V. Global Flood Alert System

1. Project Concept
   - An attempt to make the best use of Satellite Rainfall in FEW
   - Support for existing FEW activities where necessary

2. Collaboration between:
   i) Space Agencies as rainfall data provider
   ii) IDI as system developer and operator
   iii) IFNet as transmission network
   iv) Hydrological Services, River Authorities in charge of flood forecasting and warning
Schematic Figure of GFAS

**Space Agencies**

- NASA Homepage
- IDI-Japan

**Observation Satellites**

- Observation
- Data Download
- Data processing
- Mapping, Email

**System Development**

**Hydrological Service**

- Heavy rainfall around
- In the XX river basin

**River Authorities**

- River
- Flood Forecasting and Warning
- using GFAS Information etc.

**IFNet**

1. IFNet Homepage
2. Email of Heavy Rain
   to IFNet members in charge of Flood Forecasting and Warning
Flood forecasting requires real-time accurate hydrological data transmission from upstream to downstream. Difficulties exist in:

- **Difficulty in Introducing Telemetry**
  Budget constraint for maintenance, spare parts, other social factors etc.

- **Data Transmission in Trans-boundary Rivers**
  Difficulty in data transmission across borders.

- **Accuracy of Forecasting for Flash Flood**
  Detection of localized rainfall, short-term rainfall prediction, etc.

Means of data transmission:
Community Participation, Cell-phone, Satellite Rainfall, etc.
Global Precipitation Measurement (GPM)

Current Observation System:
TRMM and other Satellites orbiting the earth, and 5 Stationary Satellites

**Core Satellite**
- Dual Frequency Radar
- Multi Frequency Radiometer
- **Observation of rainfall with more accurate and higher resolution**
- Adjustment of data from constellation satellites

**8 Constellation Satellites**
- Satellites with Micro-wave Radiometers
- **More frequent Observation**

<table>
<thead>
<tr>
<th>Cooperation:</th>
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<tbody>
<tr>
<td>NOAA(US), NASA(US), ESA(EU), China, Korea and others</td>
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- Earth heating Phenomena
- Study of Climate Change
- Improvement of forecasting system

Global Observation every 3 hours

- IWRM
- Flood Forecasting
- Forecasting of crop productivity
Characteristics of Satellite Data

1. Features
   - 3-dimensional analysis of rainfall structure.
   - No influence of the topographic features.

2. Data Delivery
   - Observation is made every 3 hours (not hourly) for each grid.
   - Observation grid size is about 600km² (30km by 20km rectangle).
   - Data delivery is near-real-time basis (several hours after observation).

Expectations for Satellite Rainfall

- Large river basins where even daily and less dense data could be informative
- Without any telemetry
- Trans-boundary Rivers where prompt data transmission between countries is difficult.
1st Phase Trial Run in 2006

Purpose: Satellite Data Verification for Flood Forecasting (comparison with ground rain-gage data)

Data source: NASA (3B42RT)

Outputs:
1. Global and Regional Rainfall Map
   (Near real time and past data)
   (0.25 deg. grid in the band 0-360 deg. longitude, 60-60 N-S latitude)
2. Text Rainfall Data
3. Heavy Rain Area by Probability
   (area of over a certain probability, 1/5, 1/10 return periods)
4. E-mail Delivery of Heavy Rain Notice on Request

Delivery: Early April 2006 on IFNet Website/e-mail delivery
Trial Running of GFAS
by IDI, IFNet

http://www.internationalfloodnetwork.org/index.html
IFNet Homepage

WORST FLOODS

Global Flood Alert System (GFAS)
The GFAS will deliver global rainfall information with indication of heavy rainfall areas from early 2006. (Data source: NASA)

Flood Hazard Map Manual
This manual describes in brief the background, purpose, production and distribution of Flood Hazard Maps, as well as the verified effectiveness and current usage in Japan.

World Rivers and their Basins
Download the map from here

Click here!

The major objective of this Forum, titled “Better Water Management through Public Participation” was to develop a commitment in the Southeast Asian region to promote Integrated Water Resources Management (IWRM). The 480 persons attending from inside and outside the Southeast Asian region engaged in lively discussions.

IFNet confirmed closer cooperation among partners in the region in terms of water-related risk management for flood disasters and cosponsored the session, “Reducing vulnerability to floods, droughts and other water-related disasters” at the 2nd South East Asia Water Forum in Bali, Indonesia.
GFAS Starts with Daily Rainfall

You can select 1 or 3-day rainfall from pull-down menu here.

Latest 1 day rainfall in the world is displayed on the initial page.

Then, click here for display.
Heavy Rain Area Exceeding 5 or 10-year Return Period

You can select return periods from pull-down menu here.

Heavy rain area is shown by red.

GLOBAL FLOOD ALERT SYSTEM (GFAS)
Trial running
You can select one region from 9 regions.
Enlarged Maps for 9 Regions

Europe & North Africa
Middle East
South Africa
South Asia
Southeast Asia
East Asia
North America
South America
Oceania

Regional Map Sample (South Africa)
Area: Southeast Asia

GLOBAL FLOOD ALERT SYSTEM (GFAS)

Trial running

Area: Southeast Asia

As at 00:00, 03 04 2006 (GMT)
Area: South Asia

GLOBAL FLOOD ALERT SYSTEM (GFAS)
Trial running

Area: South Asia

As at 00:00, 03 04 2006 (GMT)
Area: South America

GLOBAL FLOOD ALERT SYSTEM (GFAS)
Trial running

Area: South America

As at 00:00, 03 04 2006 (GMT)
Text Daily Rainfall Data (Excel or Word Pad)

1440 digit data from 0E to an eastern direction.

Grid resolution: 0.25 degree.

480 lines from 60N to 60S.

To download the data, click here.
If heavy mean basin rainfall exceeding 5 or 10-year return period is observed by satellite, it's indicated in a corresponding box.
GLOBAL FLOOD ALERT SYSTEM (GFAS)
Trial running

GPAS Information

IFNet Global Flood Alert System (GFAS) disseminates every day information on possibility of flood occurrence by comparing the real time 24 hours precipitation to estimated precipitation of probability. The real time 24 hours precipitation is obtained from the Website of Tropical Rainfall Measurement Mission (TRMM), which is a joint mission between National Aeronautics and Space Administration (NASA) of USA and the Japan Aerospace Exploration Agency (JAXA) designed to monitor and study tropical rainfall.

Data source

As precipitation data source, GFAS utilizes one of the products of the TRMM Real-Time Multi-Satellite Precipitation Analysis Data Set, which is called "3B42RT".

Description of TRMM Combined HQ/VAR (3B42RT)

3B42RT product is a combination of the TRMM real-time merged passive microwave (HQ; 3B42RT) and microwave-calibrated IR (VAR; 3B41RT). The current scheme is simple replacement: for each gridbox the HQ value is used if available, and otherwise the VAR value is used.

Grid Resolution: 0.25 degrees latitude/longitude
Domain: Global 60N - 60S
Temporal resolution: 3 hours

For obtaining digital data:
ftp://tppnss.sci.gsfc.nasa.gov/pub/merged/mergeTRMMR

Detailed documentation (3B42RT doc) and programming example: http://trmm.nasa.gov/pub/3b42rt/docs/
E-mail Delivery of Heavy Rainfall Notice

- **Purpose:** satellite data verification with ground data
- **Service:** on request to registered hydrological services

**E-mail SAMPLE:**
Heavy rain information to ZZ basin. **Mean basin precipitation*** of YY mm/day, which exceeds 5 year return period rain, was observed. Please check it on IFNet website!

[http://xxxxxxxxxxxxxxxxxxxxxxxxx](http://xxxxxxxxxxxxxxxxxxxxxxxxx)

Agencies hoping to receive Email:
RID, Thailand
Department of Hydrology and River Works, Cambodia
MCTPC, MAF, Lao PDR
Future Activities/Vision

1. Optimization
   - Continuing satellite data verification with ground rain-gage
   - Grasp on user’s need (Custom-made information only to IFNet members)
     (More info shall be provided based on request.)

2. Use of Satellite Rainfall in Flood Forecasting
   - Flood forecasting using run-off model
     with input of ground, radar, satellite rainfall and digital map
   - Early realization of GPM
     More accurate data with smaller mesh, frequent data renewal
Thank You

IFNet Secretariat

c/o Infrastructure Development Institute (IDI)-Japan
5-3-23 Kojimachi, Chiyoda-ku, 102-0083 Tokyo, JAPAN
Tel: +81-3 3263 7986  Fax: +81-3 3230 4030
info@internationalfloodnetwork.org
www.internationalfloodnetwork.org