



Wildfire WG

Recent Activities and Agenda

Sentinel Asia Joint Project Team Meeting
2014 Nov 20. Yangon, Myanmar

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Wildfire WG Members



Topics today

- Wildfire distribution (existing satellites)
 - # of fire reduced in Indonesia and Thailand
 - Largest # in Myanmar (future collaboration needed?)
- Importance Fire danger index
- New Satellite data is soon available
- Future agenda

Global Wildfire Distribution



WildFire2014

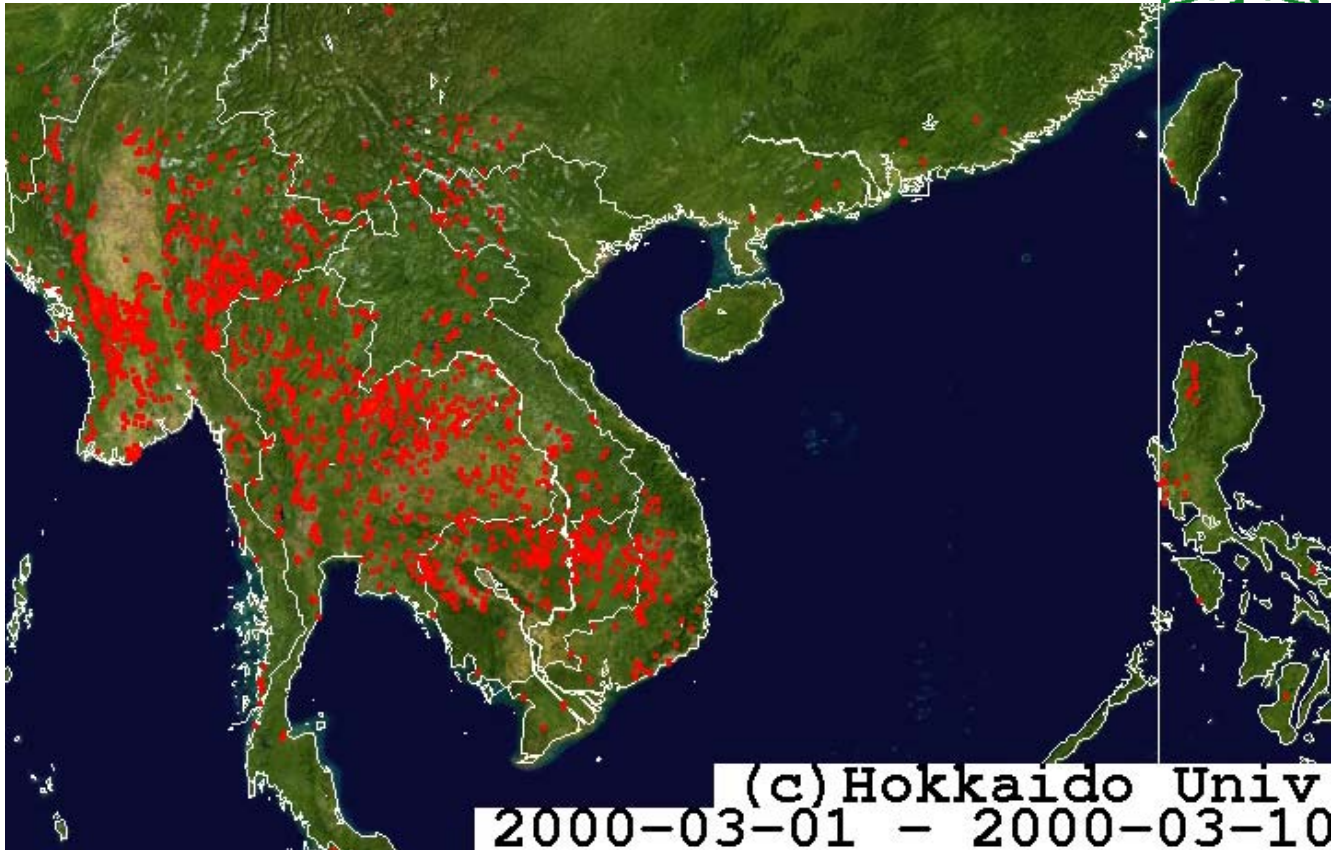
- Wildfire frequently observed in definitive dry seasons
- Wildfire emits CO₂, corresponding ½ to ¼ of CO₂ by fuel combustion
- We need to reduce human induced fire

Asian Wildfire Distribution



- Many human induced fires in Asia
- Statistics by ground observation not available

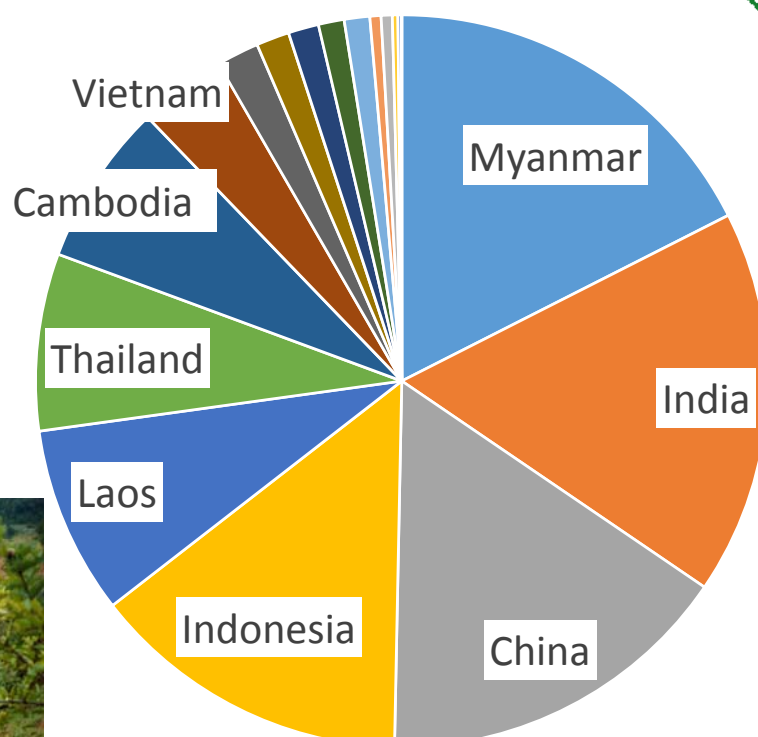
Recent Wildfire in Asia



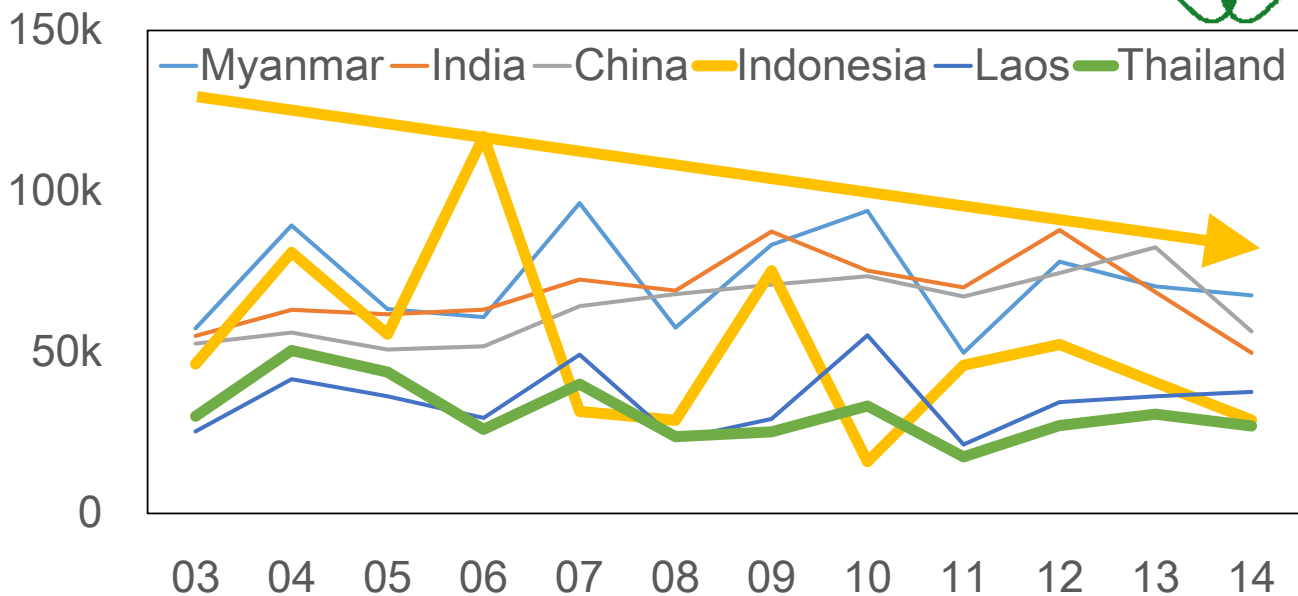
of hotspots in Asian countries



- # of MODIS hotspot (2000Nov-2014Jun)
- Largest number of hotspots detected in Myanmar.
- Slash and burn would be one of the cause of the wildfires
- We, wildfire WG is very happy to discuss what we can do.



Wildfire occurrence in Asia

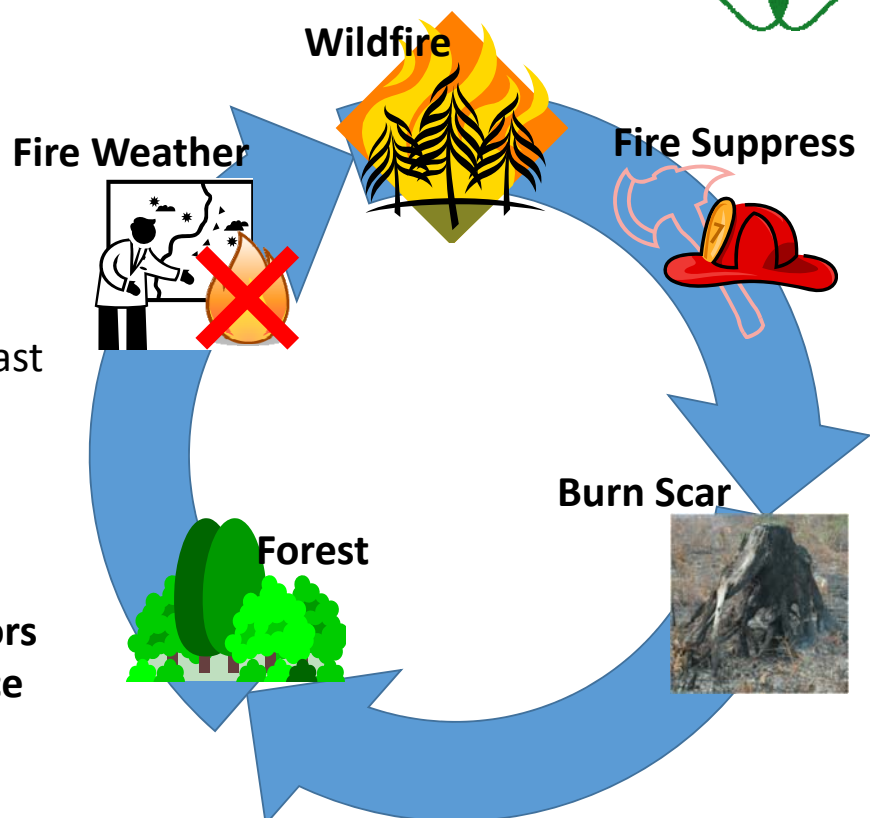


- In Indonesia and Thailand, # of wildfire decreased.
- In Indonesia, SATREPS peat fire monitoring project was held.
- Some portion would be delivered by Sentinel Asia activity.

What we need to do the next



- Current:
 - Fire location
- Next:
 - Fire Weather forecast
 - Fire location
 - Useful Interface
- We need:
 - FDI improvement
 - Fire Monitor Sensors
 - Good User Interface





Fire Danger Index (FDI)

Improvement of “Day length components”

- We find two day length components in FDRS;
 - DMC: Day length factor (Le)
 - Original day length factor is defined by the month.
 - But the day length is different by latitude and day-by-day.
- Day length is calculated by the mesh-points.



Table 1 Day length factors: the value of Le.

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Wagner(1987)	6.5	7.5	9.0	12.8	13.9	13.9	12.4	10.9	9.4	8.0	7.0	6.0
Dowdy et al.(2009)	7.9	8.4	8.9	9.5	9.9	10.2	10.1	9.7	9.1	8.6	8.1	7.8

– DC : Day length adjustment (Lf)

Table 2 Day length adjustment :Lf (Wagner 1987)

Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
-1.6	-1.6	-1.6	0.9	3.8	5.8	6.4	5.0	2.4	2.4	-1.6	-1.6

Fire Danger Index vs. weather model

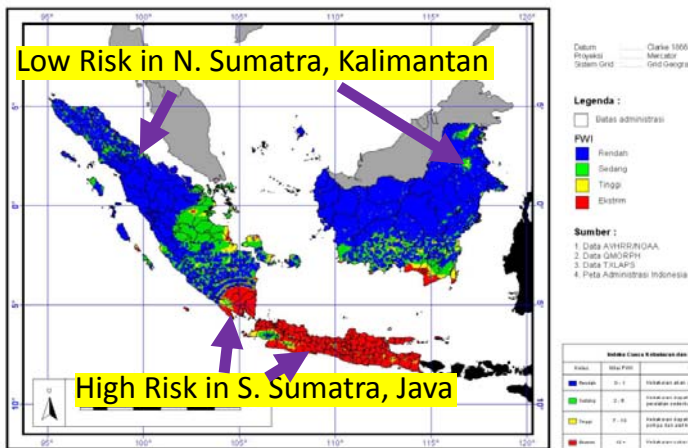


- Weather model also have a surface soil moisture.
- FDI and Weather model shows opposite gradation

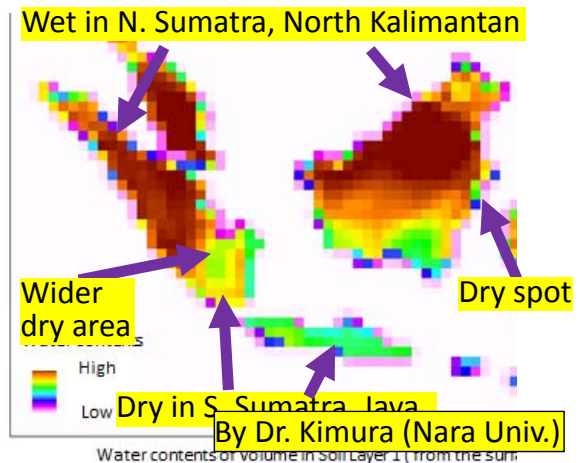
→ Which meets the real hotspots?



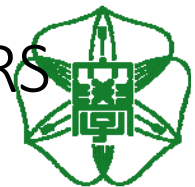
Canadian Fire Danger Index
On 2006 Sep 16 (by LAPAN & MMD)



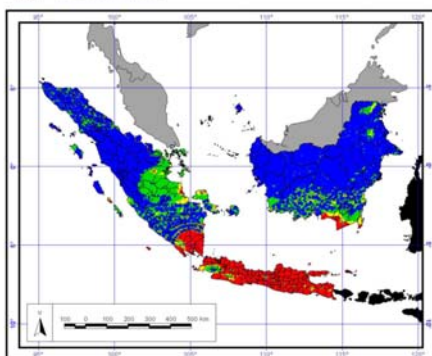
ERA Interim on 2006 Sep 16
Water Contents in Soil layer 1



Estimation and Improvement of FDRS



BIDANG PEMANTAUAN SUMBERDAYA ALAM DAN LINGKUNGAN
Pusat Pengembangan Penelitian dan Teknologi Penginderaan Jauh
Lembaga Penerbangan dan Antariksa Nasional
Jl. LAPAN No. 70, Pondok Pesantren Cipinang, Jakarta 13176, INDONESIA
http://www.lapan.go.id/ISSM/SA



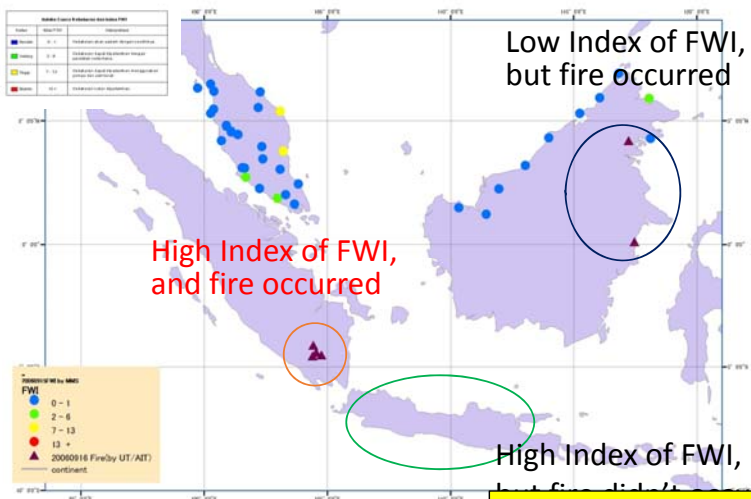
Canadian Fire Danger Index may not suitable to Southeast Asia

Original data:
FWI: LAPAN and MMD
HotSpot: UT / AIT

INDEXES CUACA KEBAKARAN
FIRE WEATHER INDEX
15 September 2006, 05:00 UTC
Berlaku s/d 16 September 2006, 05:00 UTC

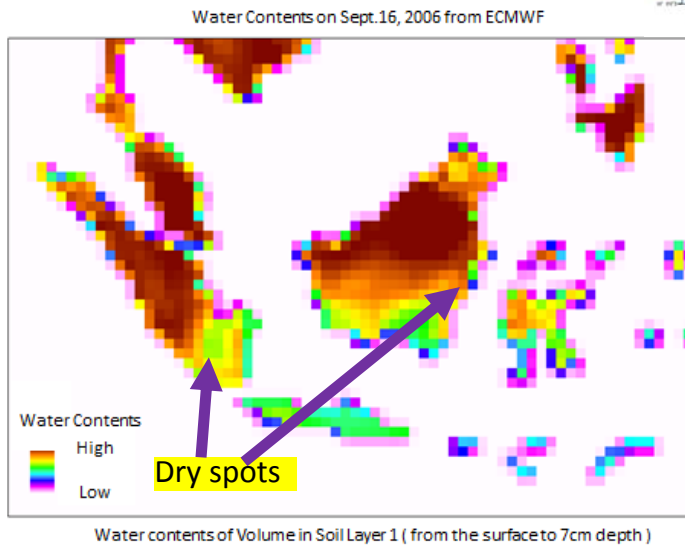
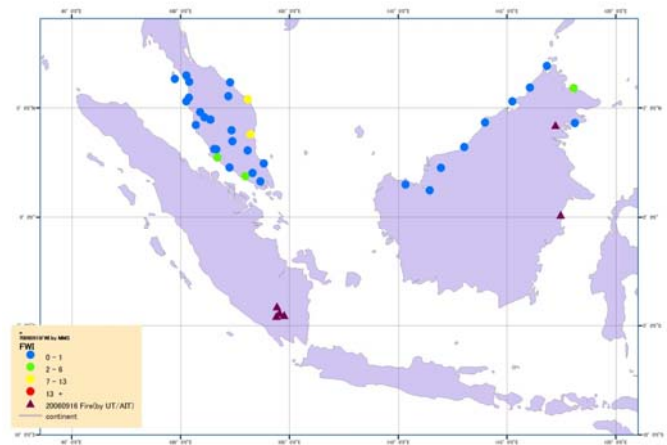


An example of
FWI on 15 September, 2006 and
Hotspot on 16 September, 2006.



By Dr. Kimura (Nara Univ.)

Hotspots compared with Soil water



ECMWF soil water volume level 1
(from 0cm to 7cm depth from surface)
is good correlation with hotspots.

Original data:
Weather: ERA Interim
HotSpot: UT / AIT

By Dr. Kimura (Nara Univ.)

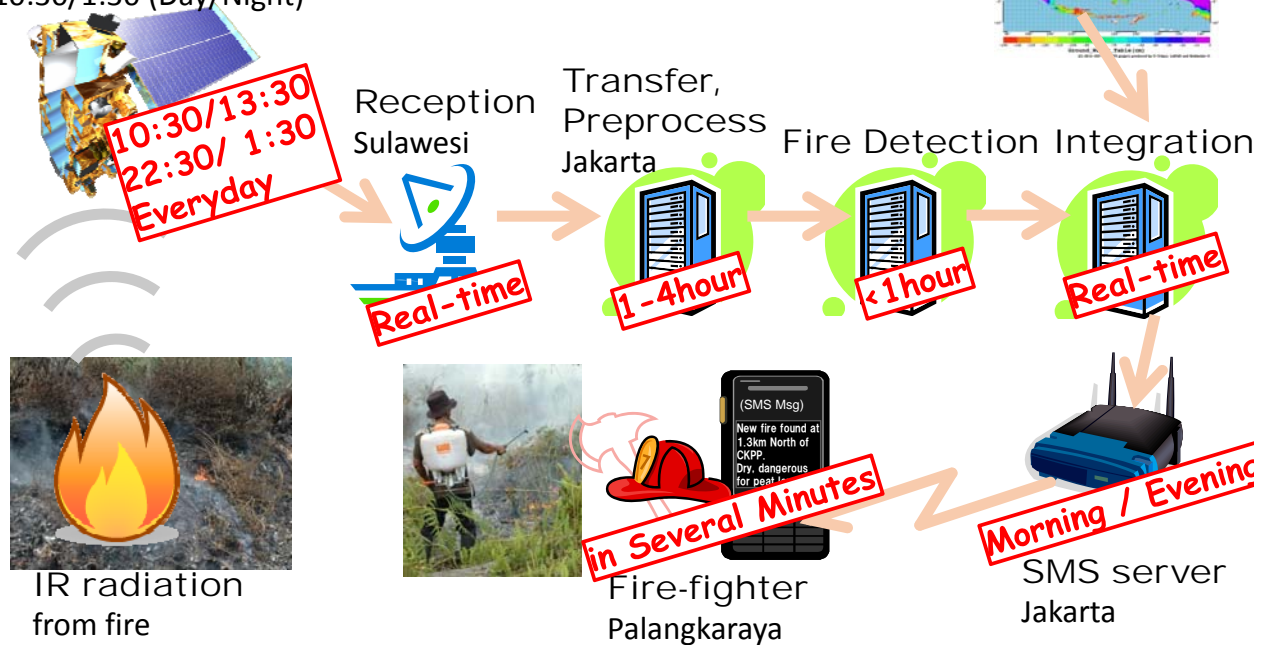


Wildfire Monitoring

Example of activity: SATREPS peat fire monitoring

Satellite observation
Currently, NASA's satellite
10:30/1:30 (Day/Night)

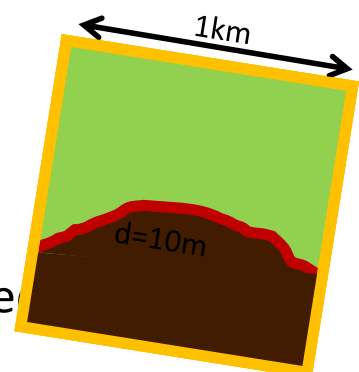
Soil-moisture
Tokyo



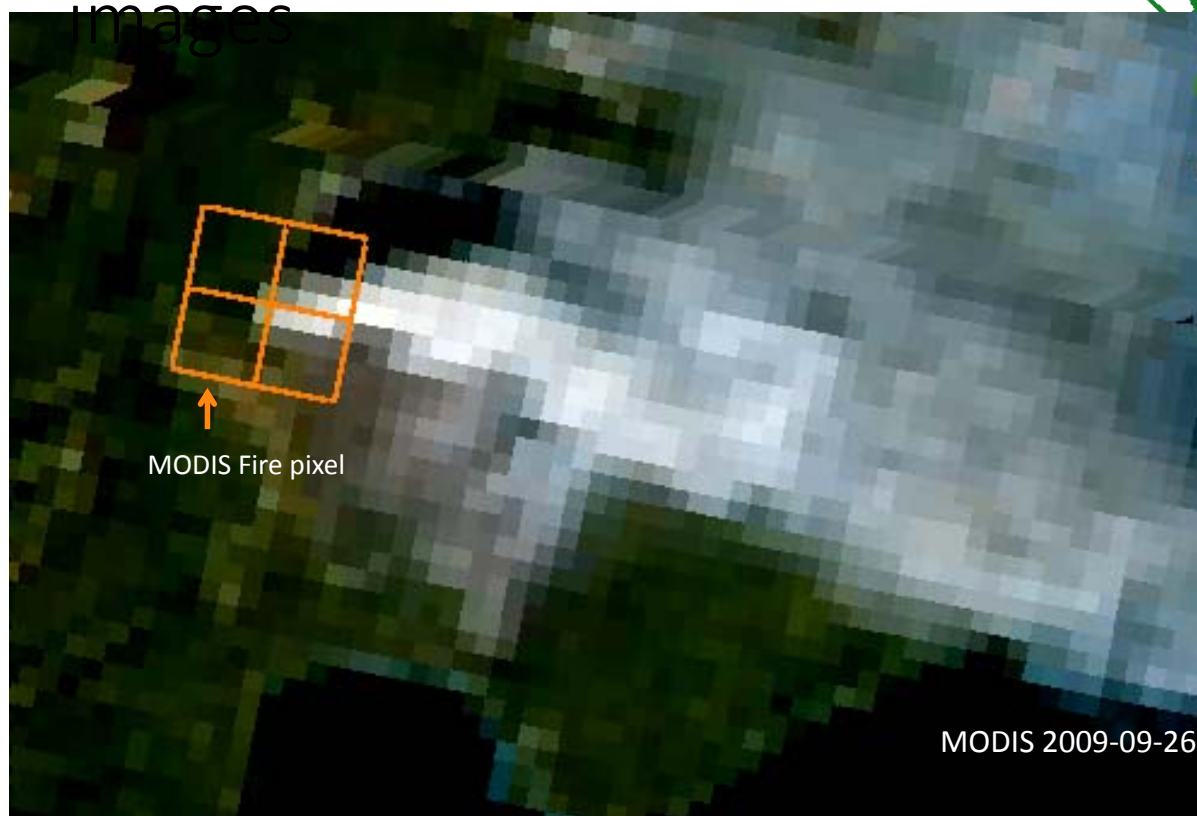
Wildfire observation from space



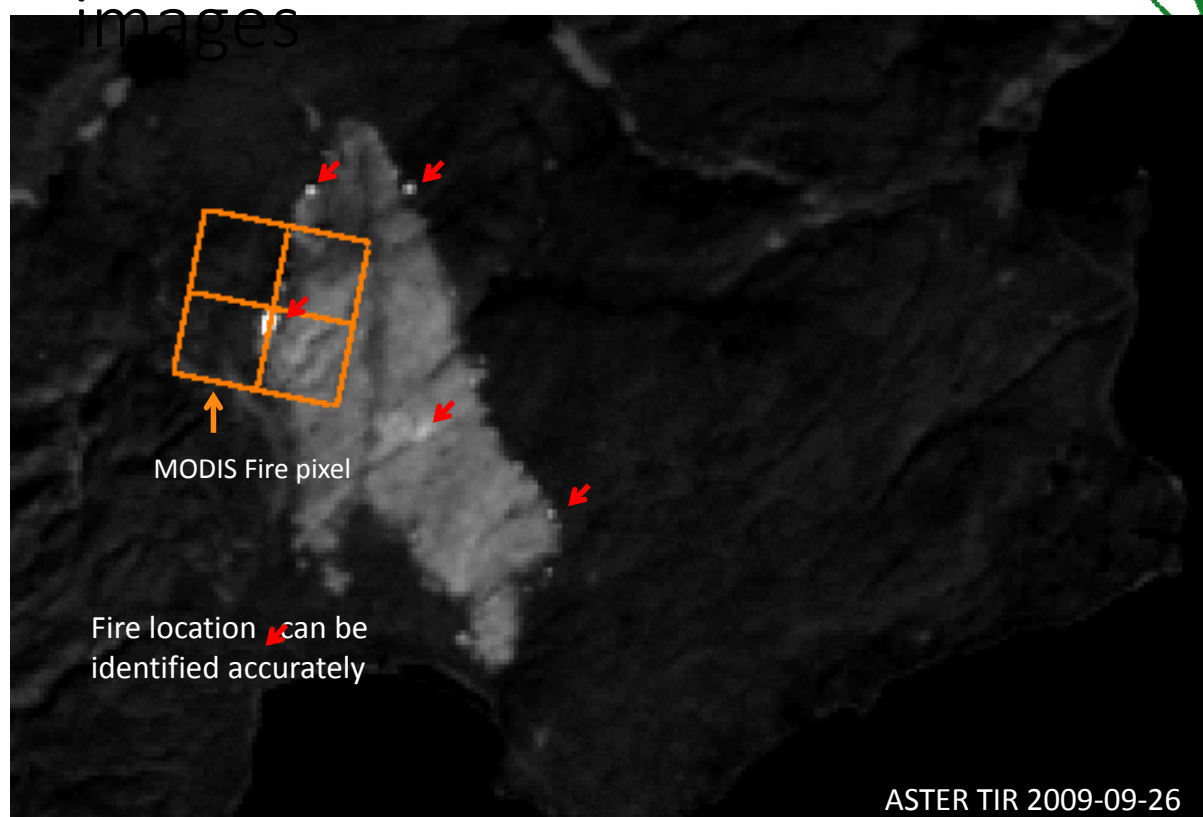
- Hotspot pixel is "Mixcell" of fire and non-fire area
 - Fire location in a pixel is "unknown"
 - Only 0.1 – 10% is filled by fire
- Apparent temperature rise are limited
 - ΔT is 5-20K in TIR, 5-200K in $4\mu m$
- High resolution & better wavelength nee



Advantage of mid-high res IR images



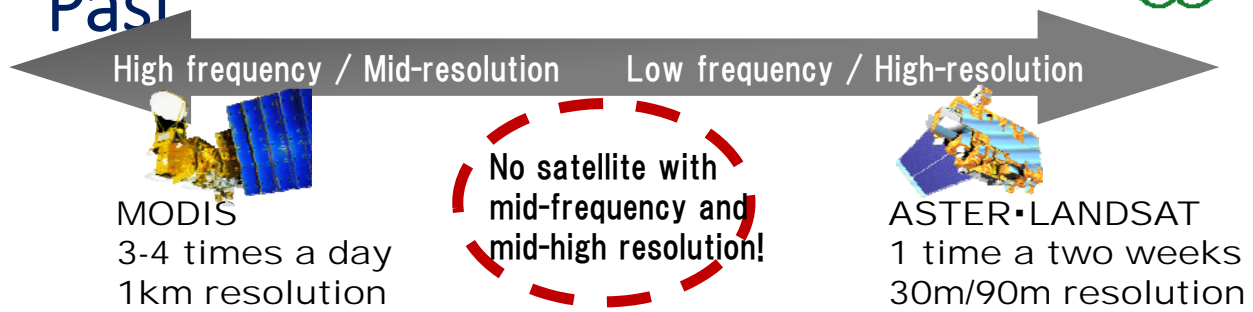
Advantage of mid-high res IR images



Satellites for Wildfire Monitoring

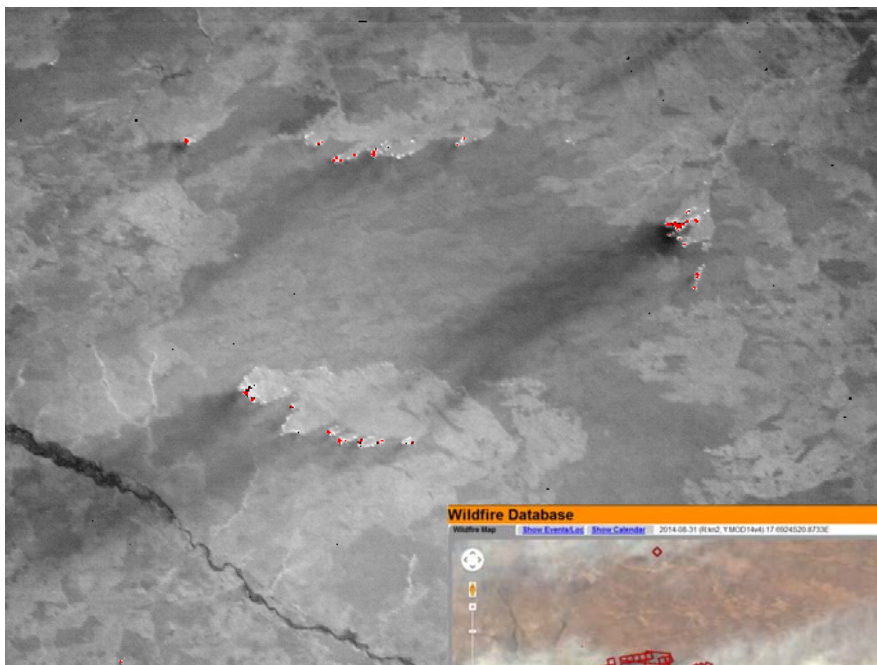


Past



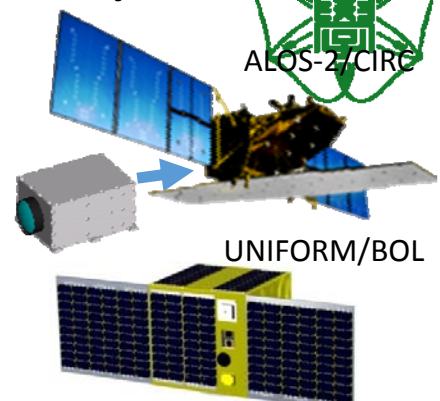
- Wildfire **expands everyday** → **Once a day** is important
- Suppression **by human** → **Location accuracy** important

• .

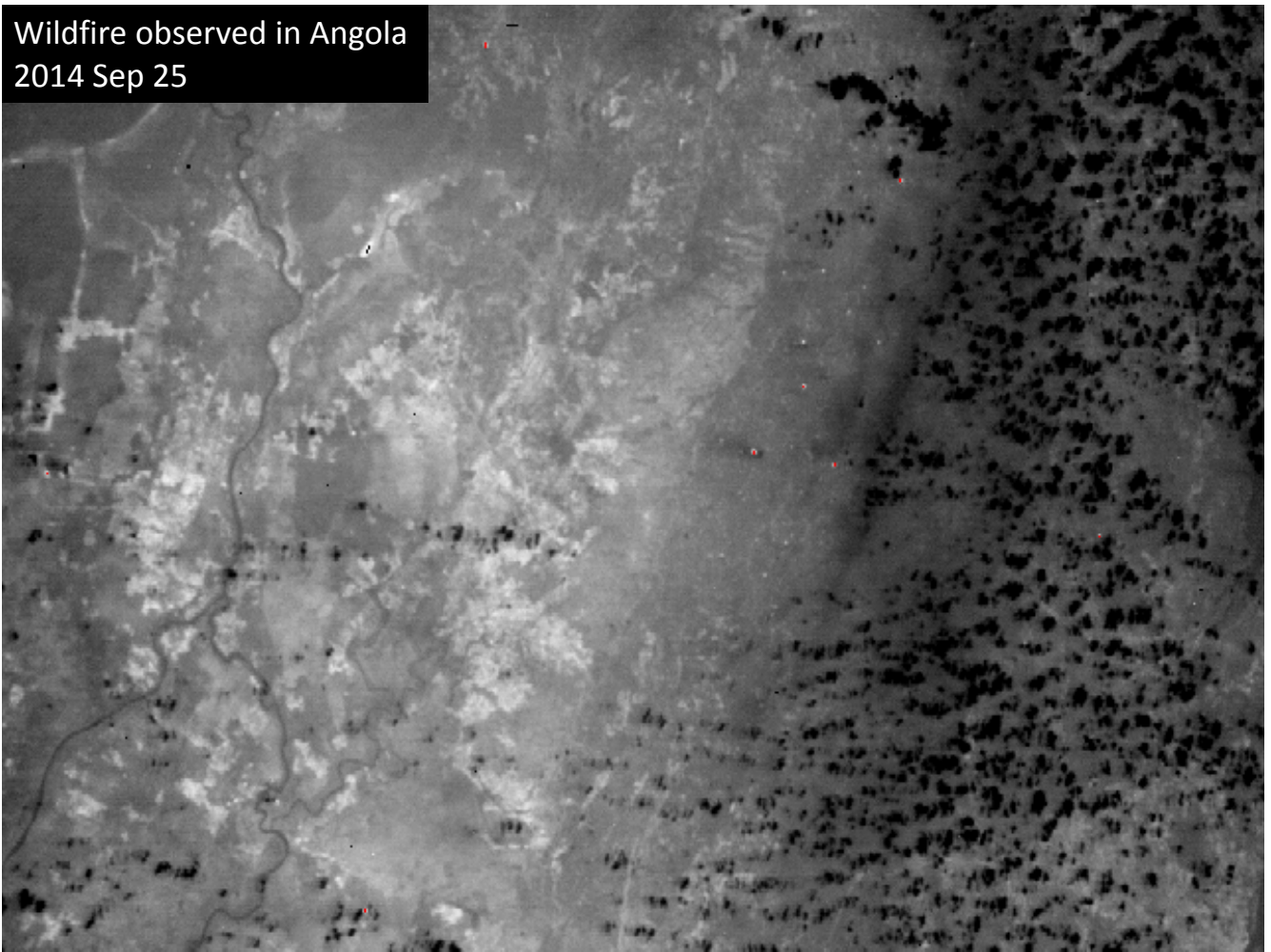


Wildfire observed in Angola
2014 Aug 31

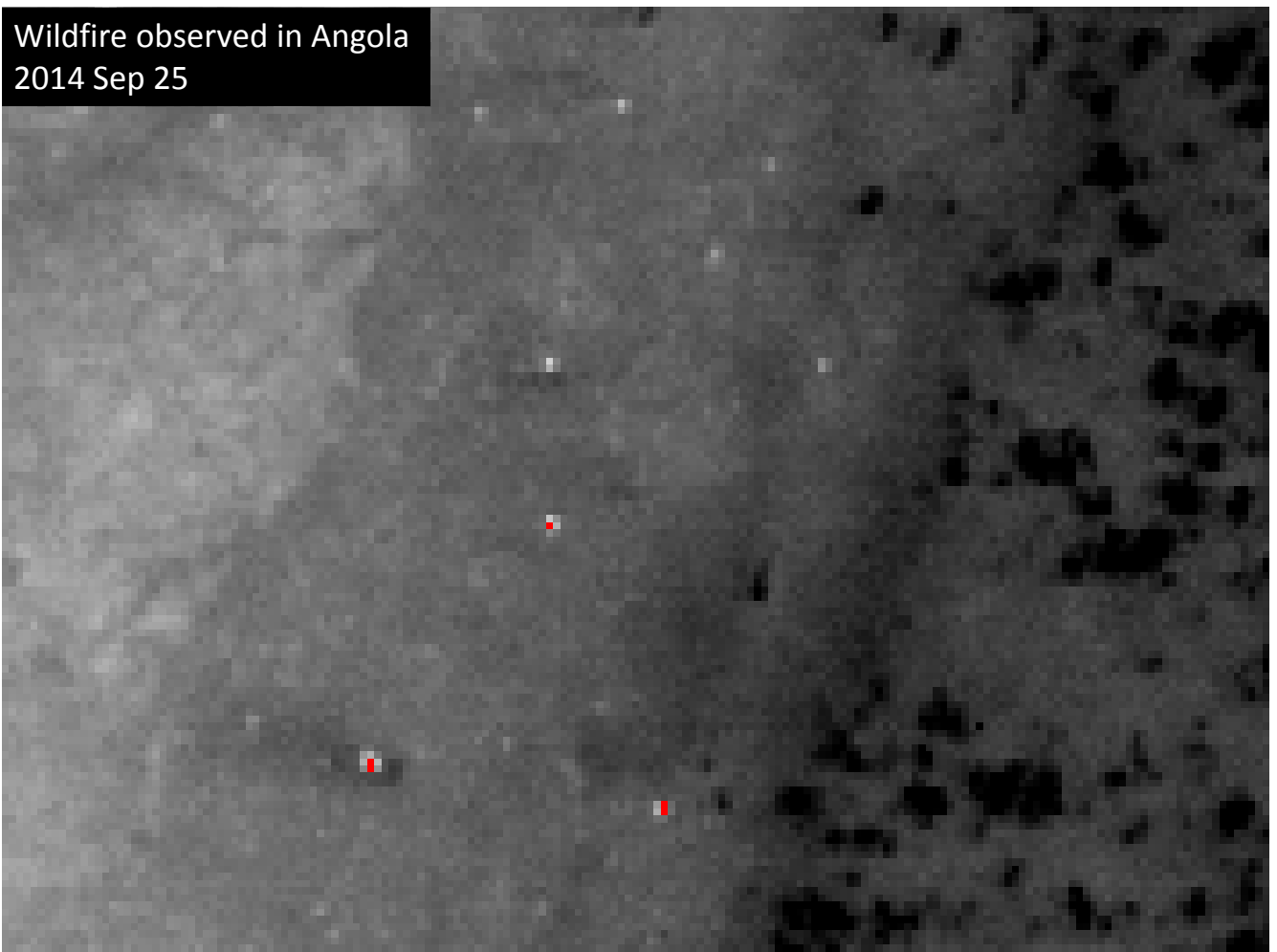
Two sensors launched
in May



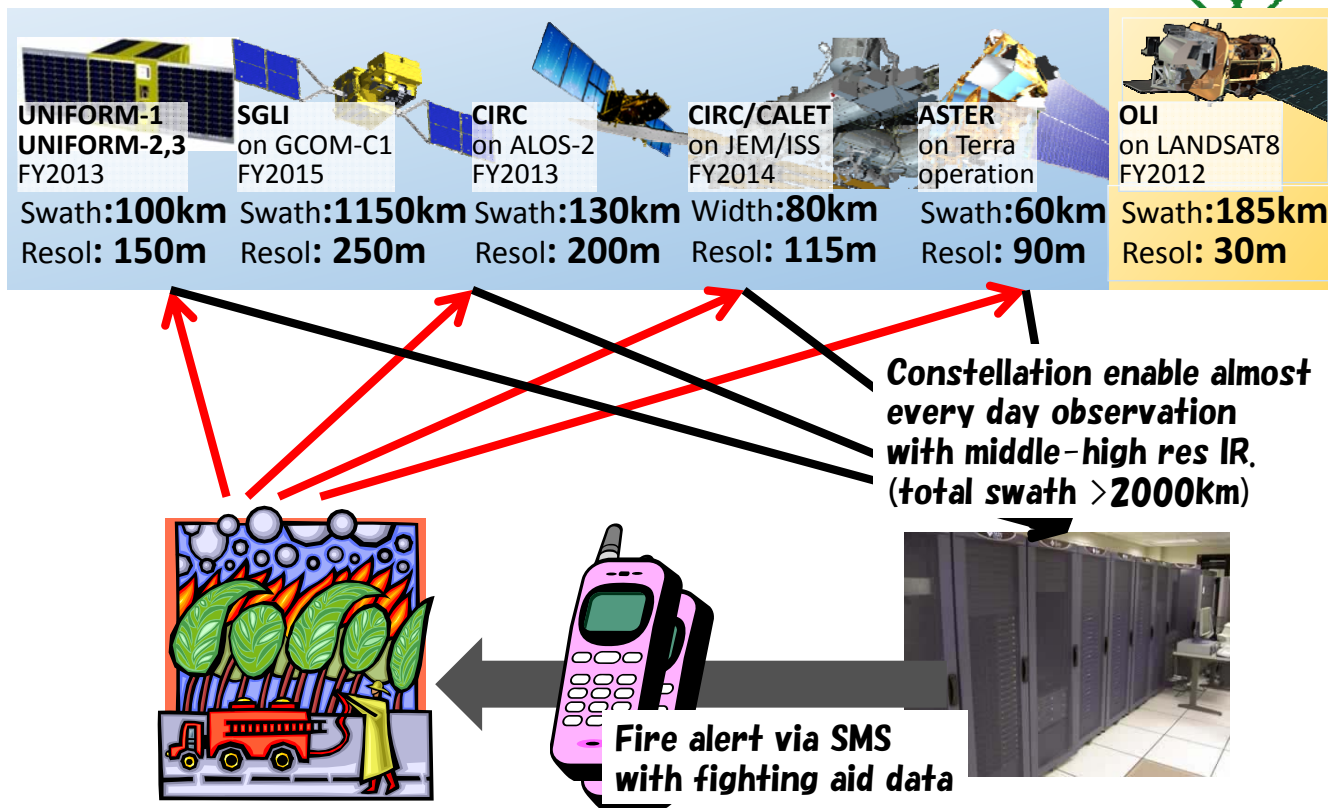
Wildfire observed in Angola
2014 Sep 25



Wildfire observed in Angola
2014 Sep 25



Fire monitoring with multi satellites



New Japanese satellites for wildfire



	Launch year	Sensor	Satellite	4-1.6 μ	11 μ m	Swath	Interval
Mid res.	Operational (1998)	MODIS	Terra	1km	1km	2330km	0.5d
	Operational (2002)	MODIS	Aqua	1km	1km	2330km	0.5d
	Operational (2010)	VIIRS	NPP	750m	750m	3000km	0.5d
High res (Interval 0.7day)	Operational (1999)	ETM+	LANDSAT 7	---	60m	185km	16d
	Operational (1998)	ASTER	Terra	---	90m	60km	48d
	Operational (2013)	OLI/TIRS	LANDSAT 8	30m	100m	185km	16d
	Launched	CIRC	ALOS 2	---	200m	130km	7d
	Launched	BOL	UNIFORM1	---	150m	100km	7d
	2014-	CIRC	JEM/CALET	---	120m	70km	7d
	2015- BOL	UNIFORM2	---	---	150m	100km	7d
	2016-	SGLI	GCOM-C1	250m	250m	1150km	1.5d
	2015-	BOL	UNIFORM3	---	150m	100km	7d

Image available once a 3 days with determined launch schedule

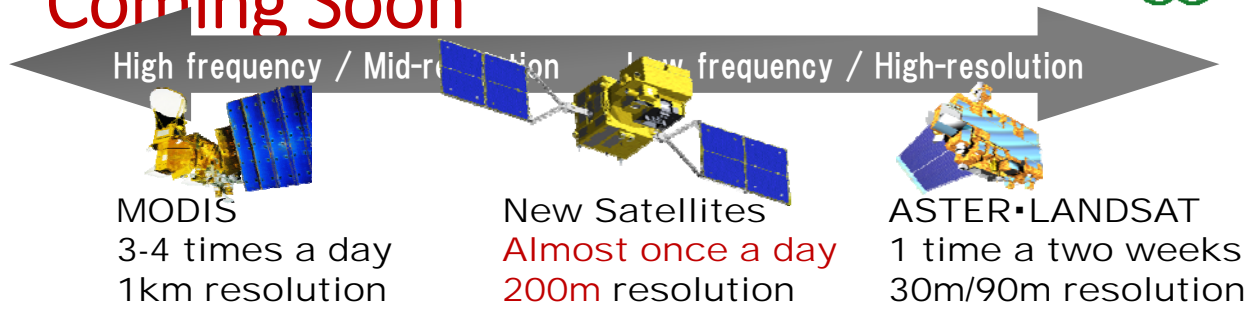
At **Image available Everyday when all planned satellites launched**

Wildfire will be observed once a two to three days.

3 high resolution IR sensors among 5 are Japanese.

Satellites for Wildfire Monitoring

Coming Soon



- Wildfire **expands everyday** → **Once a day** is important
- Suppression **by human** → **Location accuracy** important
- New satellites observes TIR/MIR with **100-250m resolution once a day**

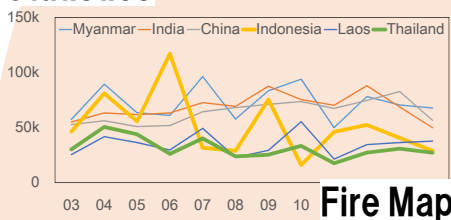


Sharing with organization is easier

Discussions to sharing information

- Who should be informed?
- What is the best media?

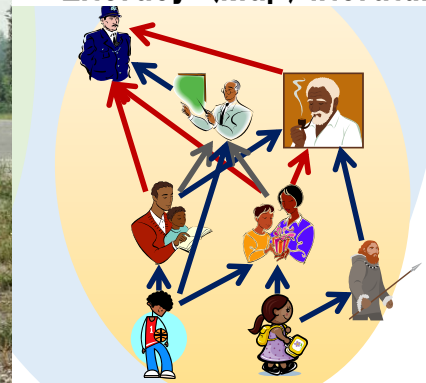
Statistics



Notification of Danger -



Structure of community
- Literacy (Map/literature)





Summary and Agenda

- Summary / lesson learned
 - Wildfire decrease in Thailand & Indonesia.
 - Integration of fire location & fire danger in SATREPS
 - Canadian FDI is not fit in Asia → Improvement started
 - Only data provider/analysis joined to WG
- Agenda
 - More collaboration with data user nodes
 - Especially with Myanmar and Indonesia for many fires
 - We want to discuss to fit collaborate with your country
 - Japan will continue to develop more IR sensors (next speech).
 - Hokkaido Univ. is happy to collaborate for you to develop microsatellite to monitor disasters.
 - May we ask JAXA to hold a new data integration system?



Thank you for your attention

We are happy to contact with you.

Koji Nakau

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