



Outline of GFAS

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I am going to talk about

- **Background**
- **IFNet (International Flood Network)**
- **GFAS (Global Flood Alert System)**
- **CHARM (International Center for Water Hazard and Risk Management under the auspices of UNESCO)**



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)**

- **Staff : 219 (including 151 researchers)**

- **Research topics: about 200**

- **Budget (FY 2004): 6 billion JPY
(55 mil. US\$)**

200 Research topics focusing on 14 priority research projects

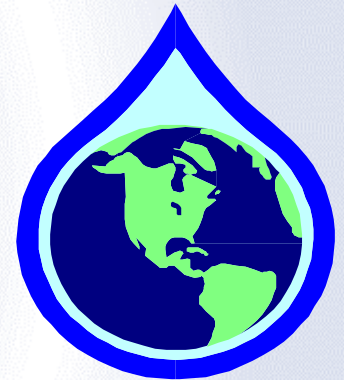
- to ensure **safety**
- to conserve and restore the **environment**
- for **efficient management** of infrastructure

9 Research Groups with 20 teams

- **Construction Technology Research Dept.**
- **Material and Geotechnical Engineering**
- **Earthquake Disaster Prevention**
- **Water Environment**
- **Hydraulic Engineering**
- **Erosion and Sediment Control**
- **Road Technology**
- **Structure**
- **Niigata Experimental Laboratory**

Internationally common recognition

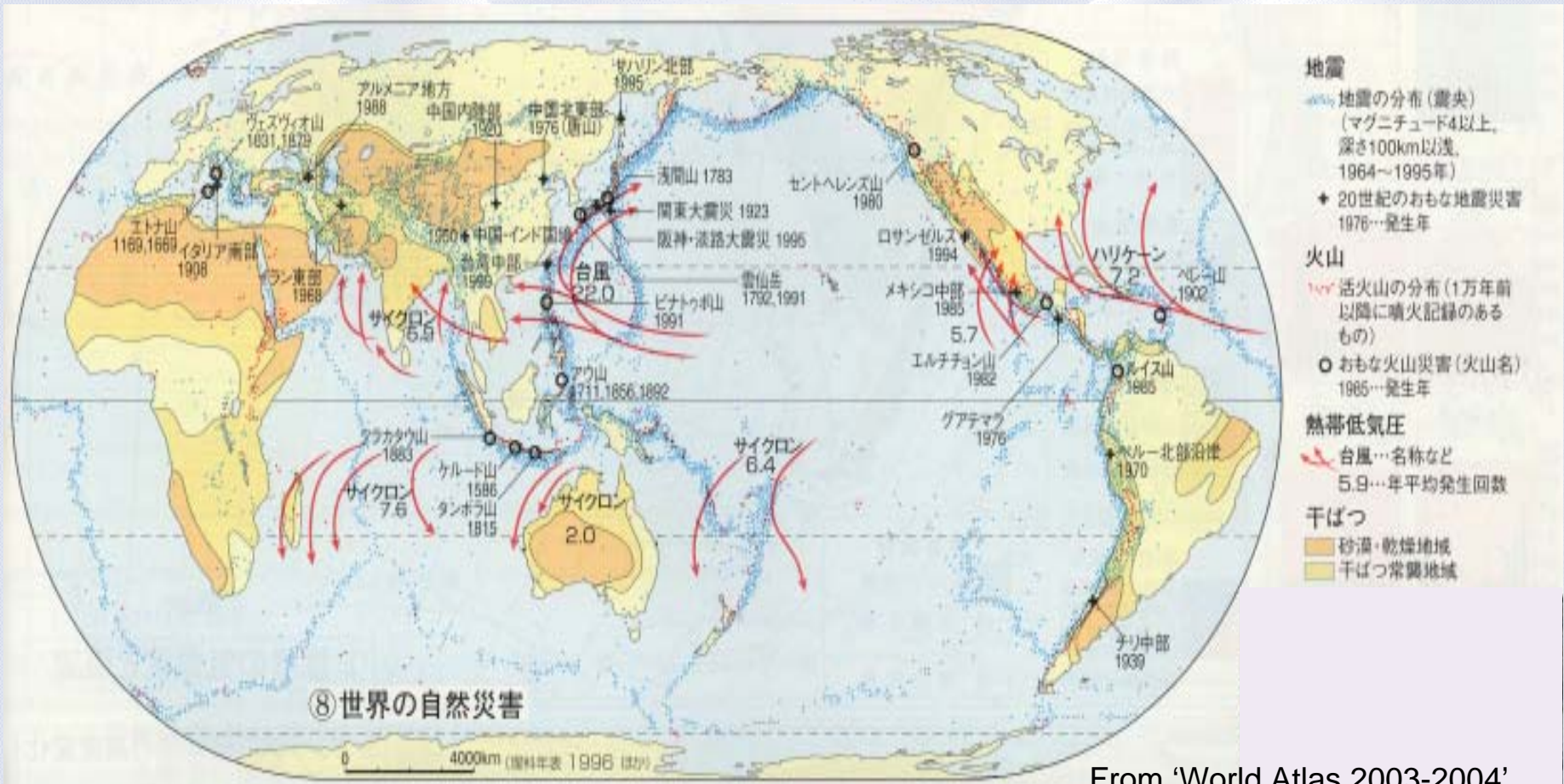
- 2002 World Summit on Sustainable Development
(Johannesburg)
- 2003 3rd World Water Forum
(Kyoto, Shiga & Osaka)



Water related disasters such as flood and drought are **major challenge for ensuring sustainable development**

Urgent needs for appropriate actions to prevent or mitigate impacts from water related hazards

Various Natural Disasters over the World

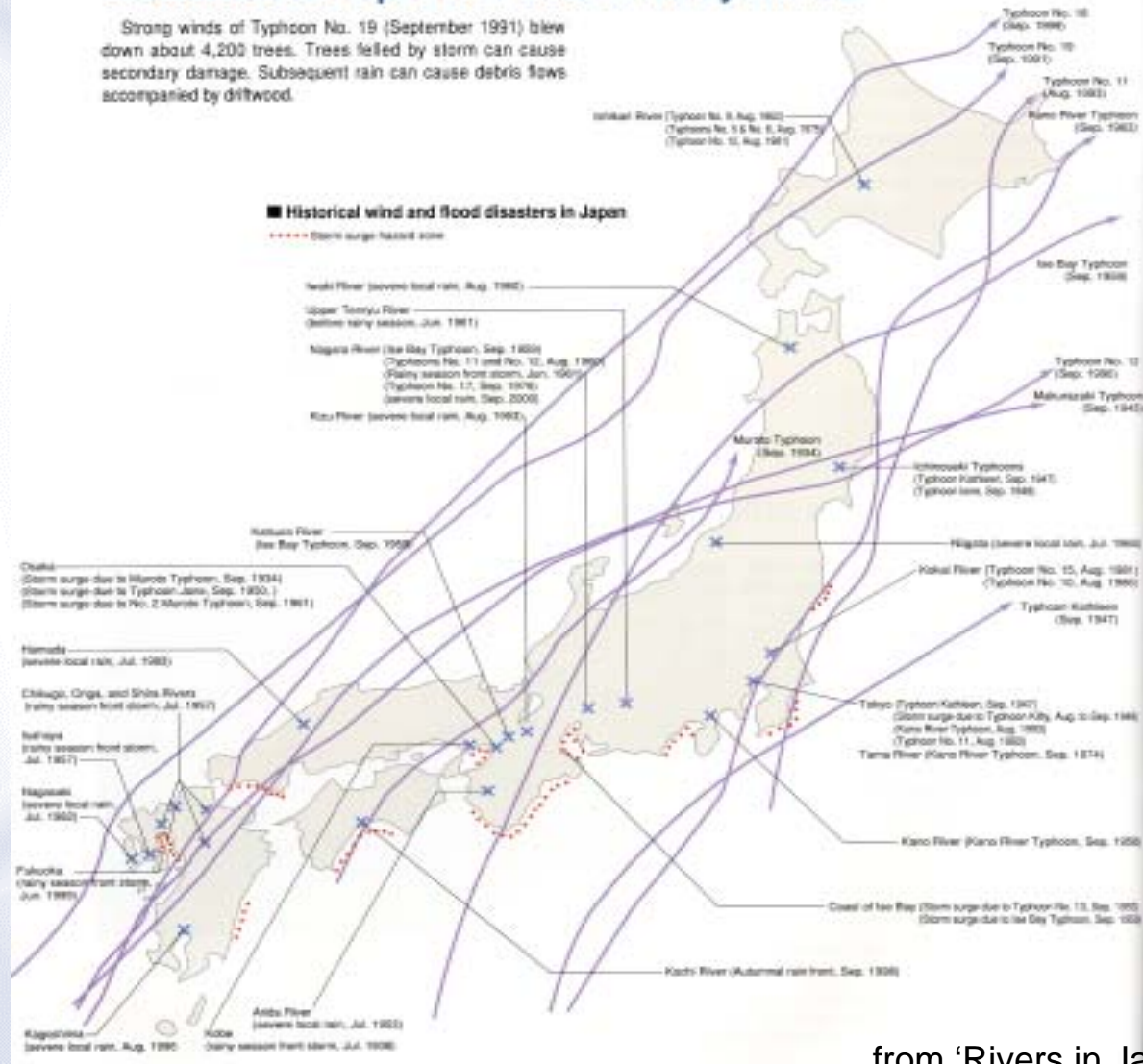


From 'World Atlas 2003-2004'
Ninomiya Shoten, 2003

Historical wind and flood disasters in Japan

Great destructive power of trees felled by storms.

Strong winds of Typhoon No. 19 (September 1991) blew down about 4,200 trees. Trees felled by storm can cause secondary damage. Subsequent rain can cause debris flows accompanied by driftwood.



In the case of downpour in Fukui Prefecture in July 2004, 283mm/day was recorded at Miyama Observatory.





Inundated situation of Sanjo City, Niigata Prefecture after downpour in July 2004. 421 mm/day of rainfall was recorded at Tochio Observatory.

International Flood Network



International Flood Network

Concept of IFNet

To internationally share the knowledge and experience for flood damage mitigation among flood affected countries and concerned organizations

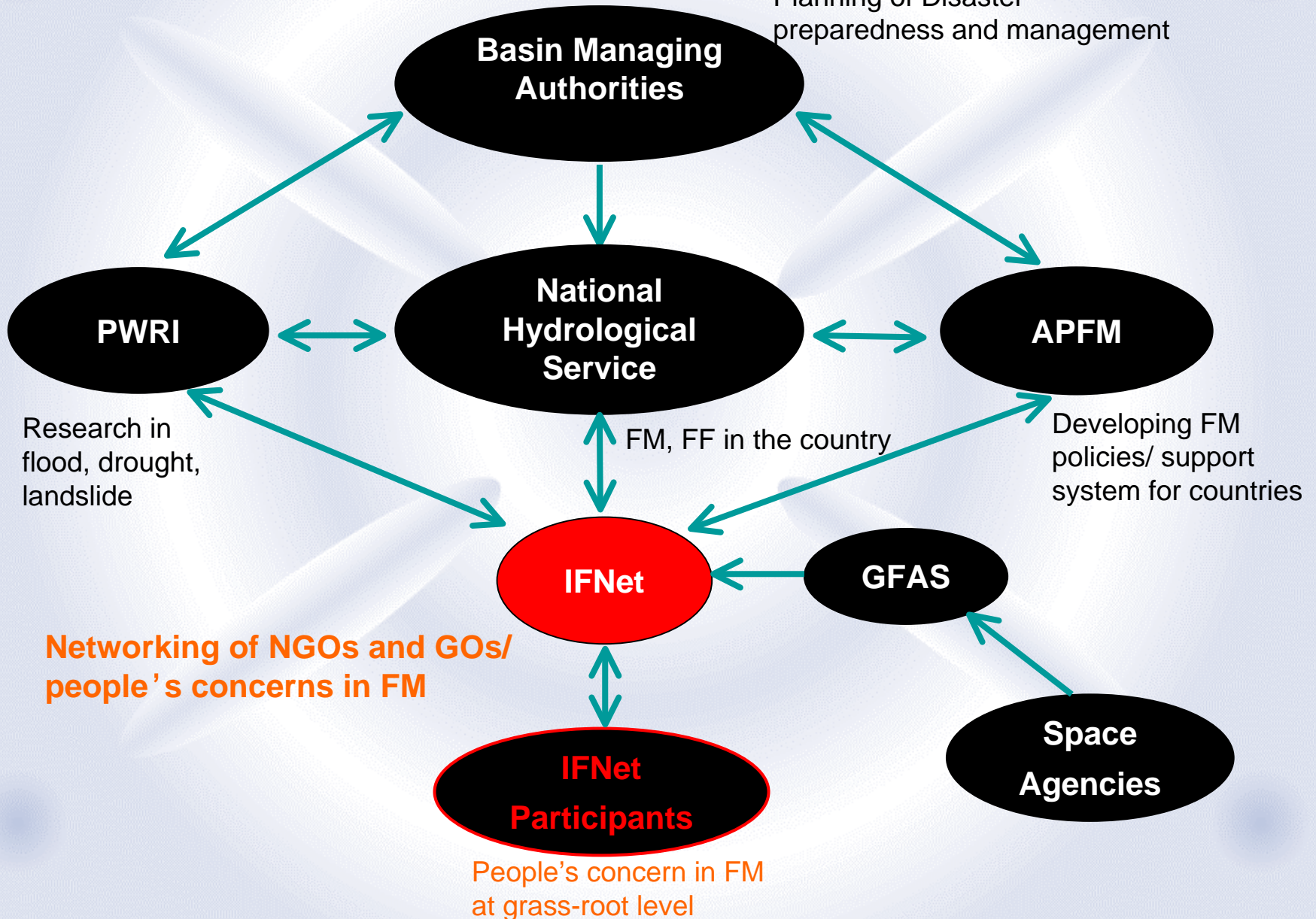
- **Exchanging information**
- **Raising public awareness of floods**
- **Establishing floods high on the international agenda**



**Established at the 3rd World Water Forum
held in Kyoto, Shiga and Osaka in March, 2003**

Framework of IFNet

Planning of Disaster preparedness and management



Governance of IFNet since August 10, 2003

Chairperson: **Mr. Avinash C. Tyagi**

*Director of Hydrology and Water Resources,
World Meteorological Organization (WMO)*

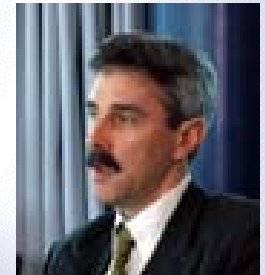


Vice Chairperson: **Mr. Akihiko Nunomura**

*Director of River Planning Division, River Bureau,
Ministry of Land, Infrastructure and Transport (MLIT), JAPAN*

Vice Chairperson: **Mr. Kees P. van Laarhoven**

*Director General for Water Affairs, Ministry of Transport, Public
Works and Water Management, THE NETHERLANDS*



Acting Director General : **Mr. Kazuo Umeda**

*Director of 2nd Research Department,
Infrastructure Development Institute (IDI) JAPAN*

Activities of IFNet

- provides mechanism for the exchange of information and opinion by establishing on interactive web site and circulating periodic newsletter.
 - **Good Practices/ Lessons Learned**
- inputs and convenes/ co-sponsors symposia, workshops and other meetings on topics related to flood
- encourages its participants and others to coordinate their efforts and collaborate in joint projects and thus improve the effectiveness of their individual programmes.
- planning projects that bring benefits to the participants;
 - **GFAS - Global Flood Alert system**
 - **Flood Hazard Mapping (in planning)**

How to participate

Participation in IFNet is **open** to all who have knowledge and experience in flood problems and are actively involved in efforts to reduce the negative impact of flood on society and natural environment

Participation form

<http://www.idi.or.jp/vision/ifnetregistration-e.html>



Flood Report from IFNet participants (Example 1)

Floods in Bangladesh in 2004



Two young girls push a pot full of relief food as they swim back to their submerged homes at the downtown of Dhaka July 25 while flood victims queue up before a homoeopathic dispensary at the neighbouring locality as the government is yet to offer healthcare service.

Reporteur: Mr. Shahidul Islam Chowdhury

BANGLADESH

Flood Report from IFNet participants (Example 2)

Floods in Bangladesh 2004



Septuagenarian Tafurunnisa sashes her way through stinky floodwaters in Dhaka on July 25 to buy essentials at a nearby market that now seems light years away.

Reporteur: Mr. Shahidul Islam Chowdhury

BANGLADESH

Flood Report from IFNet participants (Example 3)

Floods in Mozambique 2002



Reporteur: Dr. Imasiku Anayawa Nyambe

ZAMBIA

Flood Report from IFNet participants (Example 4)

Flood in Tokai Area, Japan in 2000



Dyke Break of the Shinkawa river 12th Sep. in Nishibiwajima town

Outline of GFAS

- One of the contents of IFNet (free of Charge to registered members)
- Having been developed cooperatively by MLIT, JAXA and IDI
- To generate Rainfall Map (Global, River Basin), Excessive Rainfall Area Map, Flood Alert Email . . .
- Based on data from Global Observation Satellites (Global Coverage)

JAXA : Japan Aerospace Exploration Agency
 IDI : Infrastructure Development Institute

TRMM (Tropical Rainfall Measuring Mission)

Launched in November 1997 for measuring tropical rainfall distribution

5 sensors

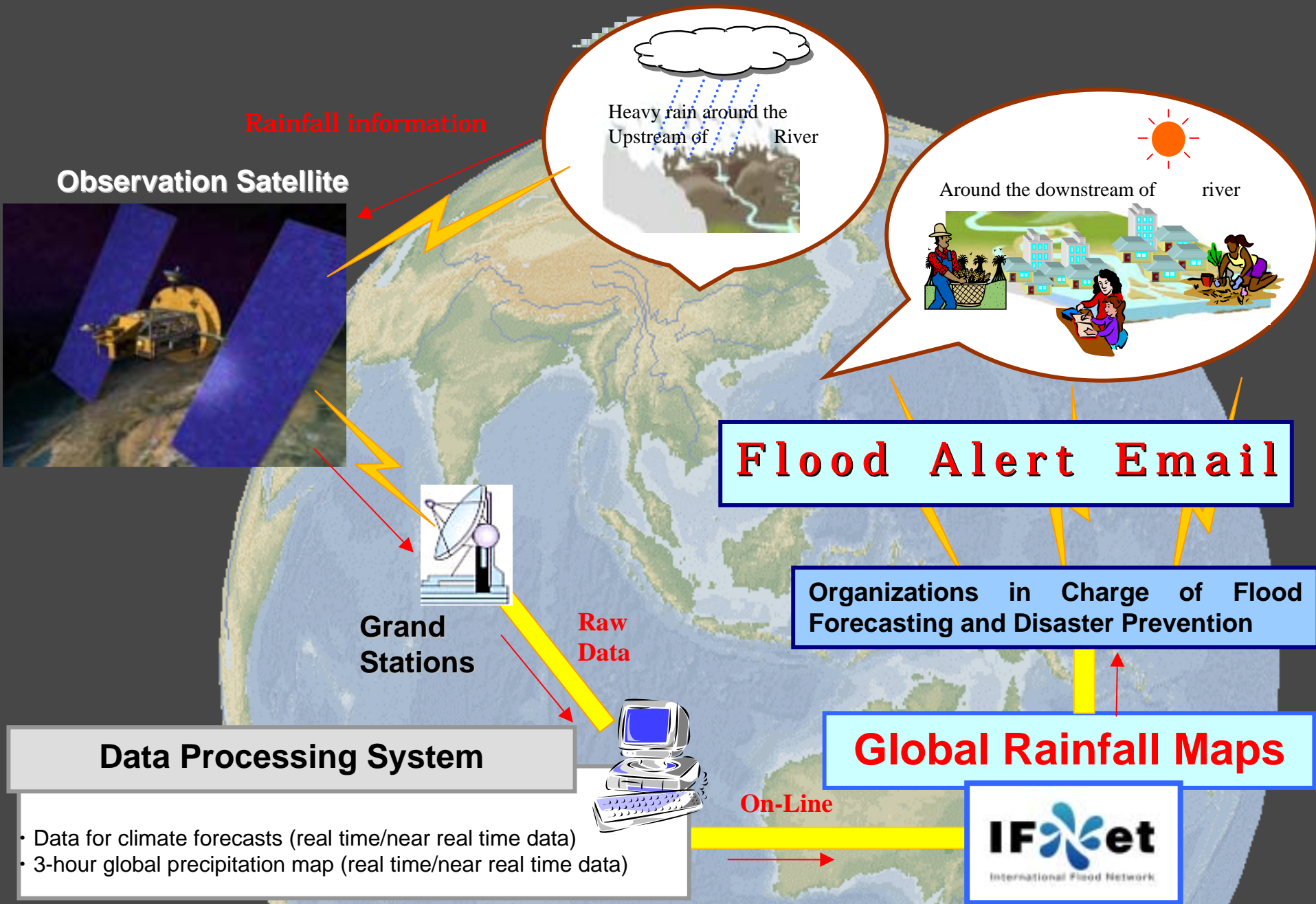
- PR (Precipitation Radar)
- TMI (TRMM Microwave Imager)
- VIRS (Visible Infrared Scanner)
- CERES (Clouds and Earth's Radiant Energy System)
- LIS (Lightning Imaging Scanner)



Is going to finish its life span

→ to be evolved into GPM

Illustrative figure of GFAS



Satellite Data for GFAS

Based on TRMM, DMSP and 5 geostationary meteorological satellites

Latitude 60° N ~ 60° S

Longitude 0° ~ 360°

Grid size $0.25^{\circ} * 0.25^{\circ}$

(22km * 28km around Japan)

Every 3 hrs

Near real time data (2~3 hrs after observation)



Objectives of GFAS

- To support flood forecasting and warning operation
- By providing near-real-time distributed rainfall information based on satellite observation
- For river basins where exist no or insufficient (telemetered) rainfall data

NOTICE: This is NOT a system which impose or replace the ground observation and conventional systems.

Effectiveness of GFAS

GFAS is effective especially under the following conditions:

- **Large River Basin** where near-real-time areal rainfall distribution data are not obtainable,
- **Trans-boundary River Basin** where prompt data transmission between countries is difficult.

Concept of Flood Alerting Email



Satellites Observati on (GPM)
TRMM (4-30 km)

Data Processing System

3-hour Global Precipitation Data

On-Line



Probability Calculation

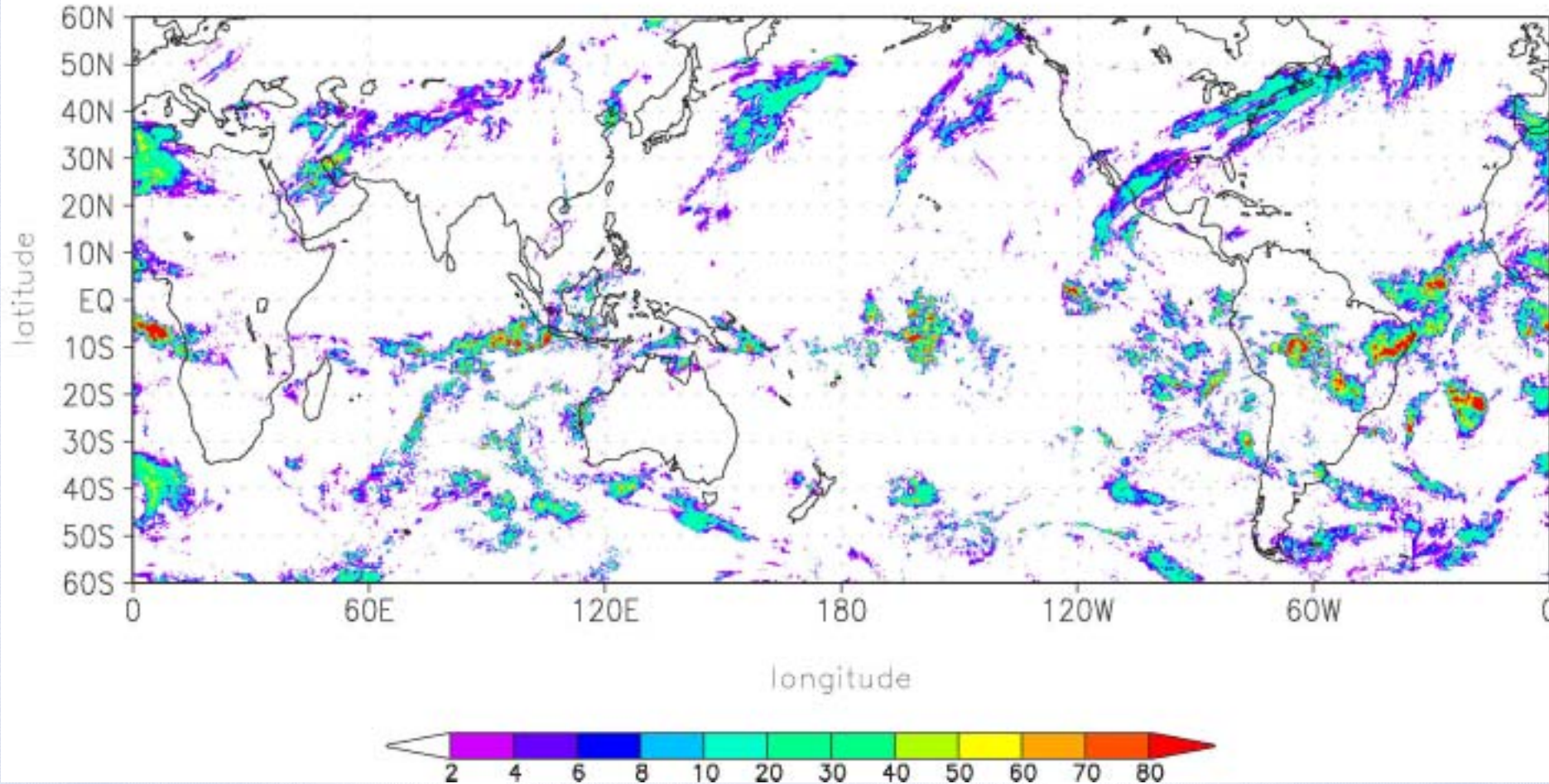
Present Rainfall $>$ Alert Level of respective rivers

Alert!

(Information Dissemination to Countries Concerned)

Output of GFAS (image sample)

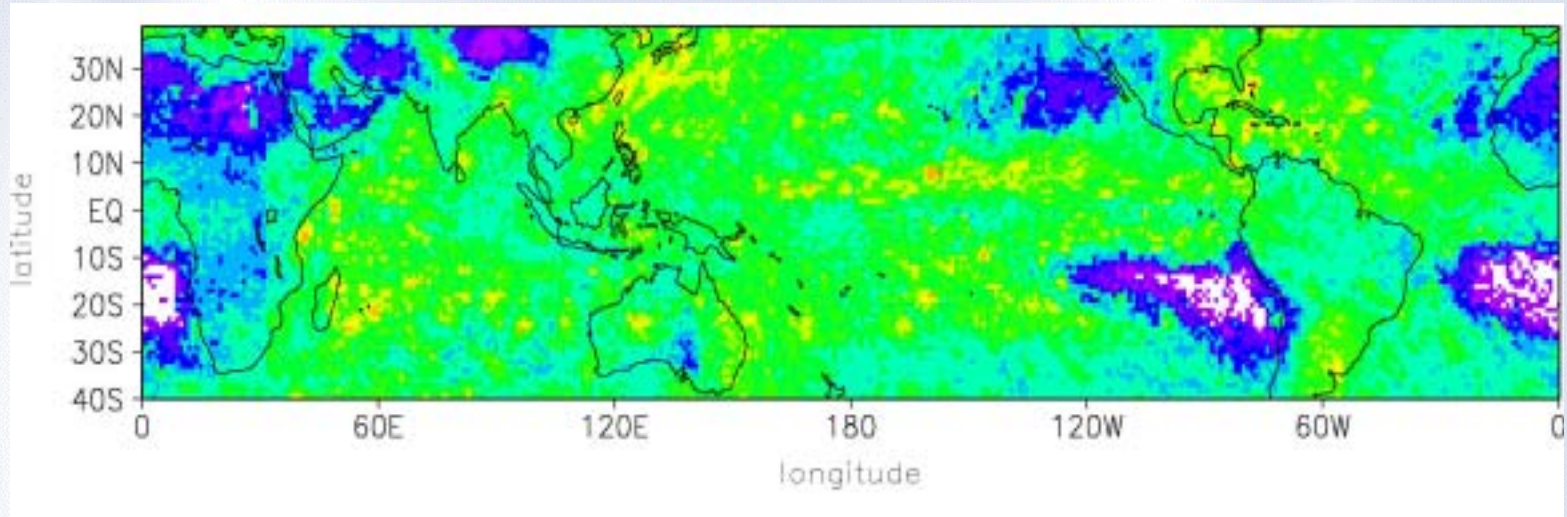
Daily Precipitation of Aug 1, 2003



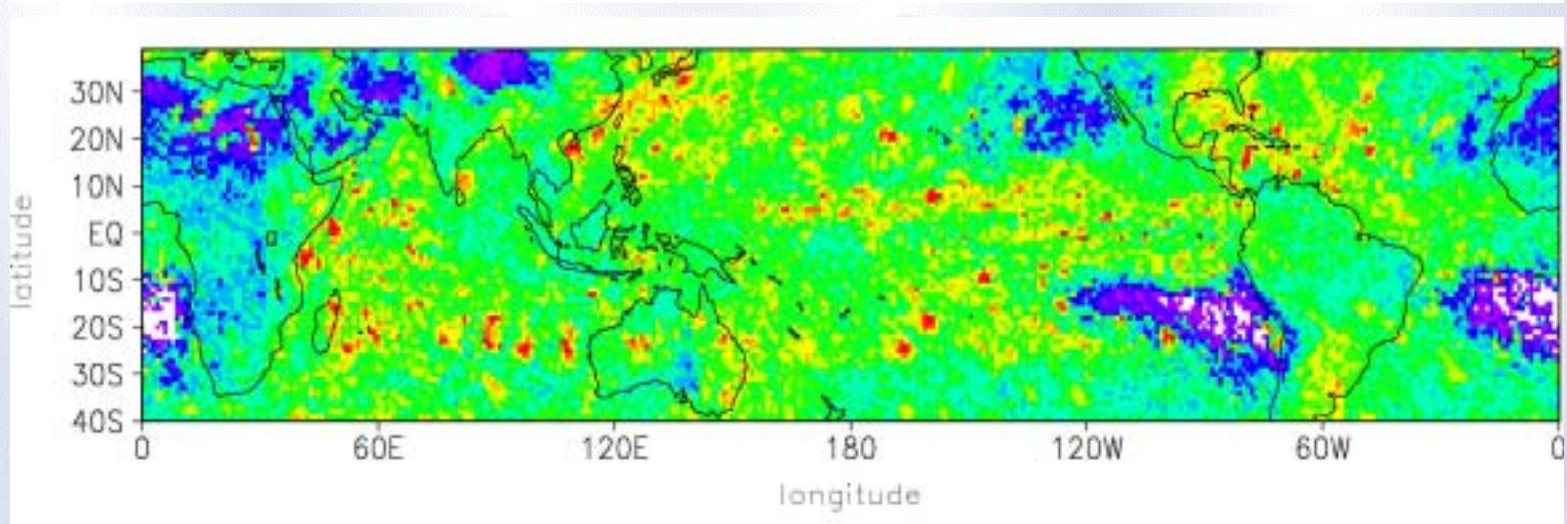
**Derived from TRMM Data of Global Real-Time 3-Hourly
Precipitation Analyses (3B42RT) by JAXA**

Daily Precipitation Probability (Image Sample)

**10-year
Return Period**



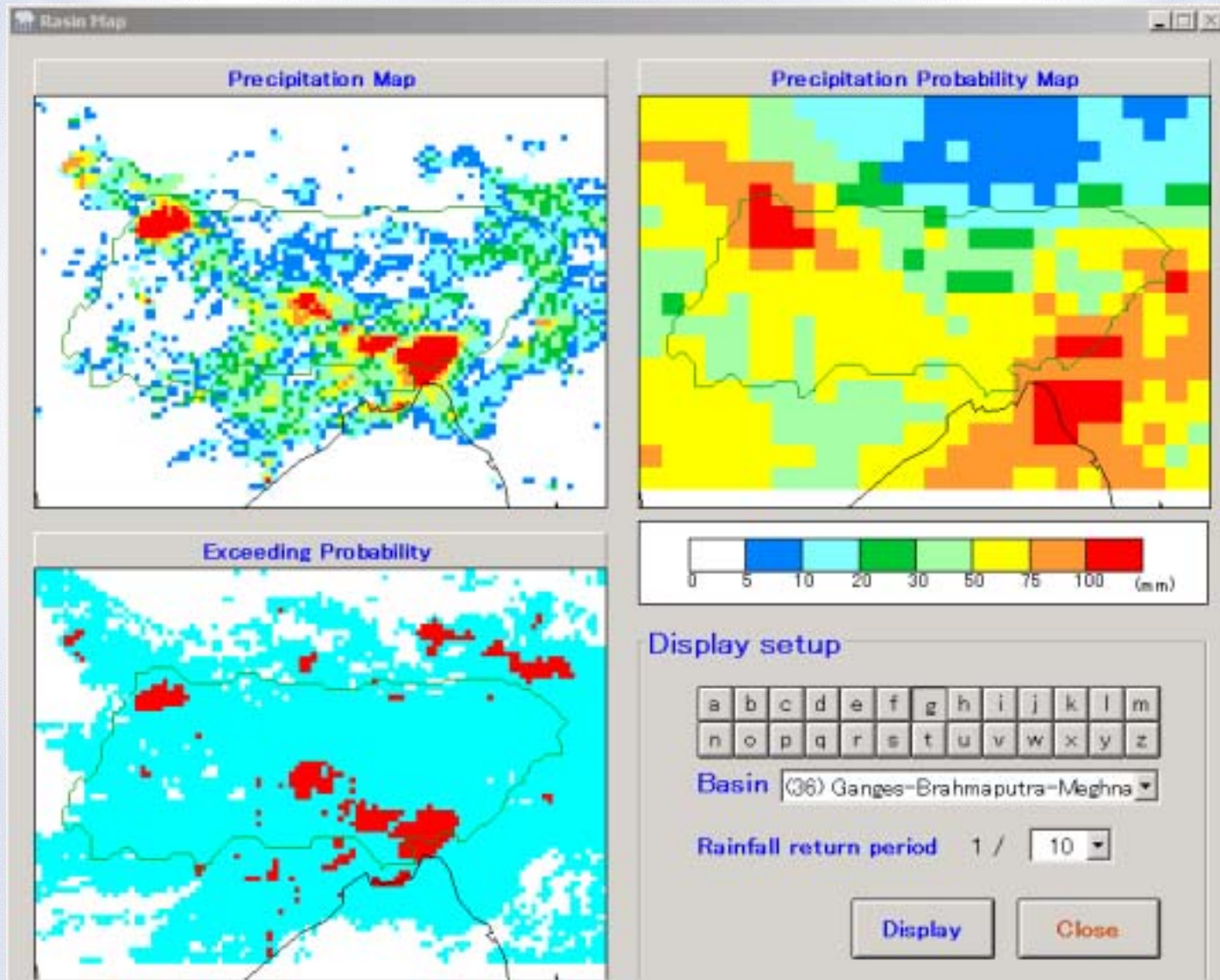
**30-year
Return Period**



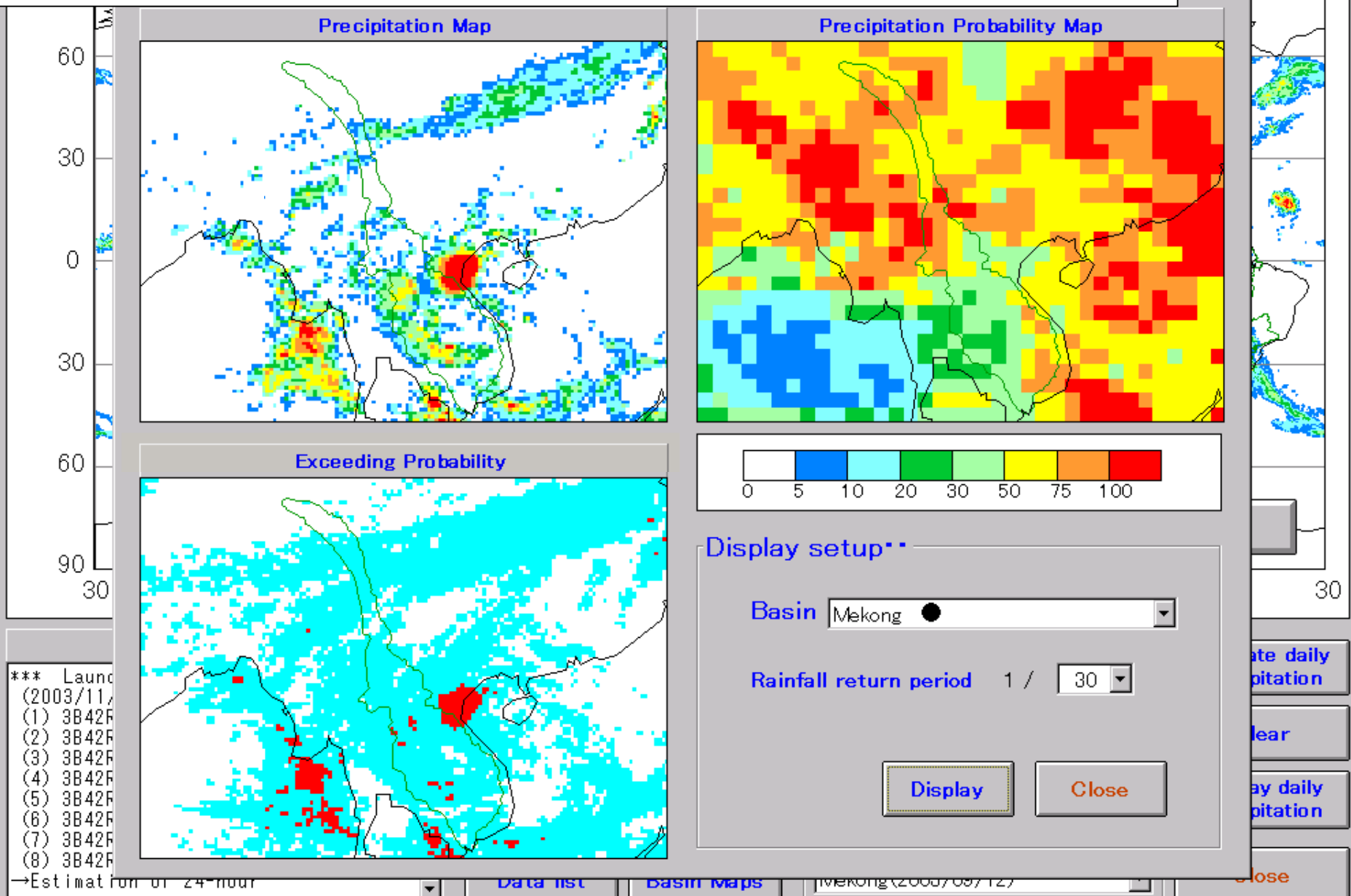
Derived from TRMM Data of Rain Accumulation (3B42) by JAXA

Ganges-Brahmaputra-Meghna River Basin

Daily precipitation on July 11, 2004



Display large scale of selected basin



*** Launch
(2003/11/17)
(1) 3B42F
(2) 3B42F
(3) 3B42F
(4) 3B42F
(5) 3B42F
(6) 3B42F
(7) 3B42F
(8) 3B42F

→ Estimation of 24-hour

Data list

Basin Maps

Mekong (2003/09/12)

ate daily
precipitation

clear

ay daily
precipitation

close

Outline of Global Precipitation Measurement (GPM)

- Scheme of establishment in observing global precipitation every 3 hours with the main satellite and 8 constellation satellites
- Japan's contribution: Development of dual precipitation data and launch of H2-A Rocket

Core Satellite

Dual Frequency Radar
Multi Frequency Radiometer

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

JAXA (Japan)

Dual frequency Radar, Rocket

NASA(US)

Satellite Bus, Micro-wave gauging measurement



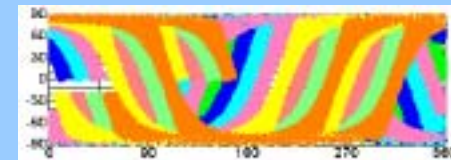
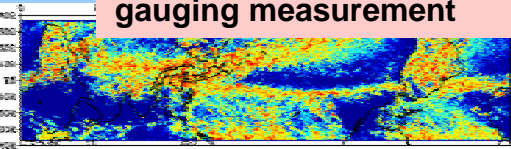
Constellation Satellites

Satellites with Micro-wave Radiometers

- ◇ More frequent Observation

Cooperation :

NOAA(US),NASA(US),ESA(EU),
China, Korea and others



- Earth heating Phenomena
- Study of Climate Change
- Improvement of forecasting system

**Global Observation
every 3 hours**

- IWRM
- Flood Forecasting
- Forecasting of crop productivity

Development Schedule

2003-4

- **System Development using Current Available Satellite Data**

2005

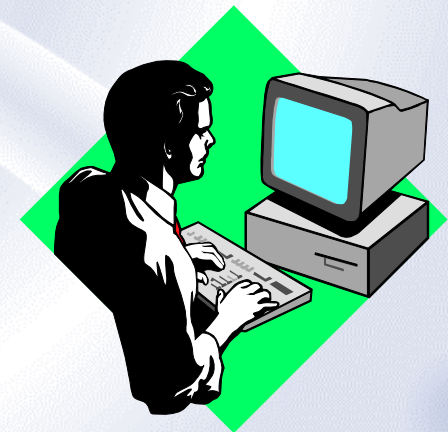
- **1st Launch of GFAS**
 - **Global and River Basin Rainfall Maps**
 - **Excessive Rainfall Area Maps**

2006

- **(4th World Water Forum in Mexico)**
- **Flood Alert through Email**

200?

- **Establishment of GPM**



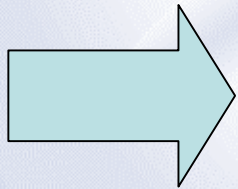


**the International Centre for
Water Hazard and Risk
Management
under the auspices of
UNESCO**

(CHARM)

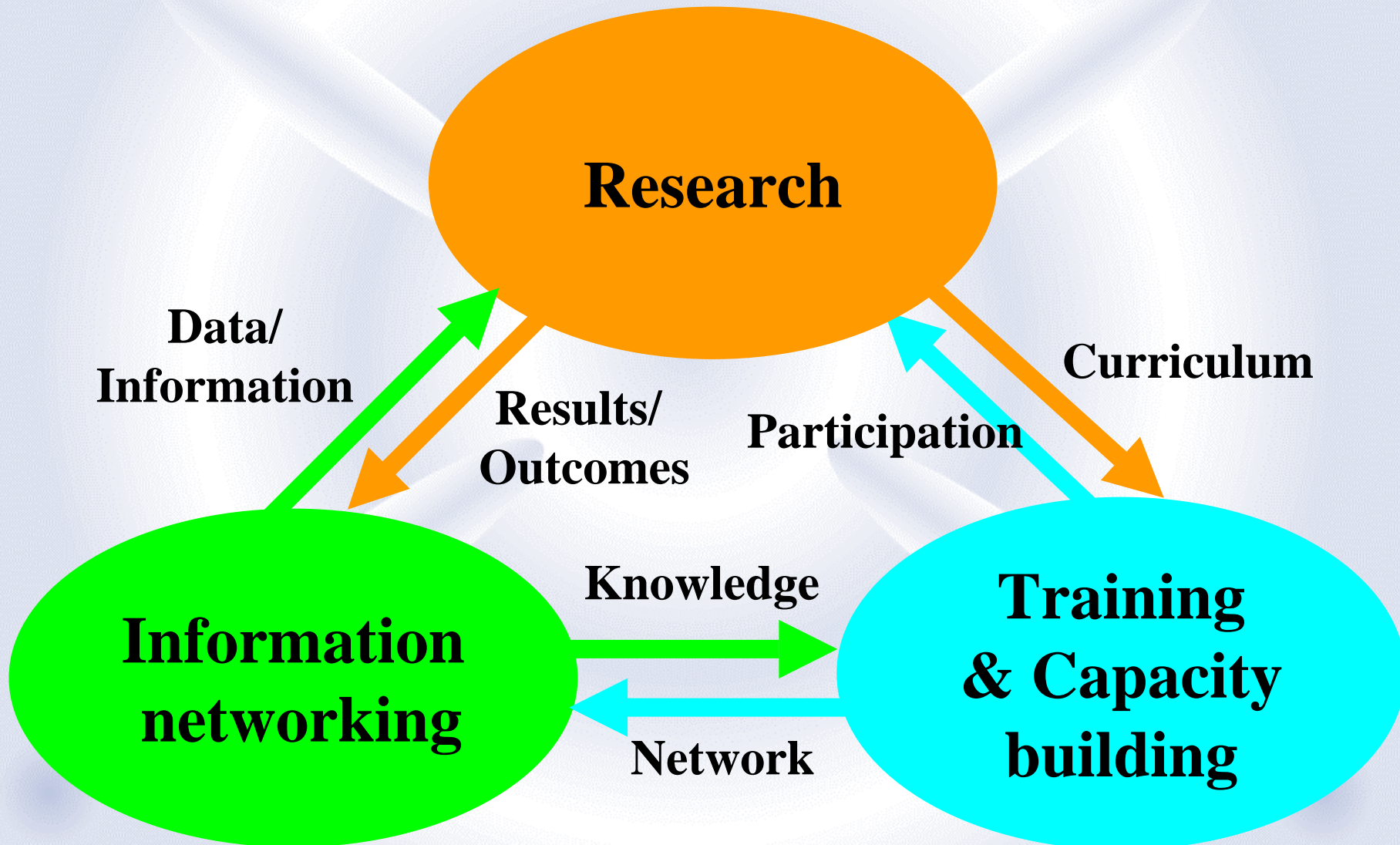
Framework of CHARM

- **Accumulated knowledge and experience** trying to overcome water-related disasters
- **Global network such as IFNet** for internationally sharing valuable information



Contribution to prevent or mitigate water-related disasters in the world

Pillar Activities of CHARM



Activities

- Research -

- **Contribution to international projects such as **WWAP** and **JUWFI** (UNESCO/WMO)**
- **Hydraulic / hydrological prediction, observation, modeling and analysis**
- **Risk assessment and risk management technologies for water-related hazards under various socio-economic, geographic and climatic conditions**

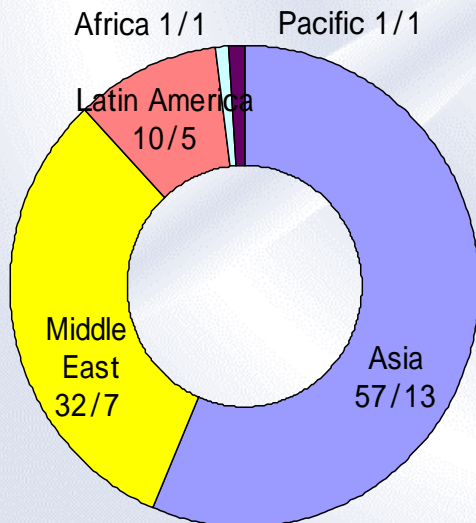
Activities

- Training and Capacity building -

PWRI has long experience in conducting JICA training courses for over 35 years

including

- **River and dam engineering**
- **Sabo engineering**



Total Number of
Trainees/Countries
101/27
in FY 2003



Activities

- Information Networking -

Information networking will be synergized with research and training activities

in order to enhance integration and coordination:

Through the information network...

- **Research output will be widely disseminated**
- **Feedback from countries / regions will be reflected in the research projects**
- **Trainees will develop domestic links to their own countries/ regions**
- **Local needs for training items would be clarified**

A Blueprint of the Centre Building



- ◆ **Research Staff** : 20 (at the initial stage)
- ◆ **Center building** : will be completed in autumn 2005
- ◆ **Office space** : 2,000m²



END

Thank you for your attention

<http://www.unesco.pwri.go.jp>