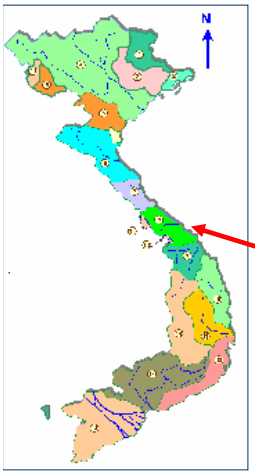
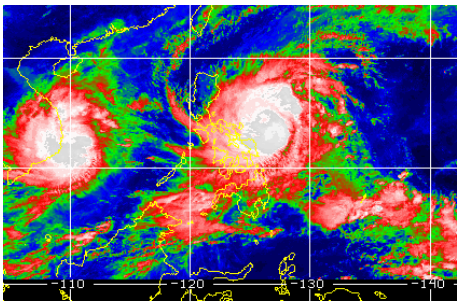
Country report



Some achievements under the framework of AWCI activity.

For Huong river basin of Vietnam

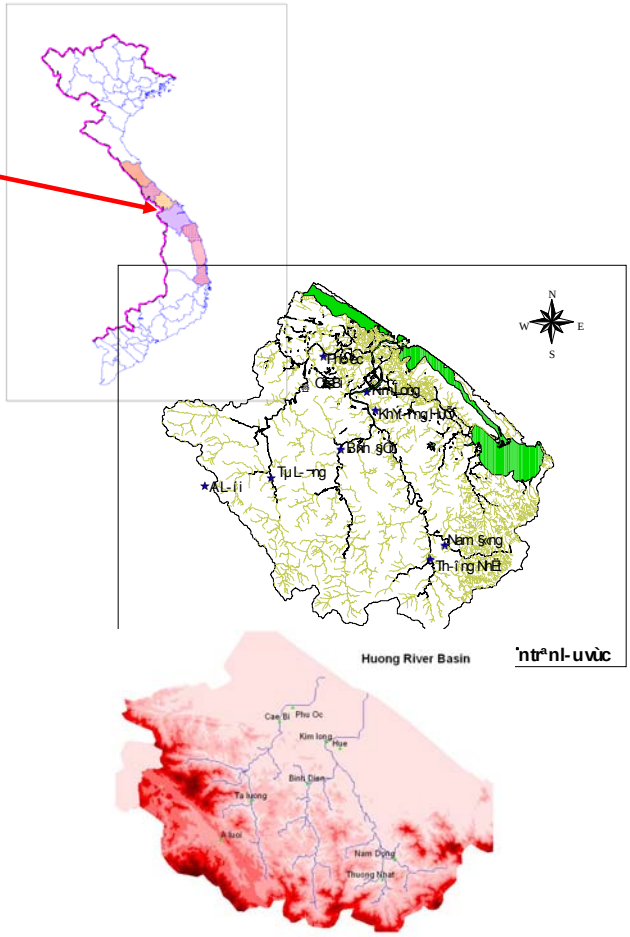


Theo Reuters, đã có 42 ngu?i thi?t m?ng

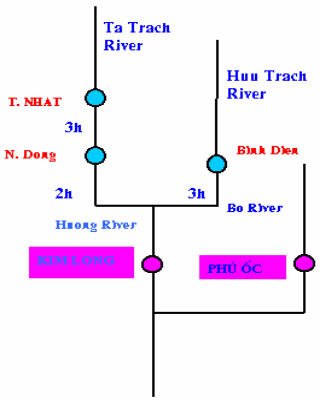
Sách v? đu?c đem phơi
tru?c m?t căn nhà đ? nát ?

Application on Huong River

Area: 2830 km^2 belong to Thua Thiên Hue Province.
Huong river system.
Location: latitude 16-17^{0}N, longitude 107-108^{0}E.
in the West and the South-West: Truong Son mountain range and Bach Ma with tops about of 1000m;
East : East Sea. This is transitional climate region.
Contain 3 main river: Ta Trach, Huu Trach and Bo river. Ta Trach river is upper stream of Huong river



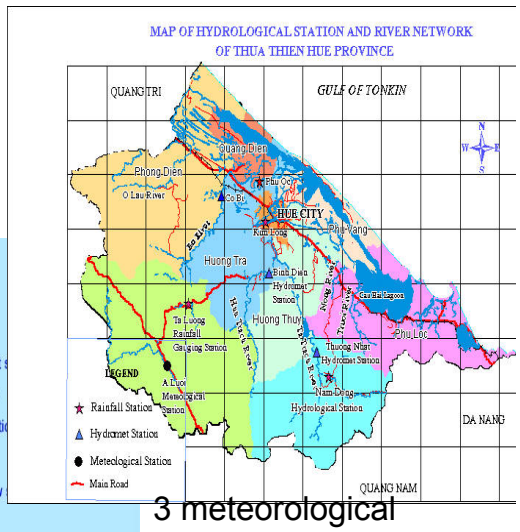
Schematic Diagram Huong System

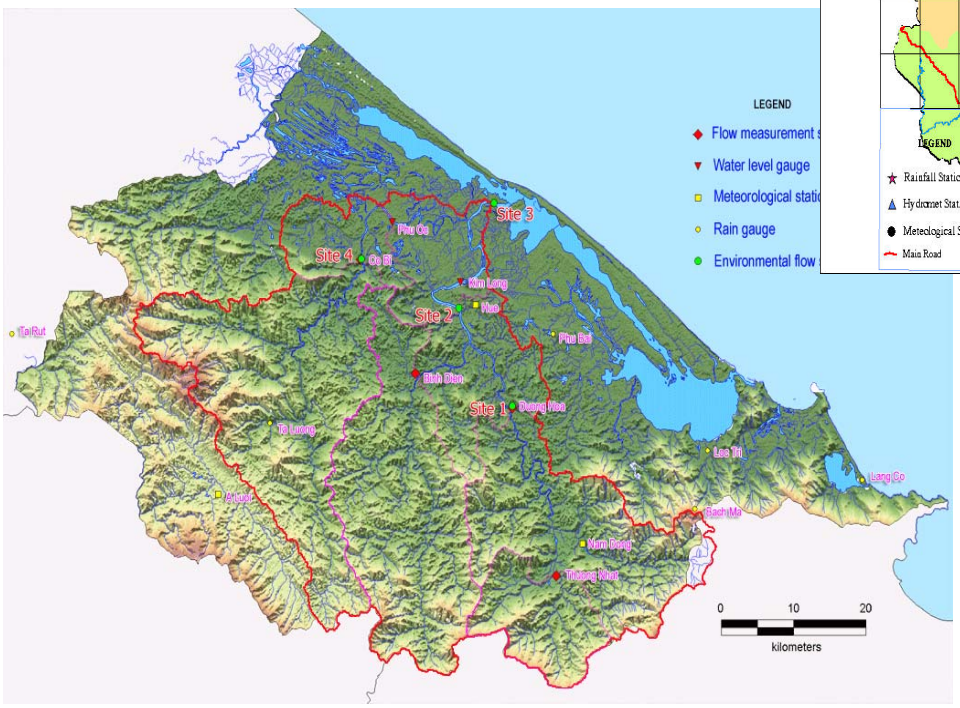


The hydrological model for short-term flood forecasting for Huong river.
-Rainfall-runoff models;
-Method of corresponding stage ;
- Multivariable regression ;
- In recent years, different models like TANK, NAM, MARINE.

- Forecasting accuracy is 75-80% for short-term forecasts respectively

Hydro-meteorological station network





3 meteorological stations;

4 hydrological stations in upstream;

2 hydrological stations in downstream

- 3 meteorological stations with long history are Hue (1915 up to now), Nam Dong (1973 up to now). Aluoi (1976 up to now).
- 4 hydrological stations in upstream, measuring rainfall (X), water stage (H) and water discharge (Q) are Thuong Nhat on Ta Trach River (1979 up to now) with the drainage area of 208 km2, Binh Dien on Huu Trach River with the drainage area of 570 km2 and Co Bi on Bo River with the drainage area of 720 km2 (1979-1985), Duong Hoa with the drainage area of 686 km2 (1986-1987).
- 2 hydrological stations in downstream, observing X, H are Kim Long (Hue) on Huong Rives and Phu Oc on Bo River (1979 up to now).
- Some hydrological investigation and rainfall points in dowmstream.

- **4 - 8th, April, 2007, Working group of Prof. Dr. Tosh Koike, Dr. Saavedra Valertbiano Oliver Cristian, Mr Kengo Aizawa, Mr. Ben Burford come to visit HMS vietnam;**

Some activities of Working group

- Introducing to GEO, GEOSS and AWCI, flood forecasting, river management system, satellite observations to Huong River; introduce the sytem and available satellite data.

- Working group visited the Trung Trung Bo Central Regional Hydro-meteorological Forecasting Center at Da Nang city;

- Working at Hydro-meteorological Forecasting Center of Hue city of Thua Thien Hue Province (Trung Trung Bo Central Regional Hydro-meteorological Forecasting Center)

- Visited some hydro-meteorological stations in the Huong river basin:

Hydrological stations: Thuong Nhat, Phu Oc, Binh Dien, Kim Long station.

Meteorological stations: Nam Dong, Hue station.

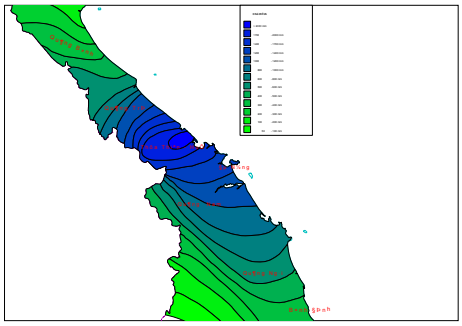
Discuss about the capabilities of Observation, transmission data of hydro-meteorological stations in the Huong river basin, capability of hydro-meteorological of Hue Center.

Thuong Nhat Hydrological station

-Vietnam have supplied the data of Huong river basin for AWCI:

- Rainfall data, water level, discharge data of Thượng Nhat, Kim Long;
- Rainfall data of some other local point in flood in November, 1999;
- GIS data.

Flood trace on flood happen November, 1999 at Kim Long Hydrological Station



Rainfall and flood occur in the Huong River basin in 11/1999

- **Dr. Oliver have applied the Distributed Hydrological Model (DHM) for Huong river basin**

Location: 107.5-107.75E 16.0-16.5 N

- Simulated area: 1500 km^2 down to Kim Long
- Computing Grid: 500 m
- Target event: 22-26 Nov 2004

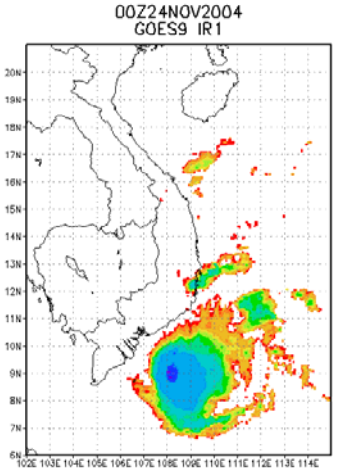
Input Rainfall:

–Observed
- Rain gauge network (daily)
- Global Satellite TRRM, 3hr, 0.25˚

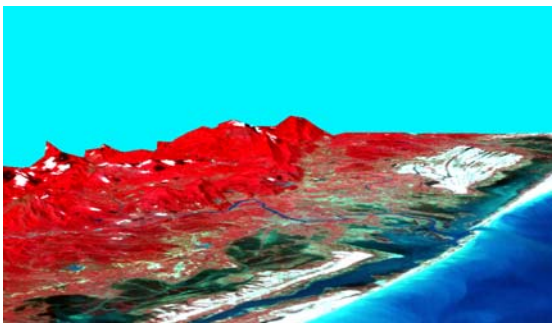
–Forecast
- Meso- scale HRM: at hydro-met. stations (24 hr lead time)
- Global JMA/GPV, 24 hr lead time issued every 12 hours
- NWPO: UKMO, NCEP

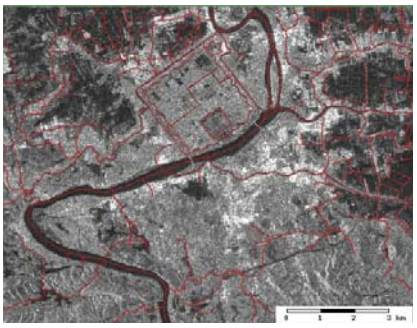
–Assimilated
- Clouds microphysics ARPS, IMDAS

- **From 22nd – 27th, May, 2007, Dr. Oliver had Arrived to Hanoi for short training courses to introduce about the Distributed Hydrological Model (DHM) and introduce about the results for application DHM for Huong river basin;**



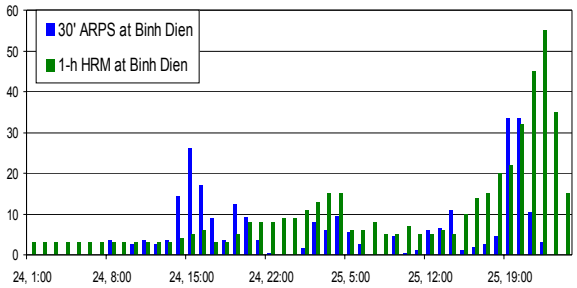
The result of Distributed Hydrological Model (DHM) applied for Huong river basin



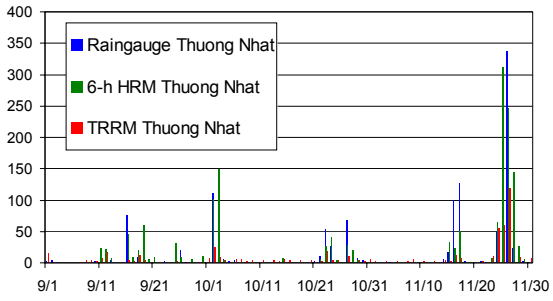


Rainfall data input model

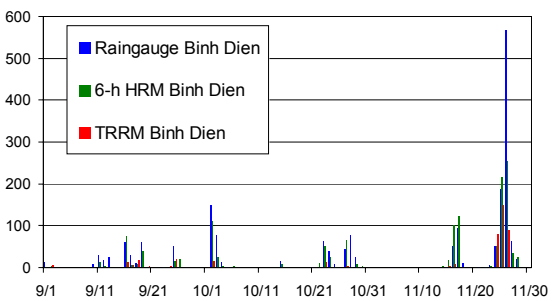
Hourly rainfall comparison at Binh Dien



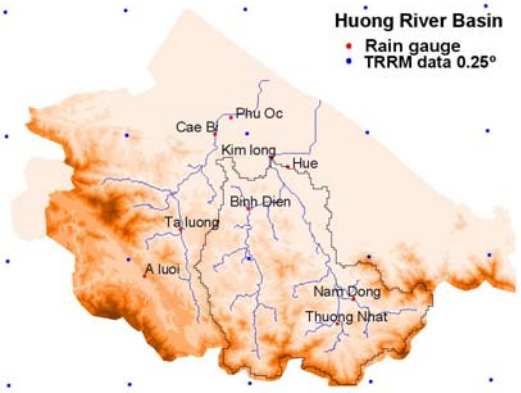
Daily rainfall comparison at Thuong Nhat



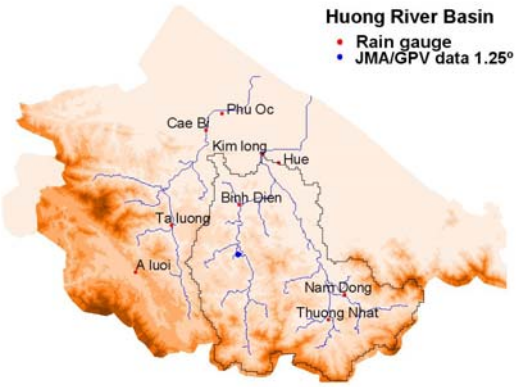
Daily rainfall comparison at Binh Dien



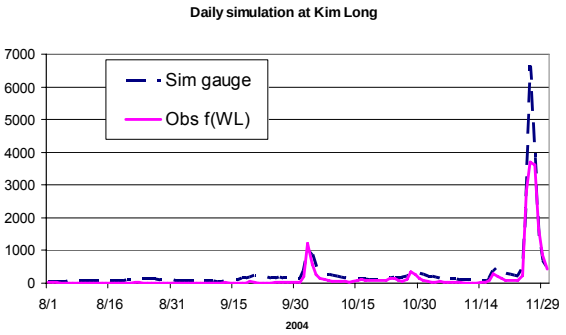
Spatial distribution of TRRM



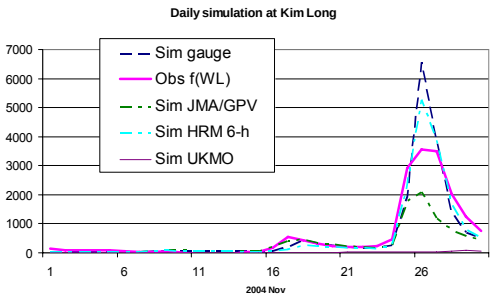
Spatial distribution of JMA/GPV

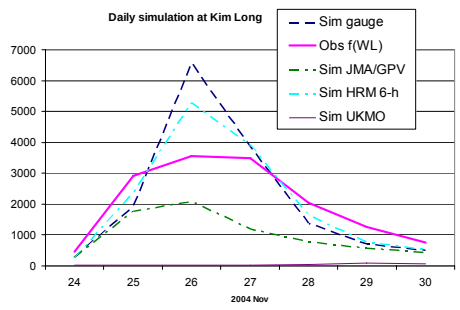


August to November Simulation



November Simulation





24-30 November , 2006 Simulation

Schedule activity

Year 2008*:*

- Vietnam will provide seriously, fully all data of Hydro-meteorological data of Huong river basin from 2007 to 2010;
- Vietnam will strongthen the capacity of station network (quality, quantity equipments, data tranmission system, computer software in processing and conservation of data for Huong river also for Hue Hydro-meterological Forecasting Center;
- Need AWCI to Organize GBHM training course in Vietnam or In Japan for *Establishment of flood and flash flood warning and forecasting system on the Huong river system;* improvement the skill, Knowledge in building the input data for modeling:

  The content of the training course: skill, Knowledge in application of DHM for Huong river basin (DEM, land use, soil type, geological maps, delineate the watershed, divide the basin to sub-basins, set-up spatial distribution of study area, prepare time series data: rain gauge and interpreted radar products).

–Need to modify, simplify and build the menu of GBHM for model application easily;

- Need to training for analyses of High resolution satellite data for apply in disaster management, estimate rainfall and flood inundation in implementation of flood forecasting and warning system in ungauged or poorly-gauged river basins.

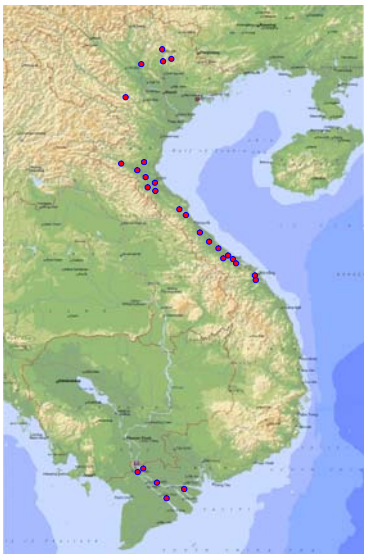
- To share the skill and know ledges in combination of the data from the rain gauges with radar information in order to increase the accuracy of rainfall estimates for flood forecasting.
- Assistance, provide of software, sophisticated hydrological models to compute and forecast flood for Huong river basins (these models can get input data from the sources: satellite-based rainfall product, rada products, numerical weather prediction model products and hydro-meteorological data);

2009 year:

- Need AWCI to Improve the Capacity building of forecasting and management of Drought and Water Quality. Specielly, in using satellite data, the skill in making the drought mapping and Water Quality. Mapping;
- Vietnam will pilot running the DHM in forecasting hydrology for Huong river after AWCI transfer the skill and technique and also the provided satelitte data for Huong river;

2010 year:

- Need AWCI to help Vietnam to perform the project" build the risk map of inundation and flood for Huong river basin" (provide the specialist, skill, technique, method to perform).



The points with flood peaks higher than III alert in 2007

In Vietnam during 2007 have been very complicated with several extreme weather events occurred all over our country, especially in the Central part of Vietnam together with 2 tropical storms and 1 tropical depression that exerted their direct impacts on our territory.

•Flood was very serious with successive and very high peaks, rather high flood rising intensity, flood water was concentrated very quickly and all these circumstances led to serious prolonged inundation in 12 provinces of Vietnam.

- Flood was very serious with successive and very high peaks, rather high flood rising intensity, flood water was concentrated very quickly and all these circumstances led to serious prolonged inundation in 12 provinces of Vietnam.
- In the central of Vietnam: (from 1st October to the end November 2007) in most rivers in Thua Thien Hue, Quang Nam, Quang Ngai, Binh Dinh, Phu Yen provinces, occurred 6 extremely big, historical floods such as:

✓ **The Flood, inundation No-1 in early August 2007**

✓ **Flood, inundation No-2 in early October 2007**

✓ **Flood, inundation No 3 in early November 2007**

The common total rainfall for 4 days varied from 500 to 700 mm; in some places, the value was higher 800 mm, such as Nam Dong: 1773mm, Thuong Nhat: 1248mm, A Luoi: 834mm.

The loss of human and property was very big.

Socio-economic Assessment

- Due to **TS No. 2** (NONAME):77 people were reported dead, 123 injured, 6 missing people; 1 473 houses were collapsed and damaged; 51 ships were sank; 67 132 ha of rice field were flooded.
- Due to **TYP No. 5** (LEKIMA): 88 people died, 180 injured and 8 missing people; 1 853 houses were collapsed and damaged; 46 ships were sank; 8 849 ha of rice fields were flooded.
- Although **Tropical Depression No. 6:** 07 people died, 01 missing and 92 injured people; 886 houses were damaged; 9416 ha of rice were flooded and damaged.
-


Thank you very much for
your attention