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Virtual Rain & Stream Gauge Information Service



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Why this project?

- Rain gauge and stream gauge data are sparse in time and space, which hampers decision making on long term planning and development.
- River flow data is not widely shared, especially transboundary data, among countries.
- High resolution near-real time data is extremely useful for "Now-casting" and for disaster risk reduction of hydro-meteorological and related hazards (floods, landslides, etc.)

Objectives

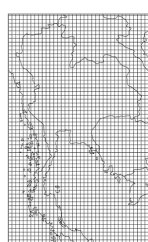
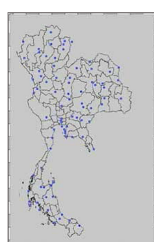
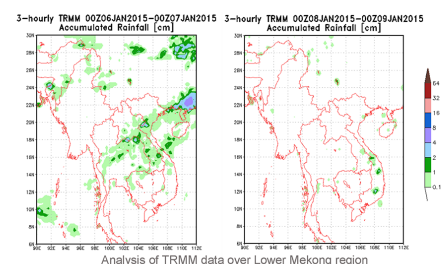
- Better calibration of TRMM / GPM and Envisat / Jason-2 data leveraging a wider range of ground measurements;
- Increased consistency and standardization of data formats available to end users;
- More convenient access to data products from the TRMM and GPM precipitation estimation missions and the Envisat and Jason-2 altimetry profiling missions;
- Detailed guidance on using these valuable data streams for a variety of applications including flood forecasting, water resource accounting and management and landslide risk assessment;
- To deliver near real-time "virtual rain gauge" and "virtual stream gauge" data at points widely distributed over Lower Mekong Region (LMR) via a web portal and OpenGIS® Web Map Service Interface Standard (WMS) data feeds.

Project End Users

- National Hydro-meteorological Services
- National Disaster Management Agencies (key decision maker)
- Water Resources Departments
- Hydropower companies
- Mekong River Commission
- Irrigation departments
- Agriculture departments
- Research institutes

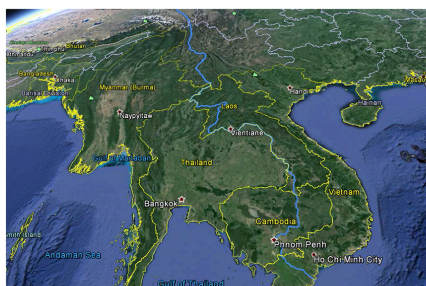
Sample Results

A visualization of GPM data from a tropical storm system.



Focus Area

- Lower Mekong Region including Cambodia, Lao PDR, Myanmar, Thailand and Vietnam (with adjustments the tool can easily be used elsewhere.)

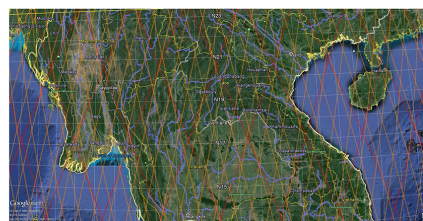


Approach/Project Activities

- Investigation of similar existing efforts:**
Satellite-derived precipitation data and information service is available in the region especially in LMR. For instance : GSMaP which is joint MRC-JAXA project would be an effective tool for accessing virtual rain gauge data over the region (<http://shareku.eorc.jaxa.jp/GSMaP/>). Therefore, efforts would be deployed to study and investigate the existing and ongoing virtual data and information services to avoid duplications and to join hand with similar work.
- Country Consultations:**
Consultations will be done to discuss the user needs and to find suitable partners to develop the tool. Country partners will be closely working with SERVIR tool development team to transfer technical-know-how and for the long-term sustainability of the efforts.
- Developing Methods, Algorithms or Procedures:**
Scripts will be developed for automatically retrieving and processing GPM (Global Precipitation Mission) rainfall data and Jason-2 and Envisat stream level estimates over selected areas and in the major rivers by calculating and correcting positive and negative biases through rigorous calibrations using available ground truth data over the areas of interest. The processes / algorithms will be validated for the accuracy. Separate algorithms will be developed and tested for different seasons, extreme events and also for different geographical settings.
- Information Delivery and Outreach:**
The virtual rainfall and stream gauge data will be made available through the SERVIR-Mekong data portal and other available data portals in consultation with partner institutes. Methods, procedures and algorithms will be documented and published. Trainings on accessing data and application of data, information, algorithms and procedures will be given in coordination with the partner institutes.
- Institutionalization:**
The SERVIR Mekong team will work with relevant partner institutes to institutionalize application of virtual rain and stream gauge data and information for their research and development activities and near real-time operation work.



The GPM Core Observatory and partner satellites orbiting Earth. The joint NASA - JAXA (Japanese Space Agency) GPM instrument was launched in February 2014.



View of part of the Lower Mekong Region showing the intersection of Jason-2 satellite (red lines) and Envisat (orange lines) orbits and major streams (purple lines) in the LMR. These intersection points provide the opportunity to generate virtual stream gauge data for hundreds of points throughout the region.

Outcomes/Anticipated Impacts

- Improved near-real time virtual rainfall gauge and virtual stream gauge data sets for:
 - hydrological and hydrodynamic modeling;
 - flood forecasting / warnings;
 - landslide early warnings;
 - Flash flood guidance;
 - river basin / reservoir management;
 - transboundary river flow management.
- Improved Decision Support System / Tools for decision making process for long-term planning and development
- Enhanced disaster risk reduction measures for hydro-meteorological and related hazards

Earth Observations & Other Inputs

- Tropical Rainfall Measuring Mission (TRMM) data
- The Global Precipitation Measurement (GPM) Core Observatory and partner satellites data
- Envisat satellite (pre-2010) and Jason-2 altimetry profiling data



SERVIR MEKONG

Production Partners



ICIMOD

