Data Provider Node – Activities Report

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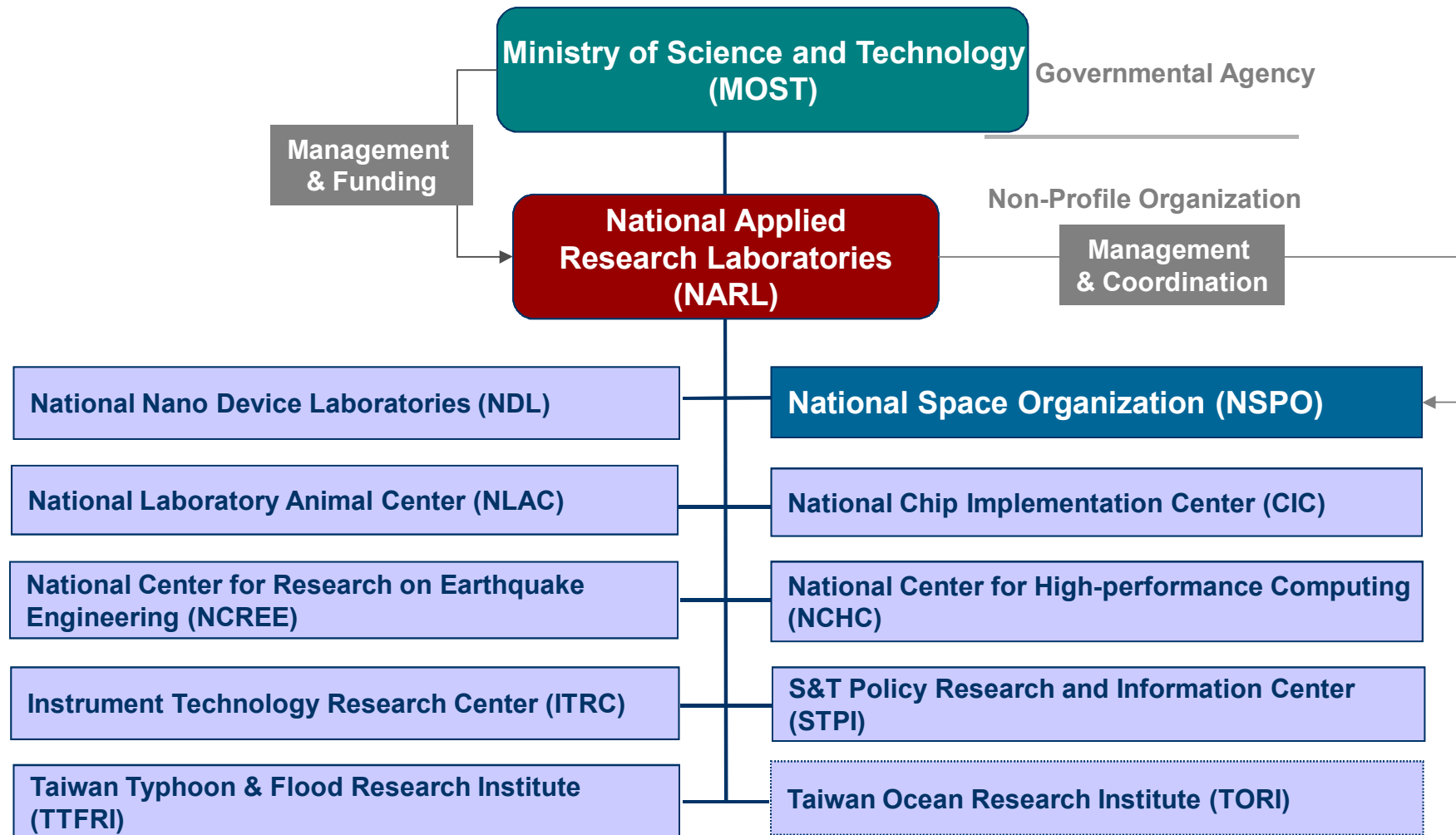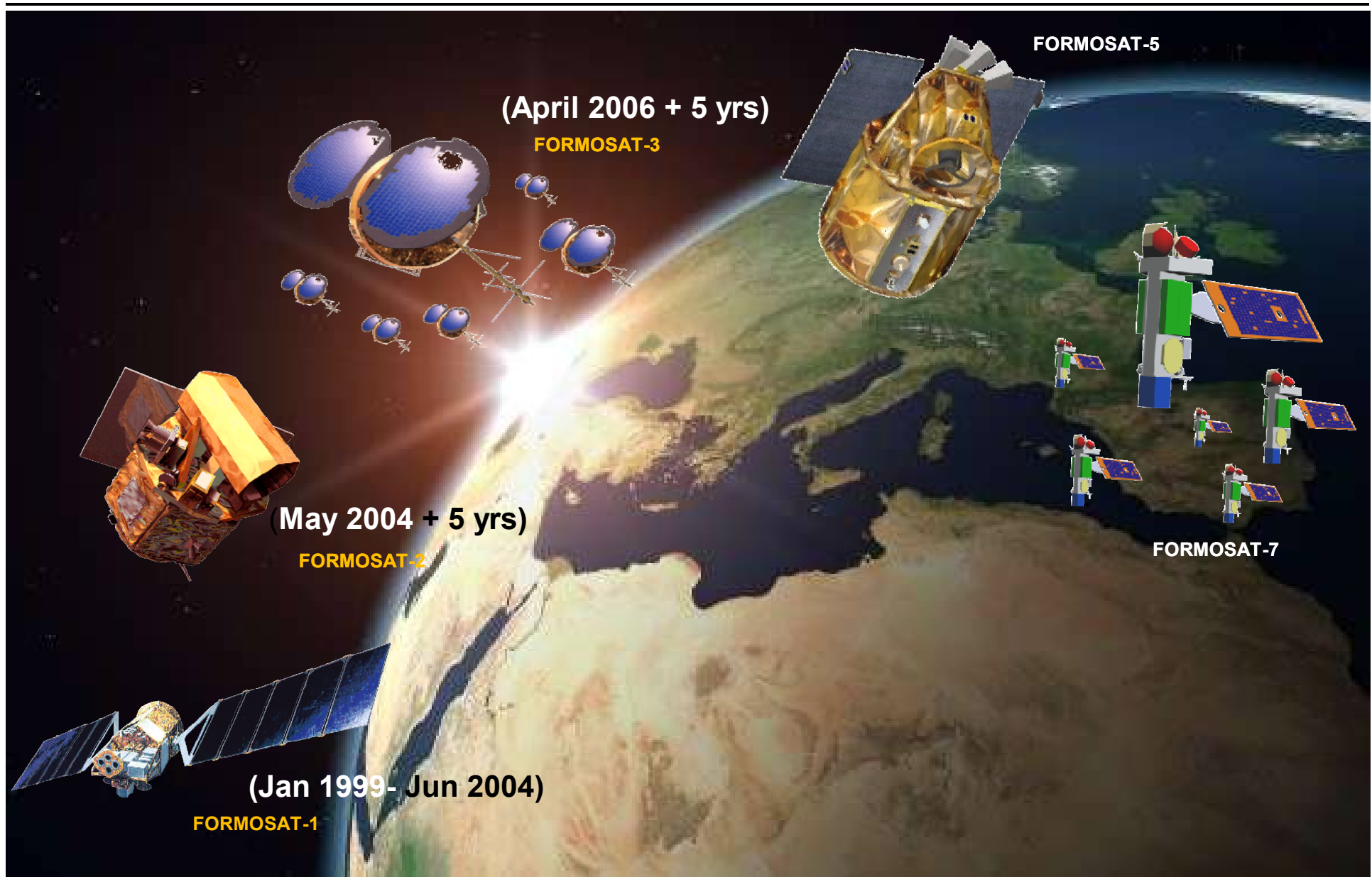www.narlabs.org.tw

About Us

www.narlabs.org.tw

Organization

NARLabs

Commitment · Passion · Innovation

Ministry of Science and Technology (MOST)

Governmental Agency

Management & Funding

National Applied Research Laboratories (NARL)

Non-Profile Organization

Management & Coordination

National Nano Device Laboratories (NDL)

National Space Organization (NSPO)

National Laboratory Animal Center (NLAC)

National Chip Implementation Center (CIC)

National Center for Research on Earthquake Engineering (NCREE)

National Center for High-performance Computing (NCHC)

Instrument Technology Research Center (ITRC)

S&T Policy Research and Information Center (STPI)

Taiwan Typhoon & Flood Research Institute (TTFRI)

Taiwan Ocean Research Institute (TORI)

FORMOSAT Programs

NARLabs

FORMOSAT-5

(April 2006 + 5 yrs)
FORMOSAT-3

FORMOSAT-7

(May 2004 + 5 yrs)
FORMOSAT-2

(Jan 1999- Jun 2004)
FORMOSAT-1

Satellite Programs

The 2ⁿᵈ Phase Taiwan's Space Program Plan

2004   2010   2016   2018

Self-reliant Spacecraft and Optic-Electric Remote Sensing Instrument Development

FORMOSAT-2

Remote Sensing Satellite Program

FORMOSAT-5

(Target Launch Date: 2016)

FORMOSAT-5 Follow-on (FORMOSAT-8)

Earth Observations

- EV Monitoring
- Disaster Support
- Data Applications

GNSS RO Spacecraft and Constellation Operations Development

FORMOSAT-3

FORMOSAT-7

2016
1ˢᵗ Set Launch

2018
2ⁿᵈ Set Launch

Atmospheric Soundings

- Weather Predication
- Climate Research
- Space Weather

FORMOSAT-5 Specification

Key Parameter	Specification
Orbit	SSO @ 720km/98.28°
Revisit Period	2 days
Mission Life	5 years
GSD	PAN (2m) / MS (4m)
Swath	24 km
Spectral Bands	PAN + 4MS
RSI Image Sensor	CMOS Image Sensor
RSI duty Cycle	8%
Satellite Weight	525 kg

FORMOSAT-5 Ready for Launch
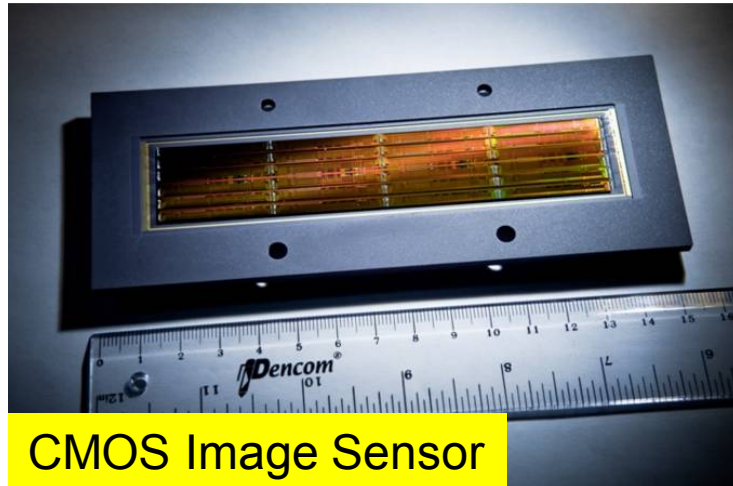
CMOS Image Sensor
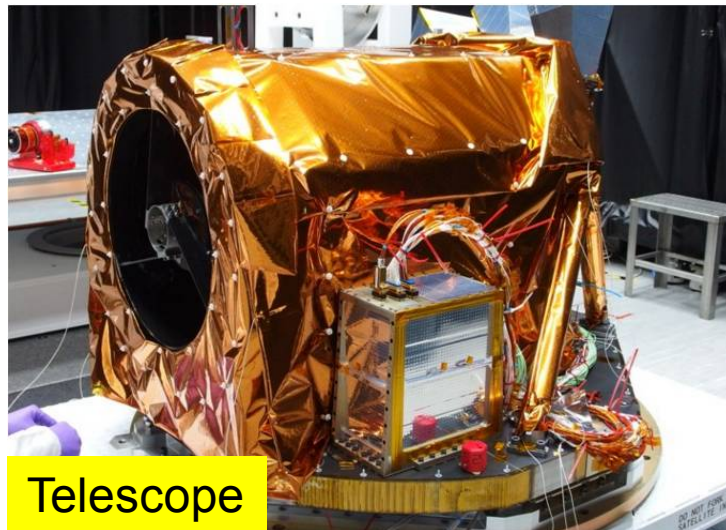
Telescope

Satellite

Supports to
Sentinel Asia

Support to Sentinel Asia since 2010

Disaster Type	2010	2011	2012	2013	2014	2015
Earthquake	0	6	1	0	0	2
Landslide	2	0	1	1	3	0
Tsunami	1	0	0	0	0	0
Vocano Eruption	2	1	0	0	3	1
Flood	8	19	6	3	3	0
Flash Flood	2	3	1	1	0	0
Typhoon	0	0	2	0	0	3
Others	2	0	1	0	2	0
Total Number of EOs	17	29	12	5	11	6

- Always take high priority.
- Consecutive monitoring.

2015 Eruption of Mt. Raung, Indonesia

2015/7/24 2015/7/25 2015/7/26

▷ ▷ ▷

西ノ島の海岸線の変化

観測した衛星： FORMOSAT-2

観測期間： 2014.10.30 ～ 2015.6.30

RESTEC

一般財団法人リモート・センシング技術センター

Daily Revisit plus Global Coverage

NARLabs

承諾 · 熱情 · 創新

- FORMOSAT-2 is a daily revisit orbiter – some areas can not be covered.
- FORMOSAT-5 is a global coverage orbiter – need two days to revisit the same area.
- The combination can greatly improve the response rate to Sentinel Asia EOR.
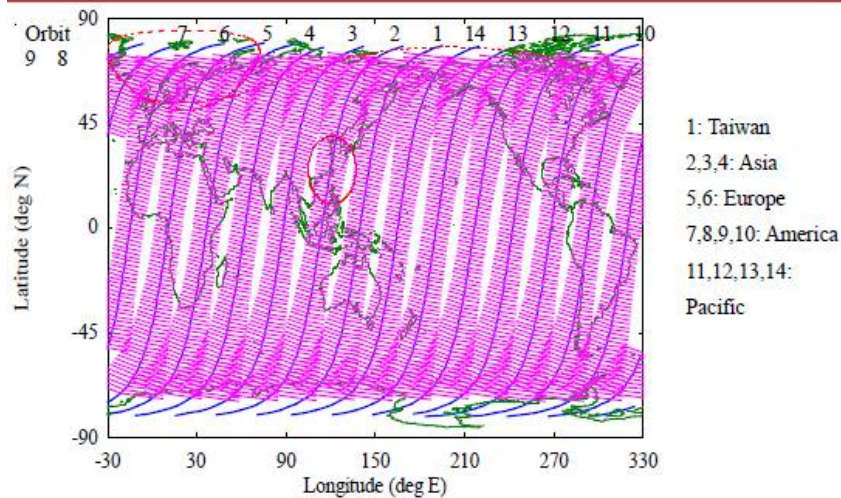
FORMOSAT-2 coverage
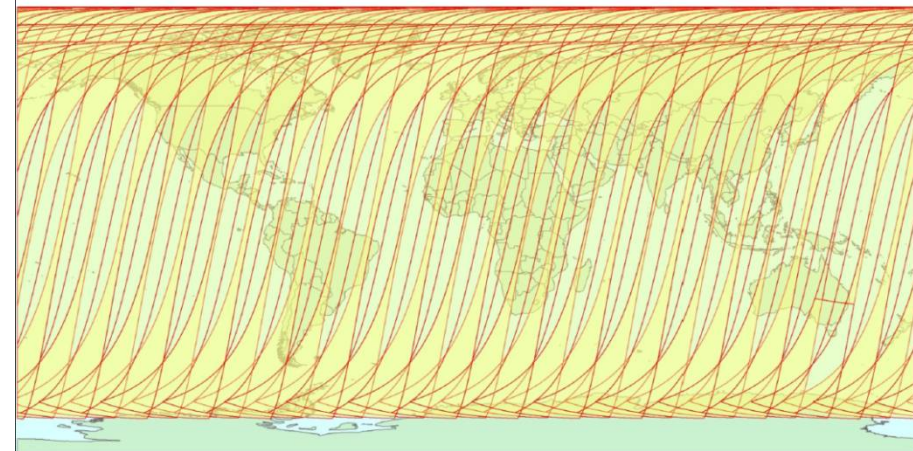
FORMOSAT-5 coverage

Respond to EOR

- Next Day Observation, observation request due at 05:00 UTC.
- Standard products ready at 04:00 UTC.
- Ortho-rectified product ready at 07:00 UTC.
- Consecutive Daily Observation.

UTC	05:00	13:00	00:00	02:00	04:00	07:00

Disaster

Schedule Uplink

Observation / Downlink

Observation Request Due

Std. Products (L1A, L2)

Ortho-rectified Product (L4)
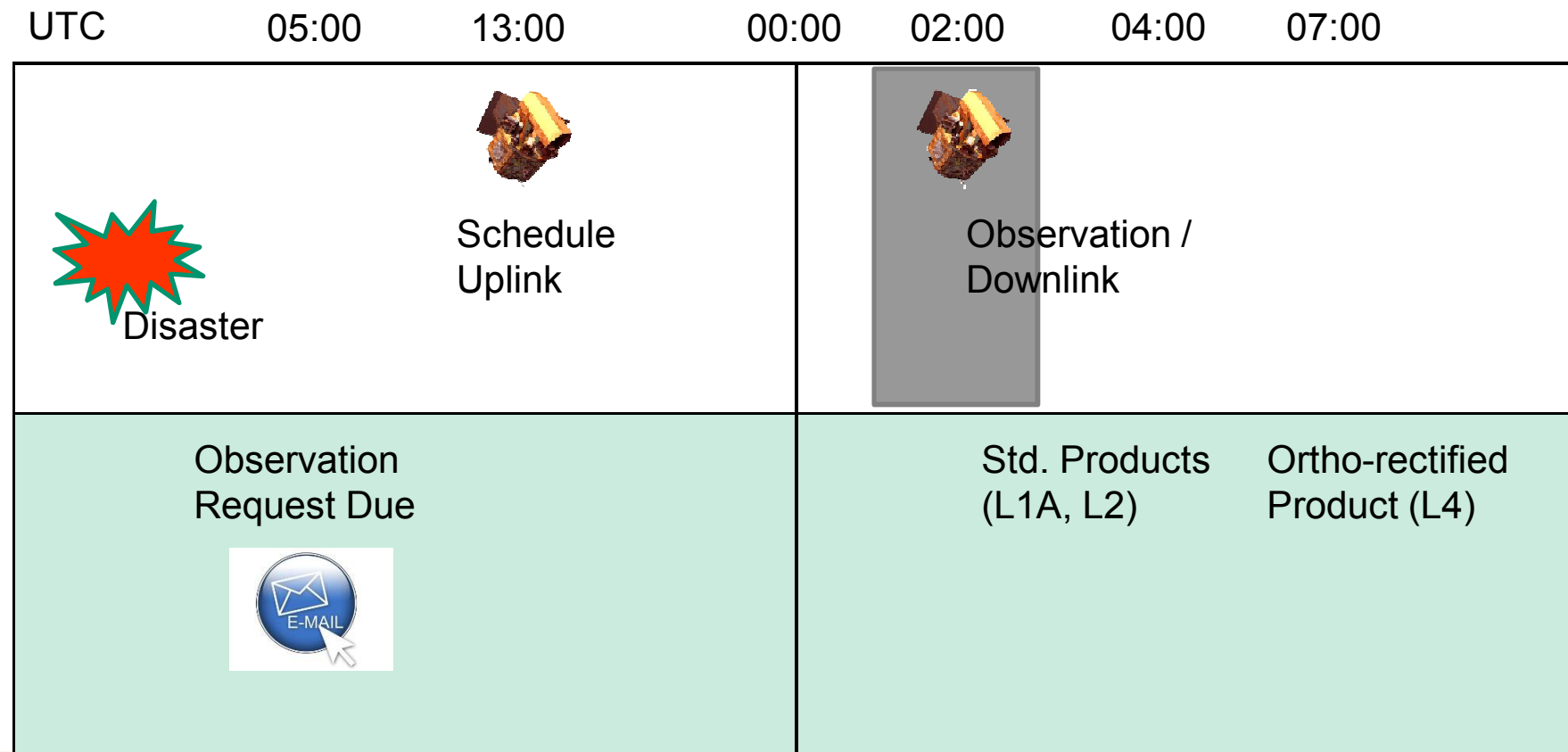
A Step-3 Pilot: Preventive Observation

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承諾・熱情・創新

- To shorten the data latency after disaster
- A new module on top of FORMOSAT Archive for external prediction modules to register
- Subscription function for Periodic monitoring (not emergency)
- Alarm triggering for new observation(emergency)

Alarm

Prediction Modules

Periodic AOI Updates

AOI Data

Subscribe Service / Alarm Handler

FORMOSAT Archive

Satellite Scheduler

New Observation
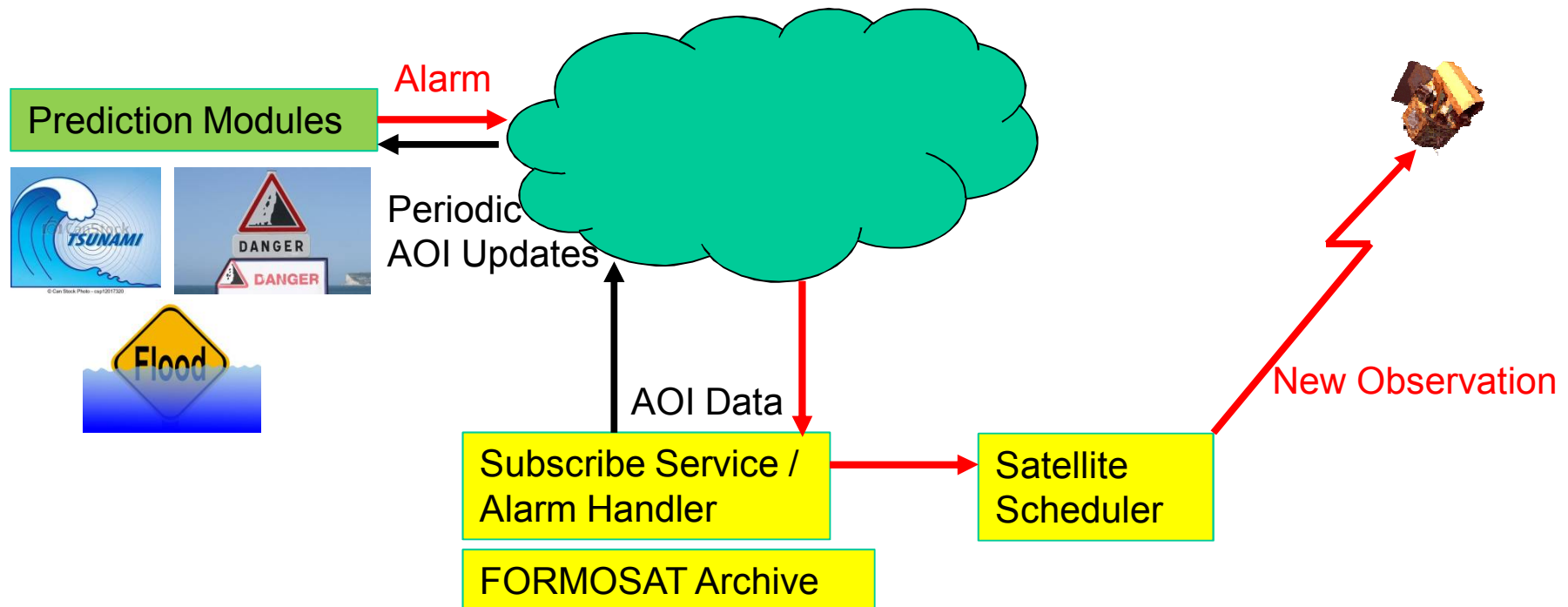
Landslide Module Test-runs

- Use the rainfall prediction issued by CWB to generate Landslide prediction.
- Alarm issued to NSPO Alarm hander.
- NSPO scheduled FORMOSAT-2 and issued EOR to Sentinel Asia accordingly.
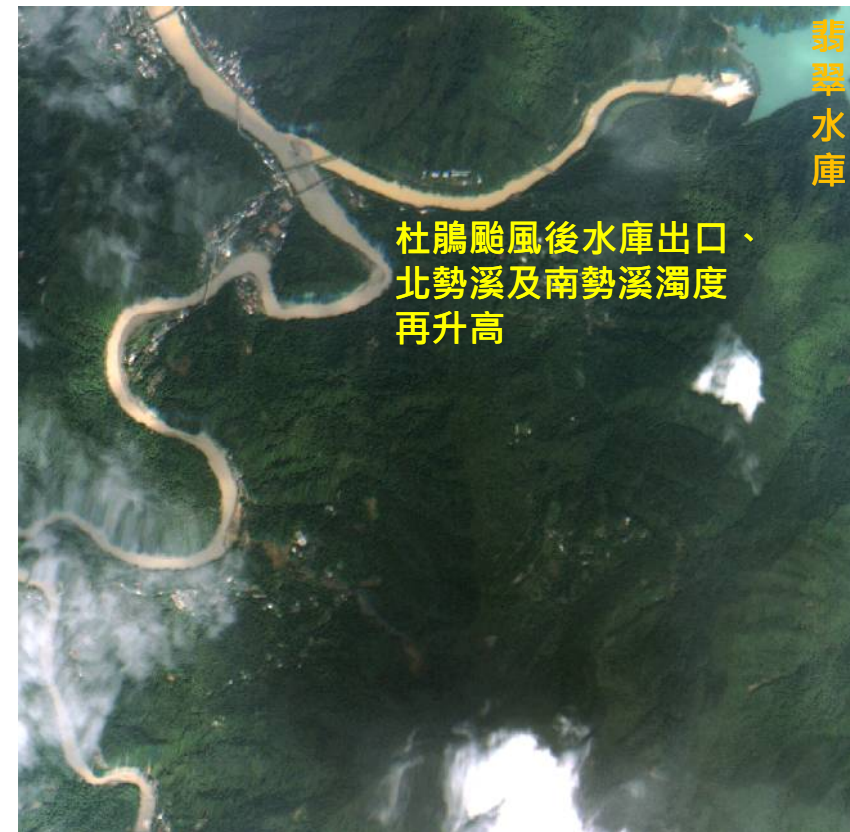- Two test-runs: Typhoon Soudelor(Aug. 6-9,2015) and Typhoon Dujuan(Sep.26-29,2015).
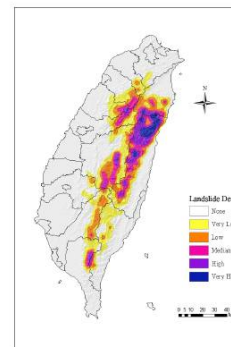
Test-run Results

- Results is promising; however, media is more focus on the muddy water supply of Taipei City.
- How to fulfill the user need is the key to success for step-3.

FORMOSAT-2 09/11/2015

FORMOSAT-2 09/30/2015

北勢溪

蘇迪勒颱風後一個月溪流漸清澈

南勢溪

翡翠水庫

杜鵑颱風後水庫出口、北勢溪及南勢溪濁度再升高
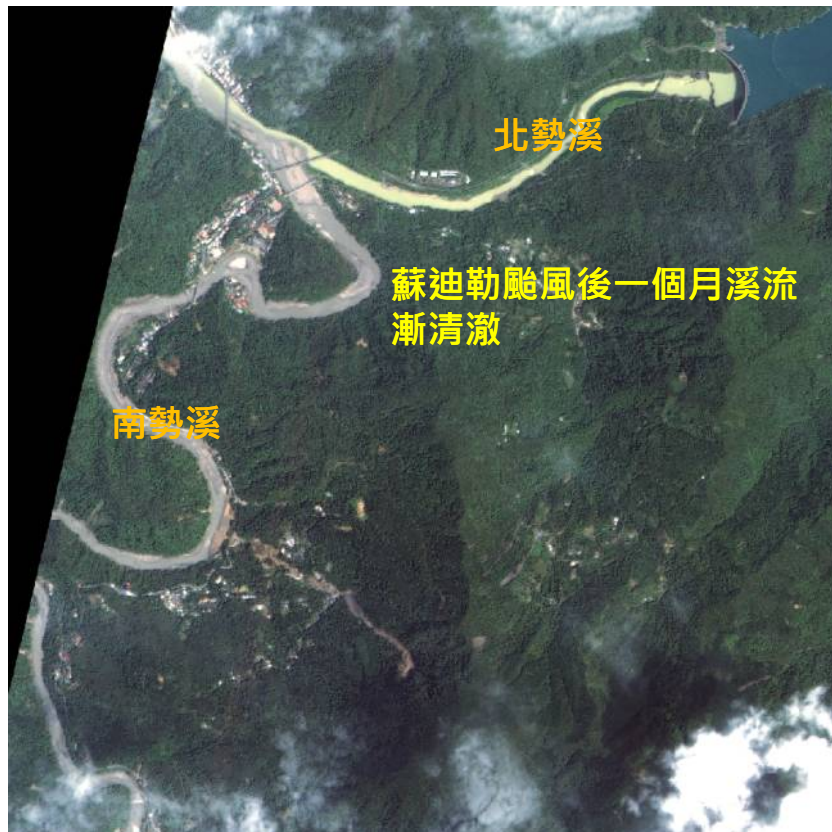
Strengthen Social Impacts

- Past SA-EOR service utilization is low.
- Integrate the data analysis function of NCU-DAN to provide map-ready products and analyzed results (Nepal Earthquake).
- Invite the national disaster responsible agency - NCDR to be in-the-loop of EOR activity (Typhoon Dujuan).
- Goal is to fully utilize the SA service then to strengthen social impacts.

Taiwan Activation
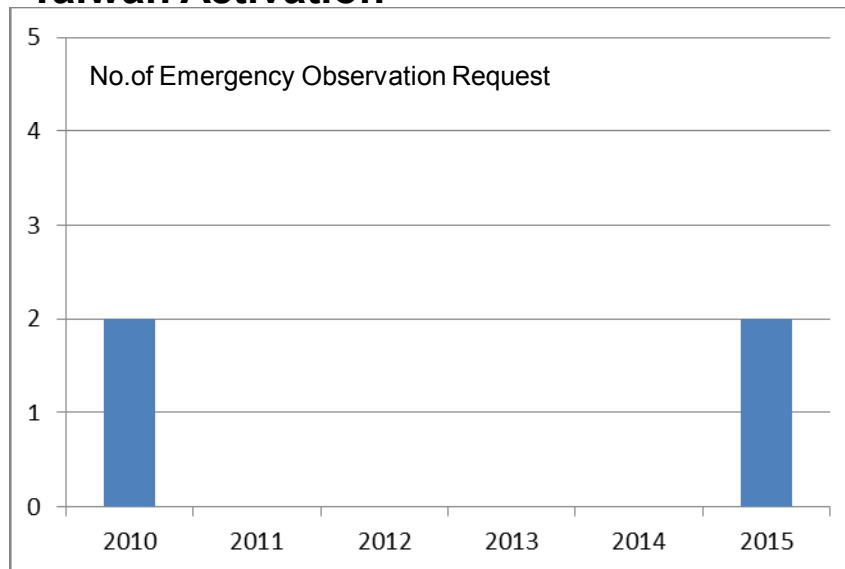
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A recent case – Nepal Earthquake

- Work with Open Street Map - OSM-Hot-Imagery-Coordination
- The idea is to support the field operation in a most needed way

FORMOSAT-2 Response to
Nepal earthquake

Conclusion Remarks

- The goal of Sentinel Asia Step-3: Aiming to Make Asian Society Resilient Against Natural Disasters is inline with NARLabs' long-term vision.
- NARLabs is committed to continuously support of disaster reduction efforts and environmental observation for better living.

FORMOSAT-5 is Coming