Achievements of the on-going JST-JICA "Wildfires and Carbon Management in Peat Forest in Indonesia: Fire Detection and Fire Prediction System Component" Project

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Outline

- Introduction on JST-JICA “Wildfires and Carbon Management in Peat Forest in Indonesia: Fire Detection and Fire Prediction System” Project
- Fire Detection and Fire Prediction System (FF) Component
- Accomplishments form FF Component
- Future plan

Wildfires and Carbon Management in Peat Forest in Indonesia

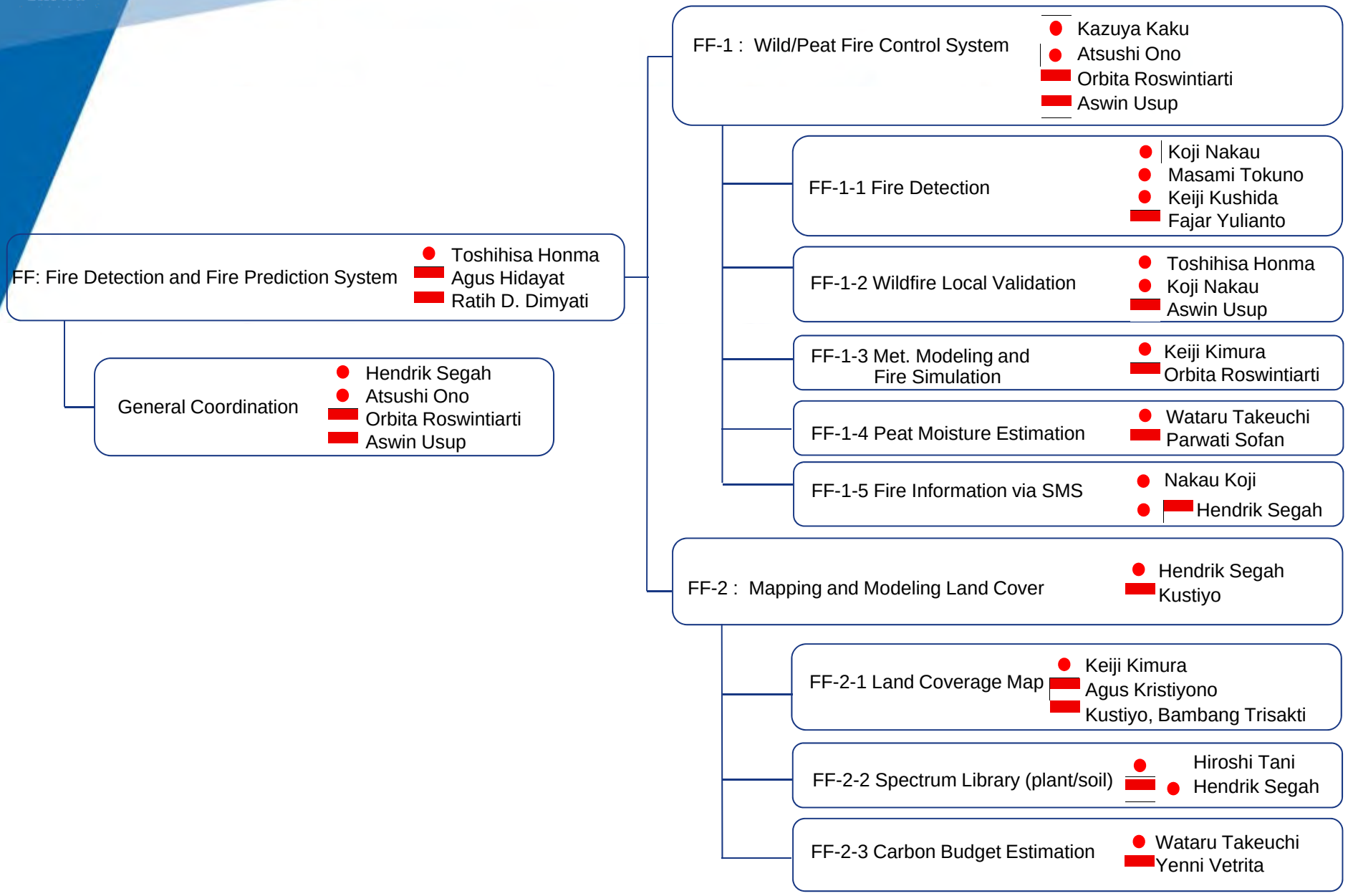
- **Executing agencies:**
  - Indonesia: National Standardization Agency of Indonesia (BSN)
  - Japan: JICA is responsible for the implementation of the Project in-closed cooperation with JST.
- **Implementation agencies:**
  1. Hokkaido University
  2. University of Palangka Raya (UNPAR)
  3. Indonesian Institute of Sciences (LIPI)
  4. Indonesian National Institute of Aeronautics and Space (LAPAN)
  5. Forest Research Development Agency, Ministry of Forestry (FORDA)
  6. Ministry of Research and Technology
- **Project sites:**

  Block C and Forest Research Development Agency, Ministry of Forestry's site of Block B of Ex-Mega Rice Project site in Central Kalimantan

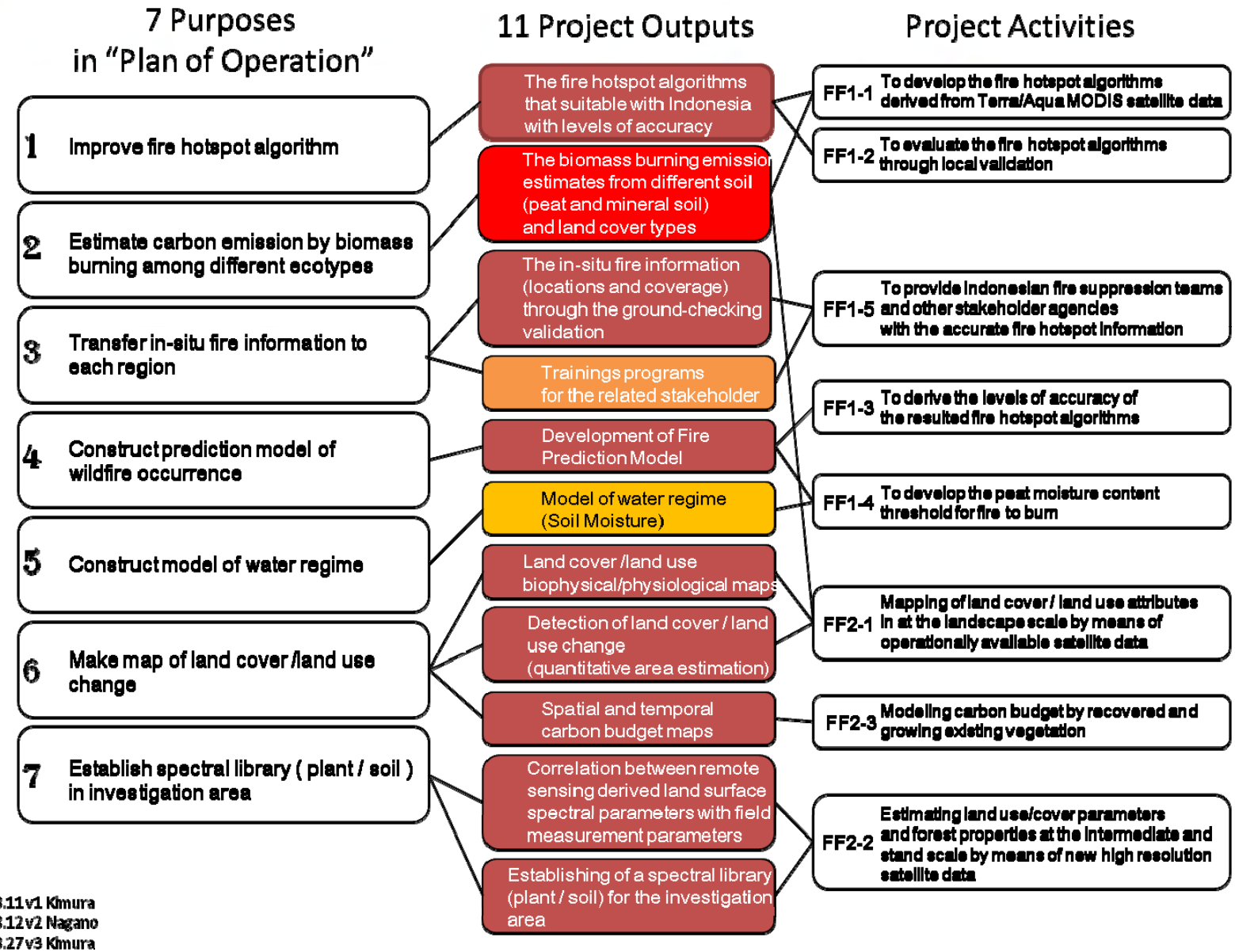
Wildfires and Carbon Management in Peat Forest in Indonesia

- **Activities:**
  1. **Fire Detection and Fire Prediction System Component (FF: Fire Detection and Fire Prediction)**
  2. Carbon Assessment Component (CA: Carbon Assessment)
  3. Carbon Management Component (CM: Carbon Management)
  4. Integrated Peat Management Component (PM: Peat Management)

Structure of FF Component



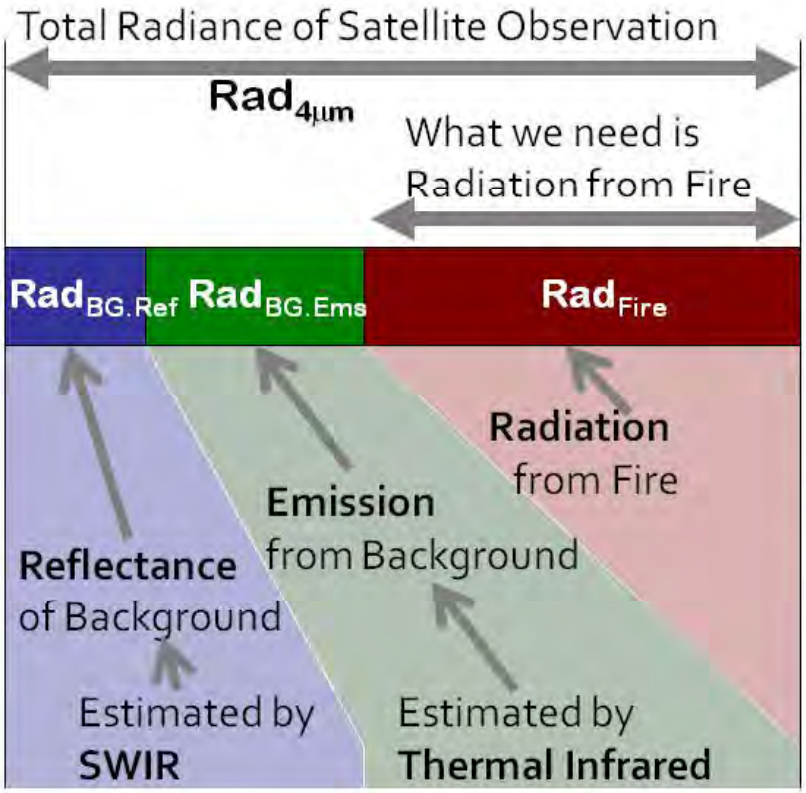
Outputs of FF Component



2009.8.11 v1 Khmura
2009.8.12 v2 Nagano
2009.8.27 v3 Khmura

Fire hotspot algorithm

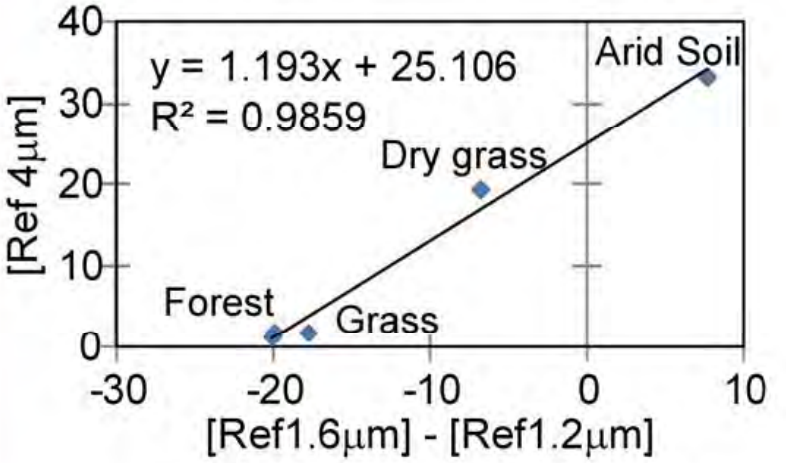
We need to estimate radiation from fire to detect fire.



$$Rad_{4\mu m}=Rad_{Fire}+Rad_{BG.Ems}+Rad_{BG.Ref}$$

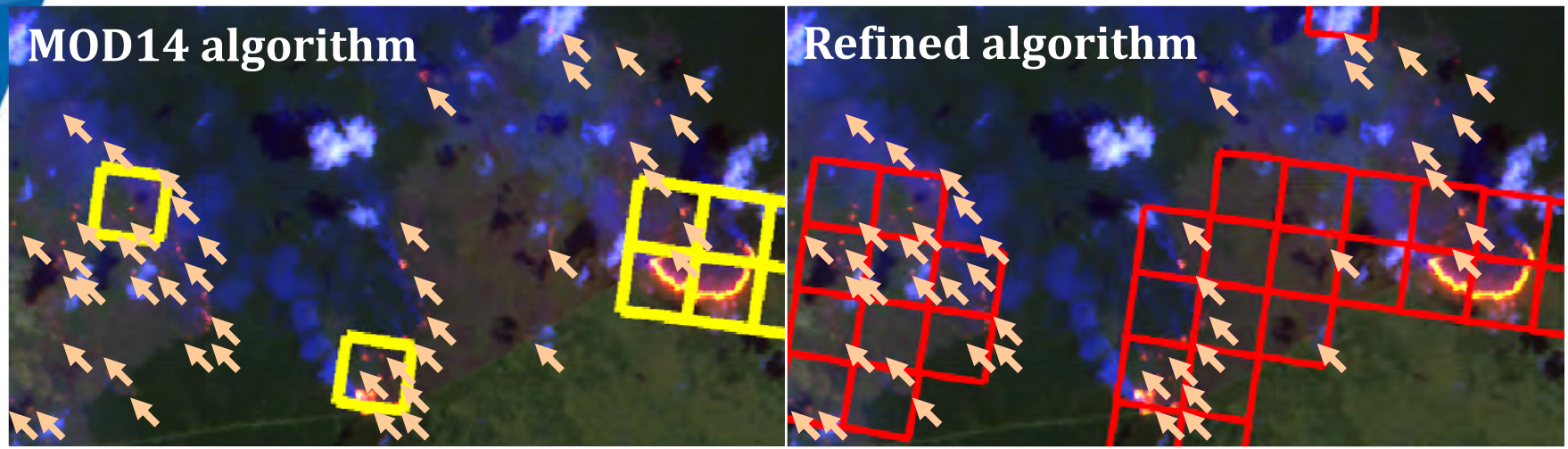
$$Rad_{BG.Ems}=I(4\mu m, BT_{11\mu m})$$

$$Ref_{BG}=1.193(Ref_{1.2\mu m}-Ref_{1.6\mu m})+0.251$$



Source: ASTER Spectrum Library

Fire hotspot algorithm *(cont.)*



Background image: ASTER false color R: 2.24μm G:1.65 μm B: 0.66 μm

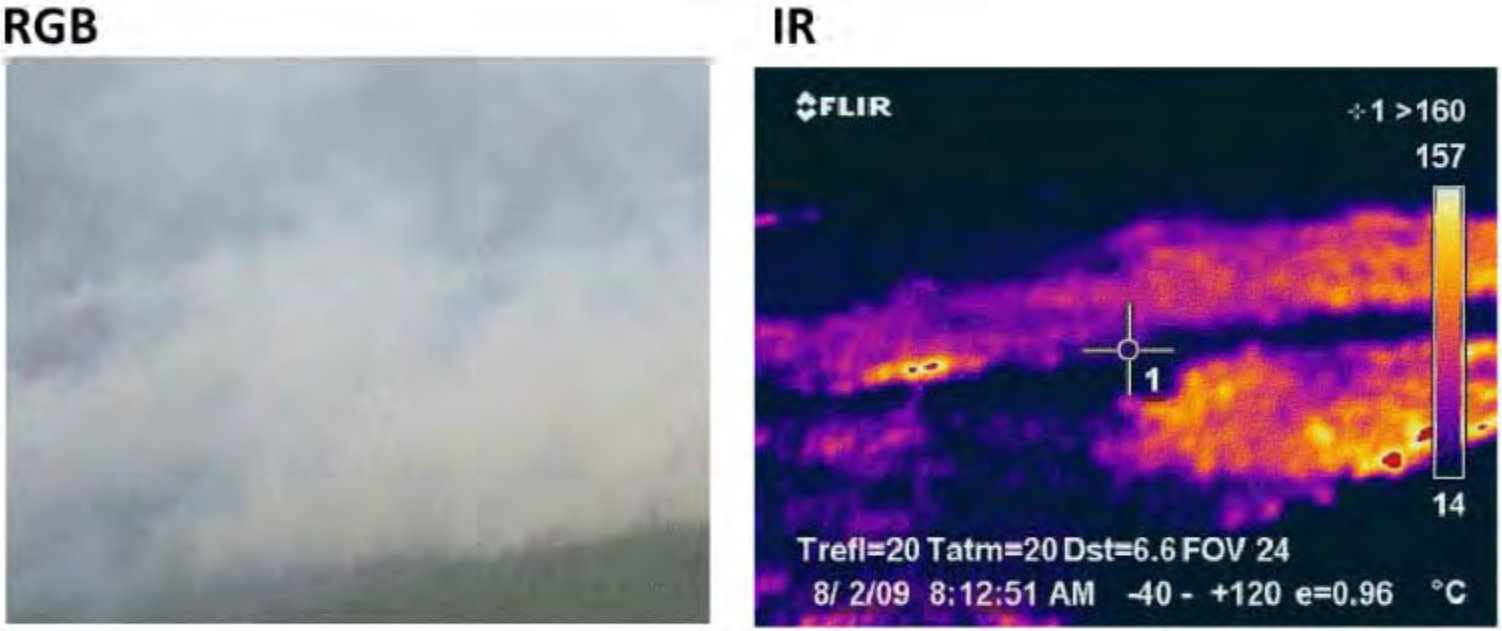
Refined hotspot algorithm developed by by Dr. K. Nakau et al. (2008).

Double S/N ratio (as compared with MOD14):

- 80% more HS and 10% less false alarm
- Smoldering, small fire, or slash and burn
- Geographic distribution is completely different
- Suitable to decide firefighting strategy and confirm extinction

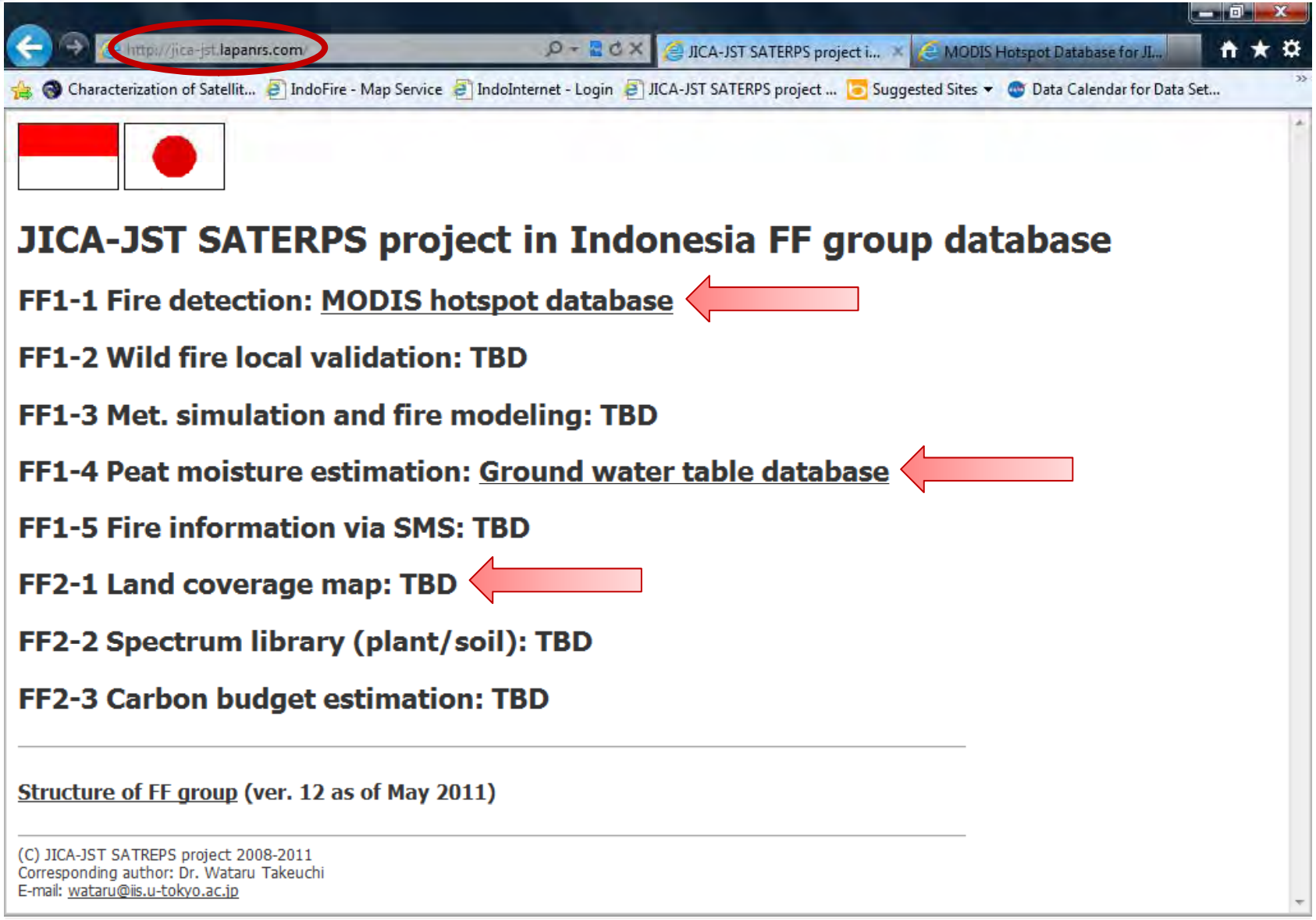
Fire hotspot validation

To verify the hotspot data obtained by satellites, aerial photographs were taken by the electrically-powered unmanned aerial vehicle (UAV) equipped with optical camera and infrared camera.

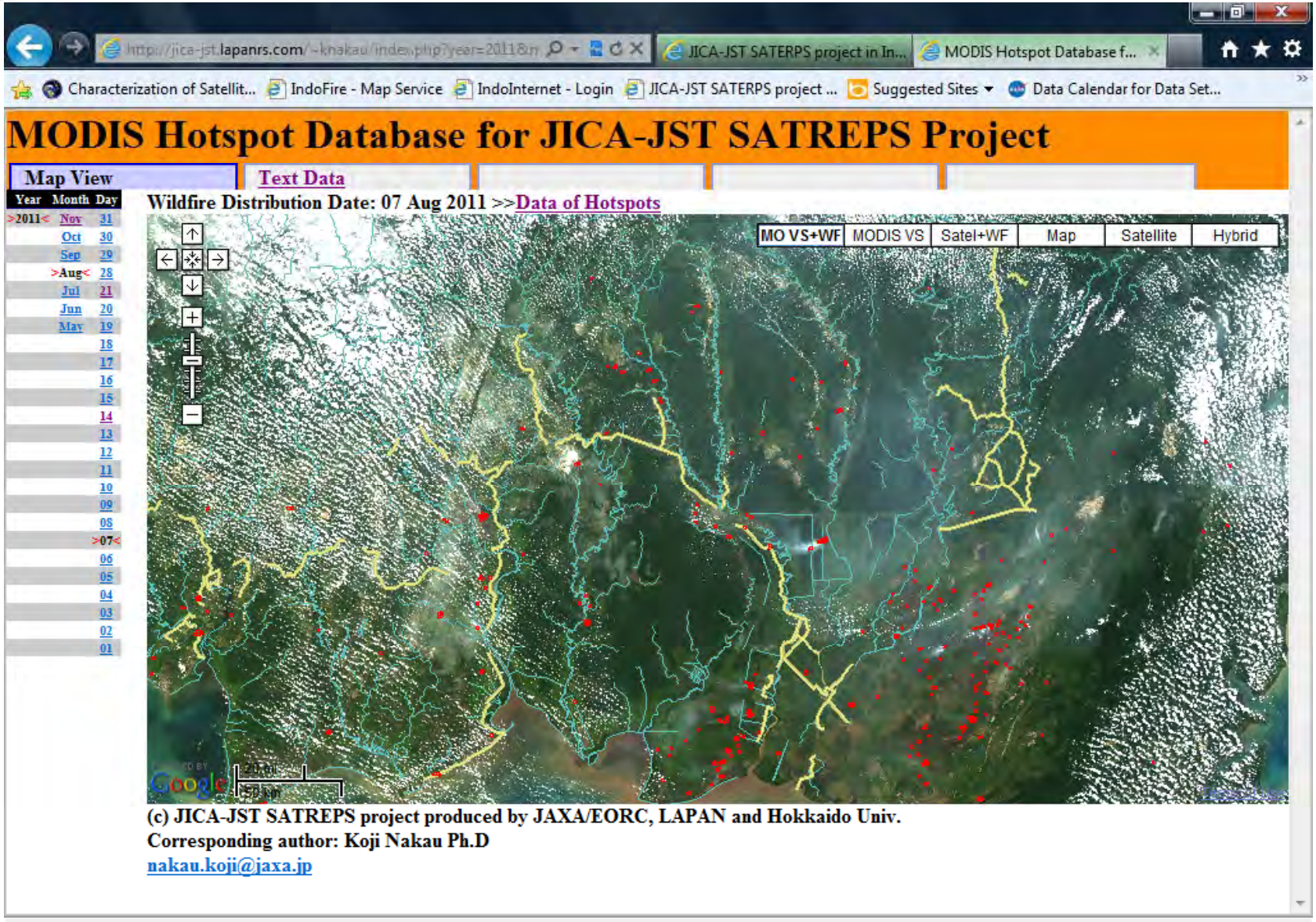


Example of thermography images of flight observation

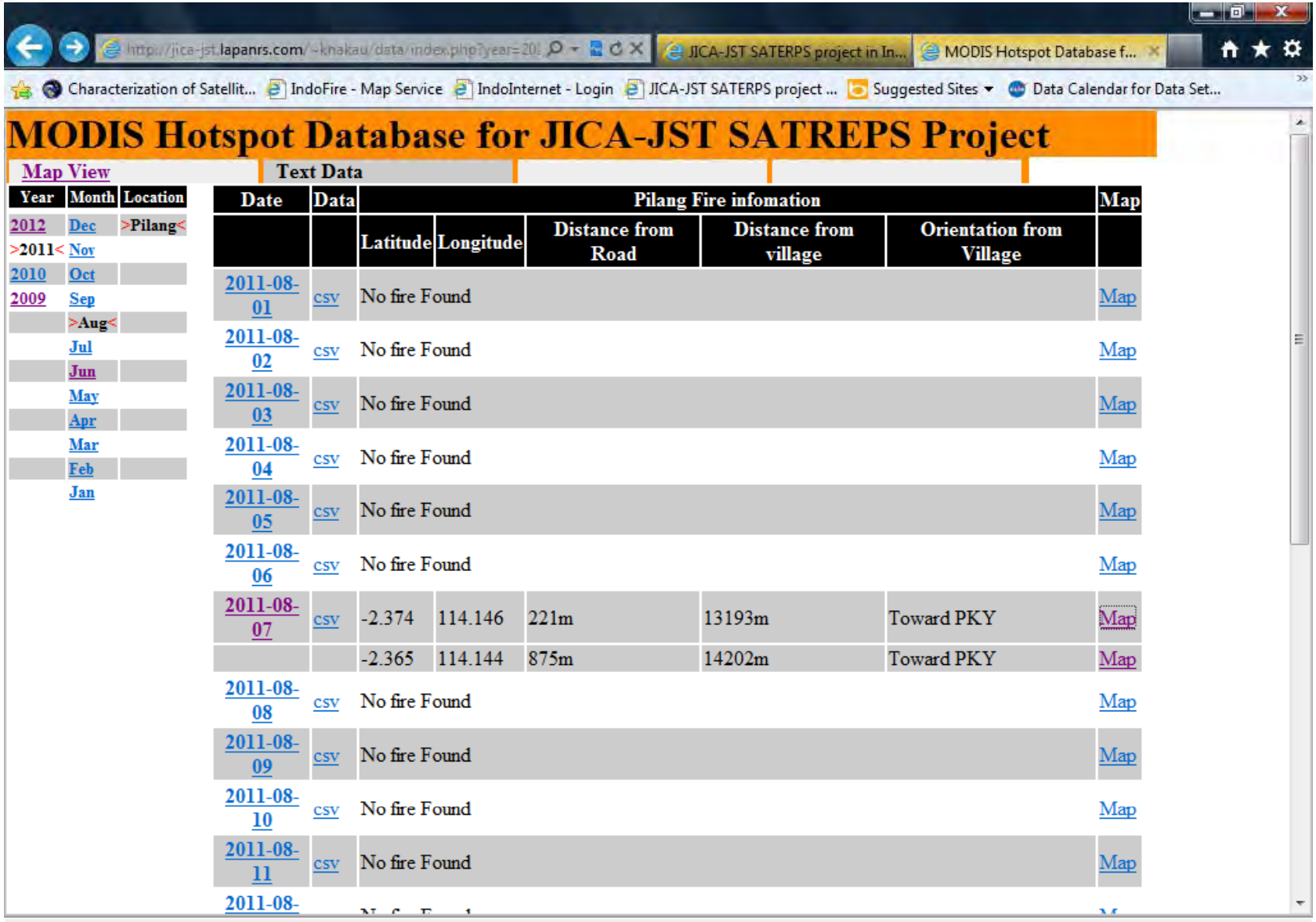
JST-JICA FF Component Website



FF1-1 MODIS Hotspot Database



FF1-1 MODIS Hotspot Database *(cont.)*



JICA-JST SATERPS project in In... | MODIS Hotspot Database f...

Characterization of Satellit... | IndoFire - Map Service | IndoInternet - Login | JICA-JST SATERPS project ... | Suggested Sites | Data Calendar for Data Set...

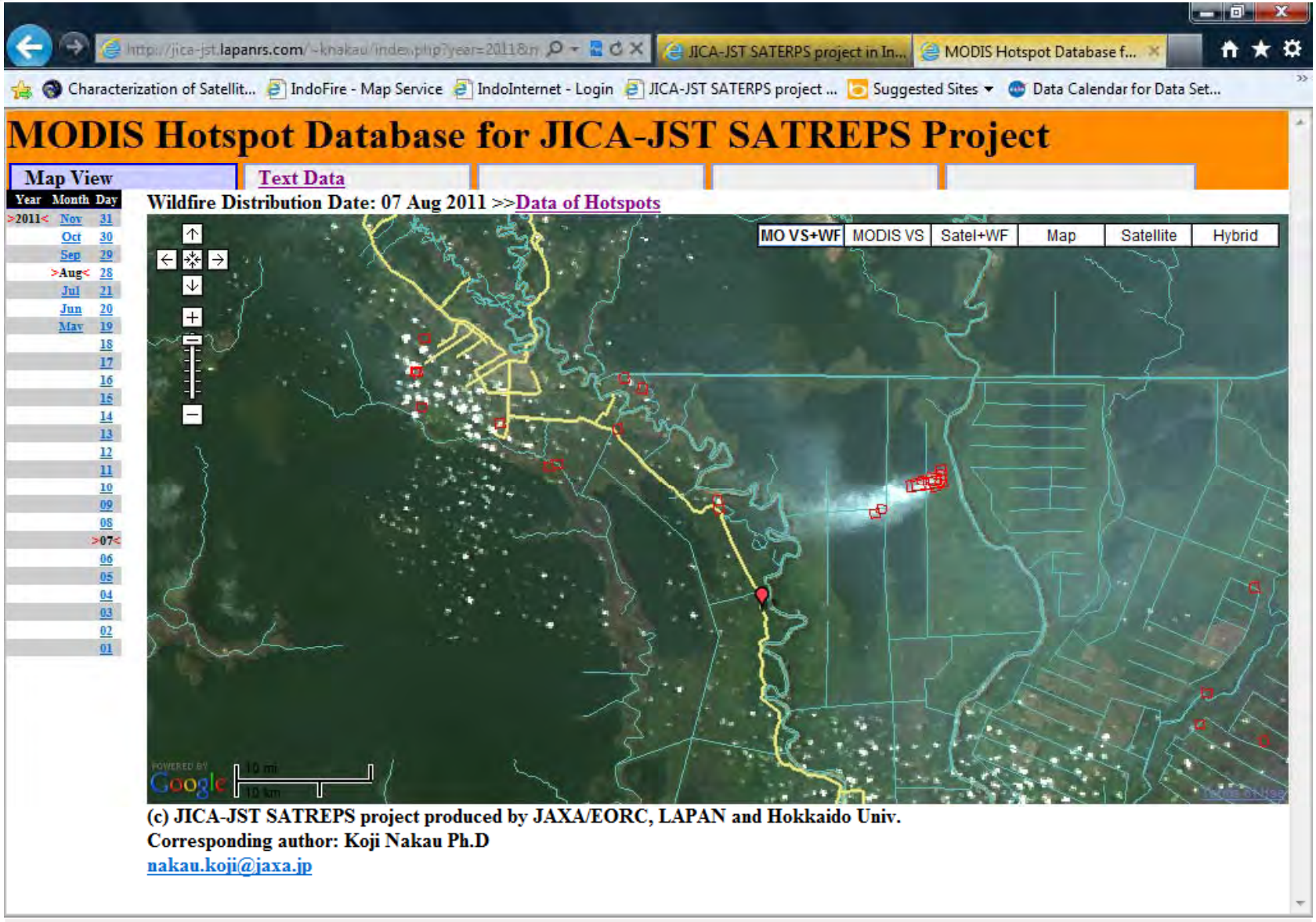
MODIS Hotspot Database for JICA-JST SATREPS Project

Map View | Text Data

Year	Month	Location
2012	Dec	>Pilang<
>2011<	Nov	
2010	Oct	
2009	Sep	
	>Aug<	
	Jul	
	Jun	
	May	
	Apr	
	Mar	
	Feb	
	Jan	

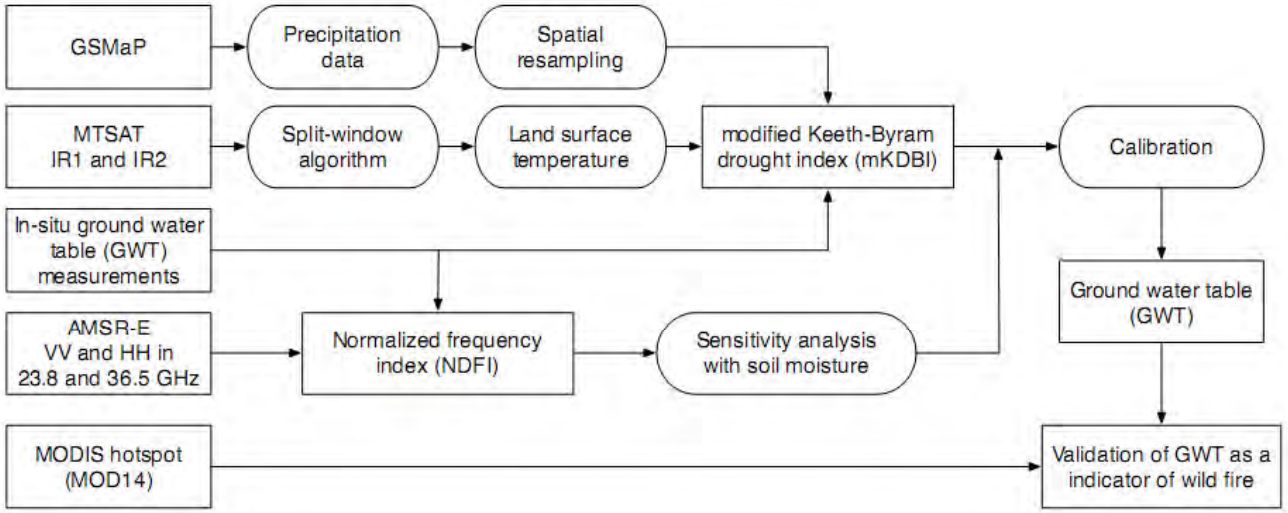
Date	Data	Pilang Fire infomation					Map
		Latitude	Longitude	Distance from Road	Distance from village	Orientation from Village	
2011-08-01	csv	No fire Found					Map
2011-08-02	csv	No fire Found					Map
2011-08-03	csv	No fire Found					Map
2011-08-04	csv	No fire Found					Map
2011-08-05	csv	No fire Found					Map
2011-08-06	csv	No fire Found					Map
2011-08-07	csv	-2.374	114.146	221m	13193m	Toward PKY	Map
		-2.365	114.144	875m	14202m	Toward PKY	Map
2011-08-08	csv	No fire Found					Map
2011-08-09	csv	No fire Found					Map
2011-08-10	csv	No fire Found					Map
2011-08-11	csv	No fire Found					Map
2011-08-							

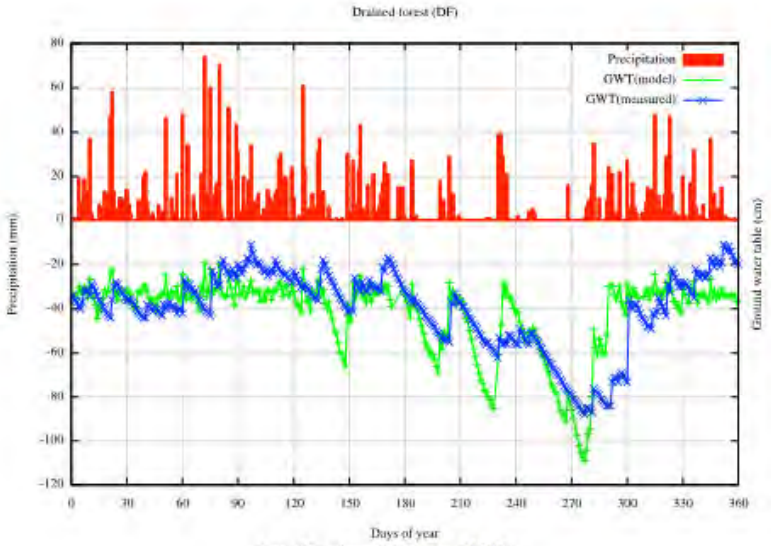
FF1-1 MODIS Hotspot Database *(cont.)*



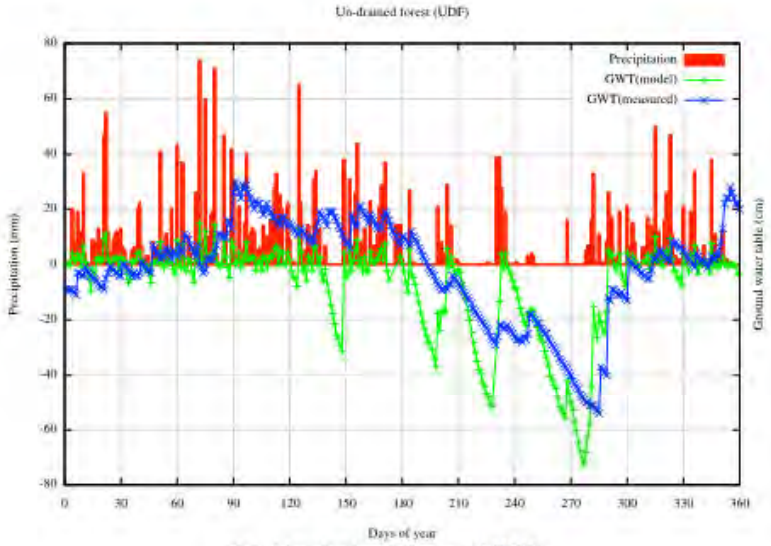
Ground Water Table

Framework of Ground Water Table (GWT) mapping using drought index



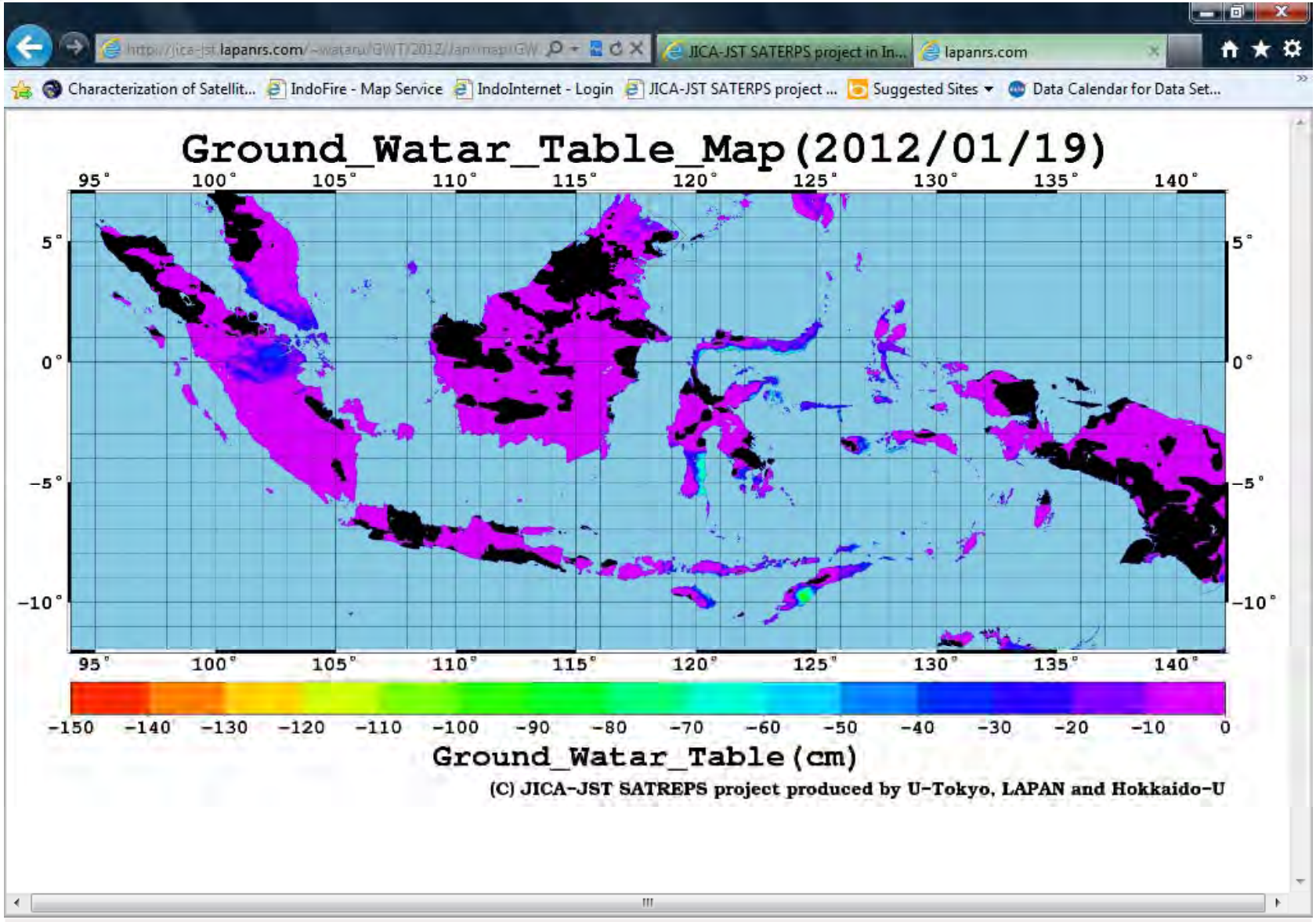


(a) Drained forest (DF)



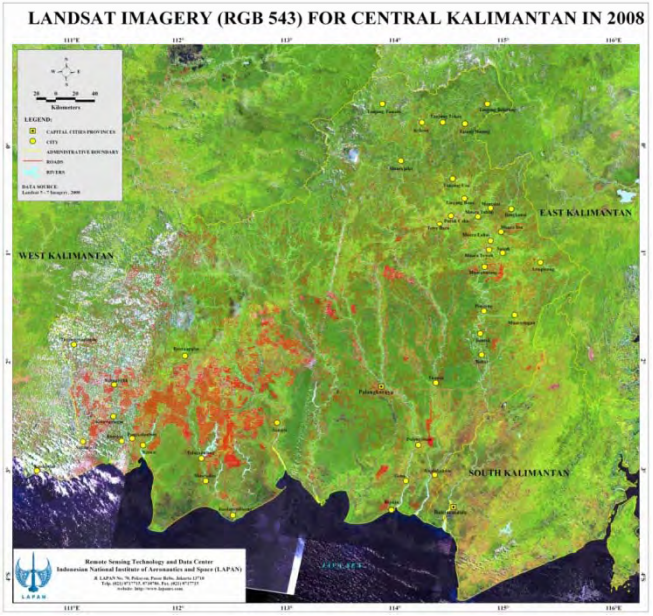
(b) Un-drained forest (UDF)

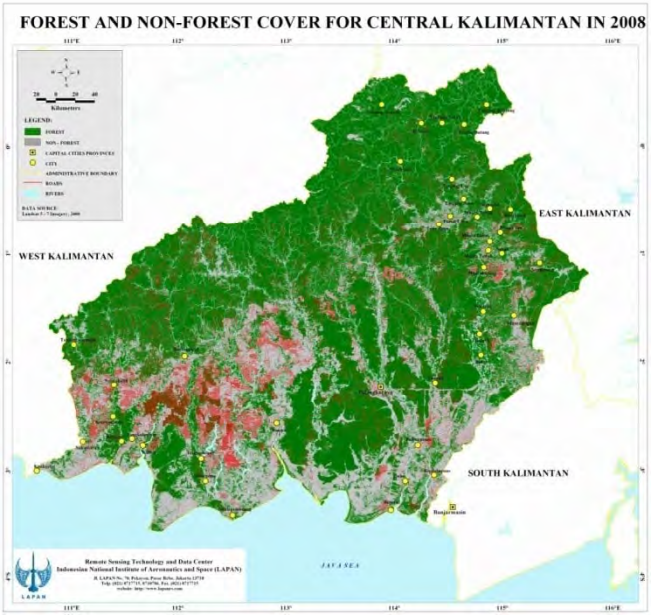
FF1-4 Ground Water Table Database *(cont.)*



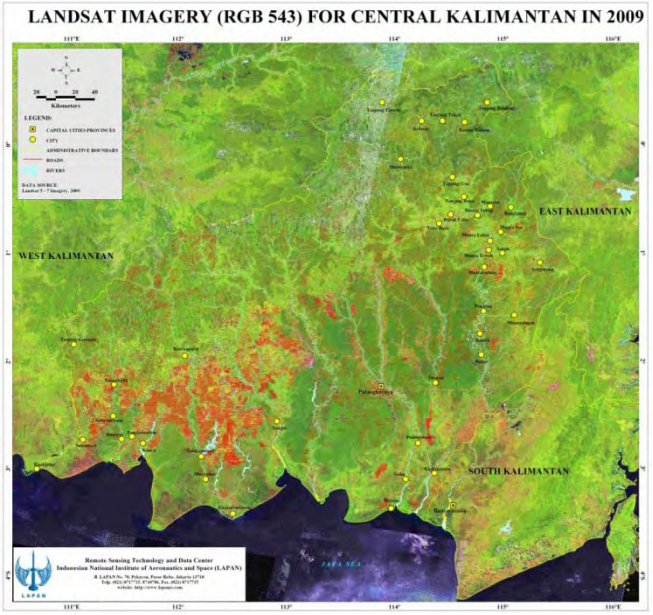
FF-2-1 Land Cover Map

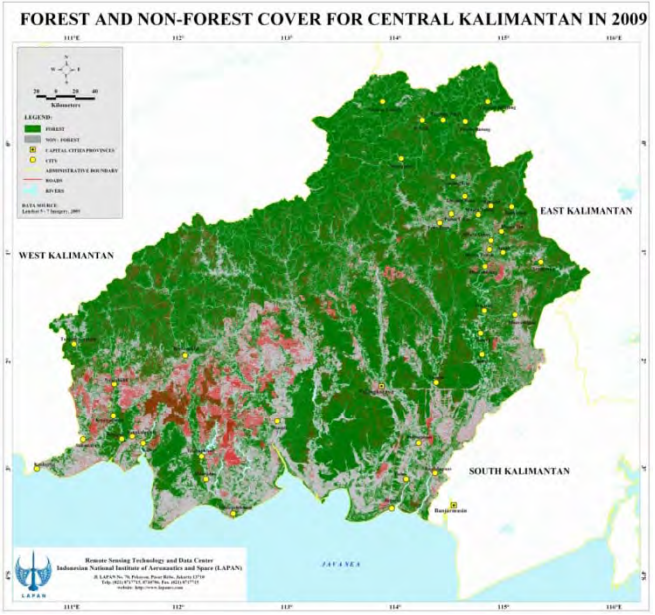
2008





2009



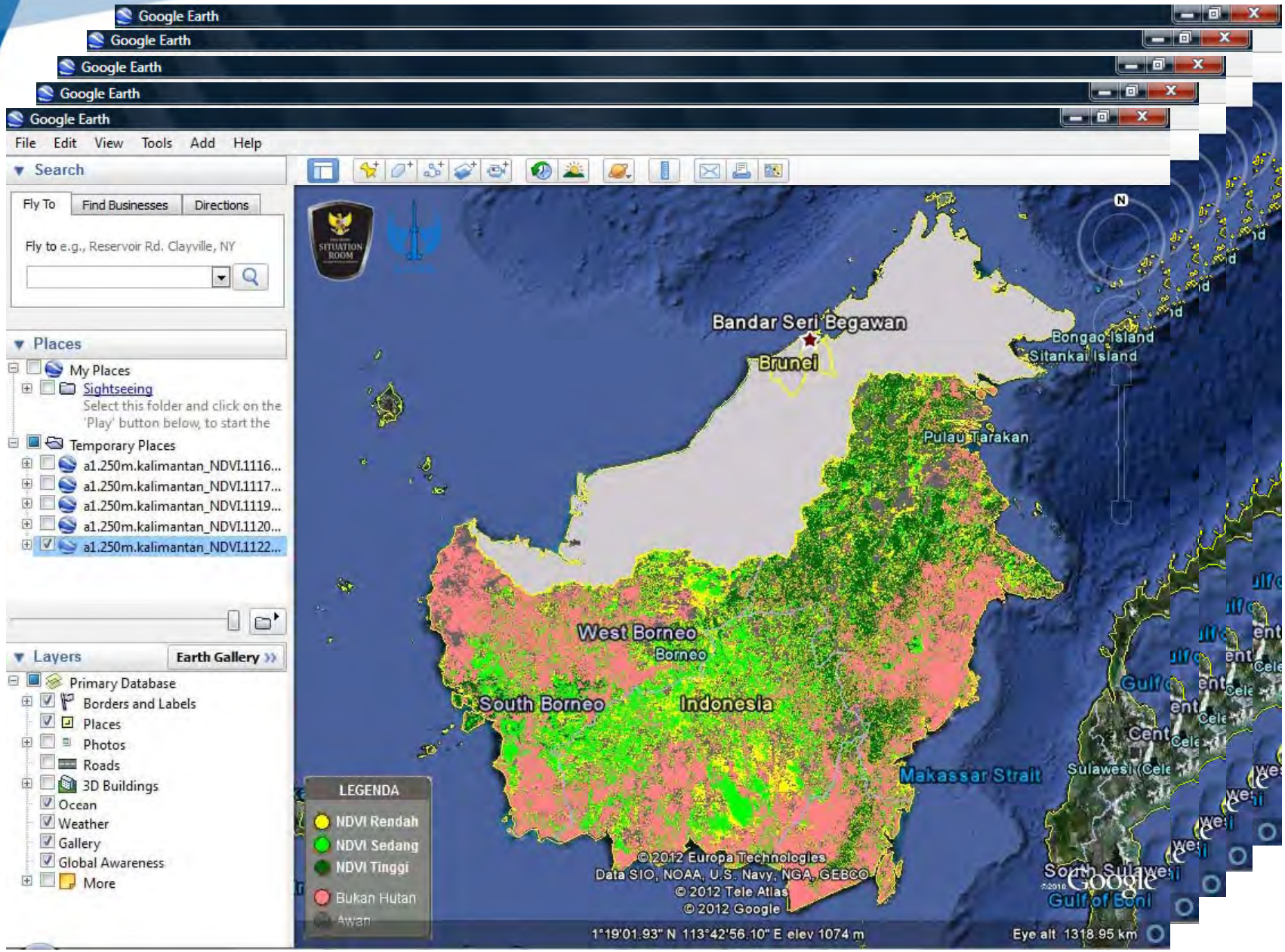


FF-2-1 Land Cover Map *(Cont.)*

Year	Forest area (ha)	Forest area compared with area (%)	Forest change (ha)
2000	9,007,164	58	-
2001	9,047,939	59	40,775
2002	8,971,911	58	-76,028
2003	8,801,951	57	-169,960
2004	8,683,361	56	-118,590
2005	8,625,535	56	-57,826
2006	8,578,507	56	-47,028
2007	8,425,437	55	-153,070
2008	8,390,578	54	-34,859
2009	8,573,513	56	182,935

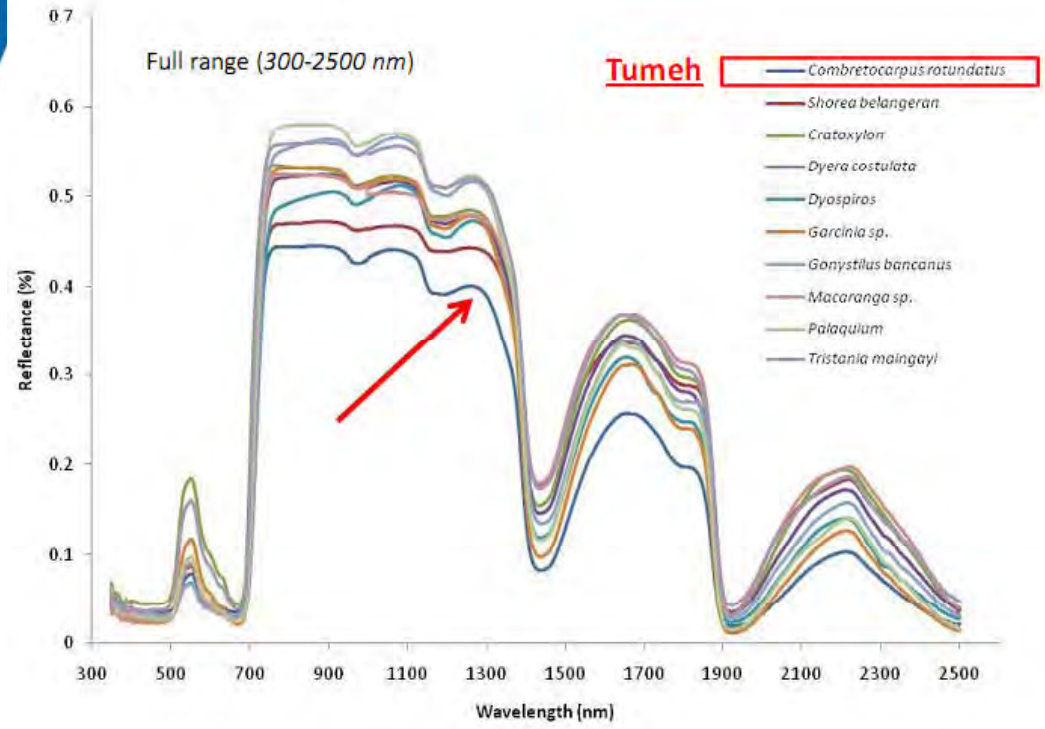
Note: Area of Central Kalimantan was 15,399,228 ha in 2008 (Source: Bakosurtanal)

16-day NDVI (250meter resolution)



FF-2-2 Spectrum Library

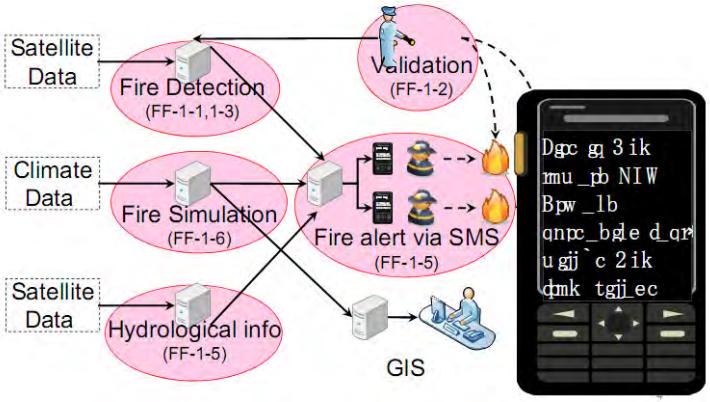
Spectral reflectances from 10 dominant tree species in peat forest

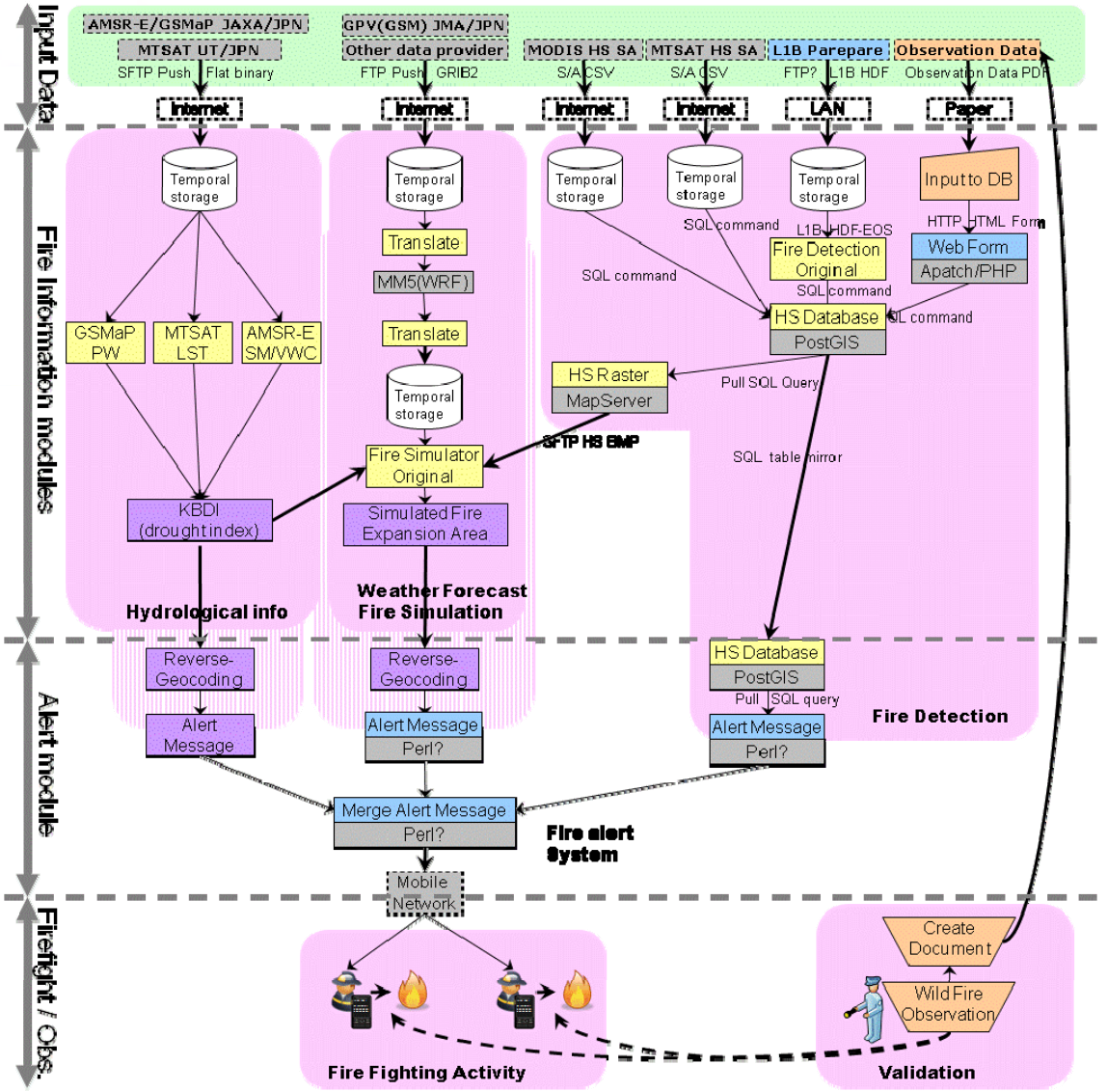


Data collection activities

Future Plan

- Detecting Hotspot
- Hotspot Data Transfer
  - Internet / Sentinel Asia
- Hotspot DB
- Output to SMS service





Thank you