

Outline of ICHARM activities

*- Research, Development
& Capacity Building -*

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ICHARM
International Centre for
Water Hazard and Risk
Management
under the auspices of UNESCO
hosted by PWRI, Tsukuba



Background: Birth of ICHARM

International Centre for Water Hazard and Risk Management

- IDNDR 1990-1999 & ISDR 2000-, MDGs, WSSD, Hyogo Framework of Action 2005 etc.
- International Flood Initiative (IFI)
 - Initiated by UNESCO-IHP in 2002 & officially launched as a UNESCO-WMO-UNU-ISDR-IAHS-IIASA program in 2005 in Kobe.
- ICHARM was proposed by UNESCO and MLIT at the MC of 3WWF in March 2003
- UNESCO 16th IHP-IGC, 33 GC, September 2004
- UNESCO 33rd General Conference, October 2005
- Final signing by UNESCO, G of Japan & PWRI on 3 March 2006
- ICHARM was established on 6 March 2006
 - A UNESCO Category II Global Center established by the gov't of Japan hosted by **Public Works Research Institute (PWRI)**, Tsukuba
- In those three years, Katrina, Indian Ocean Tsunami, Leyte Isl. Landslide and many others occurred.

UNESCO's Water-Related Centers

CATEGORY I

1. **UNESCO-IHE** Institute for water education, **The Netherlands**, 2003
9. IHP-HELP Center for WLPS (Water law, policy & science), Dundee, **UK**, 2005

CATEGORY II

2. **IRTCES** (erosion & sedimentation) Beijing, **China**, 1984
3. IRTCUD (urban drainage) Belgrad, **Serbia & Montenegro**, 1987
4. CATHALAC (Humid tropics of Latin A&C), **Panama**, 1992
5. HTC (Humid tropics), Kuala Lumpur, **Malaysia**, 1999
6. RCTWS (Arid and semi-arid zones), Cairo, **Egypt**, 2002
7. RCUWM (Urban water management), Teheran, **Iran**, 2002
8. ICQHHS (Qanats and historic hydraulic structures), Yazd, **Iran**, 2003
10. CAZALAC (Arid & semi-arid zones of LA&C), La Serena, **Chili**, 2006
11. **ICHARM (Water hazards)**, **Tsukuba, Japan, 2006**
12. European RC for Ecohydrology, Lodz, **Poland**, 2006
13. RC Urban water management for LA&C, Cali, **Colombia**, 2006
14. Under preparation
RC Management of shared groundwater resources, Tripoli, **Libya**
15. RC drought in Sub-Saharan Africa, **Namibia**
16. RC Ecohydrology, Cibinong, **Indonesia**

Public Works Research Institute (PWRI)

- History

1927: Established

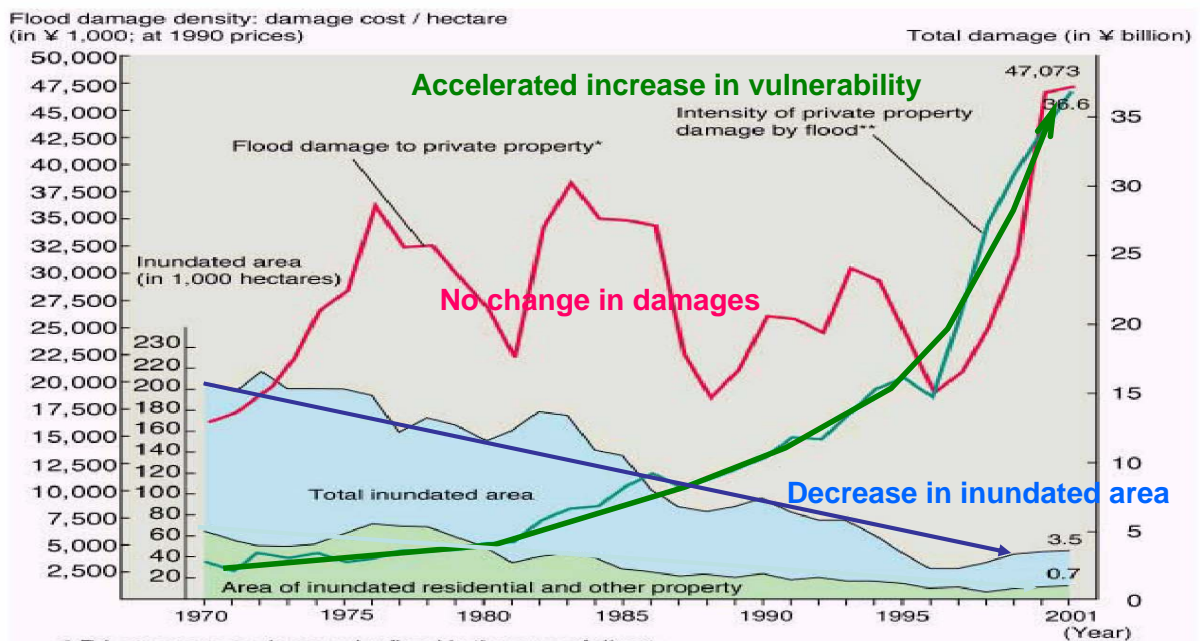
1979: Relocated to Tsukuba
(Area:126ha, Staff: 550)

2001: Re-organized into two institutes
(PWRI and NILIM)

2006: Merged with Civil Engineering Research Institute of Hokkaido

- Staff : 389 (including 266 researchers)
- 14 research groups with 37 research teams
- Budget (FY 2006): 10 bil. JPY (82 mil. USD)

Increase of flood damage potential



ICHARM Objective

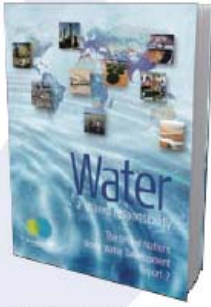
International Centre for Water Hazard and Risk Management

- To be the global Center of Excellence to provide and assist implementation of the **best practicable strategies to localities, nations, regions and the world** to manage the risk of water related hazards including floods, droughts, land slides, debris flows and water contamination.
 - At the first stage, the priority is **flood-related disasters**

ICHARM Guiding Principles

International Centre for Water Hazard and Risk Management

- **Needs Driven** rather than supply driven
- Advocate **Integrated Risk Management** (including avoidance, reduction, transference and acceptance) in multifaceted societal, economical, institutional and cultural conditions as well as technological availability.
- Produce **Policy Effective Information**
- Research Development and **Capacity Building** together
- **Alliance** with all the related organizations and initiatives



UN WWDR II (2006)

- Flood risk analyses in diverse localities in developing countries
- Development of **flood warning systems** that use satellite observations and other advanced technology
- Development of **flood hazard** mapping procedures able to meet various environmental and social conditions
- Development of community water hazards risk aversion systems with advanced flood warning and flood hazard maps as available means
- Promotion of basic research on **hydrological measurement, analysis, and forecast** to support ICHARM activities
- Participation in international research programs such as **World Water Assessment Programme, International Flood Initiative, Group of Earth Observations and Predictions in Ungaged Basins**

Research



Flood Hazard Mapping Training

Information networking

- Creation of a **worldwide and inter-disciplinary network** of practitioners, researchers and course graduates in the field of integrated water risk management
- **Collection, analysis and dissemination** of information and experiences regarding water-related disasters worldwide
- Timely organization of investigation teams when catastrophic water hazards occur
- Organizing and sponsoring **workshops and symposia**

Training

- Training courses on **practical risk reduction systems** incorporating existing social diversities, for public officers and decision makers
- Human resources development for integrated flood risk management **in cooperation with universities and related institutes worldwide**
- Training courses of **flood hazard mapping and river and dam engineering** for researchers and engineers
- Providing follow-up activities for course graduates in their home countries

Research (examples)

- **Local studies** (Identification of the real needs of the people in diverse localities) → Diagnosis & Prescription
 - **Disaster (Flood) Preparedness Indices & ISO**
- **Satellite & High-tech-based Flood Alert System** (with JAXA, IFNet/GFAS/IFAS etc.)
- **Floods & global warming: risk estimates and counter measures** (MEXT fund for 2007-2012)
 - JMA/MRI GCM (20km mesh) →
 - Development of risk indices,
 - Drawing a Global flood risk map,
 - Estimating Adaptation cost (structural & non-structural)
- **Flood Hazard Mapping:**
 - methodologies to map in remote localities with poor data
 - effective and beneficial use of HMs in real local situation

Flood disaster mitigation

with flood forecasting and warning systems
(Typical situations in developing countries)

1. Monitoring of meteorological & hydrological conditions

- × Low density of gauging stations, low sustainability of maintenance of observatories, etc.

2. Flood forecasting

- × Lack of real-time hydrologic data, therefore difficult to construct and run forecasting & warning system

3. Analysis of forecasts and judging risks

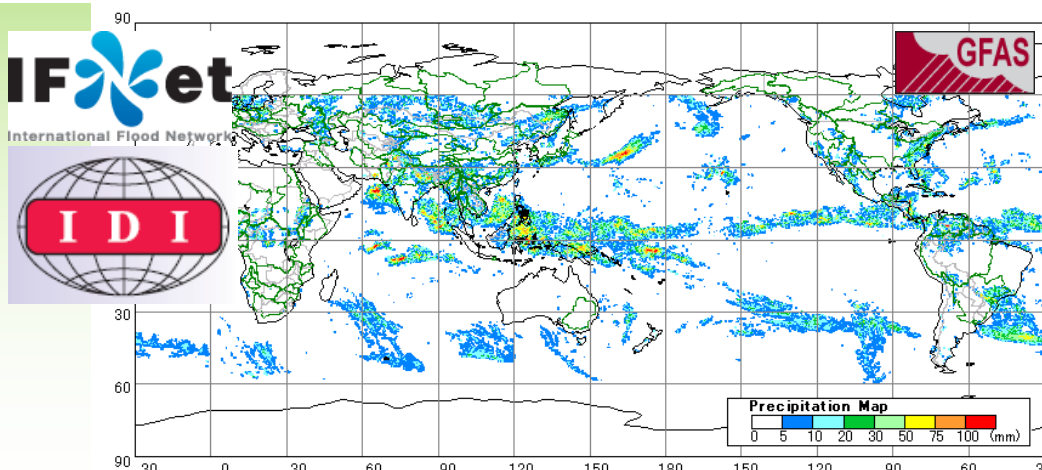
- × Lack of historical hydrologic & statistical data on flood events and damage, therefore difficult to judge risks compared with real-time information and/or simulations.

4. Dissemination of warning

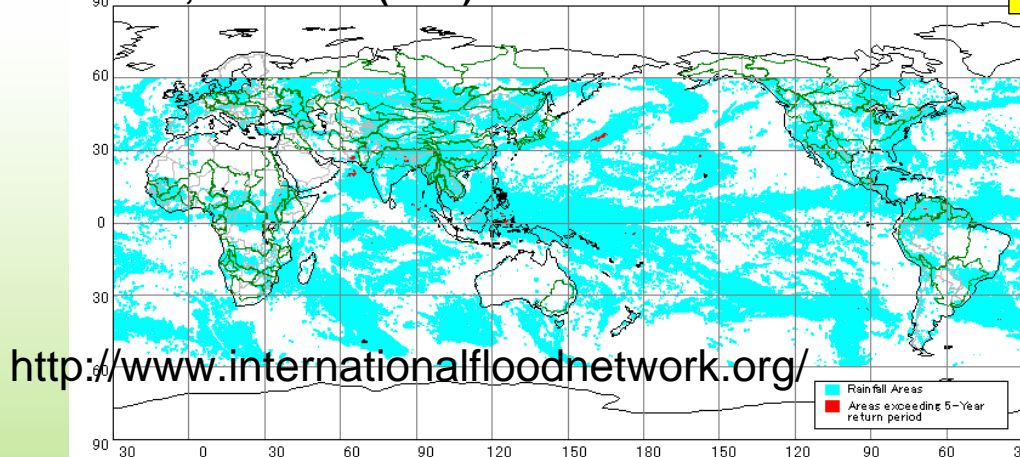
- × Lack of disaster-management community and communication network, incompatibility of flood information with local society and needs, etc.

5. Crisis management (flood fighting, evacuation, etc.)

- × Improper governance, insufficient institutional cooperation, etc.



As at 00:00, 06 27 2006 (GMT)



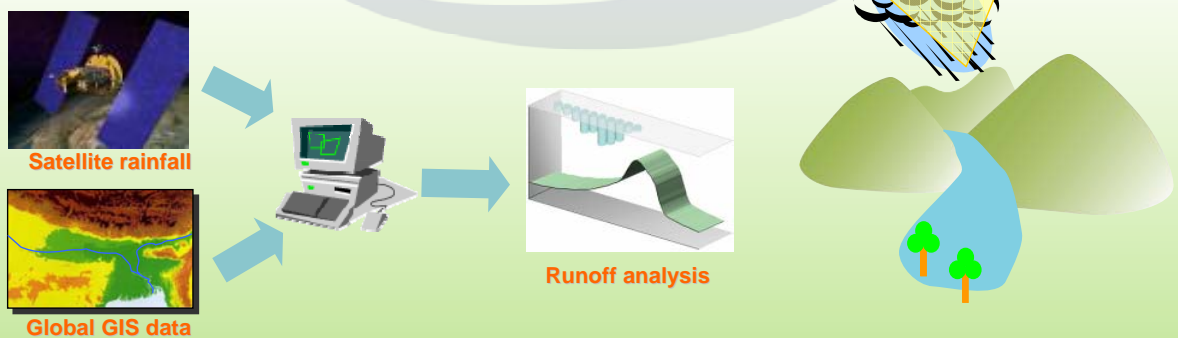
From
rainfall to
local flood
forecasts.

NASA and
Infrastructure
Development
Institute

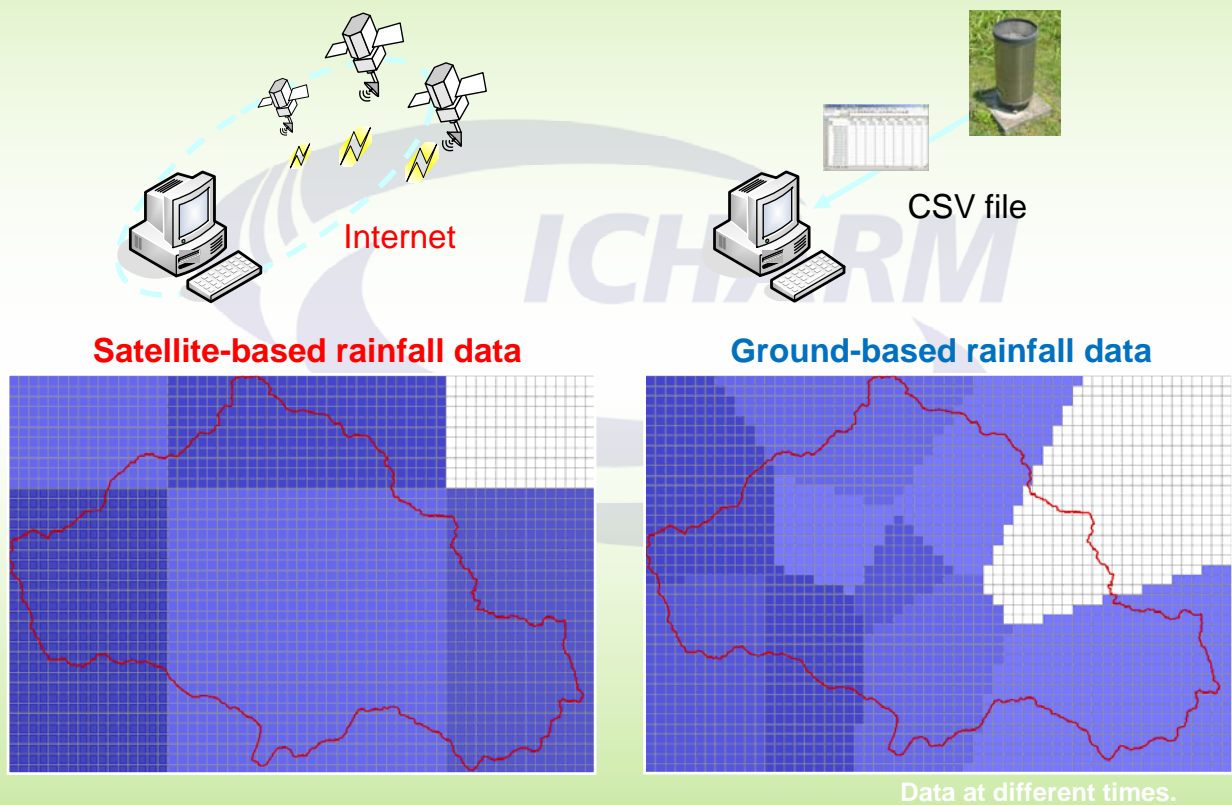
Development of Integrated Flood Analysis System (IFAS)

A computer software package specifically for flood runoff analyses with GUI using ground-based and satellite-based rainfall data

Being developed by a joint research (FY2005-2007) at ICHARM/PWRI, Infrastructure Development Institute (IDI/IF-Net), and nine major civil-engineering consulting companies

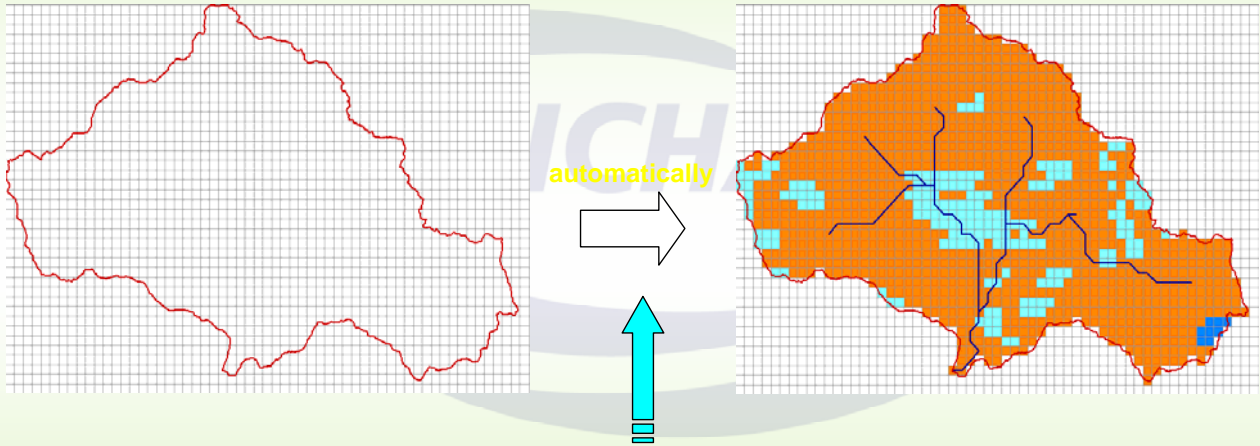


Utilization of satellite-based rainfall

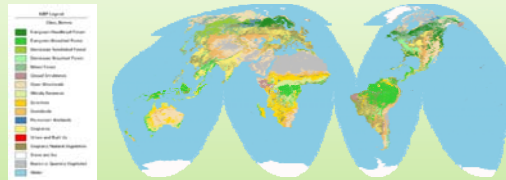


Automatic Estimate of Parameters as a first approximation

by use of globally available GIS datasets



Use global GIS data such as USGS-GTOPO30, GLCC, etc.



User friendly graphical interfaces

外部ファイルのインポート

外部データインポート

プロジェクト情報設定

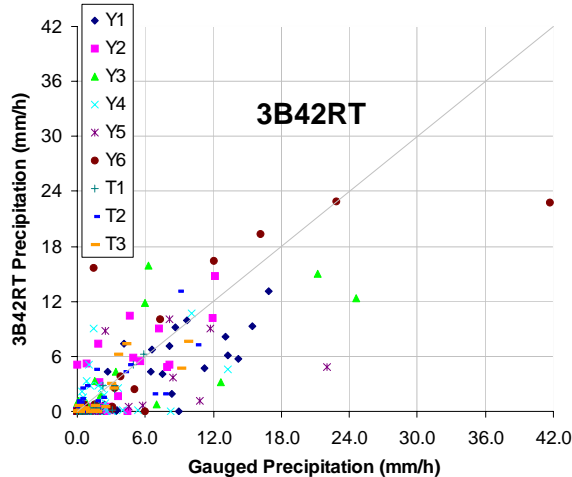
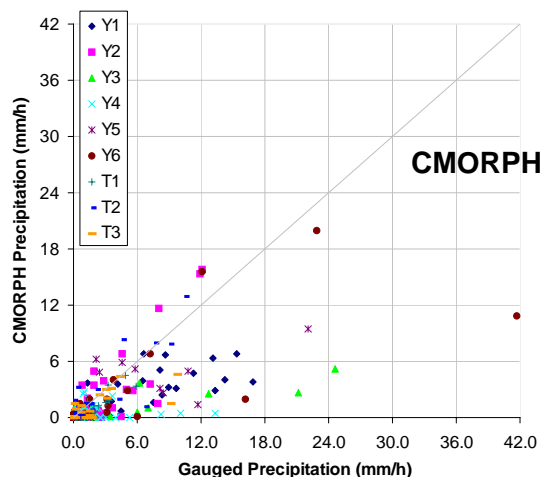
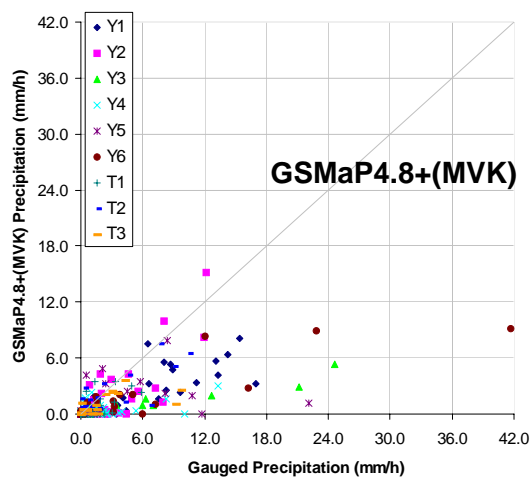
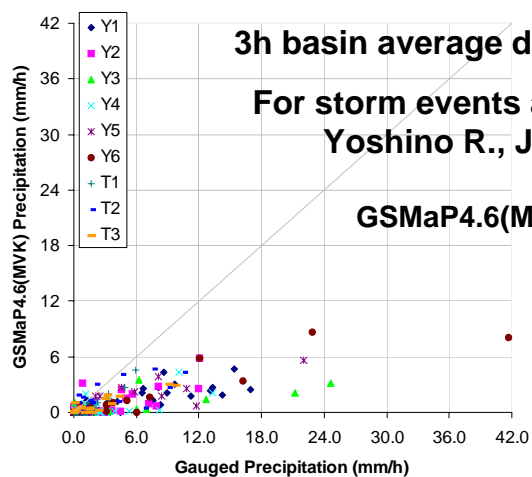
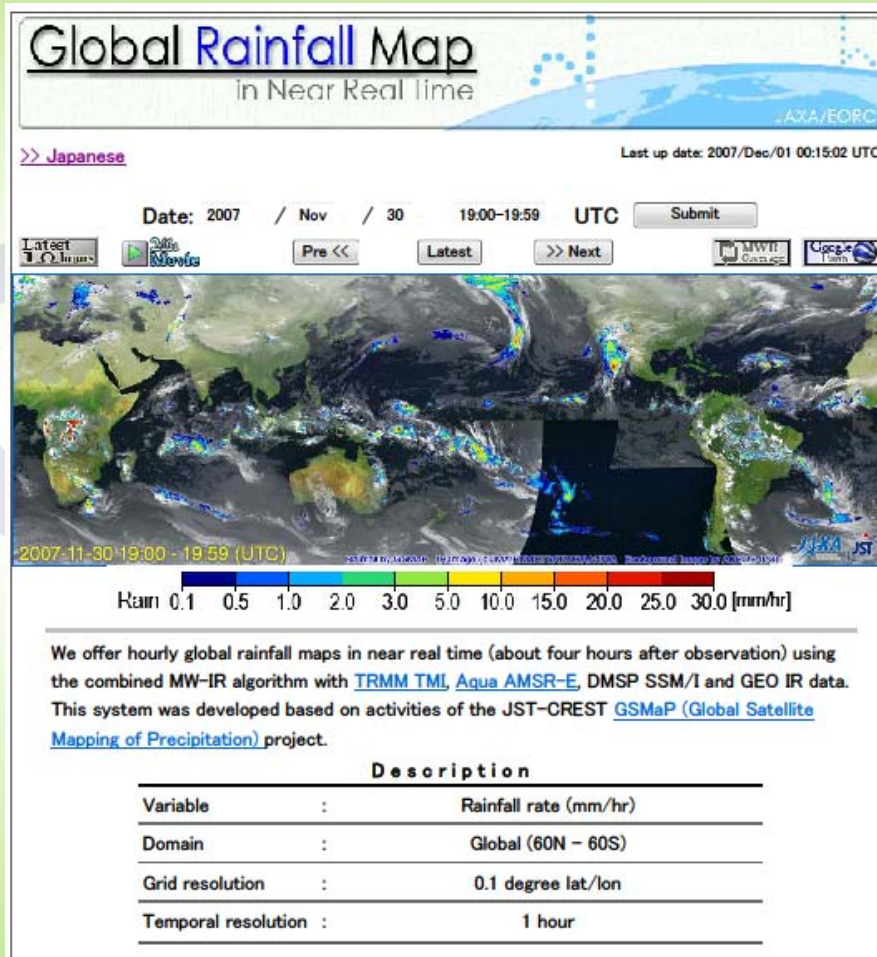
外部データファイル

外部データインポート

Real-Time GSMaP

JAXA,
JST-CREST
(Prof. Ken'ichi OKAMOTO,
Osaka Pref. Univ. et al.)

ICHARM/PWRI



Future mission: Global Precipitation Measurement (GPM)

Core Satellite

Dual-frequency Precipitation Radar and microwave radiometer

- Observation of rainfall with more accurate and higher resolution
- Adjustment of data from constellation satellites

JAXA (Japan)
Dual-frequency Precipitation Radar
NASA(US)
Satellite bus, microwave radiometer

(launch in 2013)

Constellation Satellites

Each carrying microwave radiometers, provided by international partners

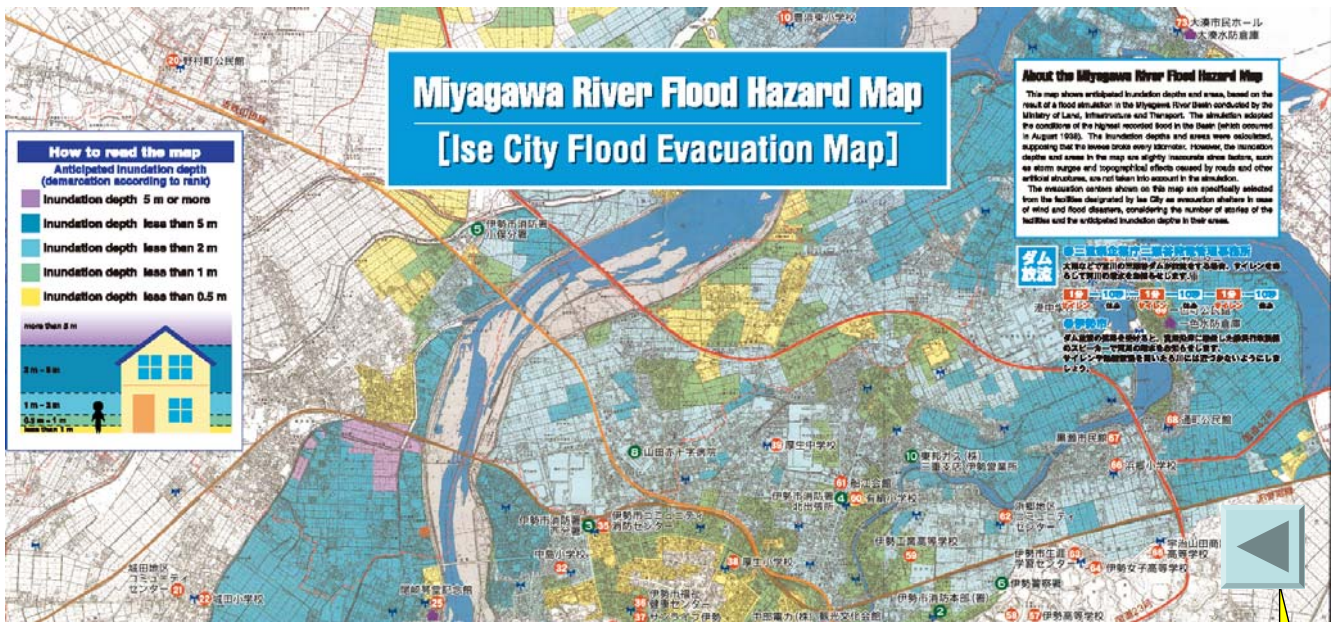
- More frequent Observation

International Partners :
NOAA(US), NASA(US), **JAXA (Japan)**, CNES/ISRO(France/India) and others

(launch around 2013)

Global Observation every 3 hours

- Improve the accuracy of both long-term and short-term weather forecasts
- Improve water resource management in river control and irrigation systems for agriculture

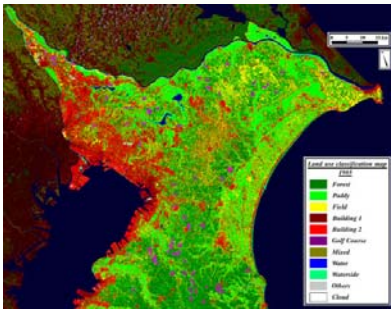
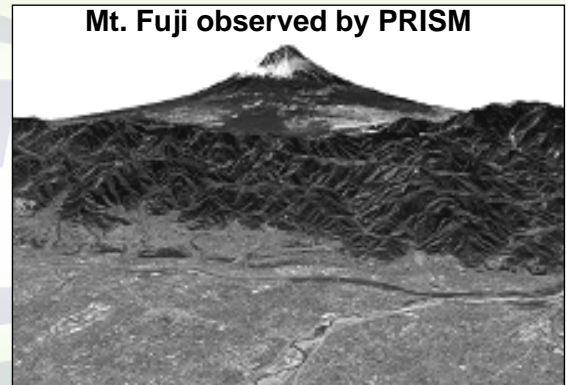


Aftercare programs in trainees' localities

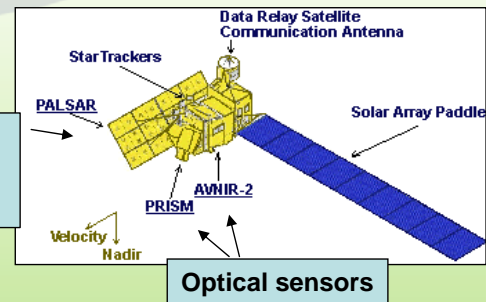
Advanced Land Observing Satellite (ALOS)



- Launch: 24 January, 2006.
- Objectives:
 - Cartography
 - Regional observation
 - **Disaster monitoring**
 - Resource surveying



PALSAR (L-band SAR)
 Cloud-free
 Day-night observation



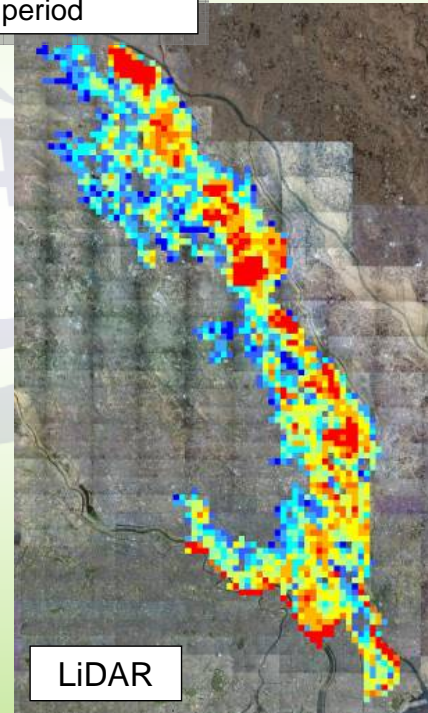
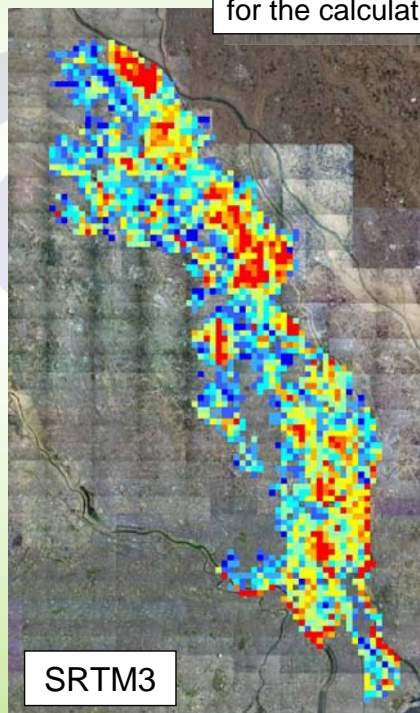
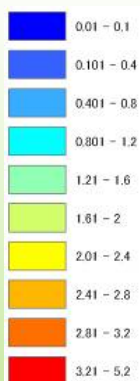
Flooding simulation with satellite-based DEM - Inundation depth -

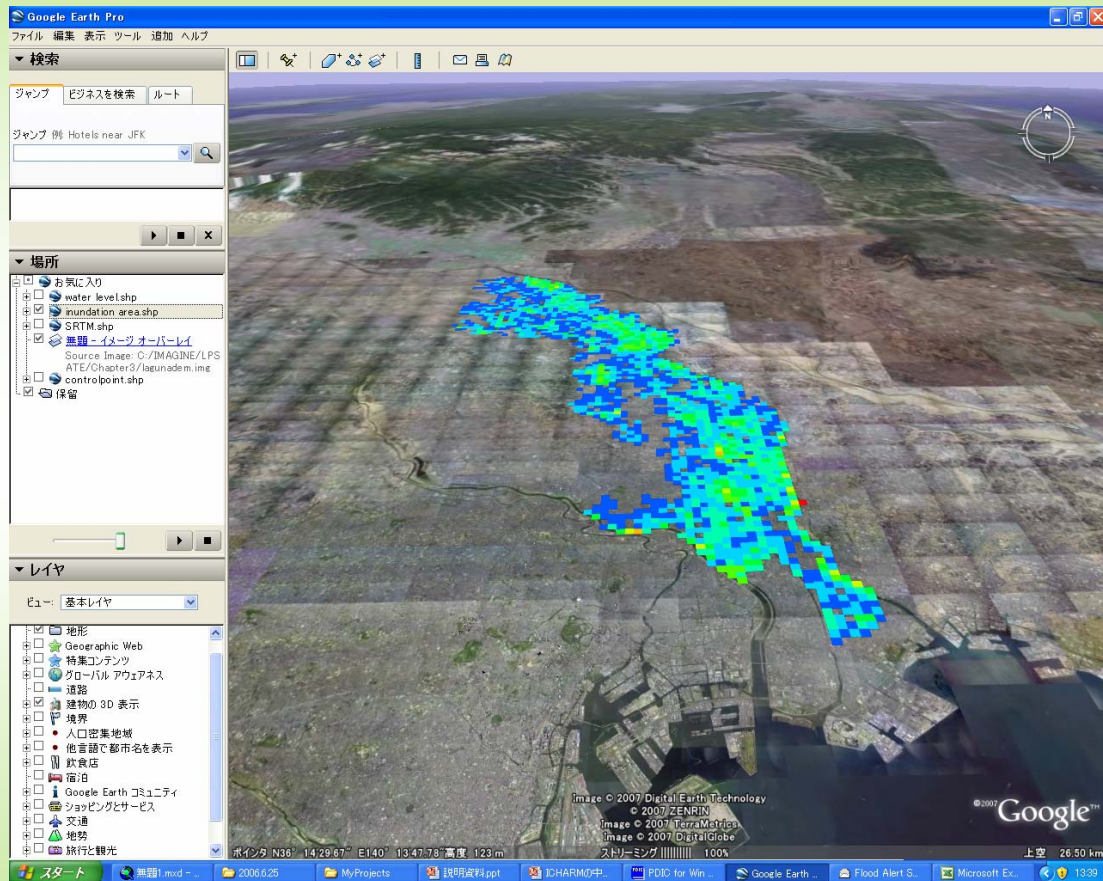
Absolute error of inundation depth from SRTM3 in this area

Mean: 0.06m
 RMSE: 0.92m

Each grid have **maximum value** for the calculation period

Depth (m)





Training (examples)

- **Training courses**
 - Flood hazard mapping course (2004-, JICA)
 - River and Dam engineering course (1969-, JICA)
 - Comprehensive Tsunami training (2008-, ISDR)
- **Aftercare program** for implementation in trainees local communities (2006-, JICA)
 - KL, 2007; China, 2008
- **Master Course on Water-related Risk Management** with National Graduate Institute for Policy Studies (GRIPS) supported by JICA started in October 2007
 - Bangladesh, China, India, Nepal, Japan

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 - With 11 students from Bangladesh, China, India, Nepal, Japan & Philippines

Master Course on Disaster Management Policy (water-related disasters)

- One year Master Course jointly established by GRIPS and PWRI supported by JICA
- Offered to **practitioners in public & private sectors** mainly in developing countries in Asia and Africa.
- Started in Oct 2007. The first year students are eleven from China, India, Bangladesh, Nepal, Philippines & Japan.
- Foster **practice and solution oriented engineers** who can plan and implement disaster management as part of development and lead the local practices.
- Through lectures, exercises and field studies.
- Master theses will be Feasibility Study of local project proposals.
- Taught by univ profs & administrative practitioners

Information Networking (examples)

- Collection of local site-specific information
 - ICHARM Local Study Series
 - ICHARM Flood Year Book
- Monitoring of the improvement of flood preparedness
- Analyses of global data sets collected elsewhere → **policy effective information**
 - Lead organization of WWDR Risk management chapter (WWDR2 Chapt 10 Managing Risk)

Thank you for your attention!

