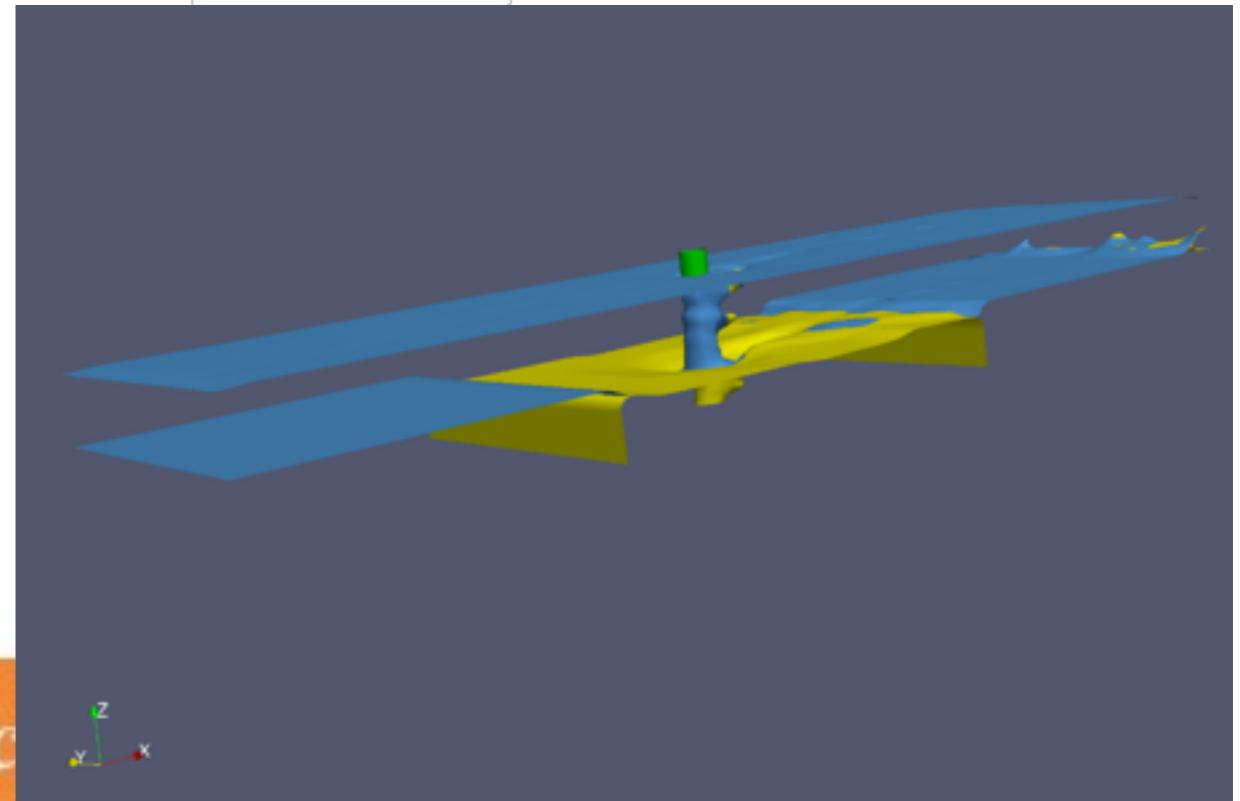
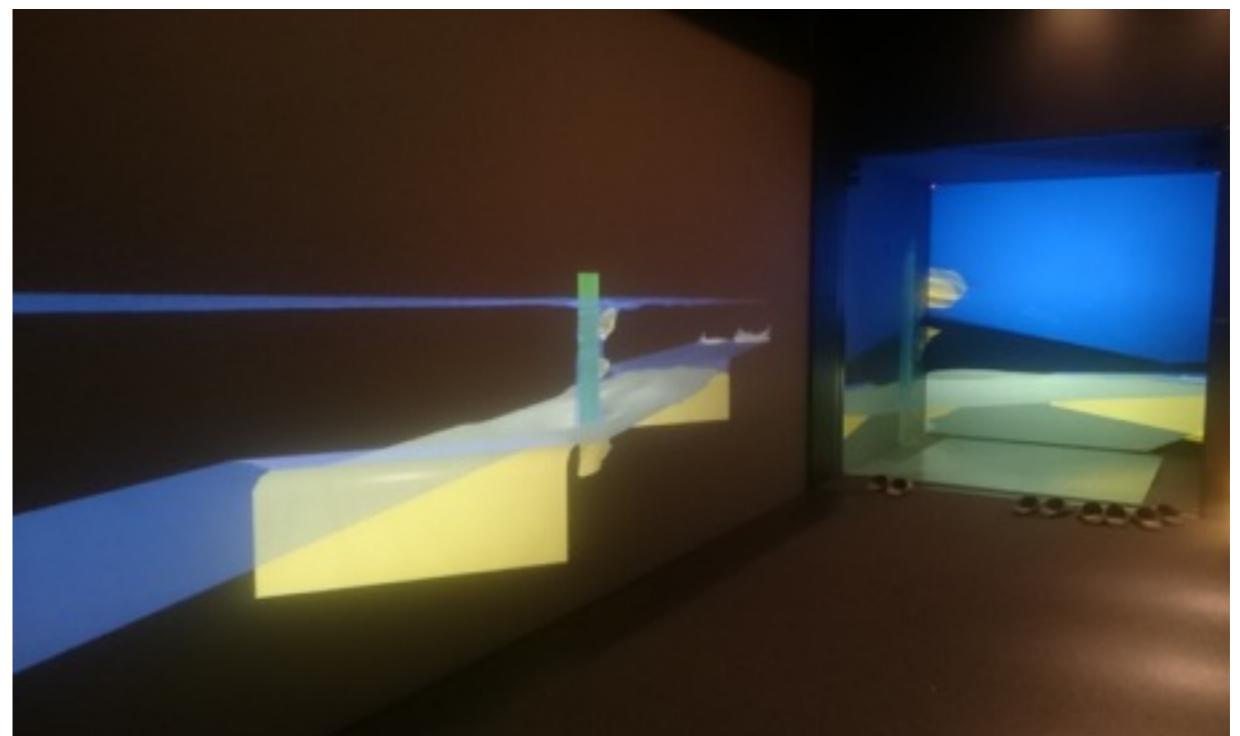
Advanced Visualization

- Scouring case study has been conducted

Advance Visualisation



LRZ: Siew Hoon Leong (12 May 2015)



Numerical Model on Environmental Study (Disasters)

- Target Cases
- Requirements
 - Data, model, simulation framework, visualization
 - Analysis and application for risk management → improvement of the model and analysis efficiency
- Compound Disasters (Complex Scenarios)
 - Typhoon/Extreme Rainfall → Flooding → Landslide/Debris Flow
 - Earthquake → Tsunami → Souring
 - Flood → Scouring
 - Impact of Land-Sea circulation interaction

Outreach and Collaboration

- User Communities
- Weather/Environment/Disaster Mitigation Agency
- NSPO of Taiwan
- Open Street Map Community
- GIS community
- Government agency and NGO
- ...

Supporting Science Communities to Make Effective Use of Available High Performance Cloud Services

- APAN Disaster Mitigation WG is about to inaugurate
- Case Study: Will/Is working with Agriculture and Disaster Mitigation WG first
- Service Directory: Welcome all parties provide any service end point
- Data Directory:
 - weather, geospatial, observation, satellite images/data, earthquake, etc.
 - public open data sources
- Proof of Concept Experiment
- Review the Progress at least once every year at APAN meeting

Conclusion

- EGI-APAN Collaboration connects regional resources on disaster mitigation
 - DMCC (EGI) + DM WG (APAN)
 - Making disaster mitigation application as services
 - Extending to social-economic impact analysis
- Availability of local detailed data is crucial for deeper understanding of natural disasters
- This is the opportunity for
 - Different disciplines to work together such as Typhoon Haiyen
 - Global data and local data combined together
 - Worldwide communities and resources working with local scientists
- Deep understanding will lead to more accurate Alert System

Welcome to ISGC 2016

Environmental Computing Workshop

DMCC Workshop



International Symposium on Grids and Clouds 2016

13-18 March 2016, Academia Sinica, Taipei, Taiwan

ISGC 2016

Ubiquitous e-infrastructures and Applications