



Agency for the  
Assessment and  
Application of  
**TECHNOLOGY**



Ridwan Djamaluddin  
Deputy Chairman  
for Natural Resource Development Technology  
[ridwan.djamaluddin@bppt.go.id](mailto:ridwan.djamaluddin@bppt.go.id)



[www.bppt.go.id](http://www.bppt.go.id)

# Legal Framework

- Coordinating Minister for People's Welfare:  
Decree No. 52; October 10<sup>th</sup>, 2012 →  
National Coordinating Team for the  
Establishment of Indonesia Climate  
Change Center
- 17 Ministries and Agencies
- Location: **BPPT**



# Indonesia Climate Technology Center

- ICCC Technical Committee
- Clusters
  - Low Emission Development Strategies
  - Climate Resilience
  - MRV of CC Programs
  - Peatland





# Geosystem Technology Labs



Indonesia

Science and Techno Park  
Serpong [40km from Jakarta]

15,000 meter<sup>2</sup>

# Geosystem Technology Laboratories

Environmental



Weather & Climate

Geomatics



Landscape

Disaster Mitigation

Mining

Marine Survey

# ICTC Operation Room at Geostech



# ICTC Outreach Facility at Geostech



# Proposed Structure and Roles of ICTC

- Panel of scientists from various fields
- National advisory board
- National scientific board
- To recommend climate change-related programs
- To build network between national entities and international community

# Technological Needs Assessment [TNA]

- Mitigation priorities: forestry/[peatland](#), waste, energy
- Adaptation priorities: food security, coastal vulnerability, water resources
- Selected technologies [3] for each priority sector in Technology Action Plan
- Multi Criteria Analysis [MCA]



# Technology Action Plan

- **Forestry**

- Integrated Forest – Peat Carbon Management and Monitoring
- Peatland Water Management

- **Water Resources**

- Rainwater Harvesting, Domestic Waste-water Recycling, Water Resource Modeling

- **Energy**

- Photovoltaic industriesSolar system

- **Waste Management**

- Mechanical – Biological Treatment
- In-Vessel Composting
- Low-Solid Anaerobic Digestion Technology

- **Coastal Vulnerability**

- Sea Wall, Coastal Reclamation





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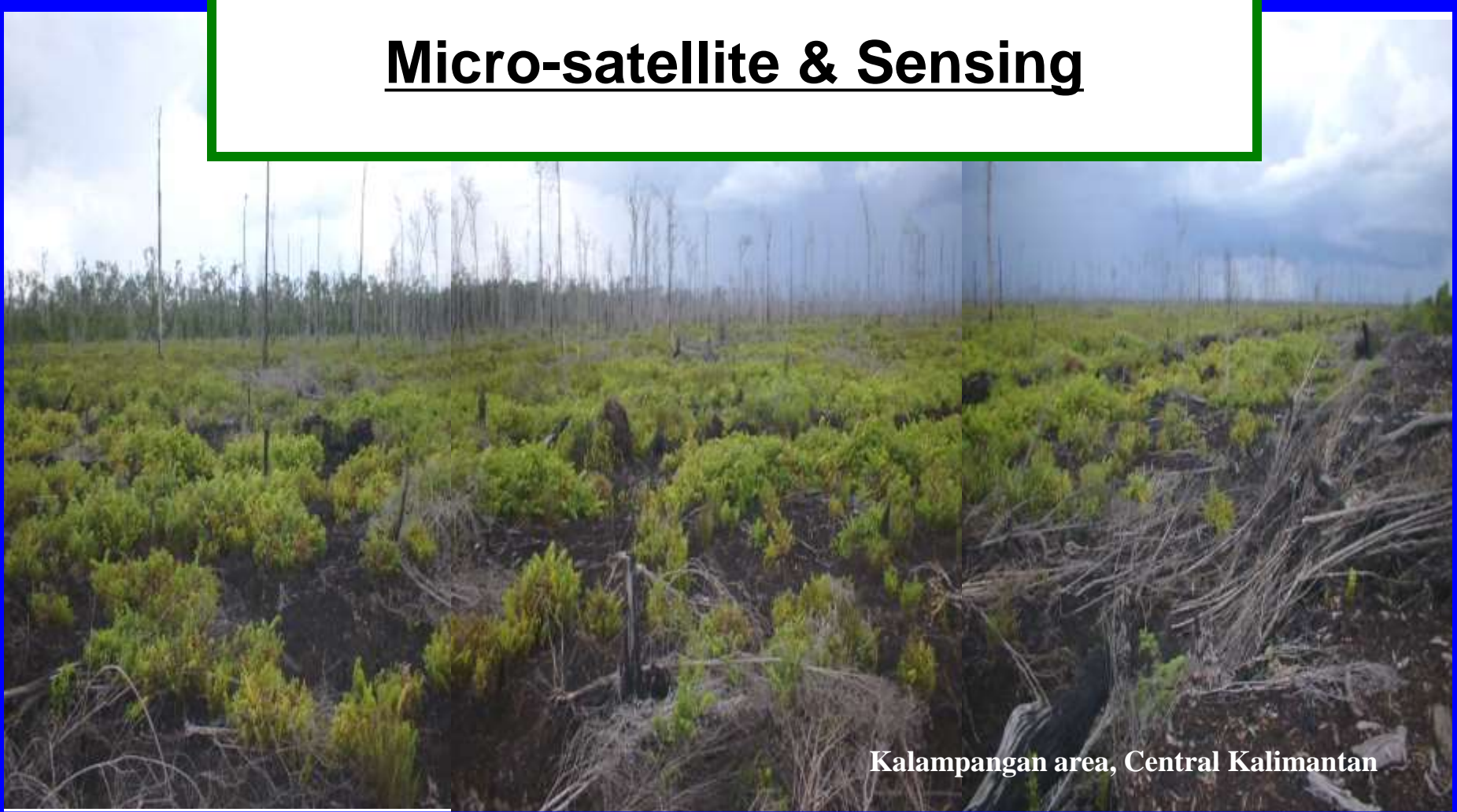


# Hokkaido University Collaboration with Indonesia Climate Technology Center



[www.bppt.go.id](http://www.bppt.go.id)

# **Integrated Monitoring-Sensing- Modeling (MSM) system: Micro-satellite & Sensing**



**Kalamangan area, Central Kalimantan**

# Micro-satellite with super multi-color telescopic camera

Cost: **5 M USD** including satellite BUS and advanced payloads

Spatial resolution: **5m/pix**

Spectral information (liquid crystal tunable filter):

Center color: 1 nm step in **400-720 nm and 650-1050 nm**, Bandwidth: **5-20 nm**

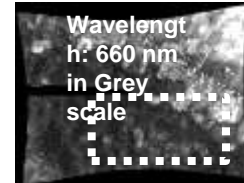
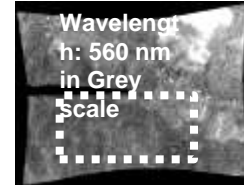
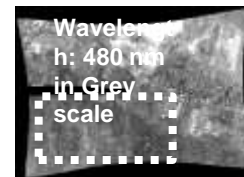


Java campaign with UAV



Multispectral Camera

- Wide FOV lens
- High-sensitive CCD
- Liquid Crystal Tunable Filter (LCTF) for Visible
- 190 x 100 x 100 mm
- 1.3 kg



Example of Composite Color Image in forest area

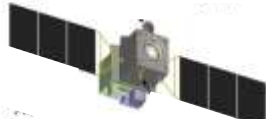


Applied to:

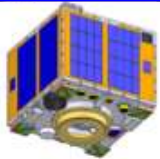
- carbon fix in forest and agri. land (red edge: 650-720 nm)
- Identification of tree species
- estimation of carbon outflow in river and marine CDOM (colored dissolved organic matters): 400-500s nm

# Development of advanced remote-sensing sensors and operation

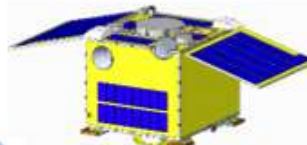
Validation with small/middle sized satellite



On-demand operation using microsatellites



RISING-2



RISESAT



UNIFORM



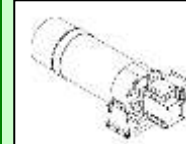
Data downlink and analysis in Indonesia

## Bolometer Array Camera



- small, light, low power
- surface temperature
- forest fire detection

## Telescopic Optics



- light (3kg) and compact
- maintenance free
- focusing free
- high-resolution (5m/pix)

## LCTF Camera



- 400 bands (1nm step)
- 400-700 nm or 650-1050 nm covered
- small and compact

LAPAN A4 satellite co-development

BPPT

Regional measurement using UA



*-innovation of ecology investigation with advanced sensors*  
*- Development an operation of satellite in collaboration with LAPAN and BPPT*



Wild Fire



bio diversity



CDOM

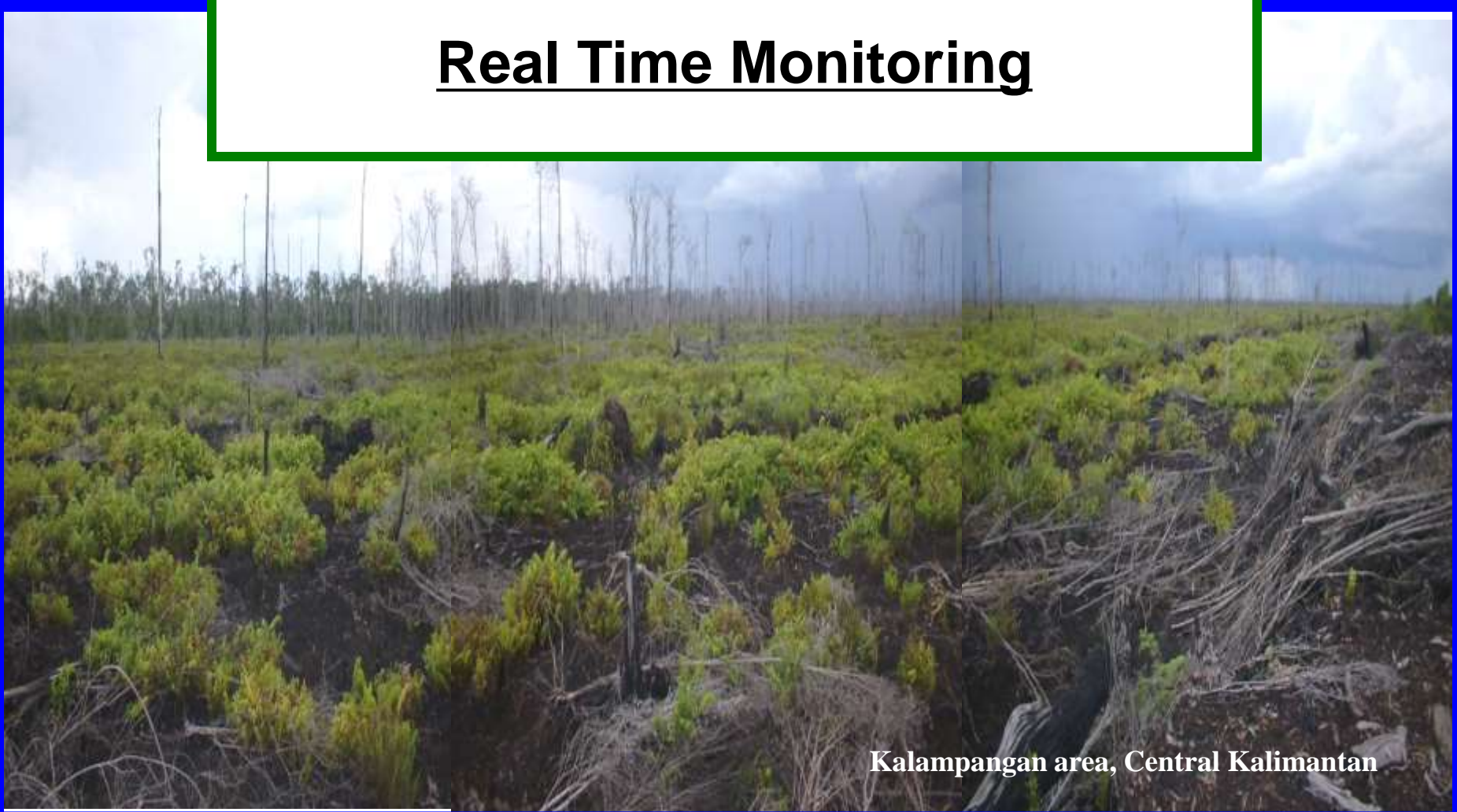
# ***Smart Remote Sensing*** with Super-Constellation by ***Asian Micro-satellite Consortium***



**10** micro-satellites in **equatorial orbits**  
enables **10-min interval** monitoring

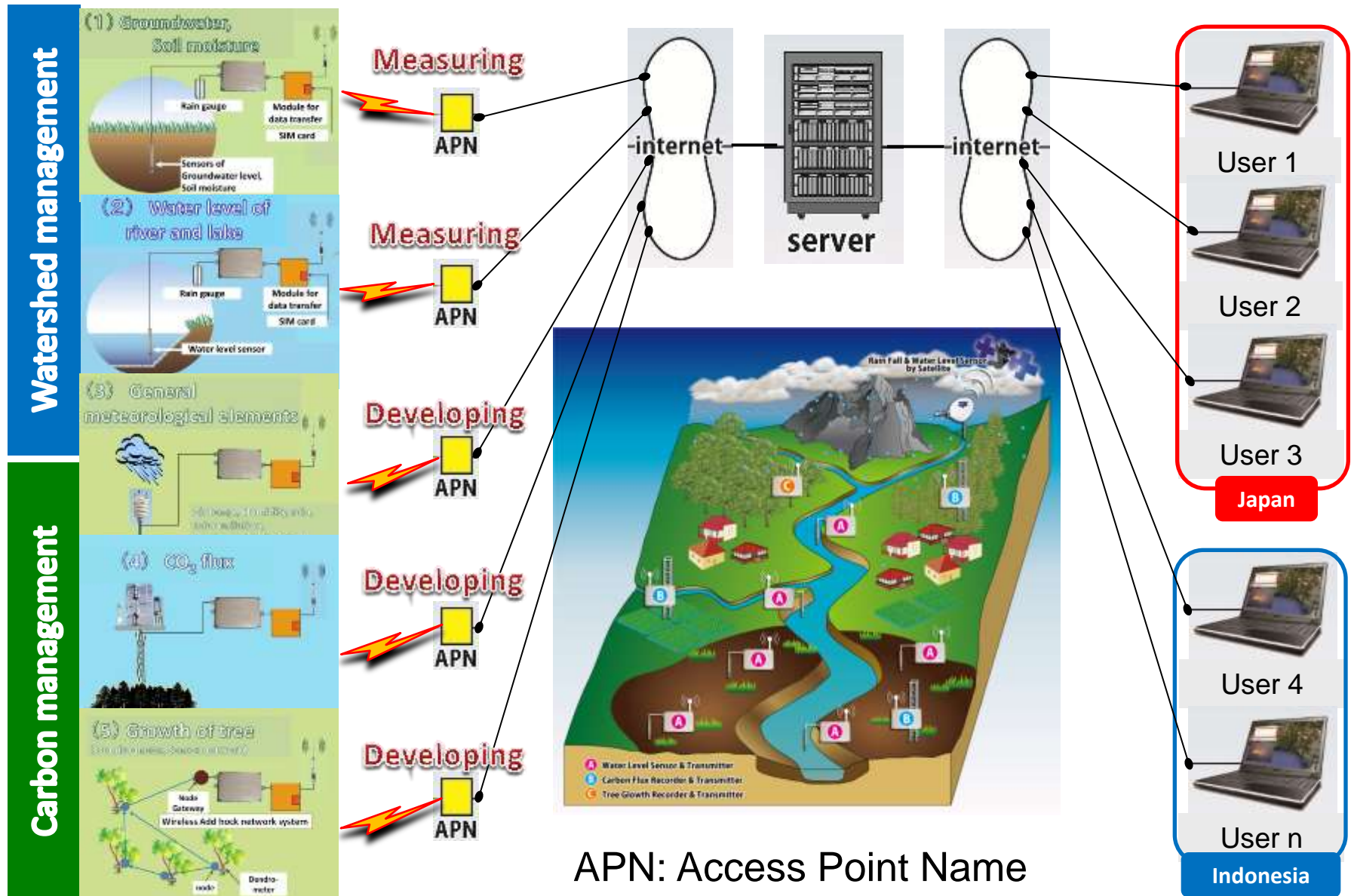
# **Integrated Monitoring-Sensing-Modeling (MSM) system:**

## **Real Time Monitoring**



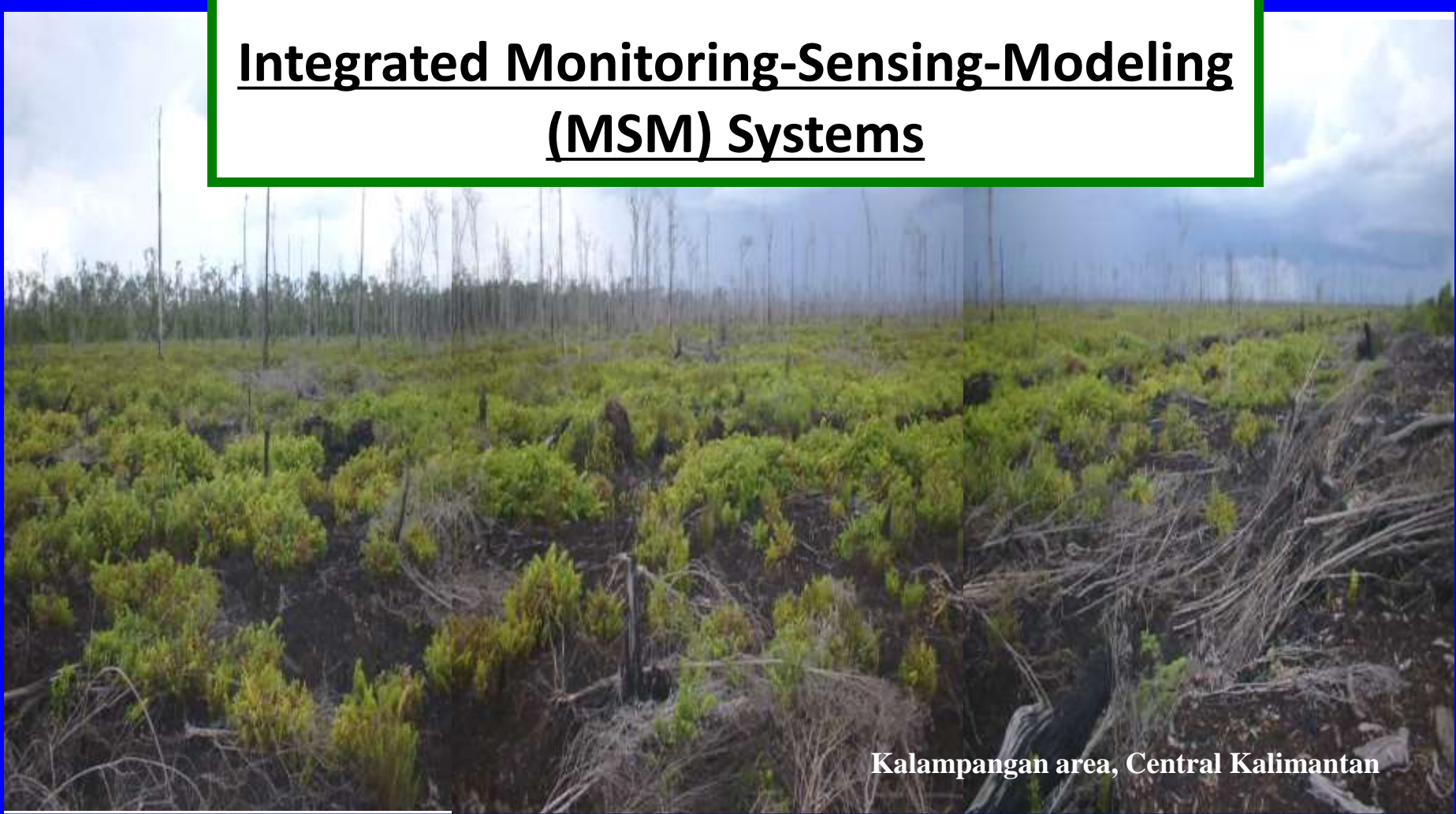
**Kalampangan area, Central Kalimantan**

# Watershed and carbon managements using data transfer network of mobile phone



# **Integrated Monitoring-Sensing-Modeling (MSM) system:**

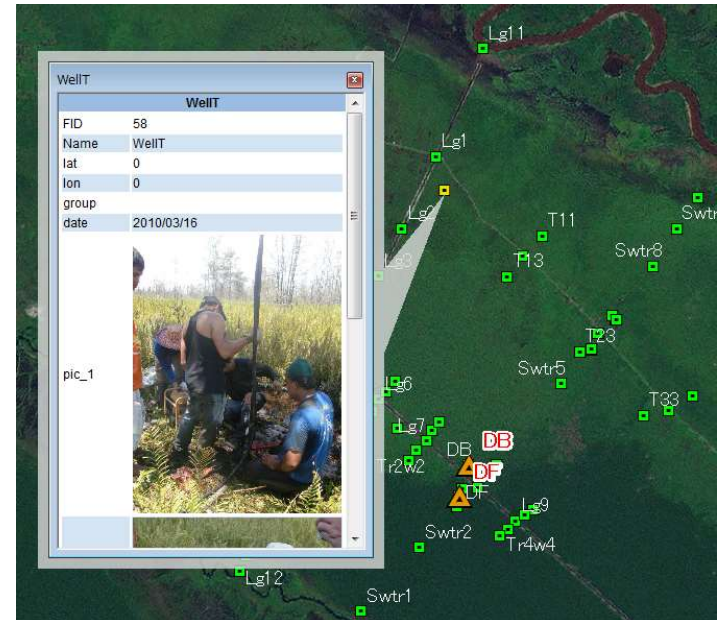
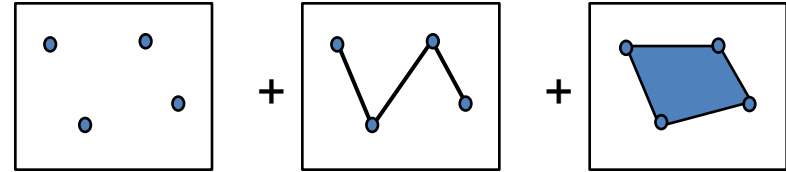
## **Integrated Monitoring-Sensing-Modeling (MSM) Systems**



**Kalamangan area, Central Kalimantan**

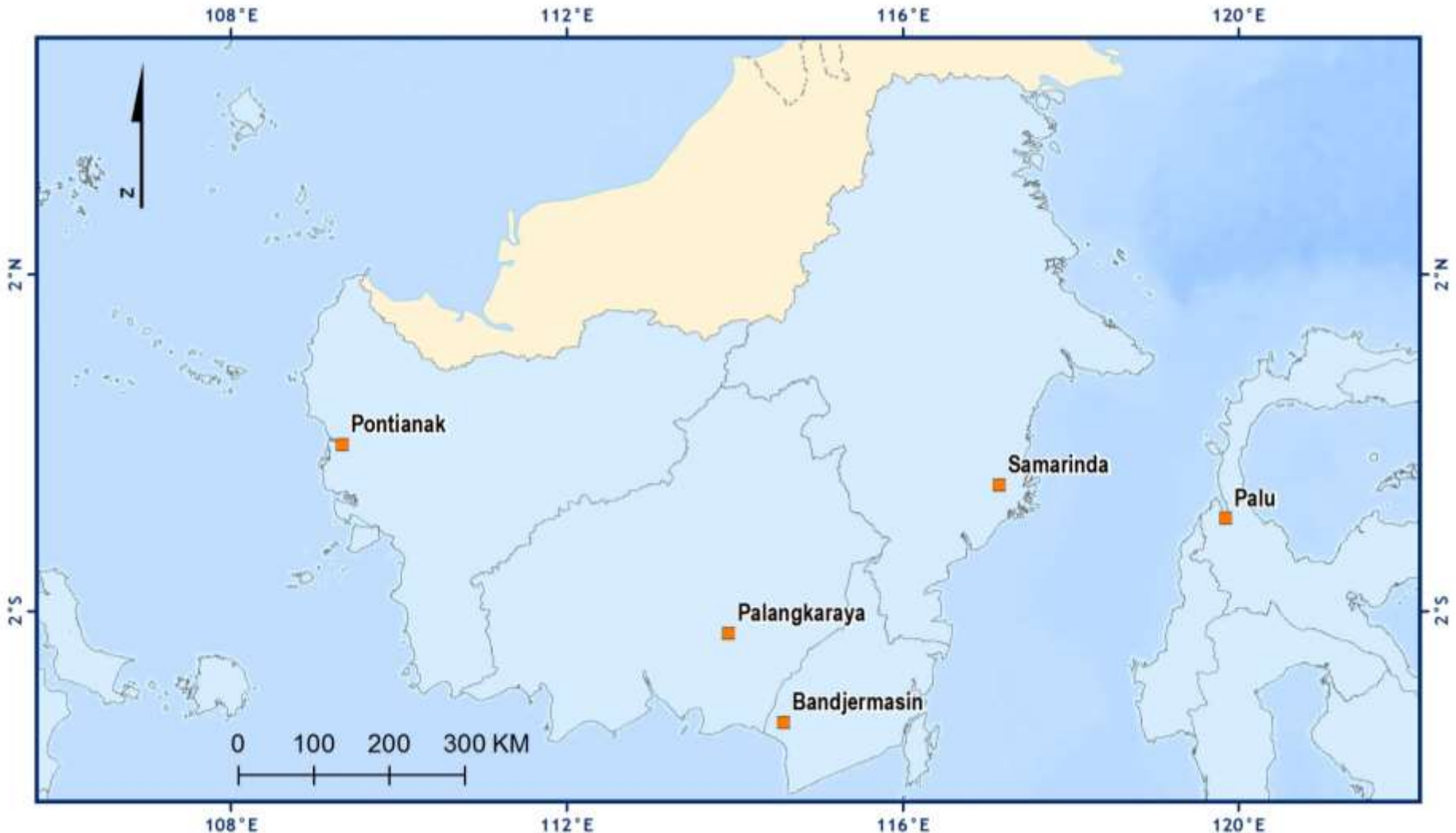
## Web GIS System

- Software
  - ESRI ArcGIS for Server
- Data Set
  - Base map of Indonesia
  - Archive of Rater data with Search Index
    - Satellite images
    - LiDAR DSM or DTM
    - DEM (SRTM & ASTER GDEM)
    - Geological maps
  - Research site Location & Information
    - Ground water Level Gauge
    - River water Level Gauge
    - Flux tower
  - Annual Summary of MODIS Active fire Products (MOD14)
  - Etc....



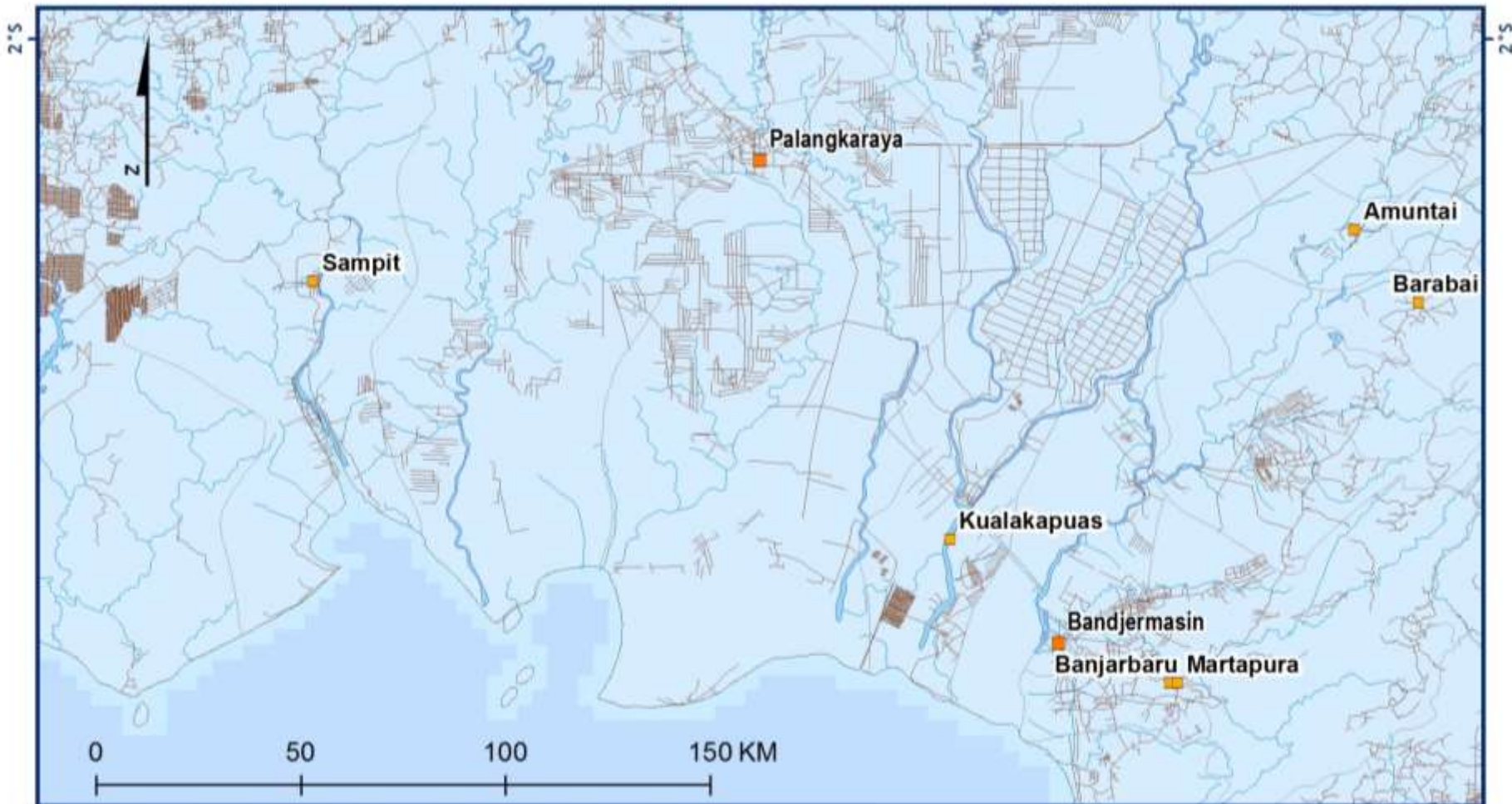
# Integrated MSM Systems

## ◆ Base map of Indonesia Zoom level 1 (border & capital city)



# Integrated MSM Systems

- ◆ Base map of Indonesia  
Zoom level 2 (river & road & logging road)



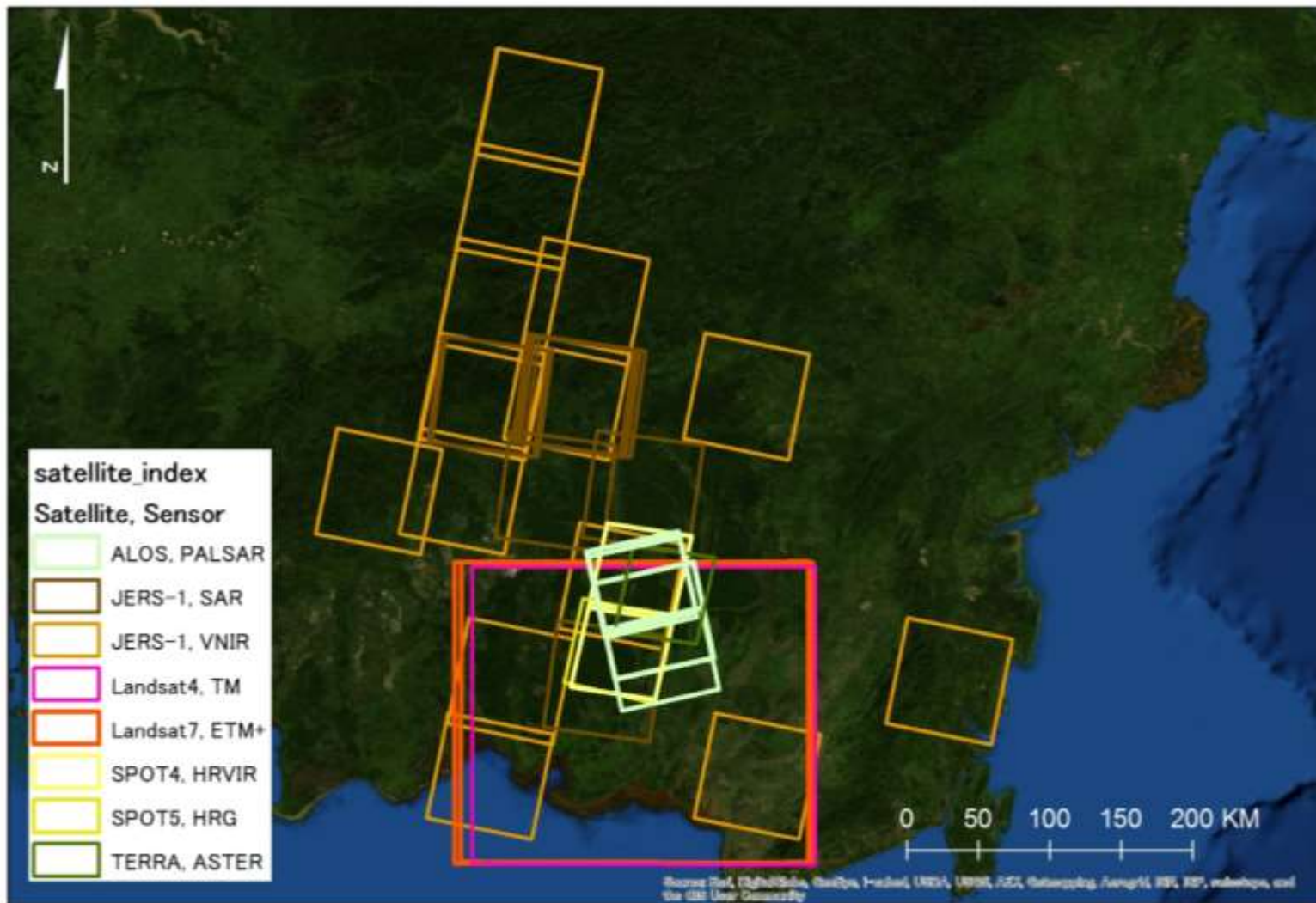
## Archived GIS Data Set (RASTER)

**Satellite image  
&  
DSM / DTM (LiDAR)  
&  
Geological map**

# Integrated MSM Systems

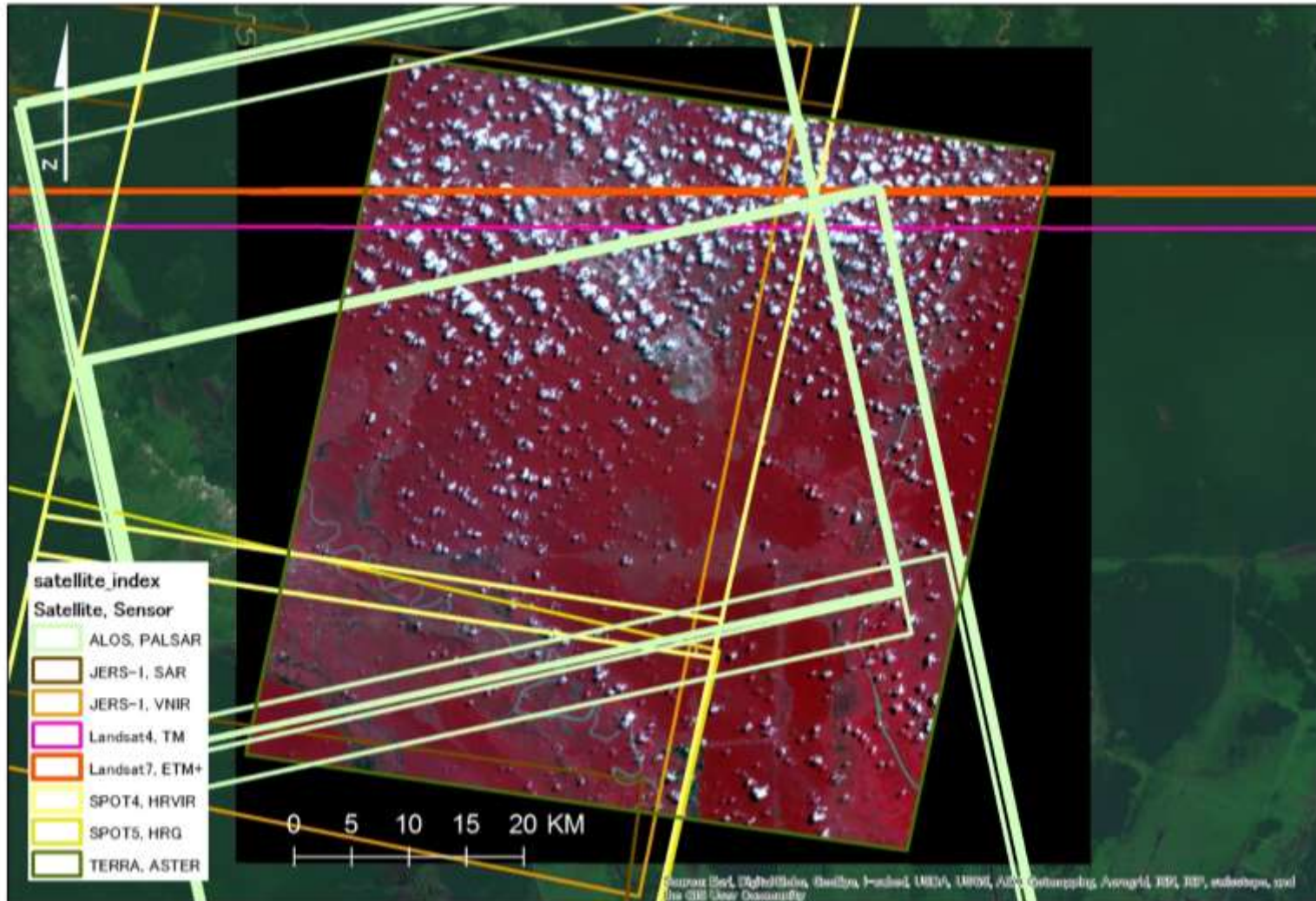
## Archived GIS Data Set (RASTER)

### Satellite image index



# Integrated MSM Systems

## Archived GIS Data Set (RASTER) Index with image (Terra ASTER)



## Archived GIS Data Set (RASTER) Index with image (ALOS PALSAR)



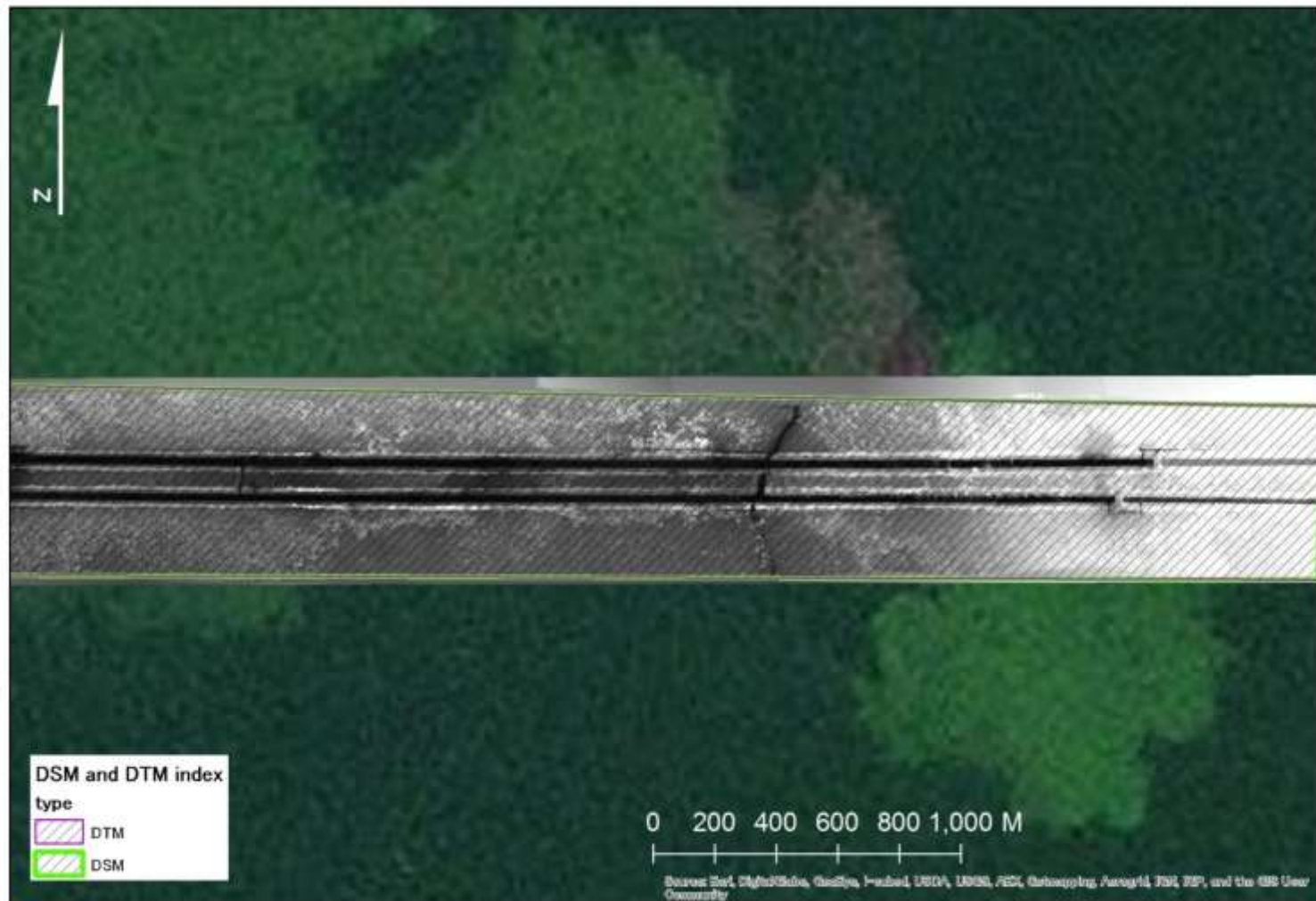
# Integrated MSM Systems

## Archived GIS Data Set (RASTER) DSM / DTM (LiDAR) Index



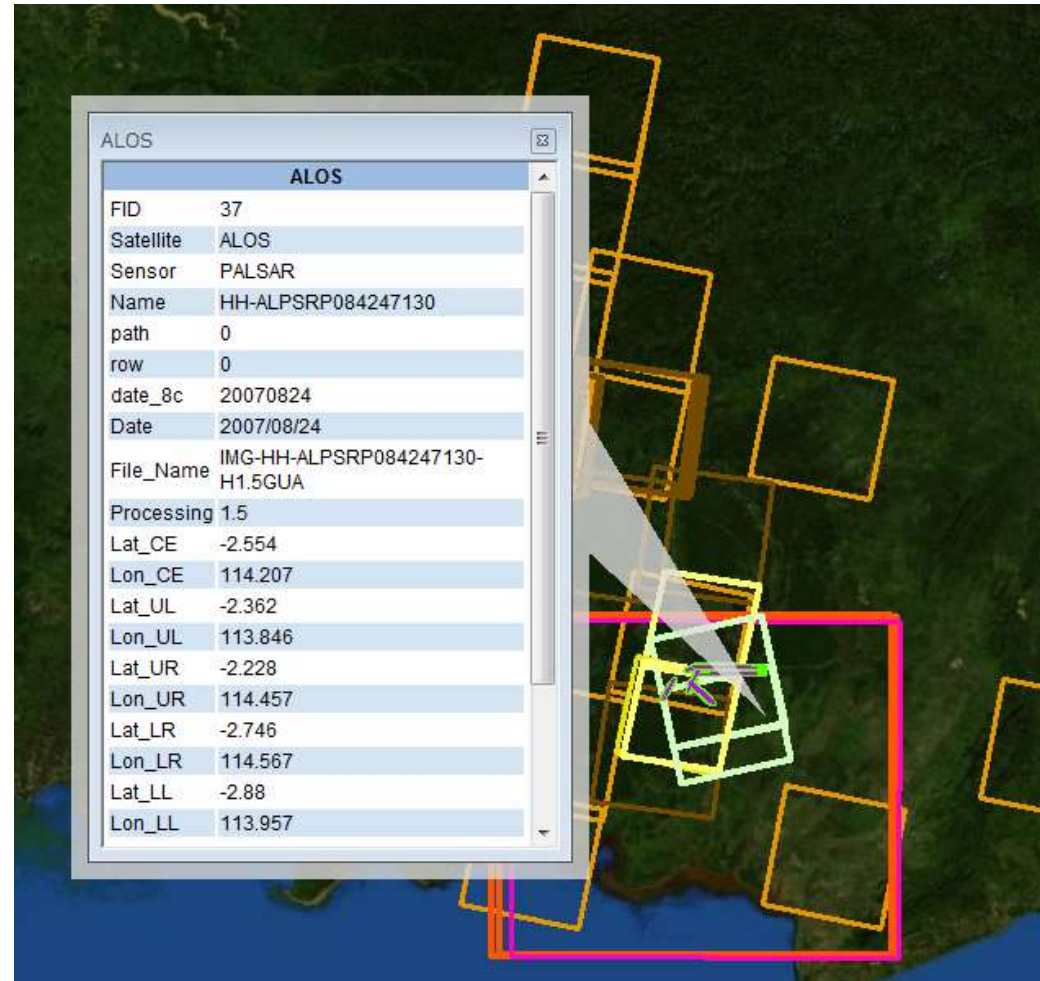
# Integrated MSM Systems

## Archived GIS Data Set (RASTER) Index with DTM



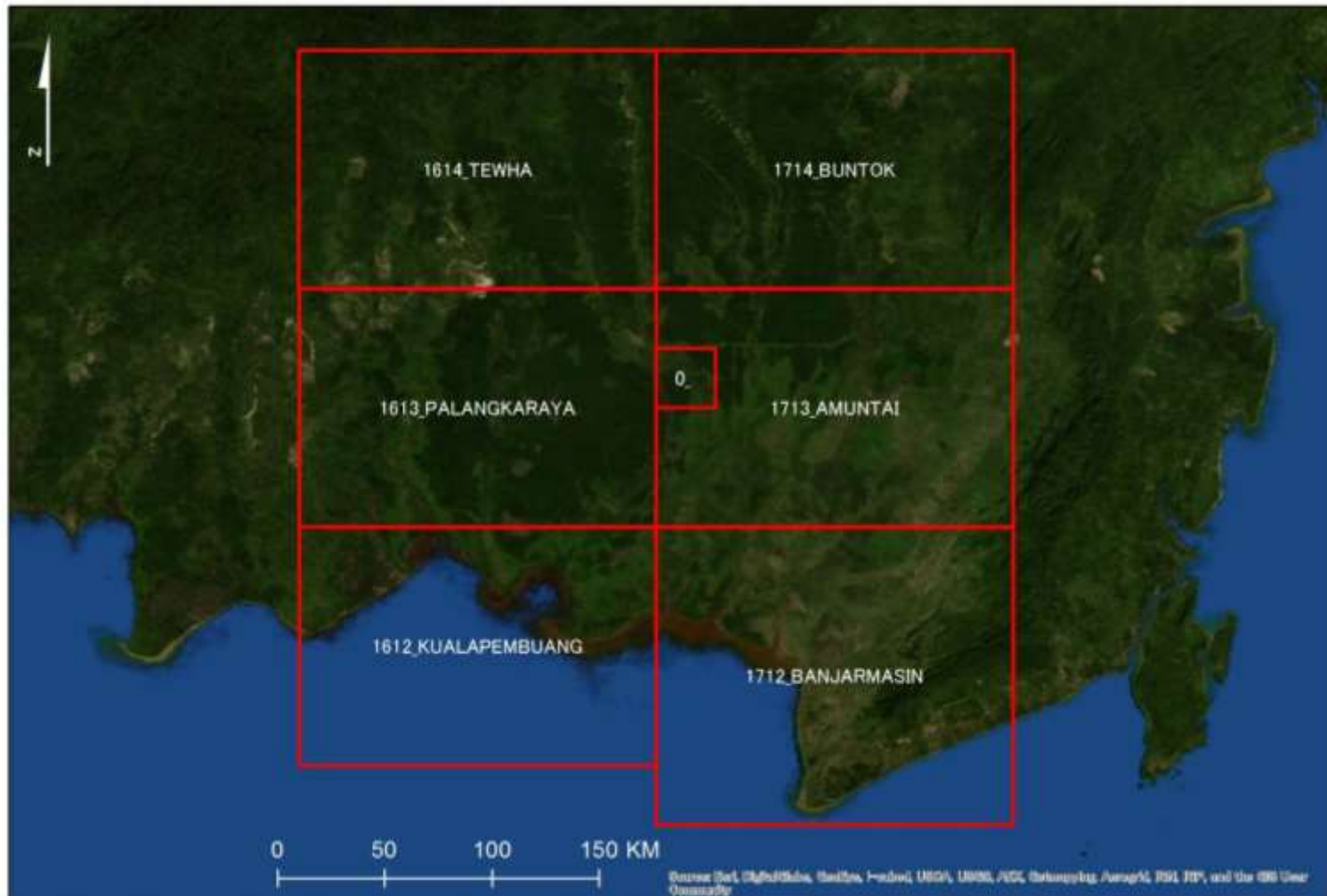
## Archived GIS Data Set (RASTER) Pop-up Information

- Satellite
- Sensor
- Product ID
- Acquisition date
- Path / Row
- Processing level



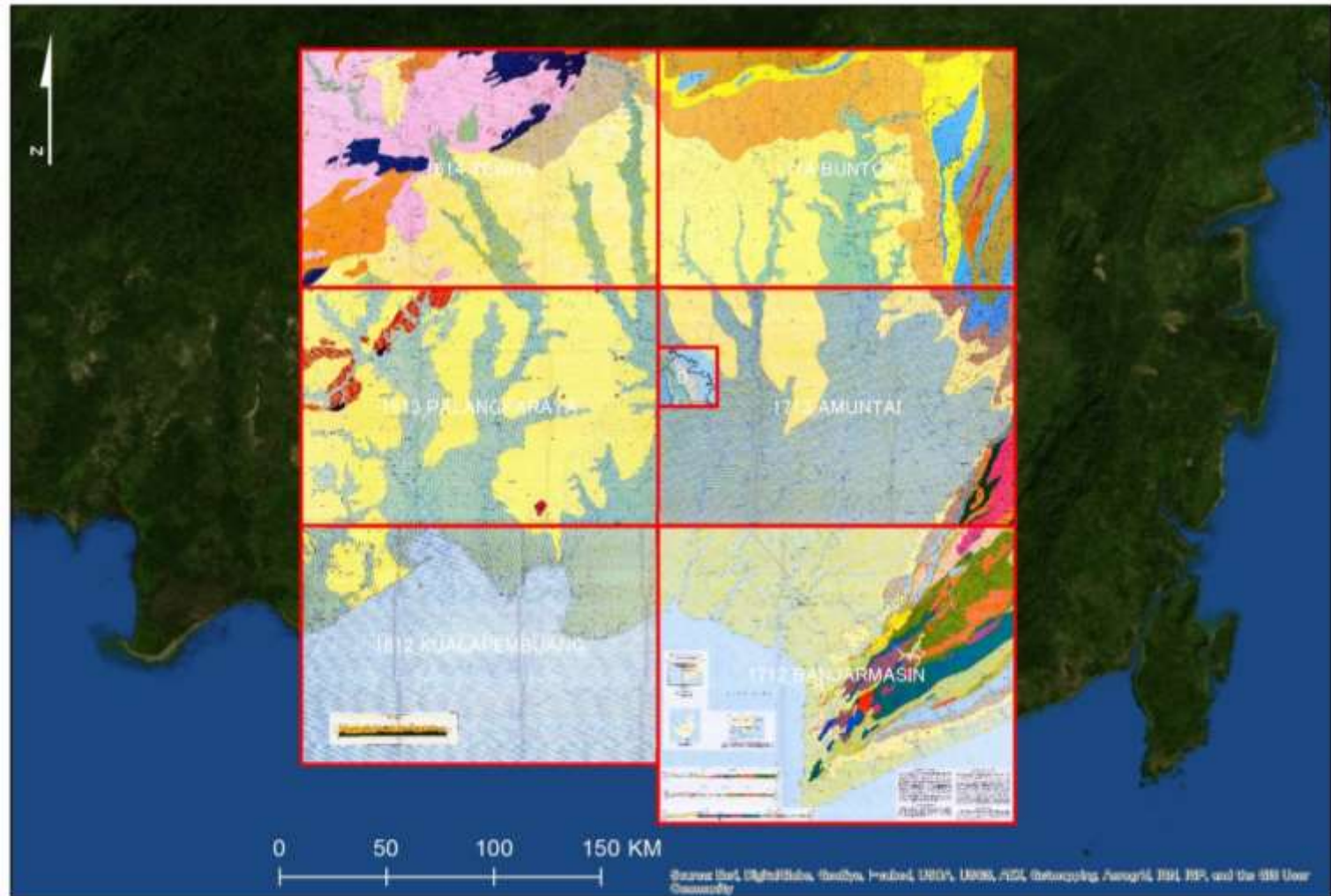
# Integrated MSM Systems

## Archived GIS Data Set (RASTER) Geological Map index (1:250000)

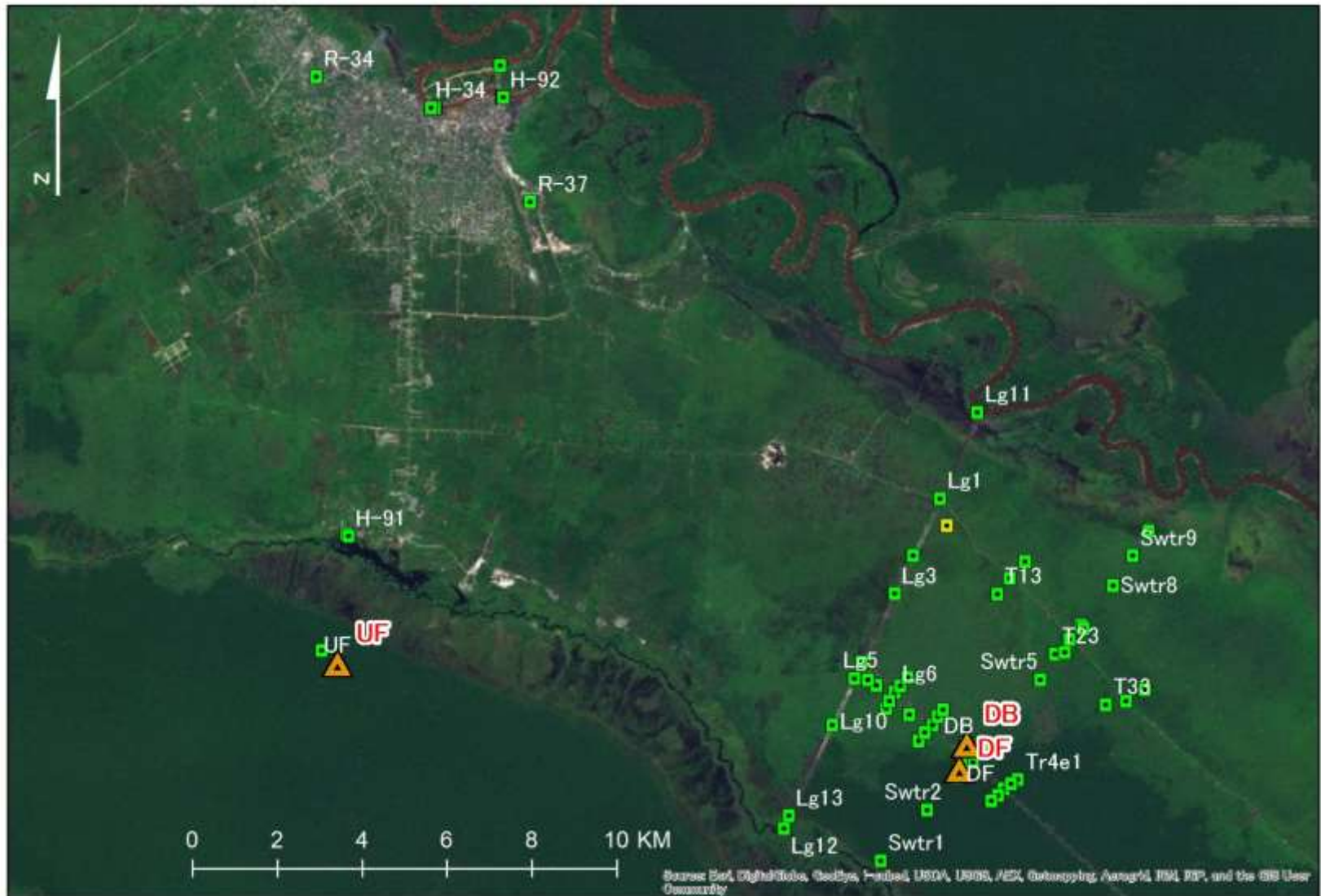


# Integrated MSM Systems

## Archived GIS Data Set (RASTER) Geological Map (1:250000)

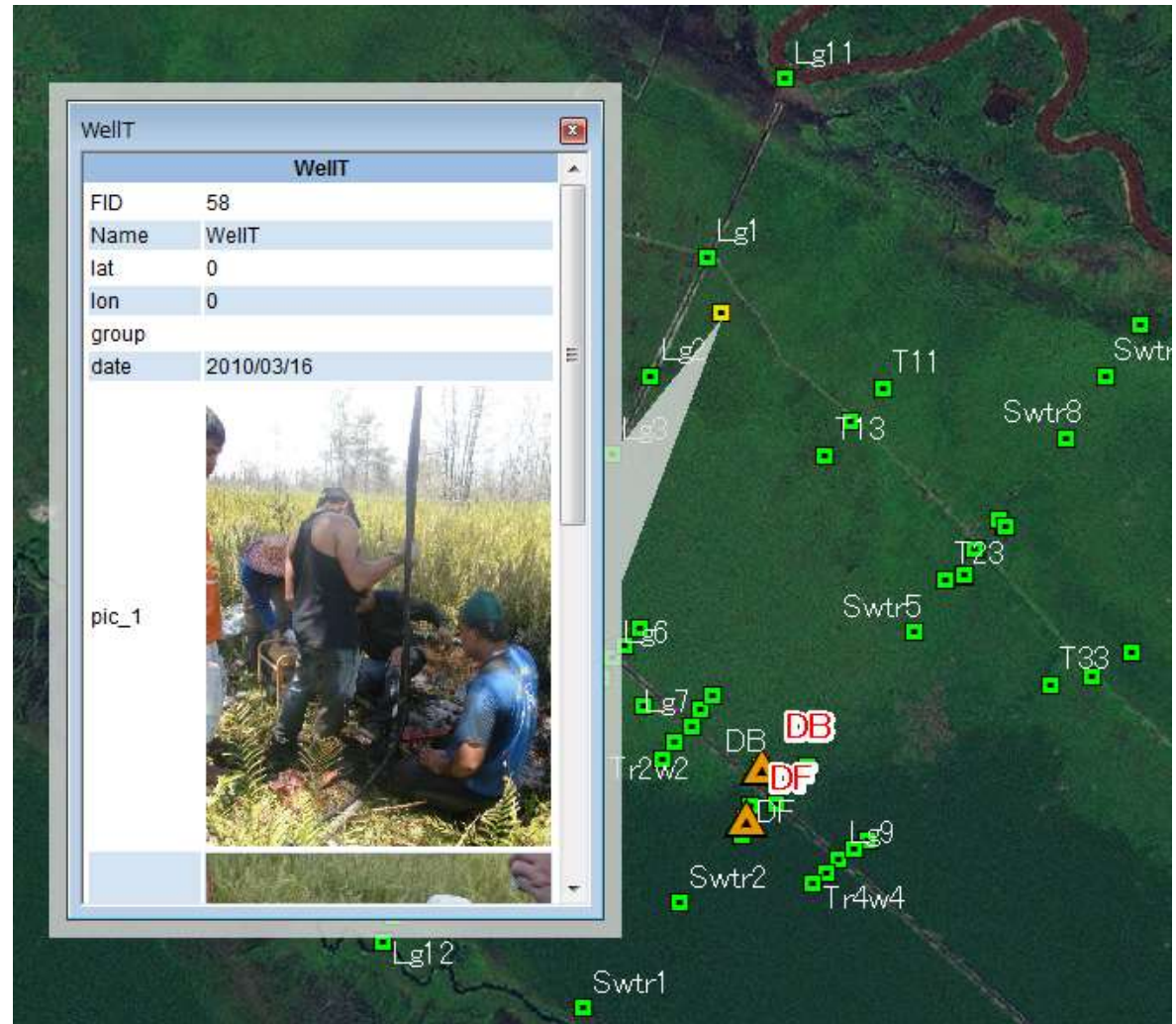


## Data Base of Research Sites

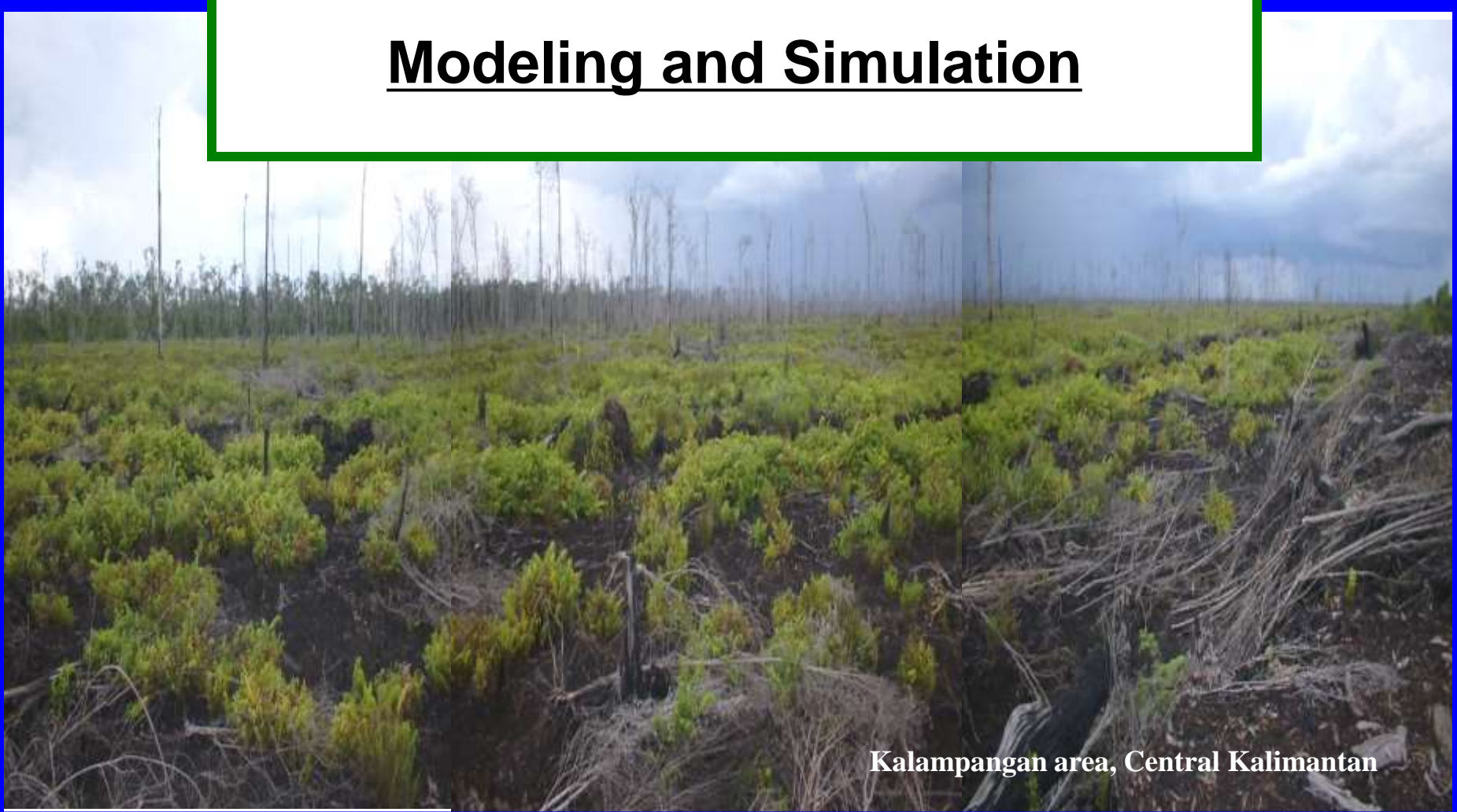


## Pop-up Information of Research Sites

- Site Name
- Research Date
- Picture  
(if available)
- Name of Researcher



# **Integrated Monitoring-Sensing- Modeling (MSM) system: Modeling and Simulation**



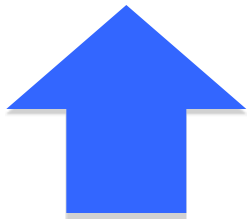
**Kalamangan area, Central Kalimantan**

Top-down

- satellite
- airplane
- inverse model



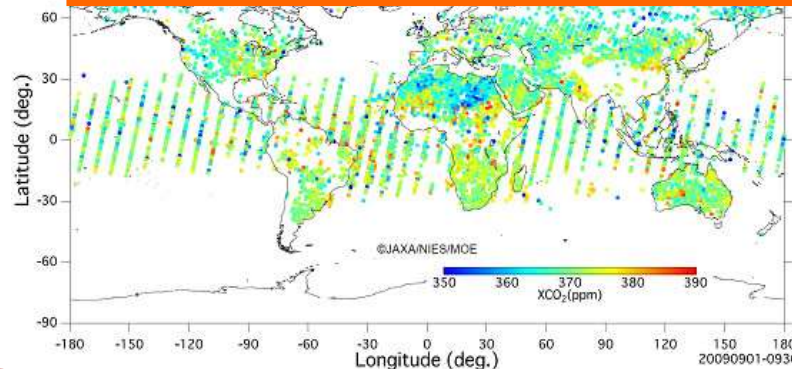
**Integrated,  
practical carbon  
budget map**



Bottom-up

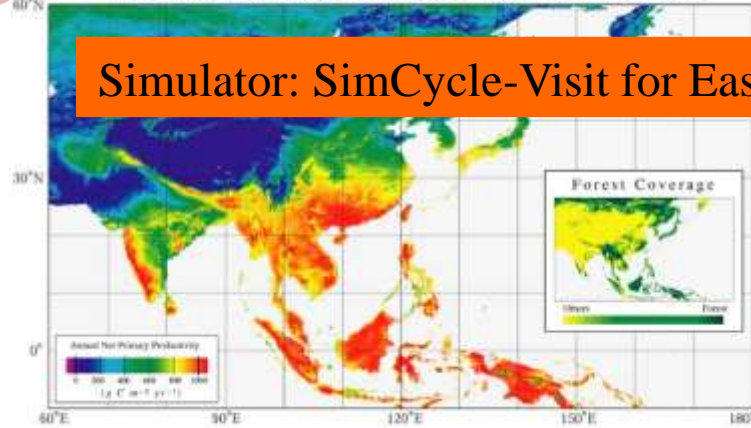
- field survey
- flux obs.
- process model

## Satellite GOSAT "IBUKI" Senescing: CO<sub>2</sub>



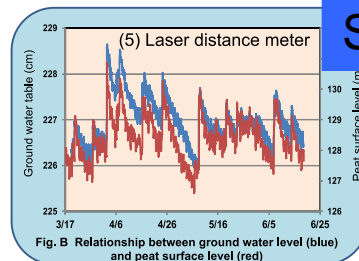
Column averaged dry air mole fraction distribution of carbon dioxide for the month of September, 2009, obtained from IBUKI observation data (unvalidated)  
By JAXA

## Net Primary Productivity of Terrestrial Ecosystems in Monsoon Asia



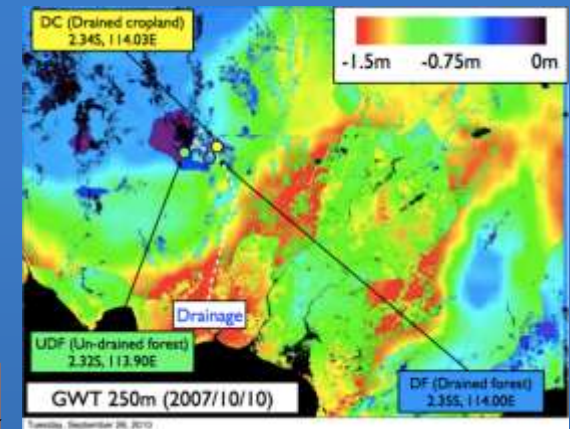
## Simulator: SimCycle-Visit for East Asia

## Subsidence Model



Presented by Kawasaki (2013)

## Carbon-Water Simulation

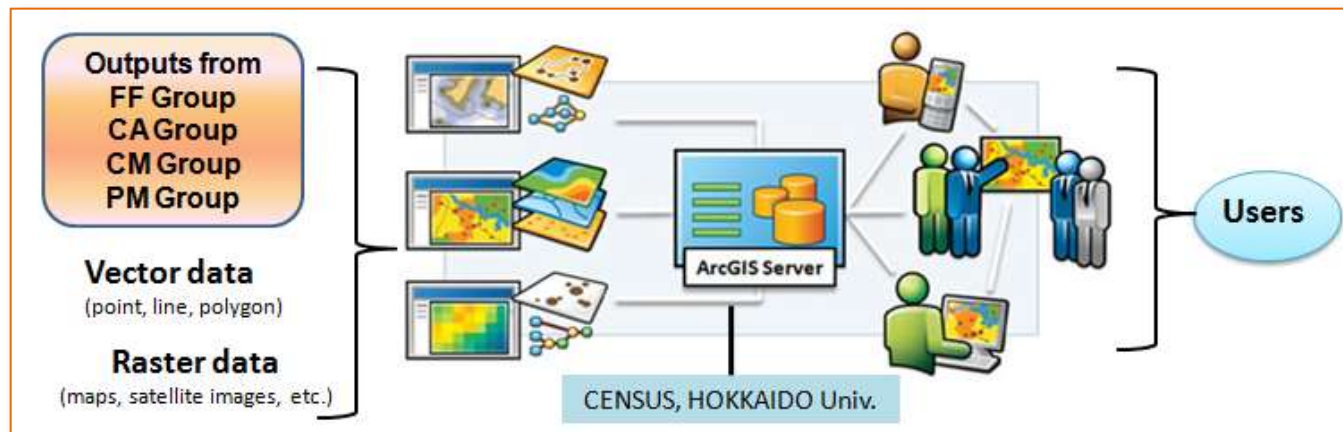


- Carbon Emission by Fire
- Carbon Loss through Water
- Carbon Emission by Microorganisms Degradation
- Tree Growth/Mortality
- Pest subsidence

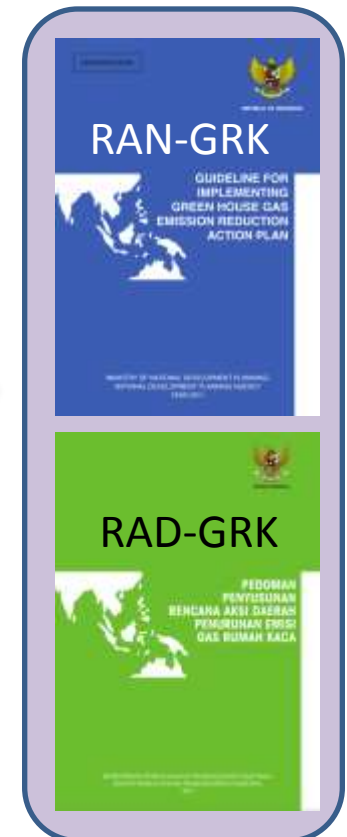
# National Action for GHG Emission Reduction (RAN-GRK)

- ✓ **Government of Indonesia** has committed to reduce GHG emissions by 2020 by 26% to **Business as Usual (BAU) baseline** with national support and by 41% to BAU with international support.
- ✓ Accordingly, the enactment of the National/Local Action Plan for Greenhouse Gas Emissions (RAN/RAD-GRK) are made as a follow-up to this commitment.

(<http://www.sekretariat-rangrk.org/english/>)

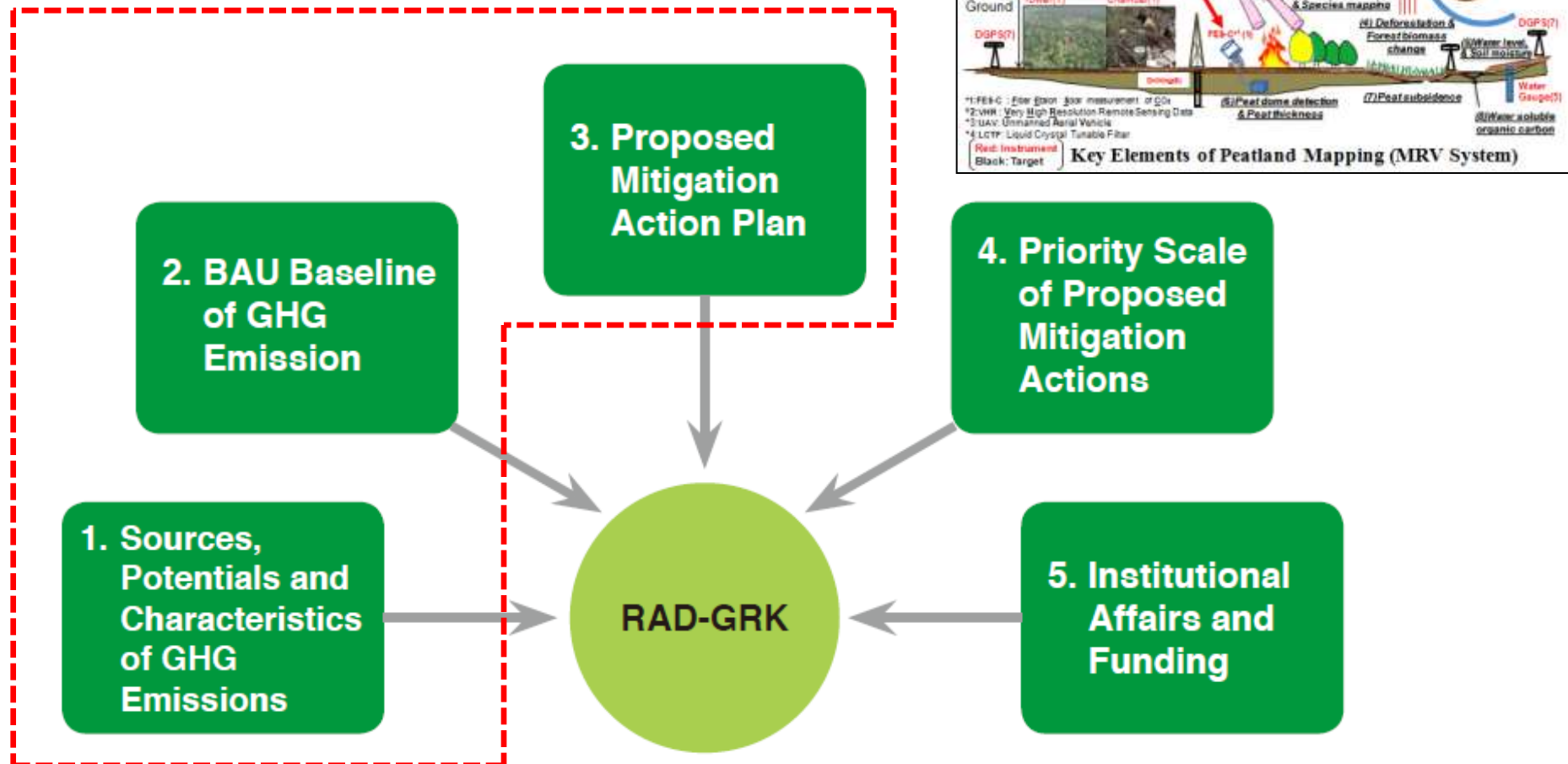


**Contribution by integrated MSM system through the Web-GIS system**



# Contribution to RAD-GRK

## Key Substances of RAD-GRK





**Thanks for your attention!**