Planning for AOGEOSS Pilot Study

Yongseung Kim

Korea Aerospace Research Institute

Outline

- **Introduction**
  - Pilot study update
  - Mekong river basin: Characteristics
  - Other relevant activities

- **Work plan**
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  - Preliminary survey on AOGEOSS pilot study
  - Data & technical support from AO Caucus country

- **Summary**

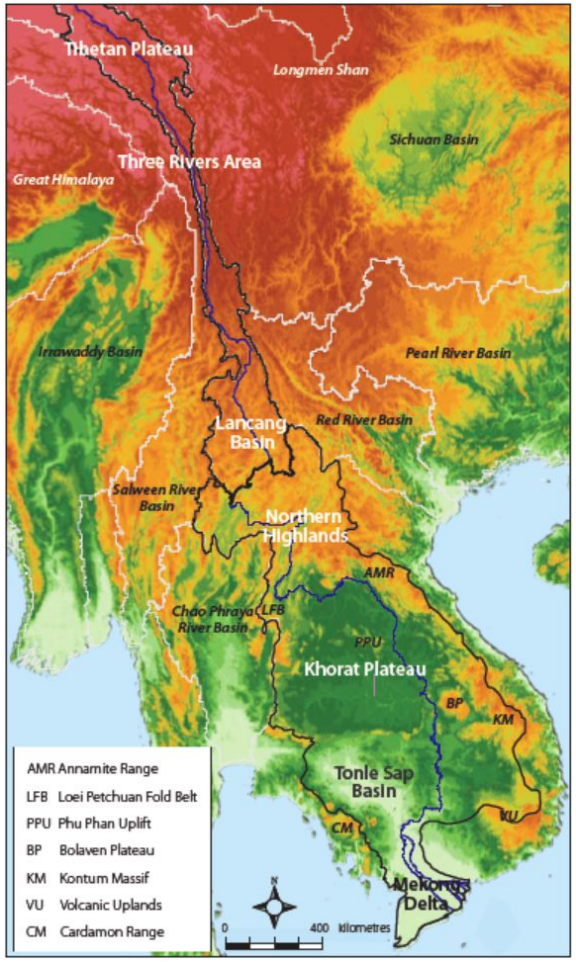
Pilot Study: Progress Update

- *Oct. 2017* Proposed the preliminary concept at AOGEOSS co-chairs lunch meeting during GEO week 2017 in Washington DC
- *May 2018* Proposed, at Int. conference of AOGEOSS in Deqing, the Mekong Delta area as a candidate site but AOGEOSS CB recommended to extend to the Mekong river basin
- *June 2018* Gathered the query table for satellite data requirements from users (Cambodia, Laos, Vietnam, China, Japan)
- *July 2018* Reported pilot study at the 44th GEO ExCom as part of the Programme Board subgroup report

Mekong River Basin: Characteristics (1/2)

- Physiography:
  - 10th largest river in the world
  - Length: 4,400 km
  - Area: 795,000 km^2
  - Regions (7): Tibetan Plateau, Three Rivers Area, Lancang Basin, Northern Highlands, Khorat Plateau, Tonle Sap Basin, Mekong Delta

- Climate:
  - Ranges from the glaciated Tibetan Plateau to the hot and humid Southeast Asia
  - Rainfall is regulated by the monsoon. Annual maximum (3,000 mm) in the Laos and minimum(600 mm) in the Tibetan Plateau

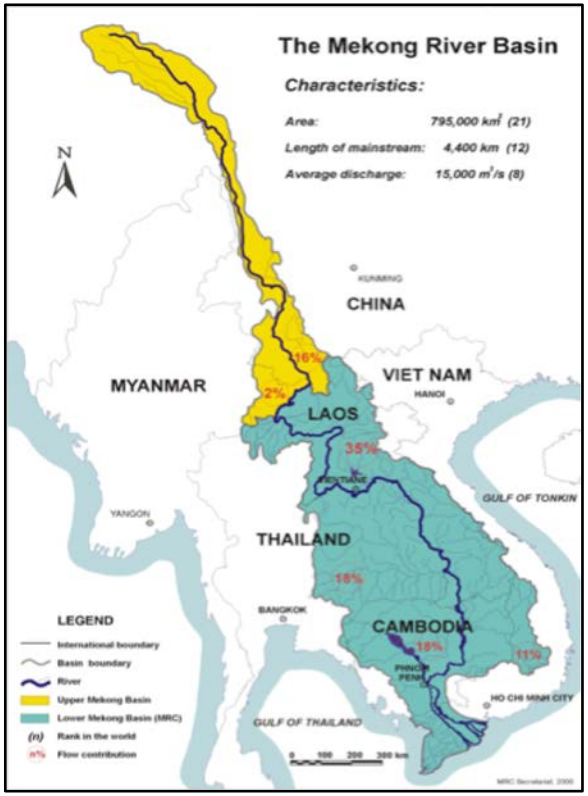


Source: www.mrcmekong.org

Mekong River Basin: Characteristics (2/2)

- Hydrology:
  - Seasonal variation of water level is closely related to the Mekong's productivity
  - Flood season lasts from June to November and accounts for 80 to 90% of total annual flow. It is important particularly for the Lower Mekong Basin

- Natural Resources:
  - Abundant water meets the needs for people as well as forest and wetlands that provide building materials, medicines and food and serve as habitats for thousands of species.
  - Known mineral resources include gold, copper, lead, zinc, oil & gas, coal, gemstone, etc.



Source: www.mrcmekong.org

Factors Affecting Environmental Change (1/2)

- Human Activities:

- Loss of forest cover in Laos and Thailand in the past decades due to shifting agriculture (slash and burn) could have affected the river discharge and the local ecosystem.

- Many man-made dams have been built on the Mekong river since 1995 not only for the management of water resource but also for the trade expansion by river modification.

- Agricultural expansion related to the change of land cover also plays a crucial role in human activities in the lower Mekong basin.

Source: www.mrcmekong.org

Factors Affecting Environmental Change (2/2)

- Climate Change:
  - The current climate model predicts over the Mekong river basin the mean temperature increase of 0.8°C, the annual rainfall increase of 200 mm, and the total annual runoff increase of 21% by 2030.

  - As for such anticipated climate change, we may have to prepare for action plans, particularly for water management, rice production, and disaster mitigation.

Therefore, as a first step, it is worthwhile to explore the cases of environmental change caused by human activities and climate change.

Source: www.mrcmekong.org

Other Relevant Activities (1/2): GEO-DARMA and SERVIR

- GEO-Data Access for Risk Management (DARMA) is one of the major initiatives supported by space agencies in association with Sendai Framework for Disaster Risk Reduction. Activities are divided into three phases: Concept phase/Prototyping Phase/Operational phase
- SERVIR is a joint venture between NASA and the U.S. AID and provides satellite observations, imaging and mapping data, geospatial information, predictive models and science applications to help environmental decision-making among developing countries. SERVIR Mekong is the first GEO-DARMA pilot project launched in 2015 for five years in the Asian Disaster Preparedness Center (ADPC) in Bangkok, Thailand. It aims to support climate resilience, food and water security. Flood mapping is a recent focus of this project.
- Global but more related to disaster issues!

Other Relevant Activities (2/2): APRSAF/SAFE

- Space Applications for Environment (SAFE) was established in 2008 as one of international cooperation initiatives of Earth Observation Working Group of Asia Pacific Regional Space Agency Forum (APRSAF). The purpose of SAFE is to resolve various environmental problems with space technology.
- SAFE implemented more than 20 prototype activities in the area of water resources, agriculture, coast and fishery over Asia-Pacific region, including the Mekong river basin.
- Not a GEO initiative but a good demonstrator!

SERVIR GLOBAL (1/3)

	Geographic Region	Developer	Contributors/ Partners	Users	Data Used
Agricultural Monitoring	Nepal & Pakistan	ICIMOD/SERVIR-Himalaya		• Min. of Agriculture, Nepal • World Food Programme-Nepal	MODIS NDVI & LST
Forest Fire Monitoring	Nepal & Bhutan	ICIMOD/SERVIR-Himalaya	• Univ. of Maryland • SpatialDev • Dept. of Forest of the Government of Nepal • ICIMOD	• Dept. of Forest, Nepal & Bhutan • Fire managers & park wardens/rangers • Green Belt Movement • Natural resource managers • District Forest Officers	• MODIS • SRTM • VIIRS

SERVIR GLOBAL (2/3)

	Geographic Region	Developer	Contributors/ Partners	Users	Data Used
Forest Fire Monitoring (cont'd)				• Focal persons at the Federation of Community Forestry Users • District residents • Researchers • ICIMOD users	
Frost Monitoring	Kenya & the Ethiopian highlands region	• Regional Center for Mapping of Resources for Development (RCMRD)/SERVIR Eastern and Southern Africa • NASA	• Kenya Meteorological Dept. in the Kenya Min. of Agriculture • RCMRD/ SERVIR Eastern and Southern Africa	• Min. of Agriculture, Kenya • Min. of Water & Irrigation, Kenya • Index insurance companies	• MODIS

SERVIR GLOBAL (3/3)

	Geographic Region	Developer	Contributors/ Partners	Users	Data Used
Frost Monitoring (cont'd)			• Tea Research Foundation of Kenya	• Tea Research Foundation of Kenya • Extension Officers in Kenya and Ethiopia	

Cited from:
http://catalogue.servirglobal.net

APRSAF/SAFE: Status

PROTOTYPING STATUS

Status	Country / Executor	Theme
Completed	VIETNAM NHMS, MONRE	Integrated water resource management
	VIETNAM FIPI, MARD	Forest monitoring
	CAMBODIA MOWRAM	Water Cycle and Agricultural Activities
	LAO PDR WREA, WERI	Forest monitoring and management
	INDONESIA LAPAN	Potential Drought Monitoring
	SRI LANKA CCD	Risk of Sea Level Rise on Coastal Zone
	PAKISTAN PMD	Monitoring Water Cycle Variations & Assessing Climate Change Impacts
	SRI LANKA NARA	NARA Modeling ocean frontal zones using high resolution satellite and float data to locate tune fish aggregations
	THAILAND DOF	Economic Fish Larvae Mapping and Monitoring
	VIETNAM FIPI, MARD	Mangrove Forest Mapping and Carbon Stock Estimation
	SRI LANKA GI, CEA	Mapping and Detecting Wetlands in River Basin
	INDONESIA ICALRD, IAARD, MOA	Assessment of drought impact on rice production in Indonesia by satellite remote sensing and dissemination with web-GIS
	CAMBODIA MOWRAM	Water and Flood Security under the Climate Change
	BANGLADESH LGED	Investigation of sedimentation process and stability of the area around the cross-dams in Meghna estuary
	INDONESIA LAPAN	The assessment of Mangrove Forest Carbon Stock Monitoring of Indonesia using Remote Sensing Approach
On-going	INDONESIA ICALRD, IAARD,MOA	SAR Technology Application for Paddy Crop Monitoring in Center of Paddy Area, in Indonesia
	MALAYSIA UPM	Monitoring of agricultural land abandonment using remote sensing
√	VIETNAM VNSC, VAST	Rice crop monitoring in the Mekong delta, Vietnam
	VIETNAM VAWR	Assessment and evaluation of the erosion and sedimentation on the coast around Ma river estuary in Vietnam
	VIETNAM NHMS, MONRE	Utilizing Satellite Data, Numerical Rainfall Forecasts, Combining with Ground Observations in Flood Forecasting for the Thai Binh River System
√	Mekong River Commission (MRC)	Deploying GSMAP for Decision Support in Tranboundary Catchments in the Lower Mekong Basin

Implementation Procedures (1/2)

- Release research announcement
- Proposals reviewed and selected by AOGEOSS coleads
- PIs shall have a kick-off meeting at upcoming AOGEOSS Workshop or Symposium and deliver:
  - project overview,
  - definition of users, developers, contributors/partners, and AOGEOSS Task Group, and
  - user requirements, etc.

Implementation Procedures (2/2): R&D Activities & Report

- Carry out R&D activities that may include:
  - conceptual design and planning
  - analysis and algorithm development
  - validation and acceptance test

- Present the progress report at AOGEOSS meetings

Preliminary Survey on AOGEOSS Pilot Study: Data Request (1/3)

No.	Research Topics	Satellite Data Requested	Duration	Area of Interest	PIs/Organization
1	Study on climate change and human impact in the Lower Mekong Basin	Optical and SAR data, Altimetry data, Passive Mictrowave data, Meteorological data	1990 - present	Lower Mekong Basin	Lam Dao Nguyen/VNSC
2	Modeling and Observation of the energy and water cycle in Mekong River Basin	Optical/Micro wave	2000 - 2018	Mekong River Basin	Jiancheng Shi/ Institute of Remote Sensing and Digital Earth
3	Rice planted area mapping (GEOGLM/Asia-RICE)	SAR (Sentinel-1, ALOS-2) with available opticals	2012 - present	Great Mekong Subregion (GMS)	Shinichi Sobue, Thuy Le Toan, Kei Oyoshi/ JAXA, CESBiO

Preliminary Survey on AOGEOSS Pilot Study: Data Request (2/3)

No.	Research Topics	Satellite Data Requested	Duration	Area of Interest	PIs/Organization
4	Rice growth outlook using satellite derived agro-met data (GEOGLAM/Asia-RiCE)	Optical and SAR data, Altimetry data, Passive Mictrowave data, Meteorological data	2012 - present	GMS	Shinichi Sobue, Kei Oyoshi/ JAXA
5	Estimation of Methane Emission from Paddy Fields	ALOS-2, MODIS, GCOM-C/W, GOSAT	- 2018	Vietnam (Lower Mekong Delta Region)	Hironori Arai, Wataru Takeuchi, Lam Dao Nguyen, Thuy Le Toan, Kei Oyoshi, Shinichi Sobue/ U-Tokyo, VNSC, CESBiO, JAXA

Preliminary Survey on AOGEOSS Pilot Study: Data Request (3/3)

No.	Research Topics	Satellite Data Requested	Duration	Area of Interest	PIs/Organization
6	Rice Planted Area Mapping (APRSAF/SAFE Initiative)	ALOS-2	2016 – 2018	Cambodia	Shinichi Sobue, Kei Oyoshi/ JAXA and Department of Planing and Statistics, Ministry of Agriculture, Forestry and Fisheries (MAFF), Cambodia
7	Rice Planted Area Mapping (APRSAF/SAFE Initiative)	ALOS-2	2016 - 2018	Myanmar	Shinichi Sobue, Kei Oyoshi/ JAXA and Department of Agricultural Land Management and Statistics, Ministry of Agriculture, Livestock and Irrigation, Myanmar

Community Support

- Data and technical support

Country	Satellite Data & Technical Support
Australia	**Open Data Cube**
China	**TBD**
Japan	**TBD**
Korea	**KOMPSAT Optical & SAR Data**

- Financial contributions from member countries and finance organizations (e.g., ADB) would facilitate the implementation of this project.

Summary

- The Mekong river basin will serve as one of good test beds to explore case studies for three GEO priority areas: climate change, disaster risk reduction, and sustainable development.

- Pilot studies will be carried out by following procedures:
  - Proposals reviewed and selected by AOGEOSS coleads
  - PIs shall present a project overview at upcoming AOGEOSS Workshop or Symposium
  - Carry out R&D activities
  - Present the progress report at AOGEOSS meetings.

- The most important element for this pilot study is the dedicated collaboration among AOGEOSS countries. More importantly, active participation by each AOGEOSS task group will significantly improve final results.