

Rain-gauge, radar and satellite rainfall intercomparison in Asian monsoon region

アジアモンスーン域における
雨量計・レーダー・衛星雨量の相互比較

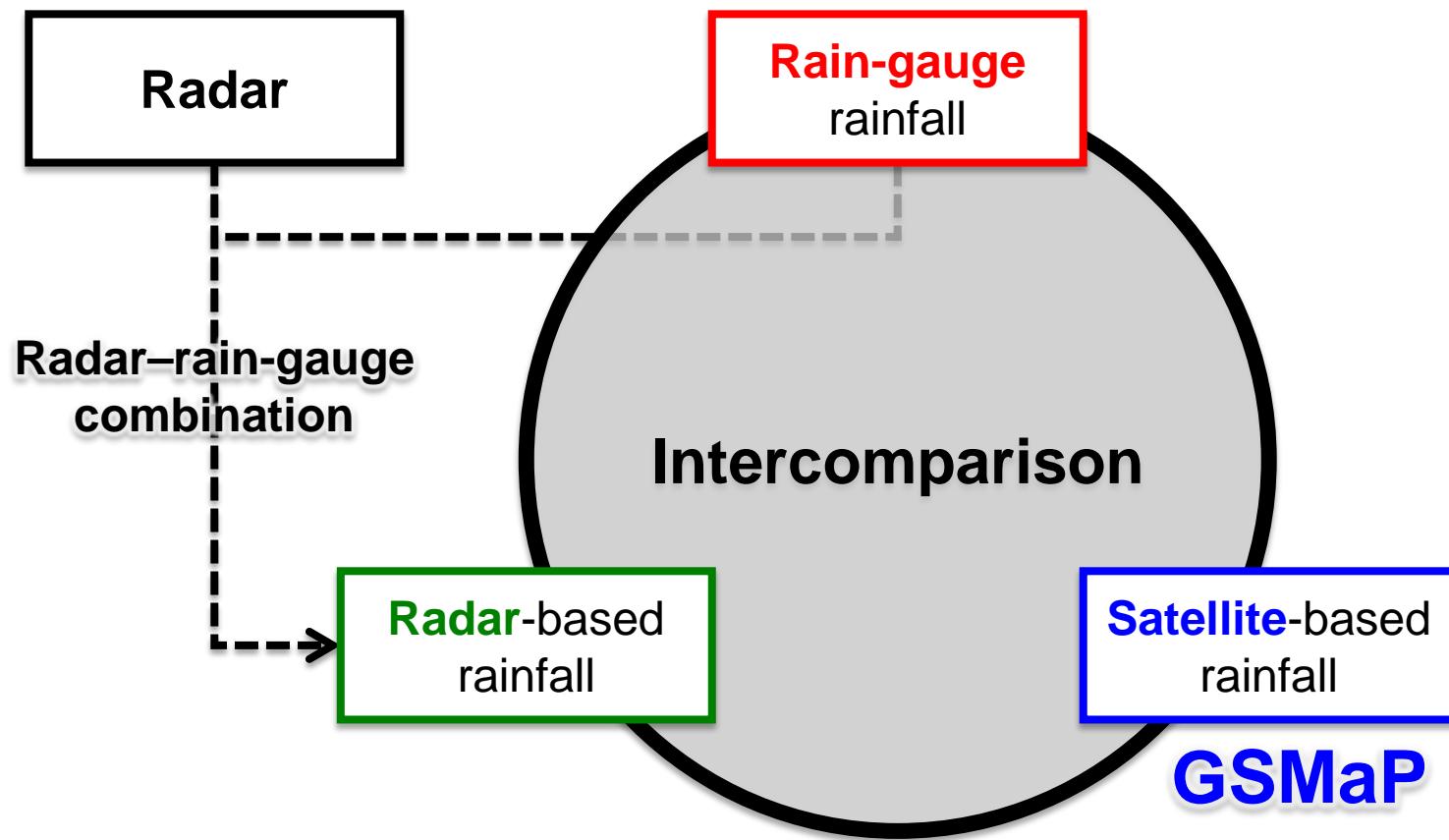
2016 年 7 月 29 日

上米良 秀行
一般財団法人 河川情報センター

GSMaPの性能向上に必要なこと

- 現状把握
 - 地上観測データ収集・整理・処理、性能調査
 - 問題点の洗い出し・原因究明・整理
- 対策立案・技術開発
 - 問題解決・克服のための対策を練る
 - 利用者の目線、既存戦力との協働・相互補完
 - 衛星観測＋地上観測（雨量計・レーダー）
- 技術適用
 - アルゴリズム改良、個別技術適用（オフライン）
- 経験・知識・技術・データの集約・共有
- 枠組み構築、予算・担い手確保
- 利用者増大、フィードバック強化
- 観測強化

Concept

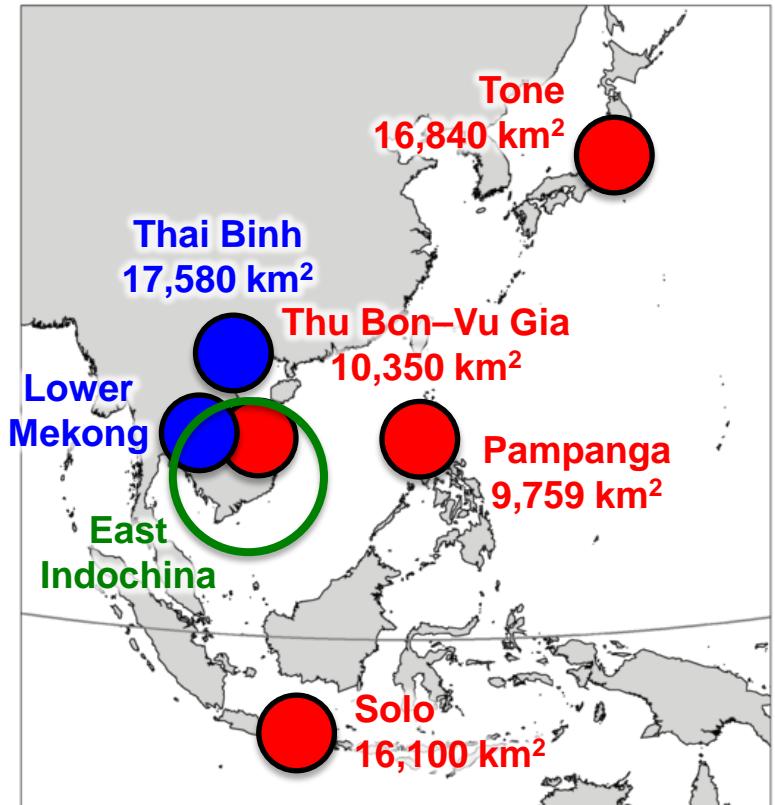


GSMaP Assessment in Asian monsoon region

- To know the performance of GSMaP satellite rainfall products over many areas of Asian monsoon region, through the direct/indirect comparisons with ground-based observations

For

- Better use of GSMaP, especially in un-gauged areas
- Contribution to GPM-GSMaP algorithm development



- JSPS-Kakenhi (# 25882049) in FYs 2013 & 2014
- APRSAF-SAFE, in 2014 & 2015 for Thai Binh, in 2015 & 2016 for Lower Mekong
- JAXA PMM-8 (PI # 216) in FYs 2016-2018

APHW04-D3-PM2-312-005

Hydrological Assessments of GSMAp Satellite Rainfall Products in Vietnam

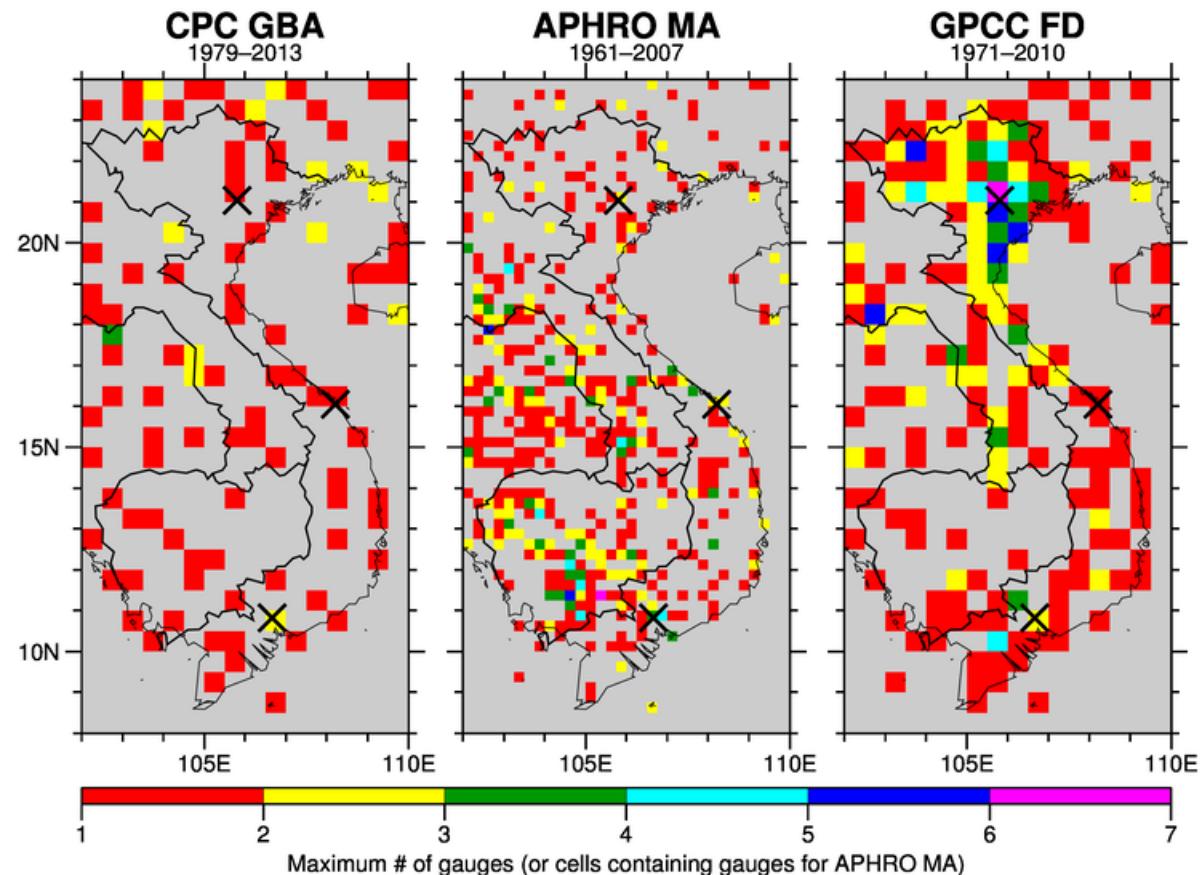
雨量計・レーダー・衛星雨量の相互比較
GSMApの水文学的性能調査

Hideyuki Kamimera	Foundation of River & Basin Integrated Communications, Japan
Thanh Ngo-Duc	Hanoi University of Science, Vietnam
Le Viet Xe	National Hydro-Meteorological Service, Vietnam
Dang Ngoc Tinh	National Hydro-Meteorological Service, Vietnam
Lal Samarakoon	Asian Institute of Technology, Thailand
Ko Hamamoto	Japan Aerospace Exploration Agency, Japan
Jun Matsumoto	Tokyo Metropolitan University, Japan

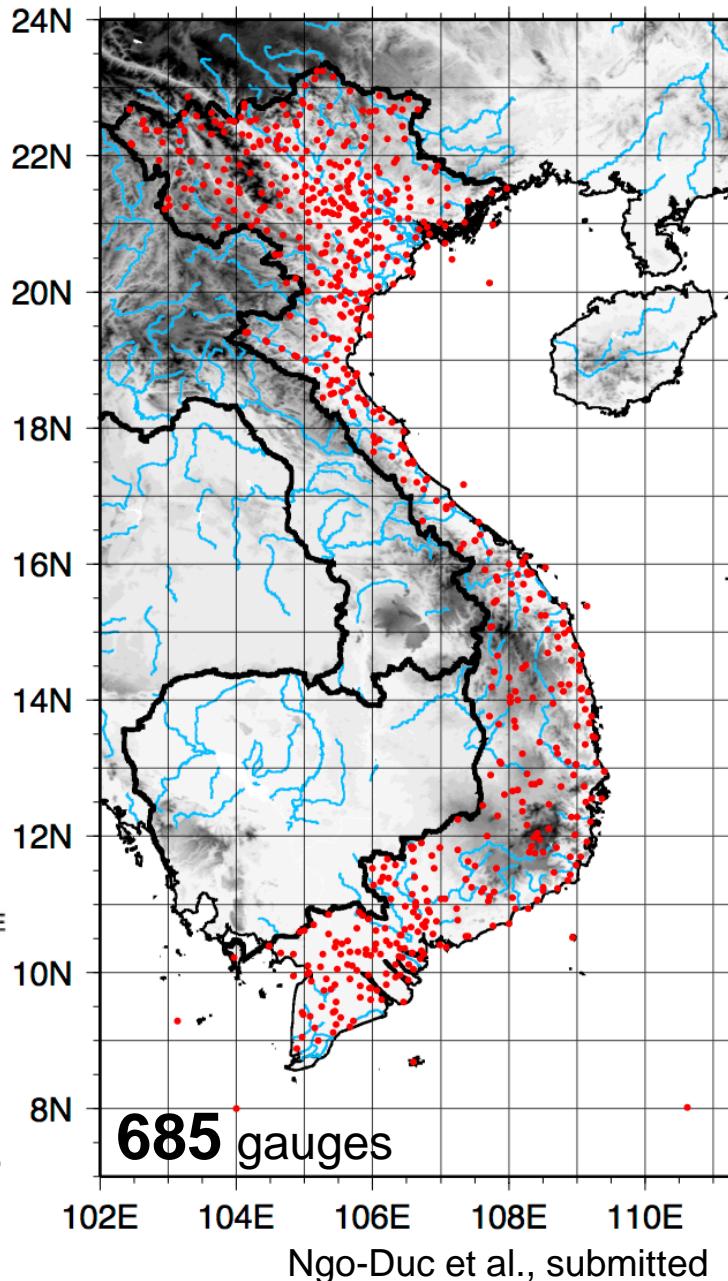
Rain-gauge Network in Vietnam

764 gauges by NHMS

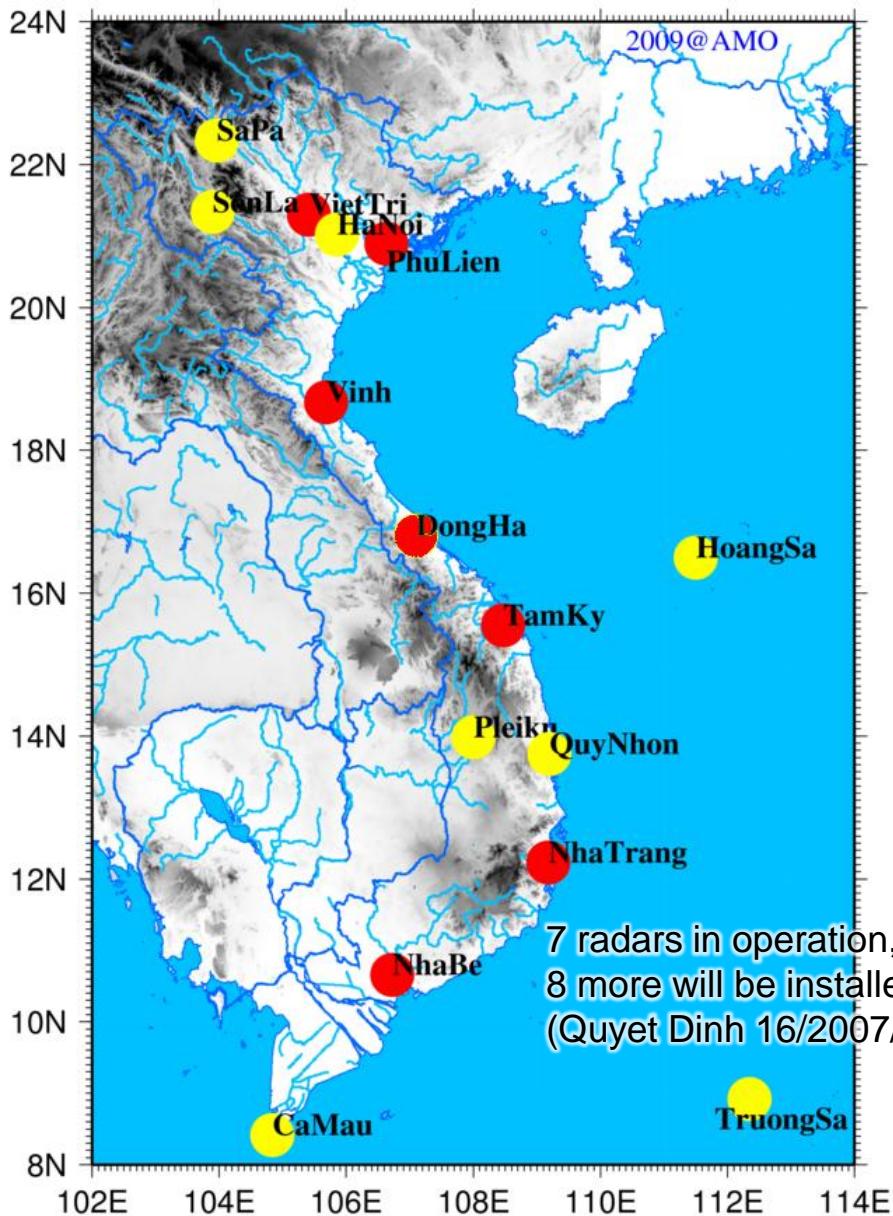
(World Bank and UNISDR, 2013)



- In early data sets, such as CPC-GBA, APHRO-MA, GPCC-FD, numbers of rain-gauges are not enough large.
- GPCC-like “**Vietnamese**” rainfall data set should be built for further studies and applications in Vietnam > **VnGP**

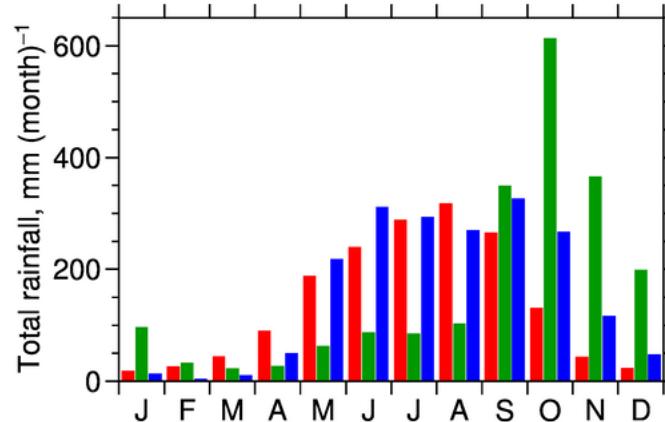
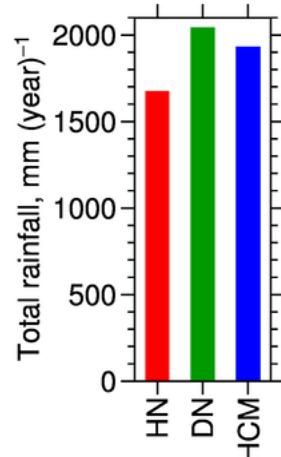
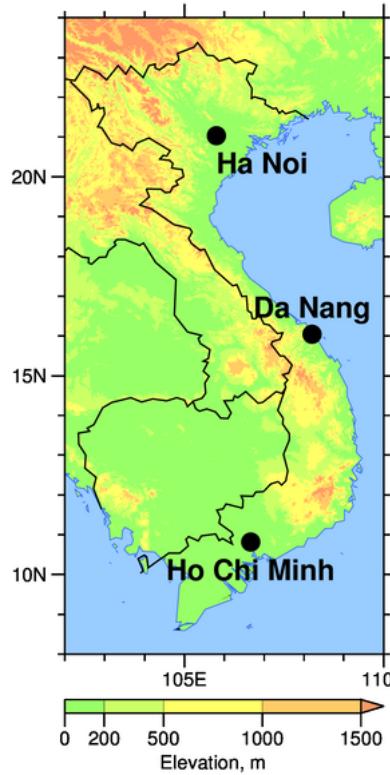


Weather Radar Network in Vietnam



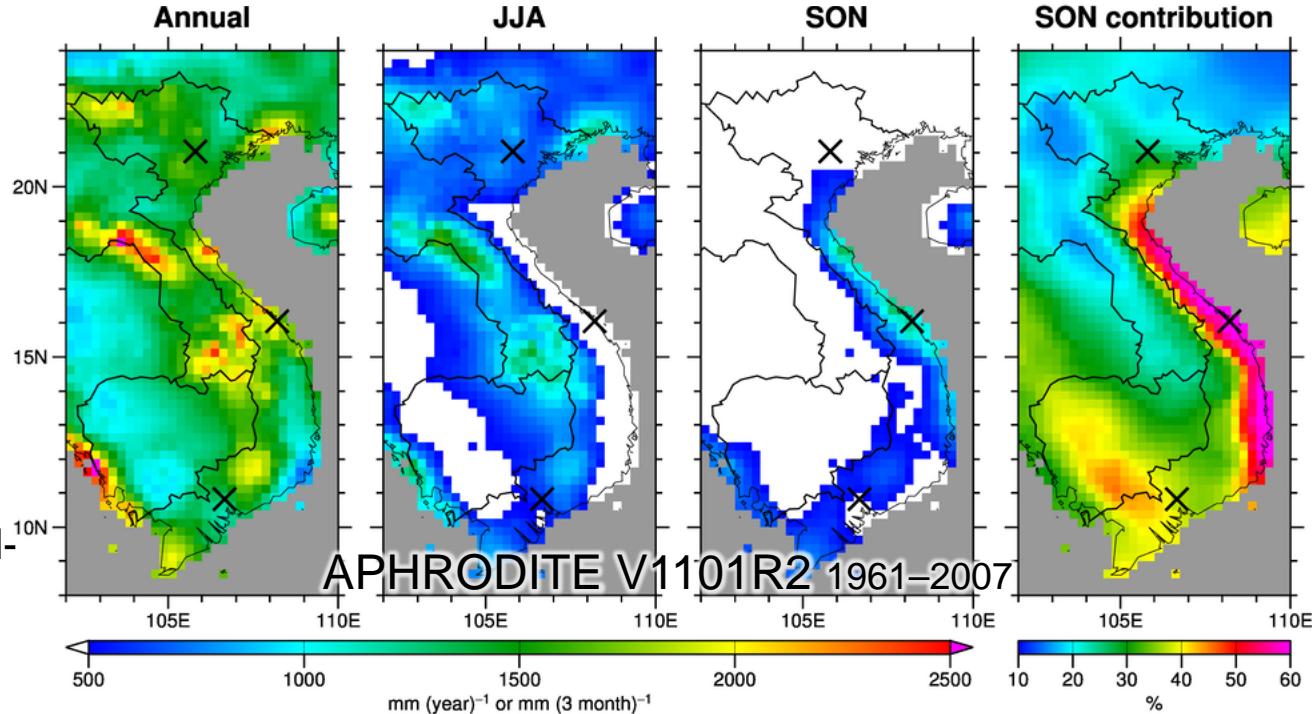
Courtesy of Mr. Nguyen Quang Vinh

Why Central Vietnam?



WMO
rainfall clim.

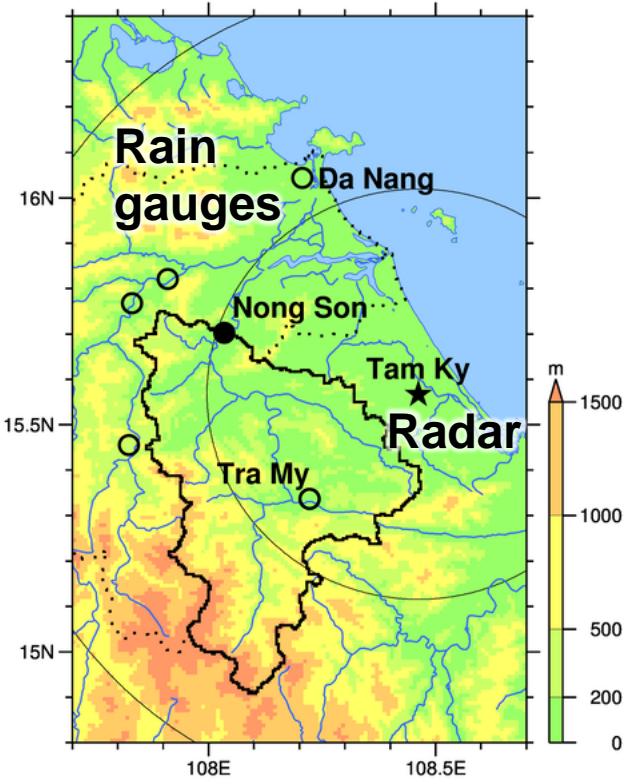
HN: Ha Noi
1898–1990
DN: Da Nang
1947–1990
HCM: Ho Chi Minh
1906–1990



Central region:

- Highest annual rainfall
- Most rainfall is concentrated in SON
- Steep topography & rapid-flowing rivers
- At risk of water disasters

Selected Region/Period & Data



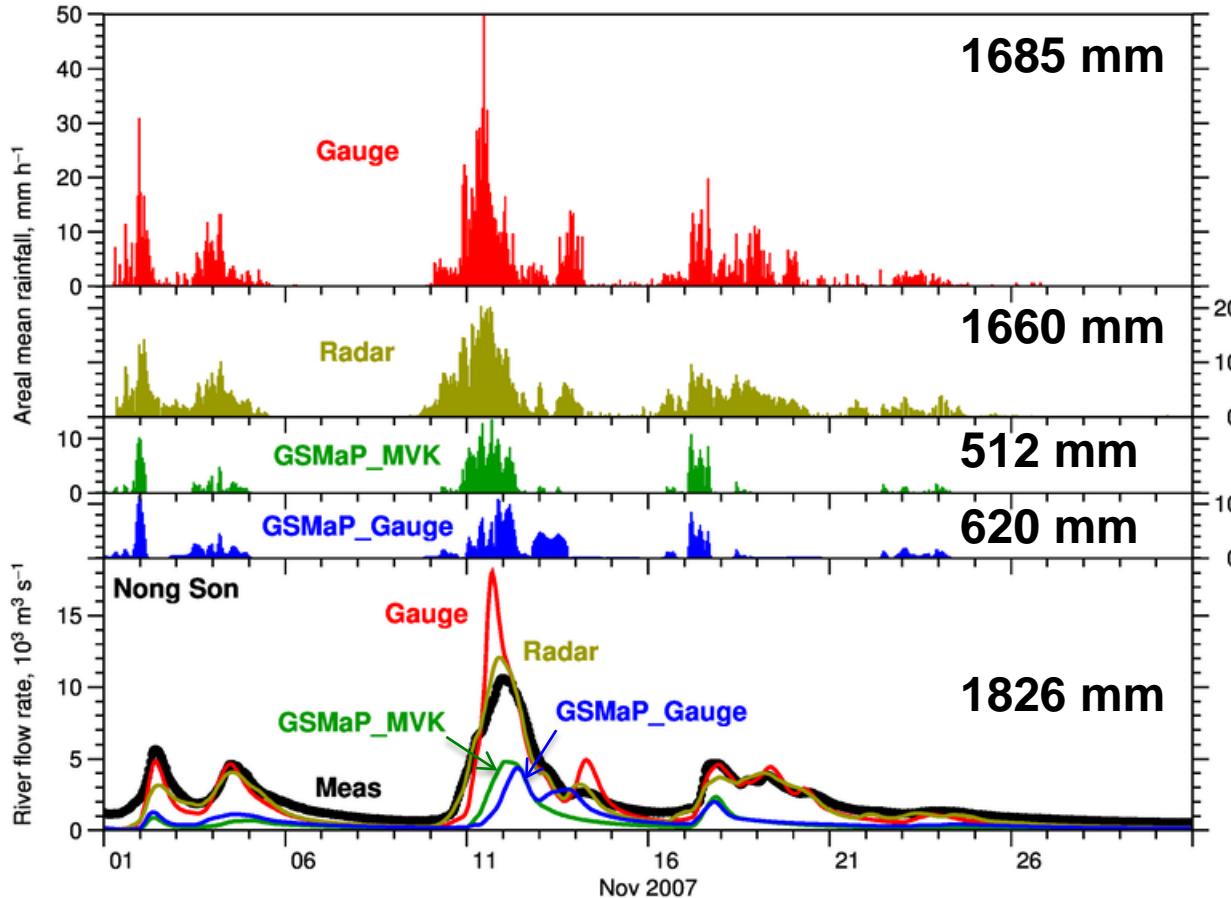
- **Region:** Nong Son cat. ($3,155 \text{ km}^2$) & surr.
- **Period:** Nov. 2007
- **Data:**
 - Rainfall & related data
 - Satellite rainfall products (by JAXA)
 - GSMP_MVK (ver. 5.222.1)
 - GSMP_Gauge (ver. 40, beta)
 - Rain gauge (TB) at 6 points (5 by CREST/JEPP, 1 by NHMS)
 - Ground-based radar (CDR, 5.3 cm) at Tam Ky (by NHMS)
 - River discharge at Nong Son (by NHMS)



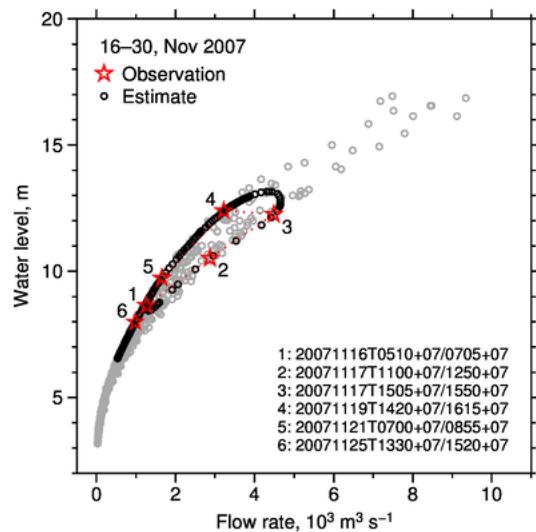
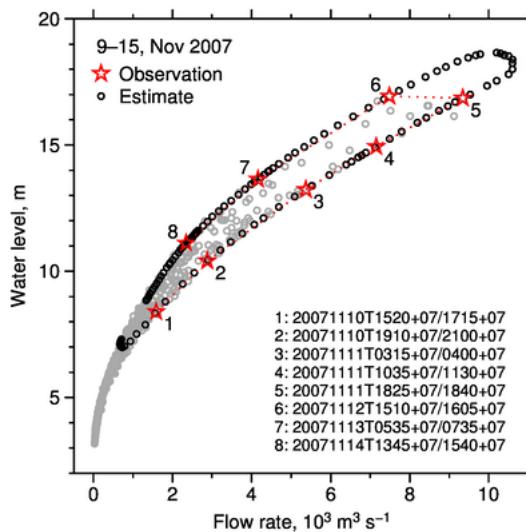
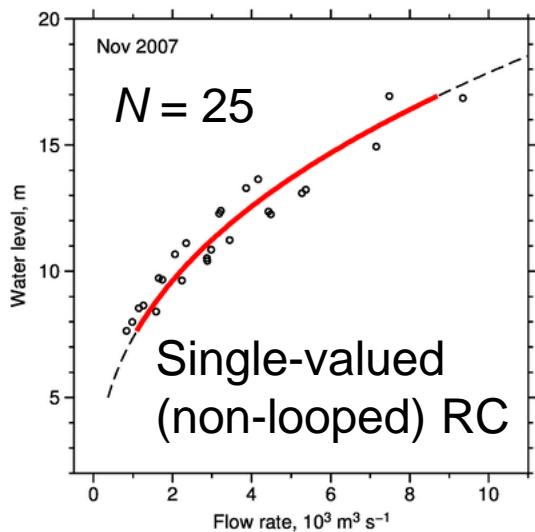
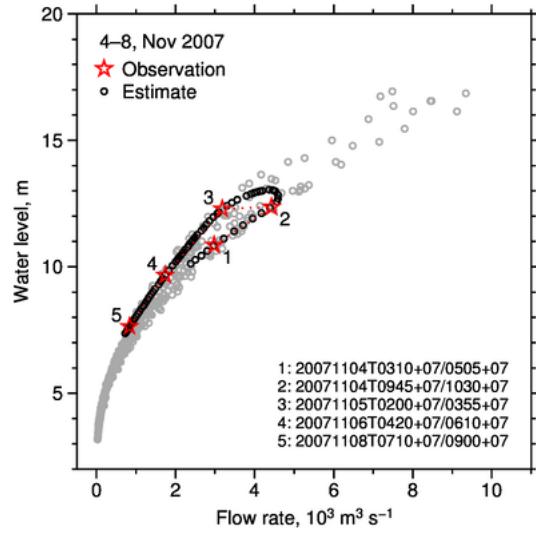
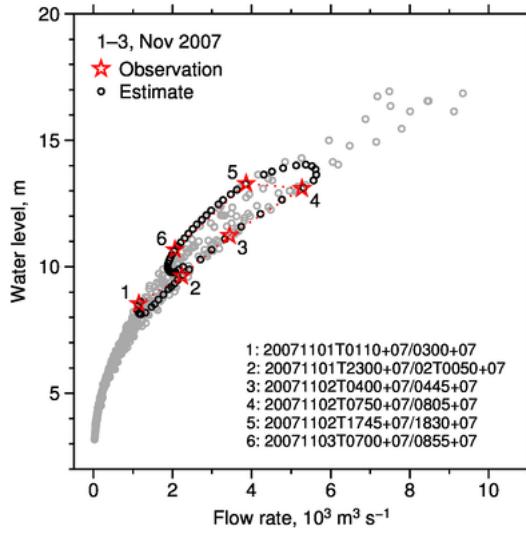
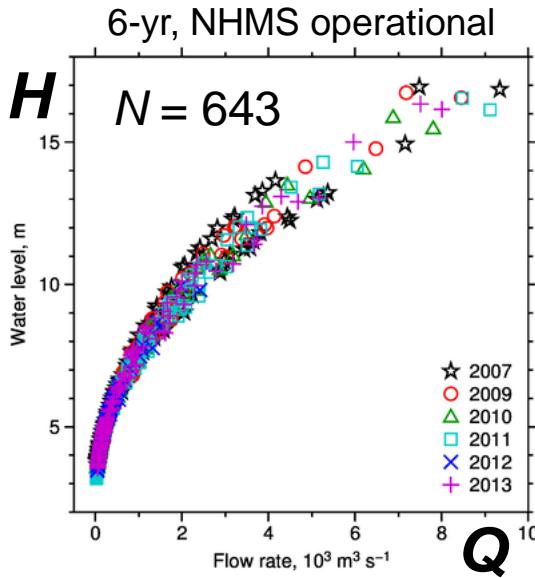
River flow simulation with four rainfall inputs

Areal rainfall

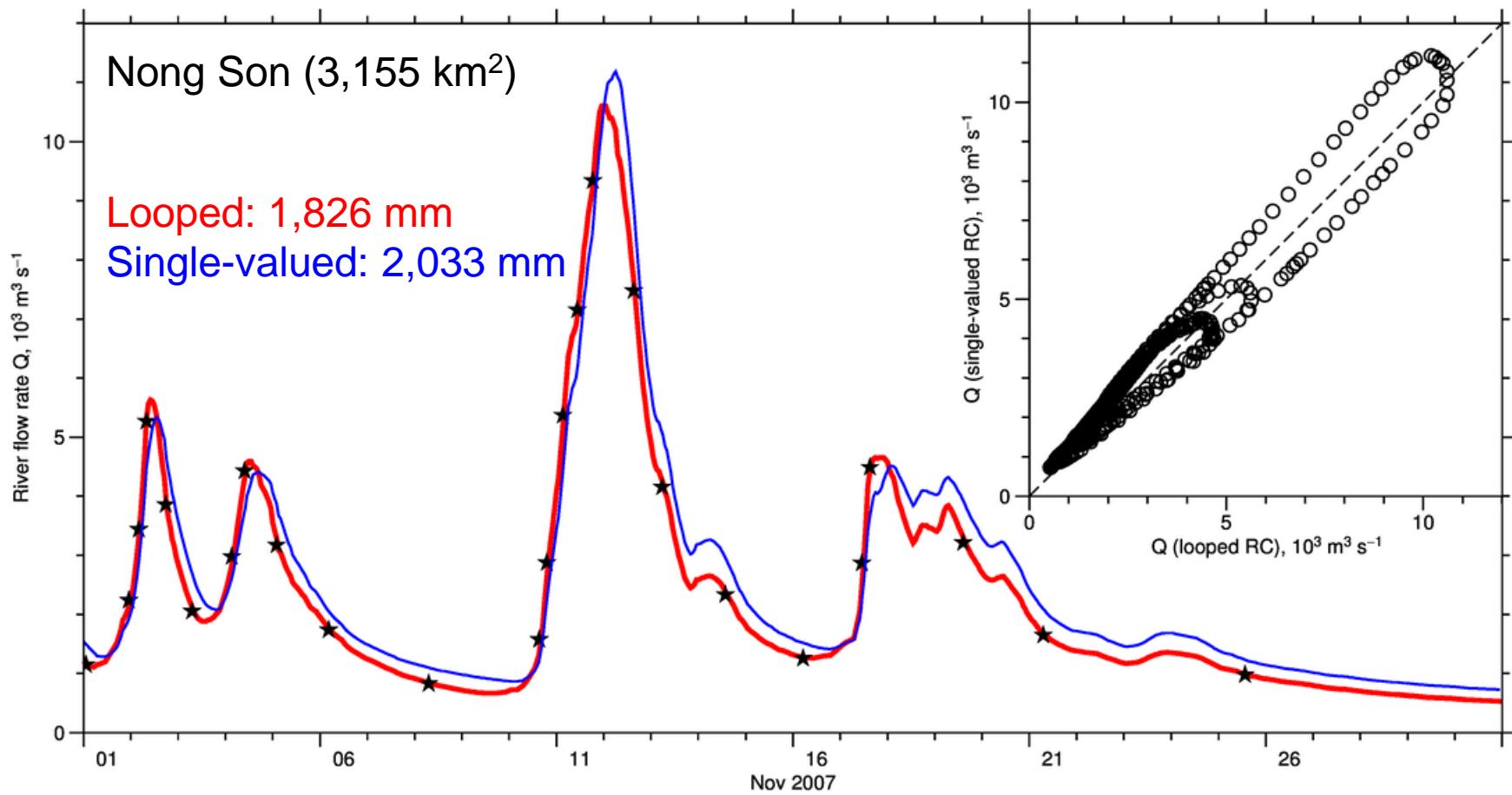
River flow rate



Looped rating curves



Difference in two estimated series

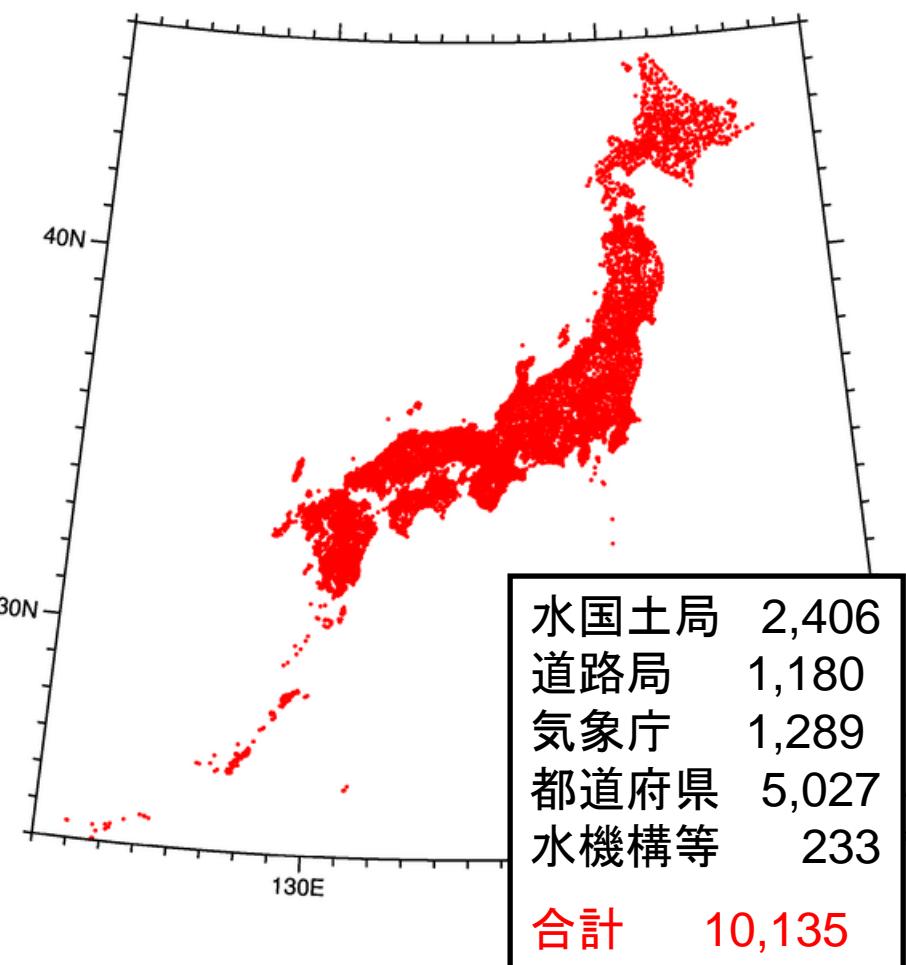


Rainfall Intercomparison Example in Japan

地上観測データが充実している日本で
GSMaPの性能をきちんと把握する

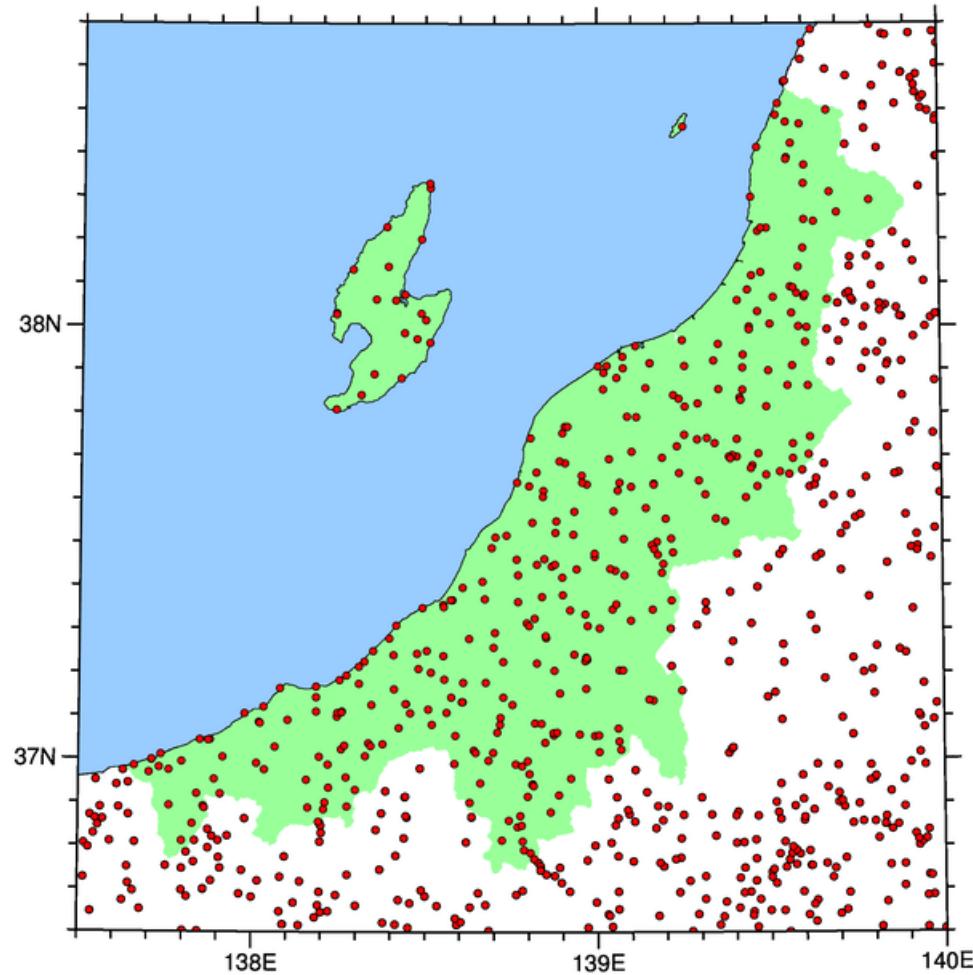
Rain gauge network in Japan

Rain gauge network in Japan

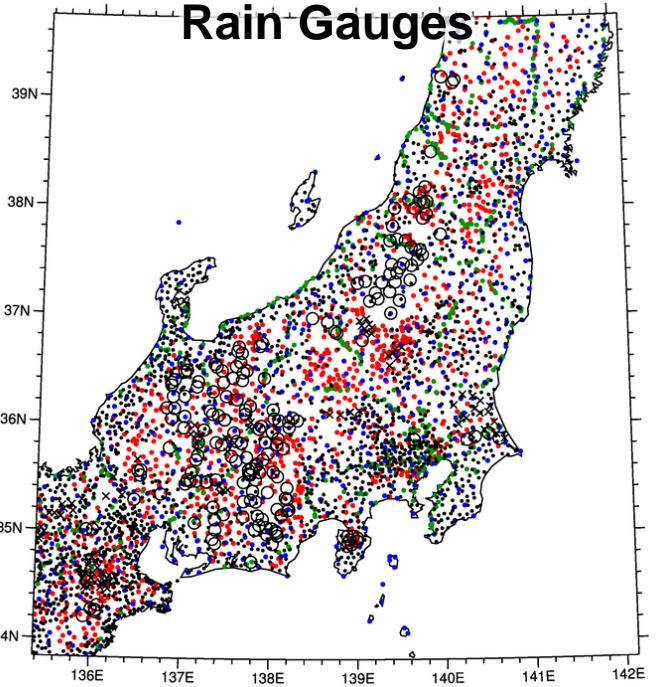


中尾 (2014)

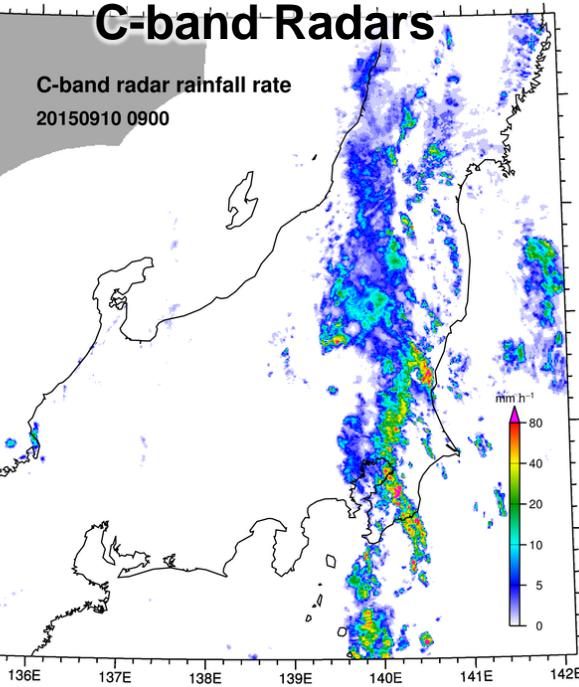
Rain gauge network in/around Niigata



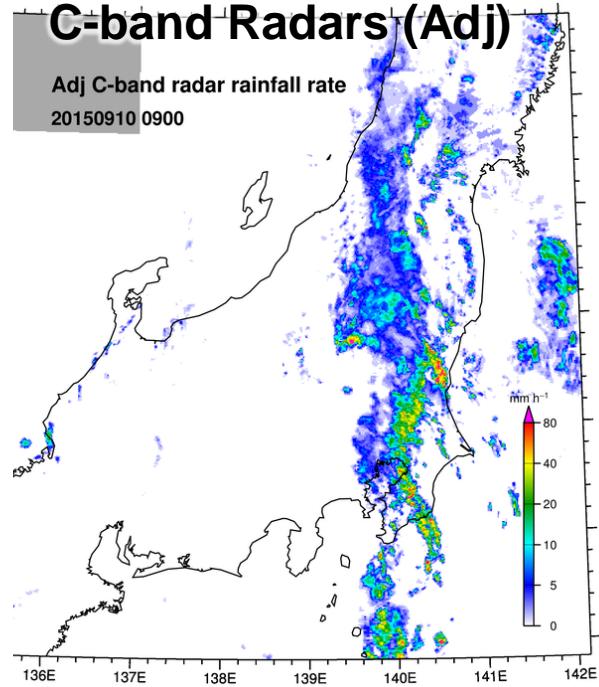
Rain Gauges



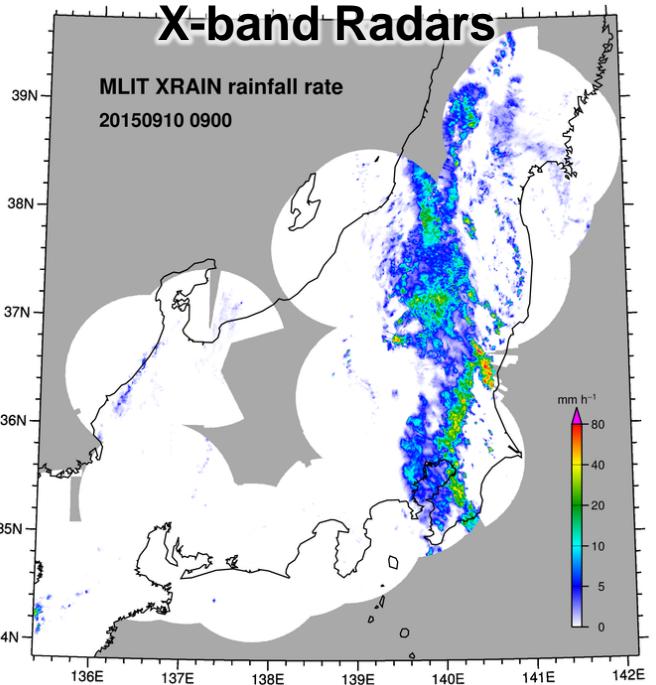
C-band Radars



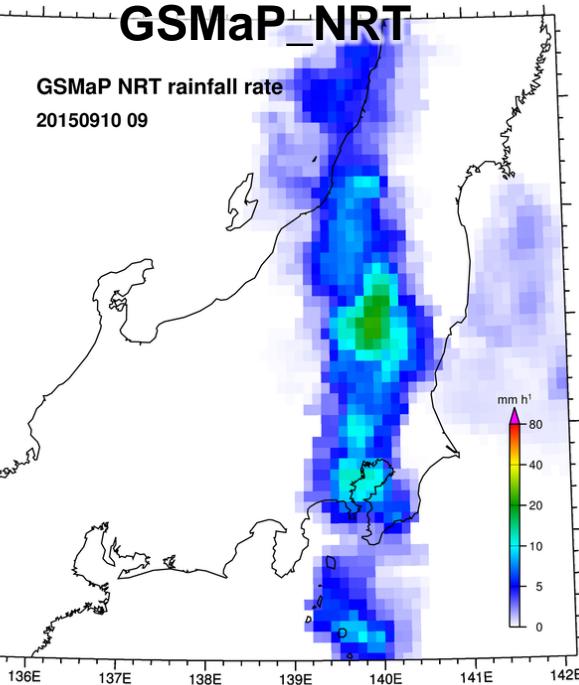
C-band Radars (Adj)



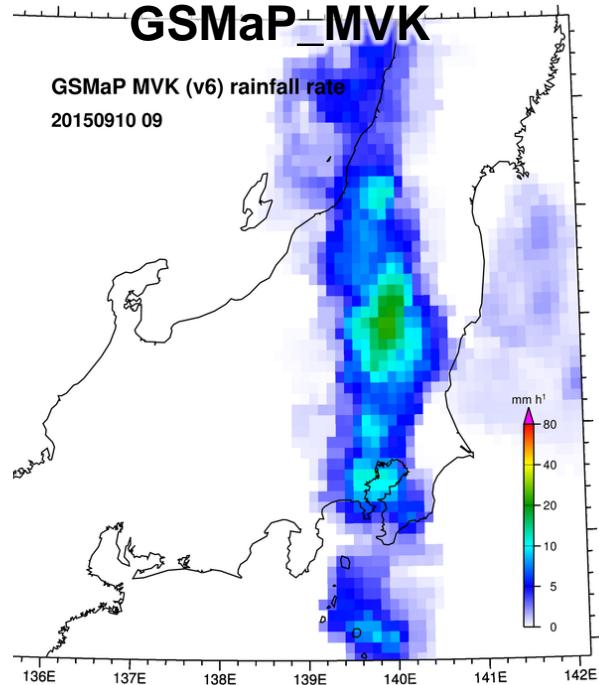
X-band Radars



GSMaP_NRT



GSMaP_MVK



Heavy rain and flood inundation disasters over the Kanto and Tohoku regions in Japan, Sept 2015



Courtesy of MLIT, Japan



Kinu River



Shibui River



Casualties: 8

Landslides: 177

Houses half-destroyed: 6,014

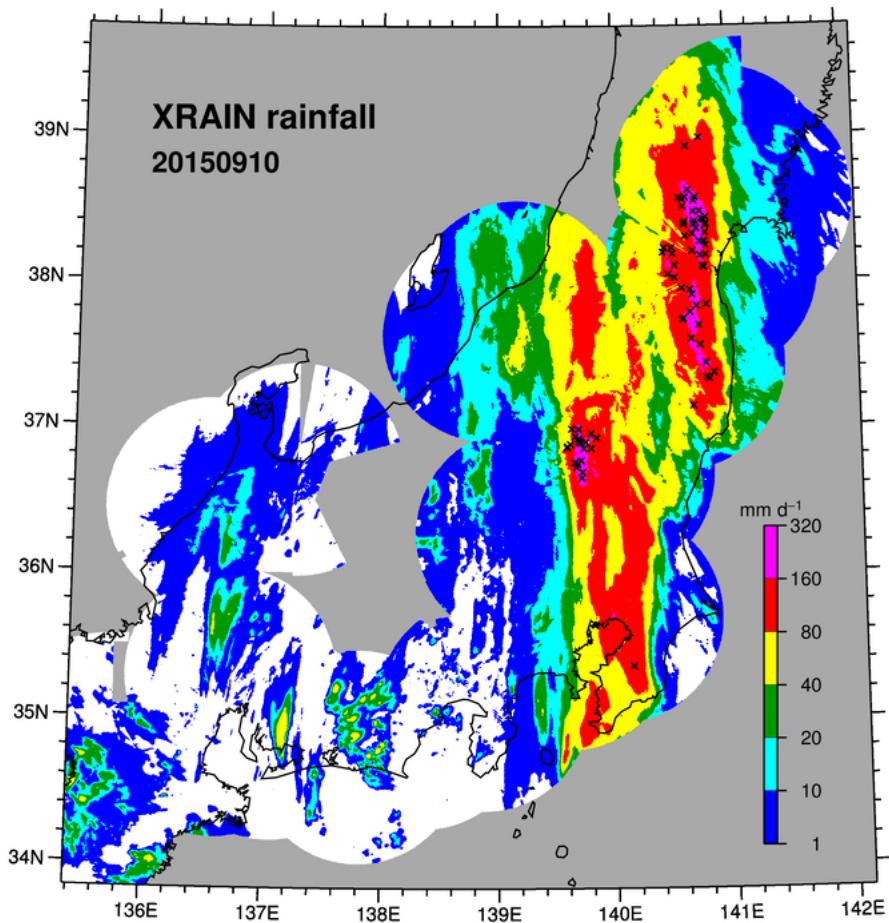
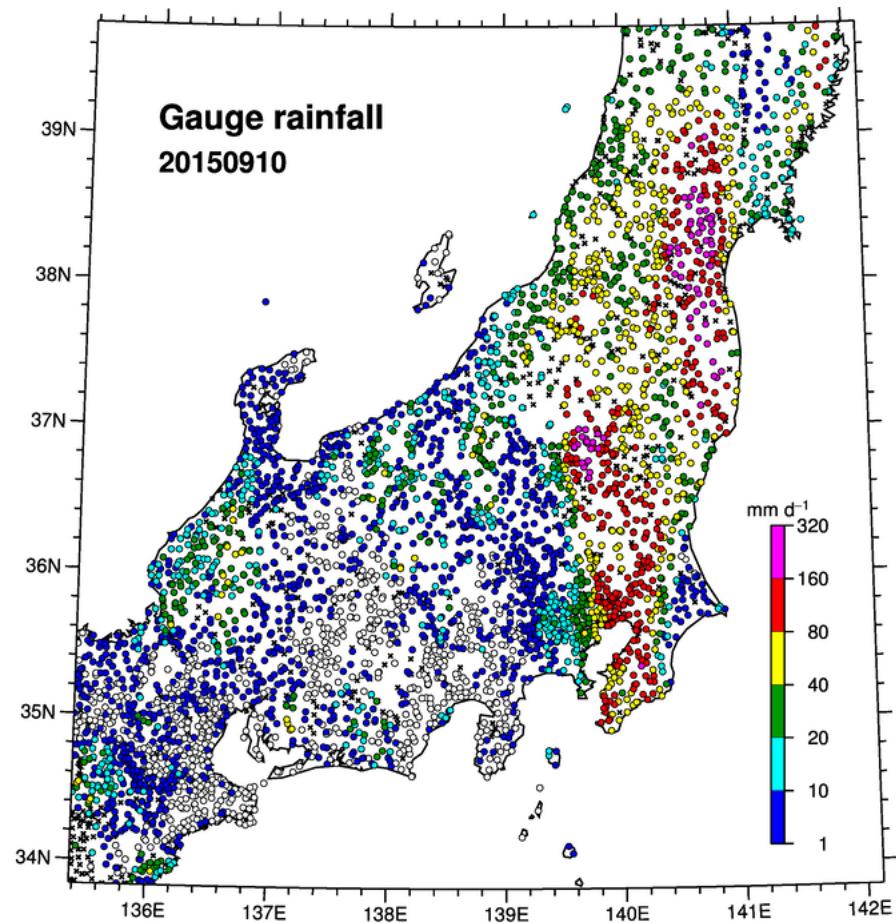
Houses partially destroyed: 410

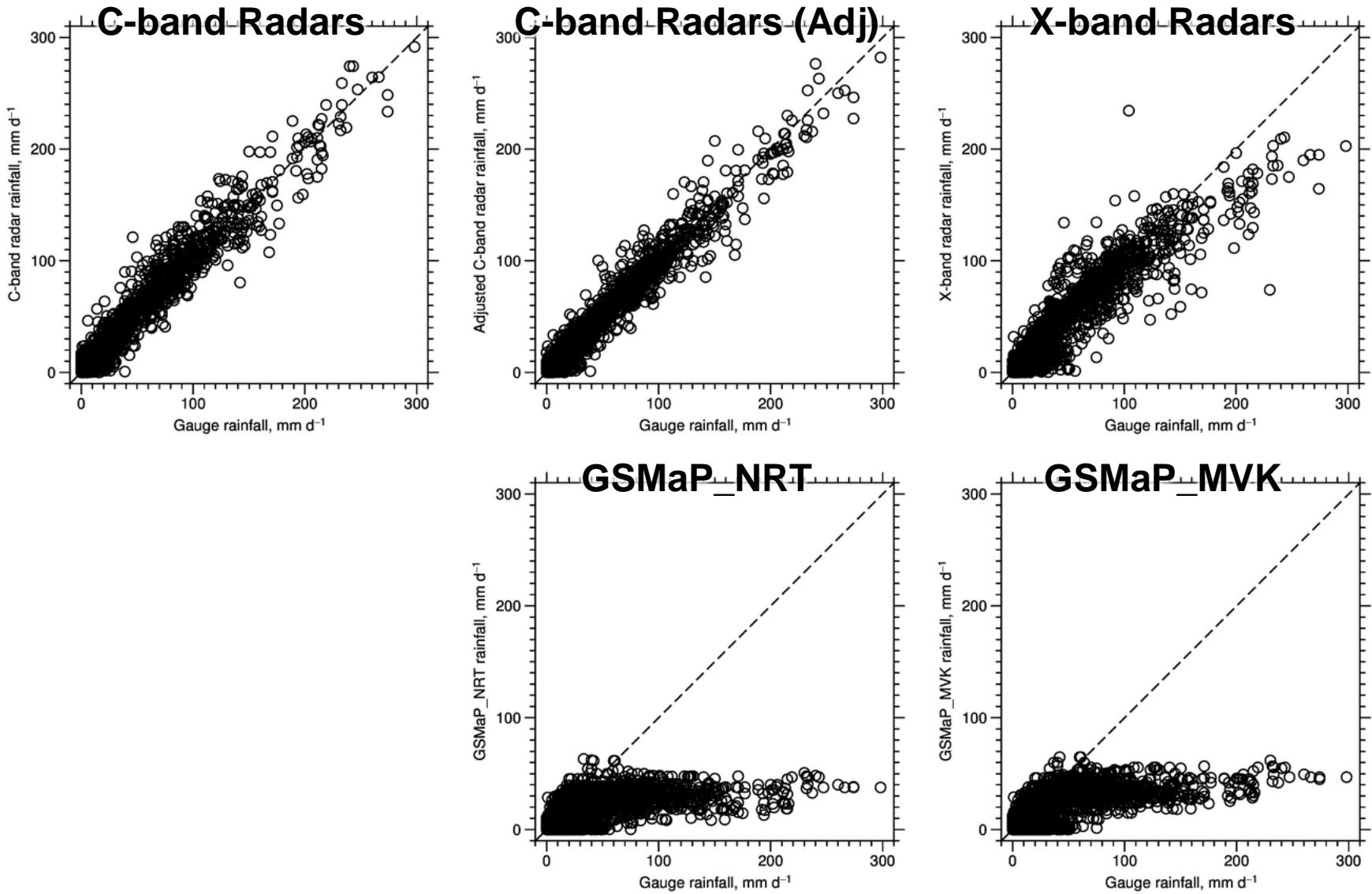
Houses inundated above the floor: 2,870

Houses inundated below the floor: 10,059

Courtesy of MLIT, Japan

One-day rainfall accumulation





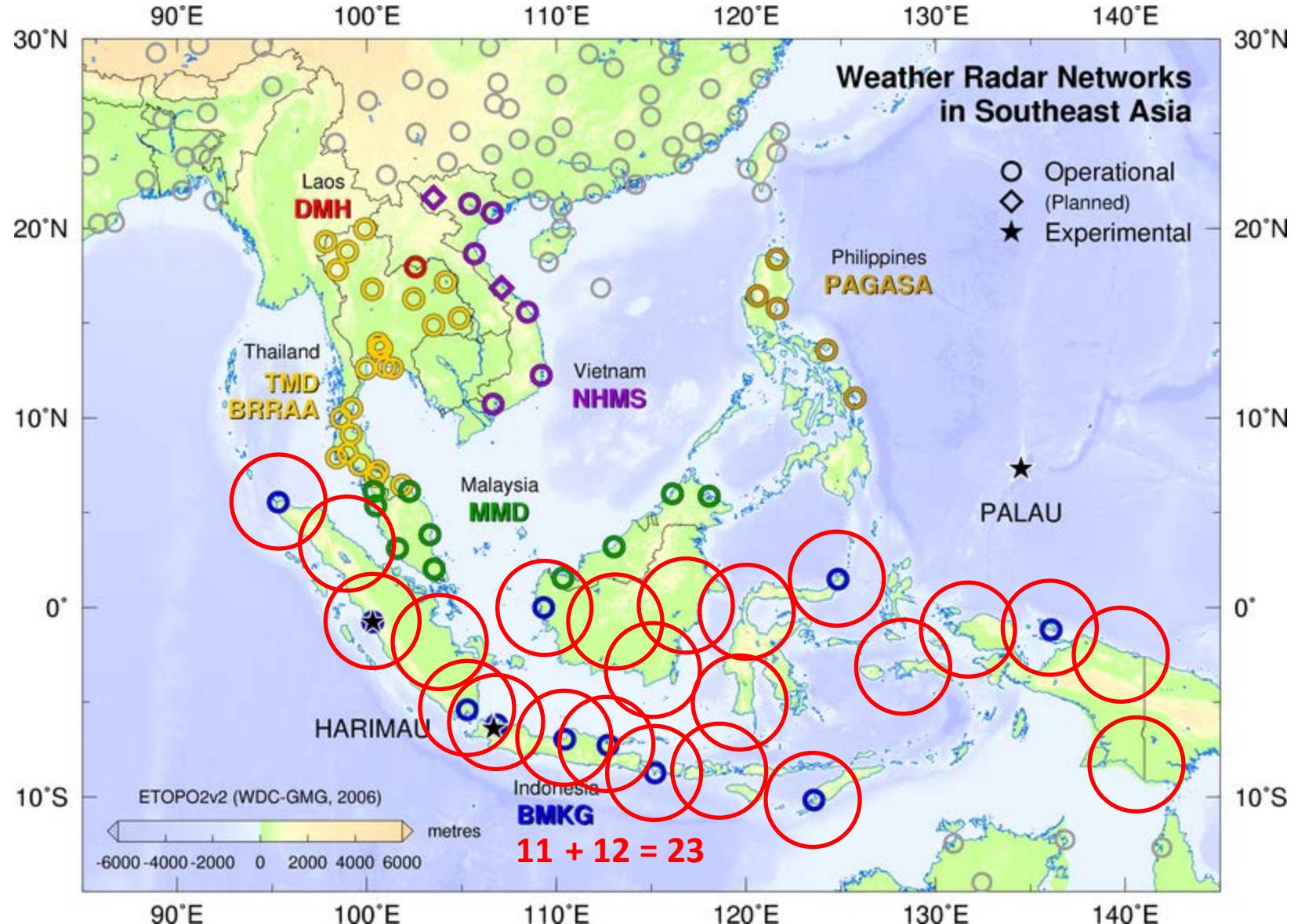
JAXA PMM-8 Project Assessment and Application of GSMaP in East Indochina

国境を越えた多国協力による
広域降雨分布の理解と衛星雨量の性能調査応用

24 June 2016
TMD, Bangkok, Thailand

Dr. Hideyuki Kamimura
FRICS, Tokyo, Japan

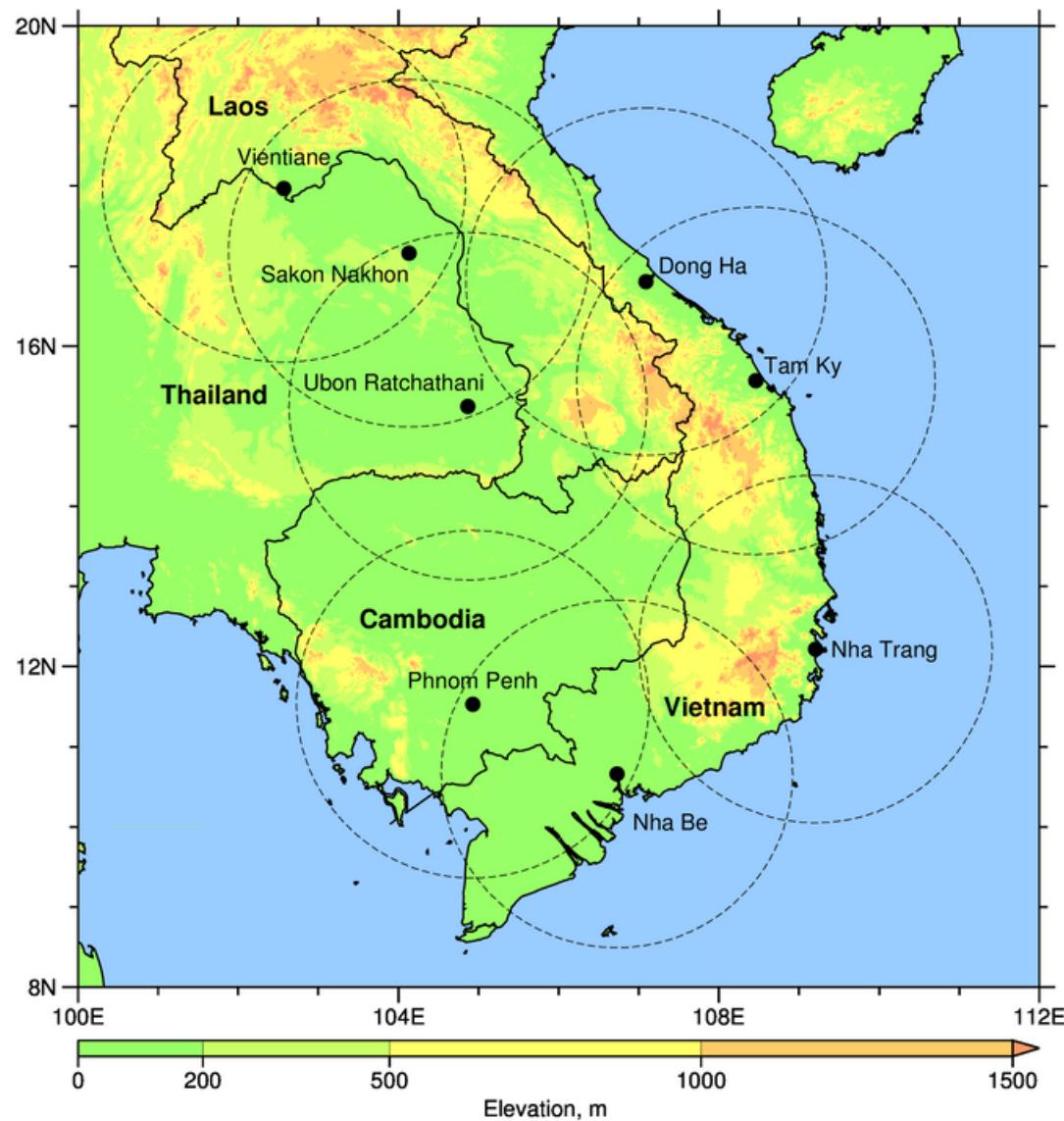
Operational Weather Radar “Networks” in SE Asia



31 radars in Indonesia, as of Nov 2013

As investigated in spring 2010

Weather Radar “Network” in East Indochina



Research Collaboration Structure

CIs in Cambodia 水資源気象省

- ★ Mr. Mao Hak
Deputy Director General, MOWRAM
- Mr. Oum Ryna
Director, Department of Meteorology,
MOWRAM

CIs in Laos 気象水文局

- ★ Mr. Vanhdy Douangmala
Director, Aeronautical Meteorology Division,
DMH
- Mr. Bounteum Sysouphanthavong
Director, Weather Forecasting Division, DMH

Japan

PI: H. Kamimera

CIs in Thailand 気象局他

- ★ Dr. Kamol Promasakha na Sakolnakhon
Director, Meteorological Radar and Satellite
Data Analysis Division, TMD
- Dr. Somchai Baimoung
National Research Council of Thailand
- Dr. Sarintip Tantanee
Associate Professor, Naresuan University
- Dr. Nattapon Mahavik
Naresuan University

CIs in Vietnam 水文気象局

- ★ Mr. Hoang Gia Hiep
Director, Aero-Meteorological Observatory,
NHMS
- Ms. Bui Hong Trang
Aero-Meteorological Observatory, NHMS
- Mr. Le Viet Xe
Deputy Director, Mid-Central Regional Hydro-
Meteorological Center, NHMS

★: CI representative

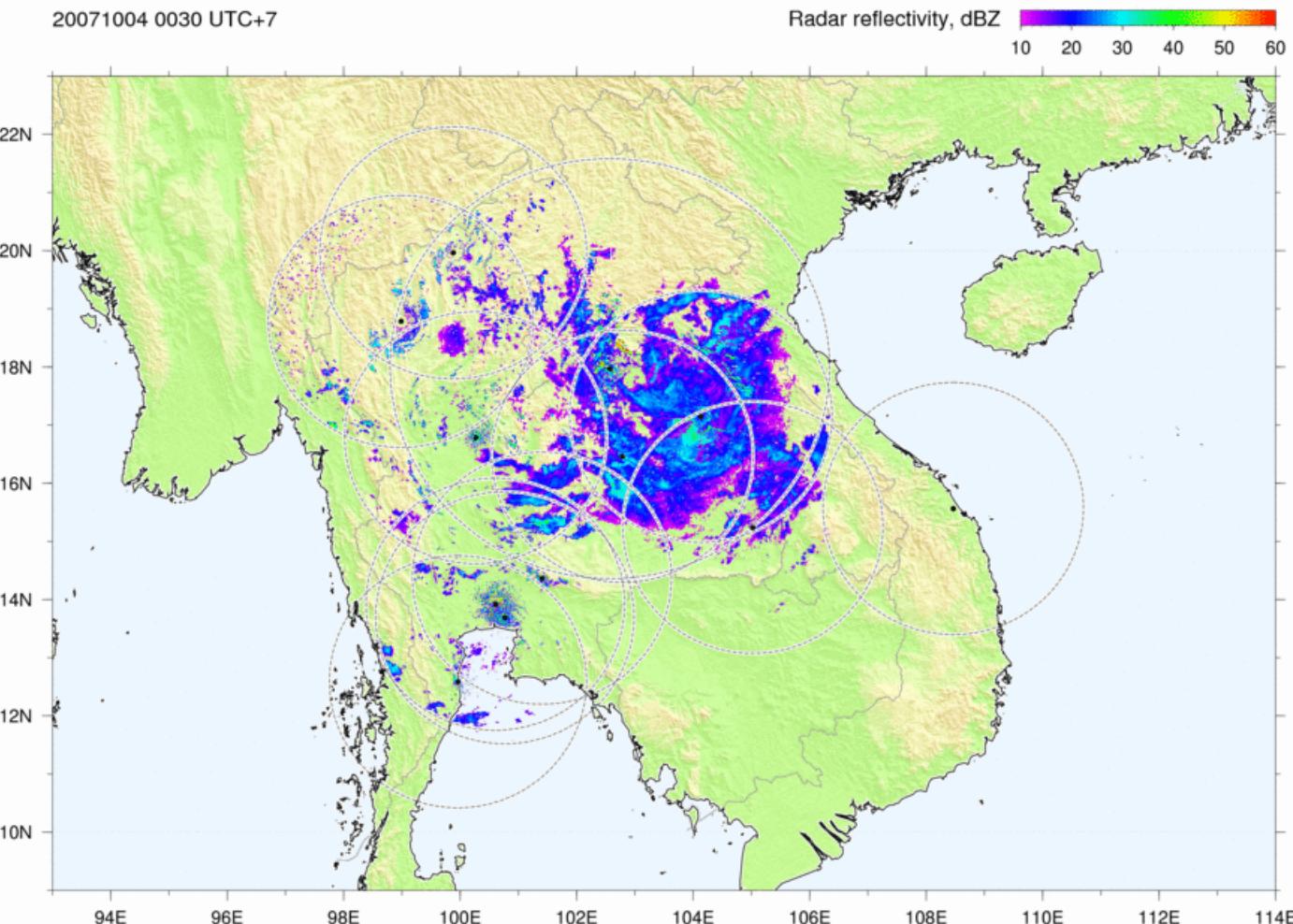
S/C-band Doppler Radars

Country	Station	Radar maker & product ID	Data format
Cambodia	Phnom Penh	Selex METEOR 600S	Rainbow
Laos	Vientiane	JRC	IRIS
Thailand	Sakon Nakhon	EEC DWSR-88C	EDGE (OV)
	Ubon Ratchathani	EEC DWSR-88C	EDGE (OV)
Vietnam	Dong Ha	EEC DWSR-2501C	EDGE
	Tam Ky	EEC DWSR-2501C	EDGE
	Nha Trang	EEC DWSR-2500C	EDGE
	Nha Be	EEC DWSR-2500C	EDGE

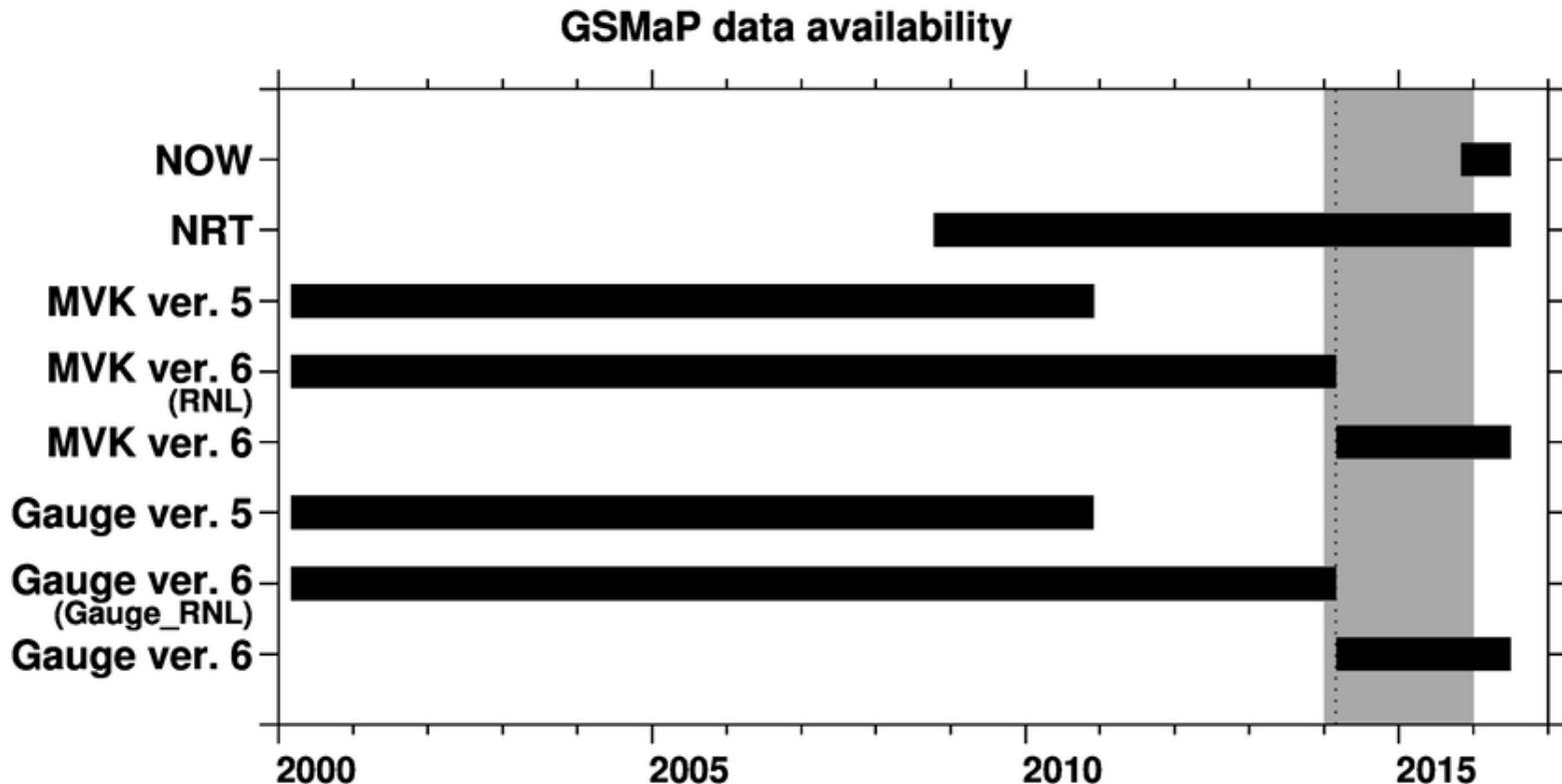
The countries are arranged in alphabetical order and the stations from north to south.

A Simple Trial

Typhoon Lekima in Oct 2007
observed with radars in Thailand, Laos and Vietnam



Target Period: 2014 & 2015



NRT, MVK (ver. 6) and Gauge (ver. 6) will be assessed in this project.

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