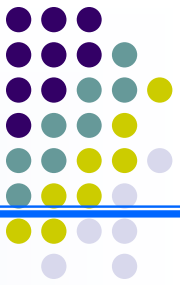


*Thailand, 21 March 2018*



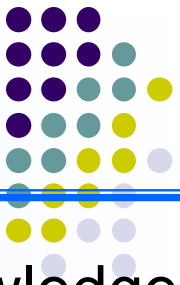
# **Applying Remote Sensing Technology in flood forecasting and warning systems in Viet Nam**

Bui Dinh Lap

National Hydro-Meteorological Service, Ministry of Natural Resources and Environment,  
Vietnam

# Contents:

---



The objectives of this presentation are to share knowledge and experiences on improving flood forecasting and warning systems through satellite-based technology and information and communication technology. There are three contents will be presented in this report as follows:

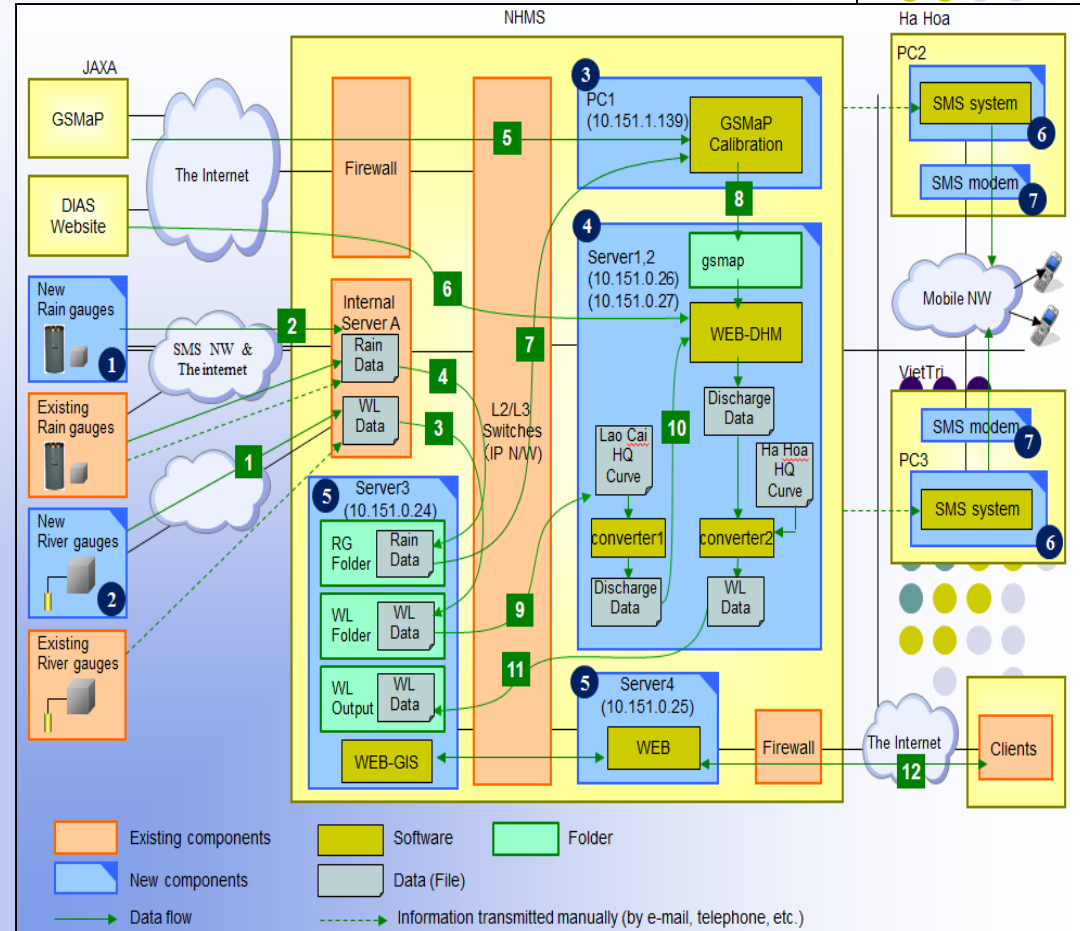
- 1. Overview Flood Warning System**
- 2. Overview about pilot basin (Thao river basin)**
- 3. The results of system**

# Overview System

## Applying Remote Sensing Technology in flood forecasting and warning systems in Viet Nam

### Information flow

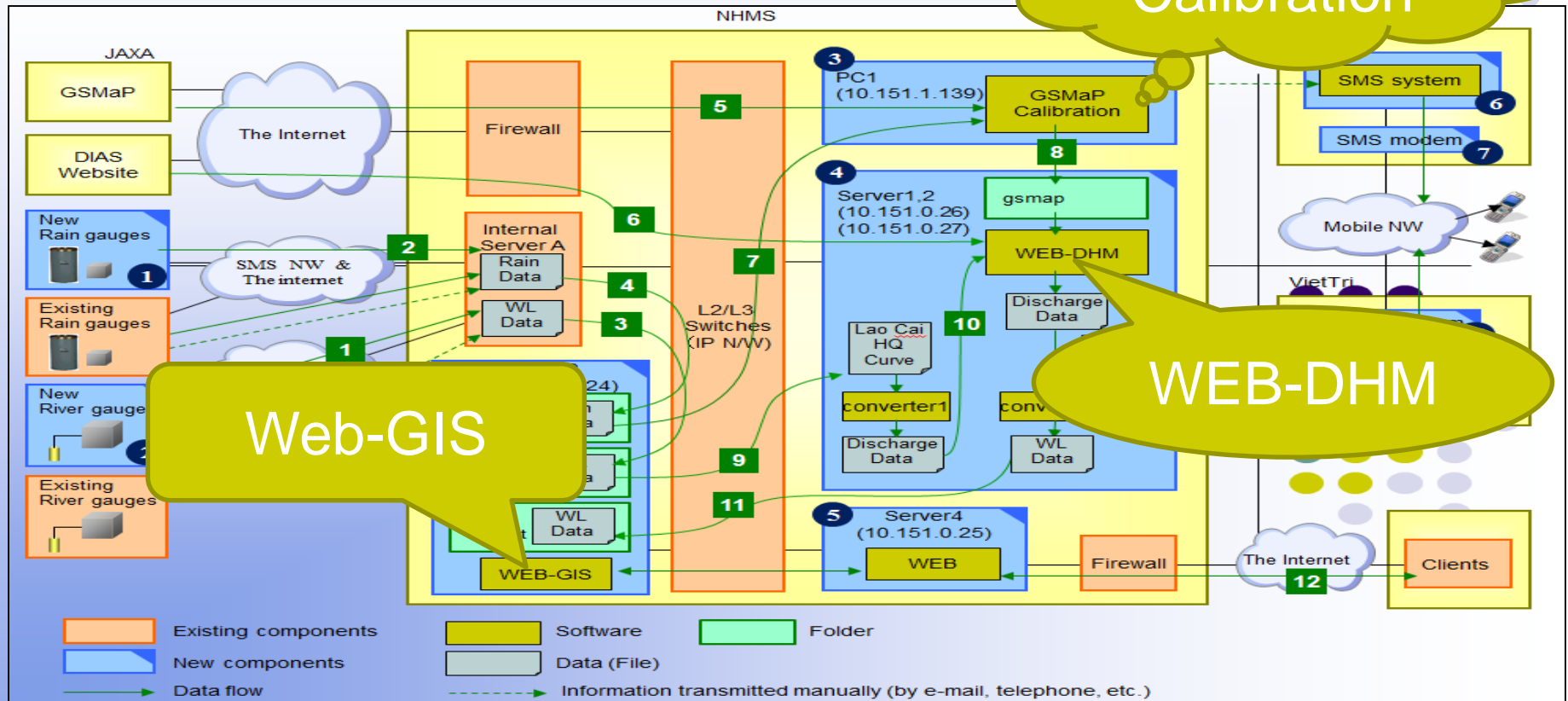
- ✓ GSMap data is obtained from JAXA server to the PC in NHMS via the internet.
- ✓ Rain data from rain gauges is transmitted to NHMS via SMS and the internet and stowed in the internal server.
- ✓ Water Level data from river gauges is transmitted to NHMS via some kind of media and stowed in the internal server.
- ✓ Rain data and Water Level data are transferred from the internal server A to WEB-GIS server.
- ✓ GSMap Calibration obtains Rain data from WEB-GIS server.
- ✓ Calibrated GSMap data is transferred to WEB-DHM.
- ✓ Discharge data output from WEB-DHM is converted to water level data by converter-2 software.
- ✓ SMS messages are generated by SMS systems in Ha Hoa or Viet Tri.
- ✓ WEB-GIS server presents rain data, water level data and prediction of water level to clients via website.



**Figure 1: Overview System Configuration**

# Overview System

Applying Remote Sensing Technology in flood forecasting and warning systems in Viet Nam



There is three main software to run the forecast system:

- GSMaP Calibration
- The Water and Energy Budget based Distributed Hydrological Model (WEB-DHM)
- Web-GIS

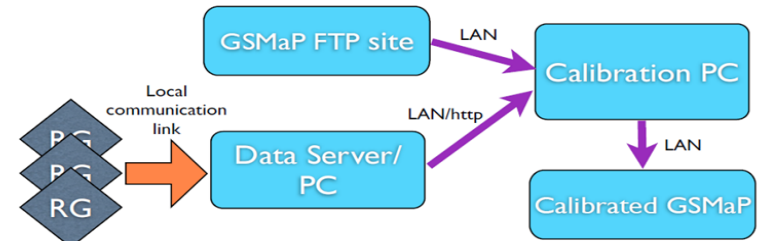
# Overview System

## Applying Remote Sensing Technology in flood forecasting and warning systems in Viet Nam

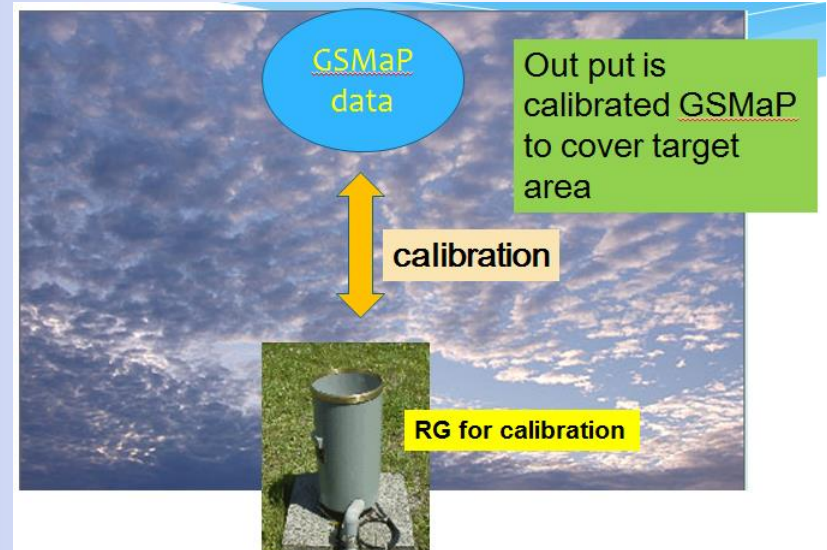
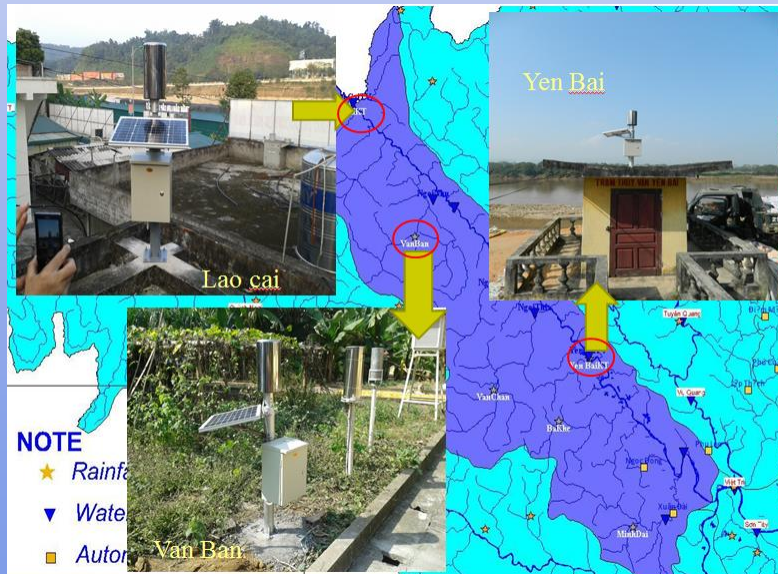


GSMaP is a global coverage data set provided by JAXA in hourly basis. Original data to provide GSMaP is space borne microwave sensors.

### Calibration System Structure



GSMaP calibration system is a combination of PC/FTP server and local rain gauges.





WEB-DHM has been developed by **Tokyo University**, this page shows the framework of the WEB-DHM system.

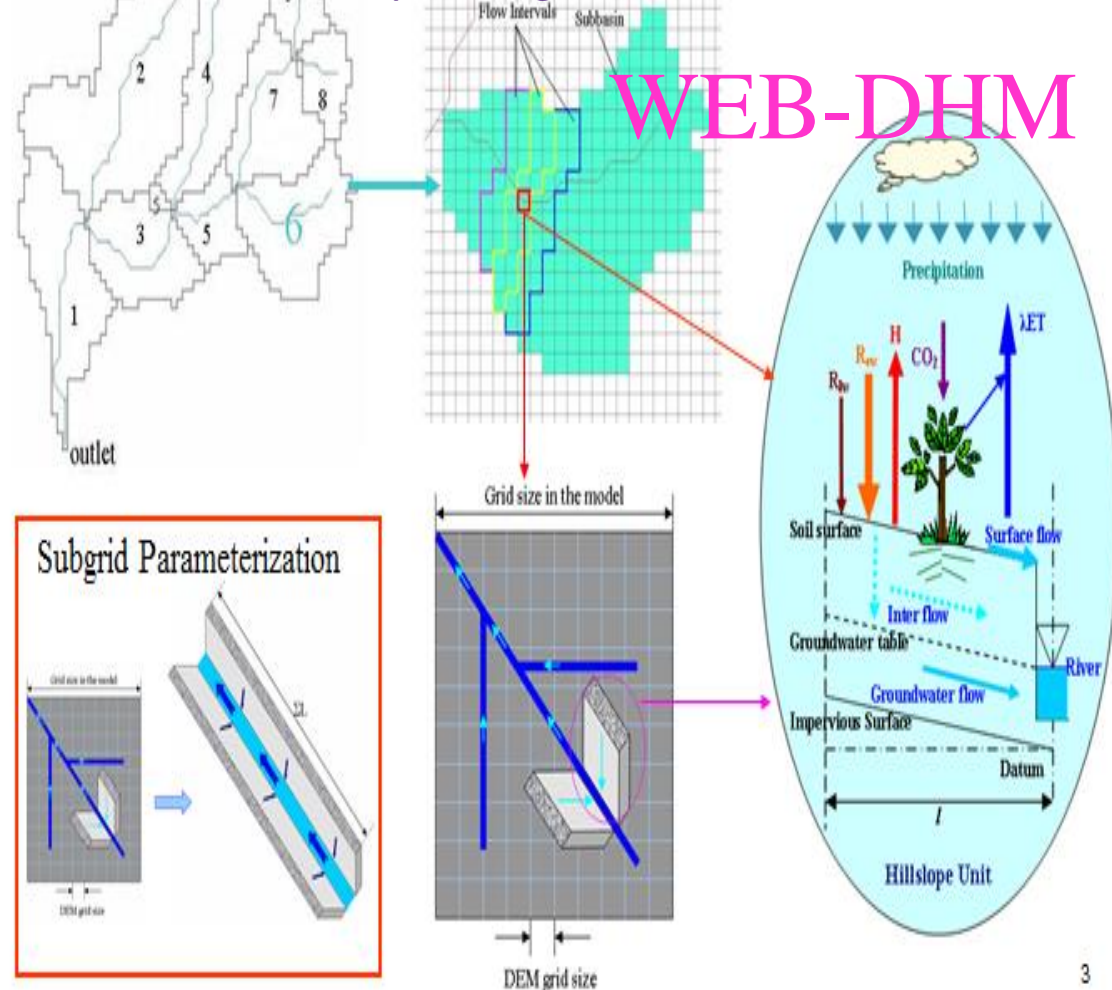
- DEM is used to define the target area; the target basin is divided into sub-basins;
- In a sub-basin, a number of flow intervals are specified to represent the time lag and accumulation process in the river network.
- Each flow interval includes several model grids.

(1) for each grid with one land use type, the SiB2 is used to calculate fluxes between atmosphere and land surface.

(2) each model grid is subdivided into a number of symmetrical hillslopes. For each hillslope, the GBHM is used to calculate runoff.

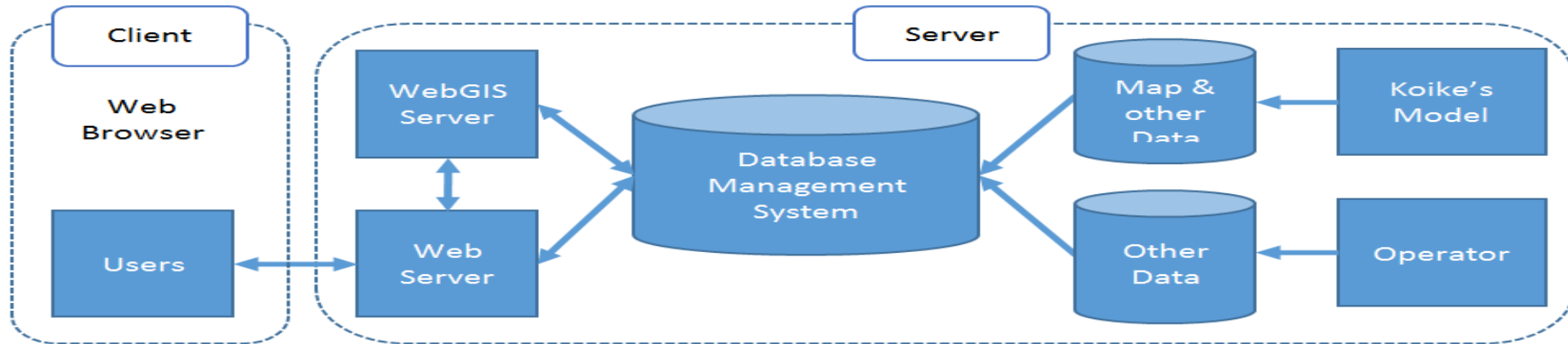
(**W**ater and **E**nergy **B**udget-based  
**D**istributed **H**ydrological **M**odel)

# WEB-DHM



# Overview System

Applying Remote Sensing Technology in flood forecasting and warning systems in Viet Nam





# Overview about pilot basin

## Applying Remote Sensing Technology in flood forecasting and warning systems in Viet Nam



Target area of the flood forecasting and warning systems is **the Red River** basin in Vietnam. The pilot area for the improved flood forecasting and the application of SMS flood warning dissemination system is **Ha Hoa District** in Phu Tho Province. The locations of those areas are shown in next figure



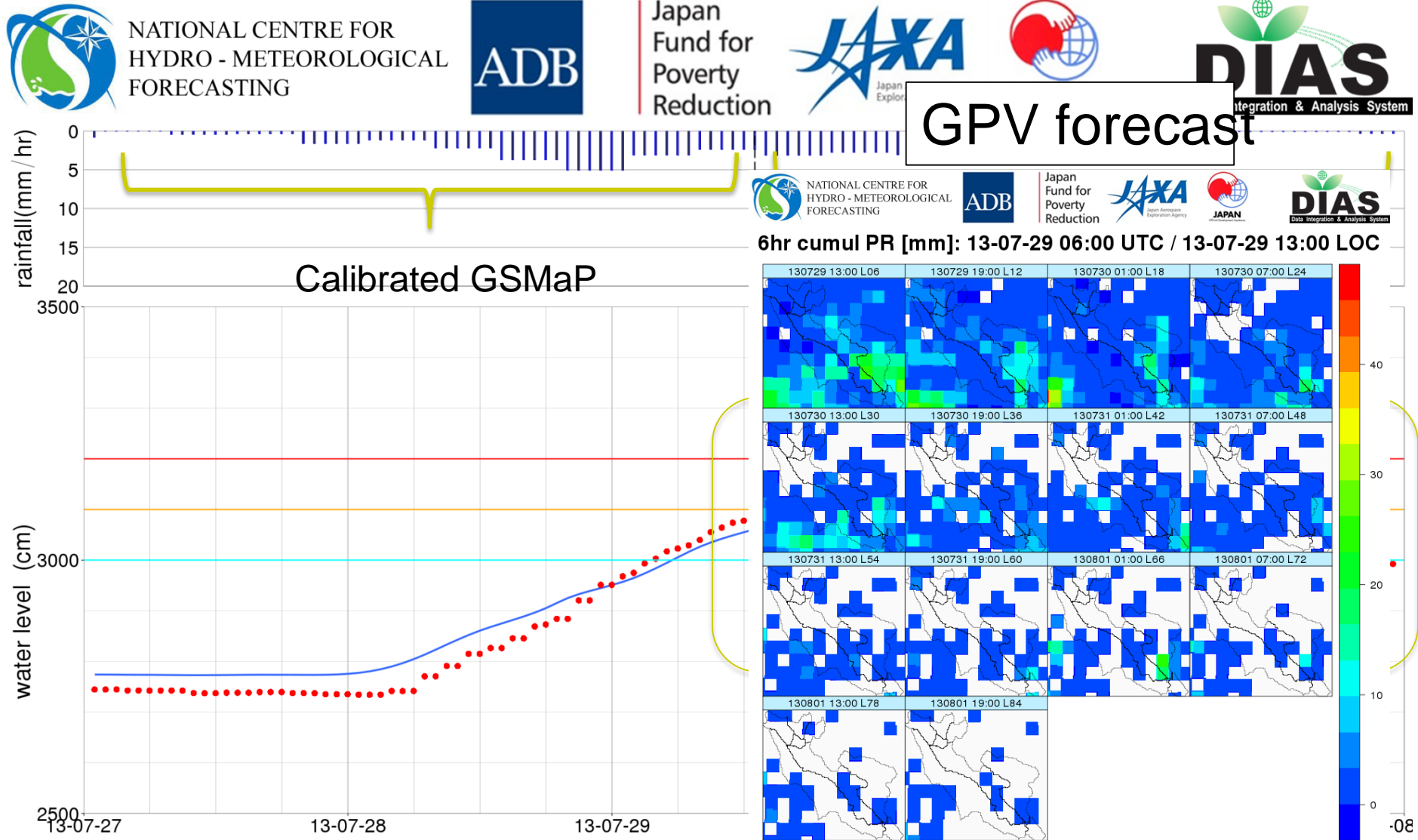
Location Map of Target Area and Target District





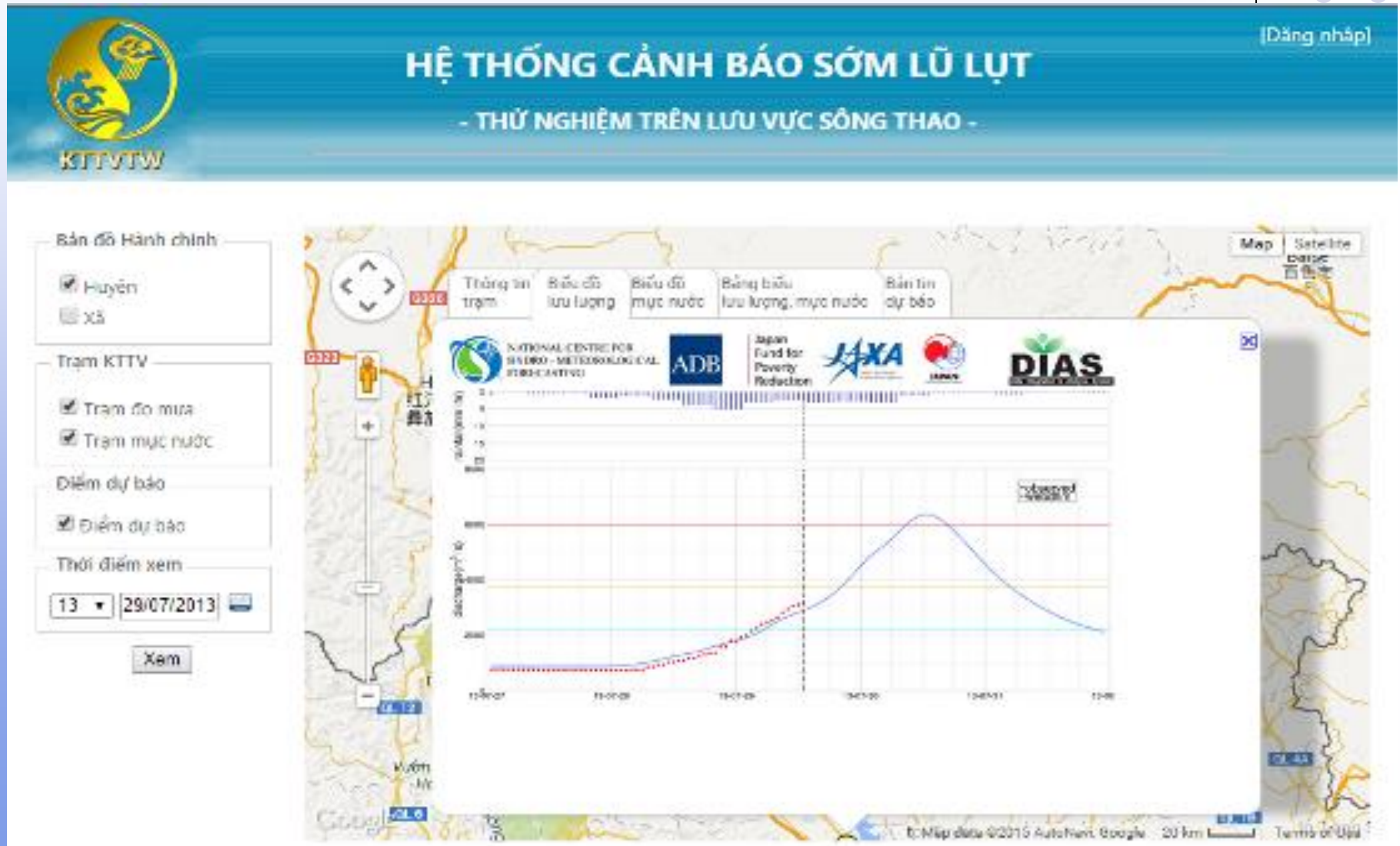
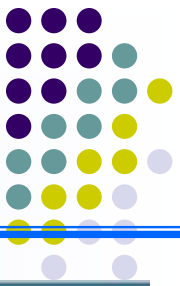
# Some results of system

Applying Remote Sensing Technology in flood forecasting and warning systems in Viet Nam



# Some results of system

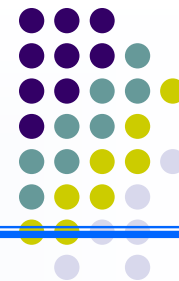
Applying Remote Sensing Technology in flood forecasting and warning systems in Viet Nam







**BỘ TÀI NGUYÊN VÀ MÔI TRƯỜNG**  
**TRUNG TÂM KHÍ TƯỢNG THỦY VĂN QUỐC GIA**  
NATIONAL HYDRO - METEOROLOGICAL SERVICE



**THANK YOU !**