

Early Results of a Wildfire Monitoring Microsatellite UNIFORM-1

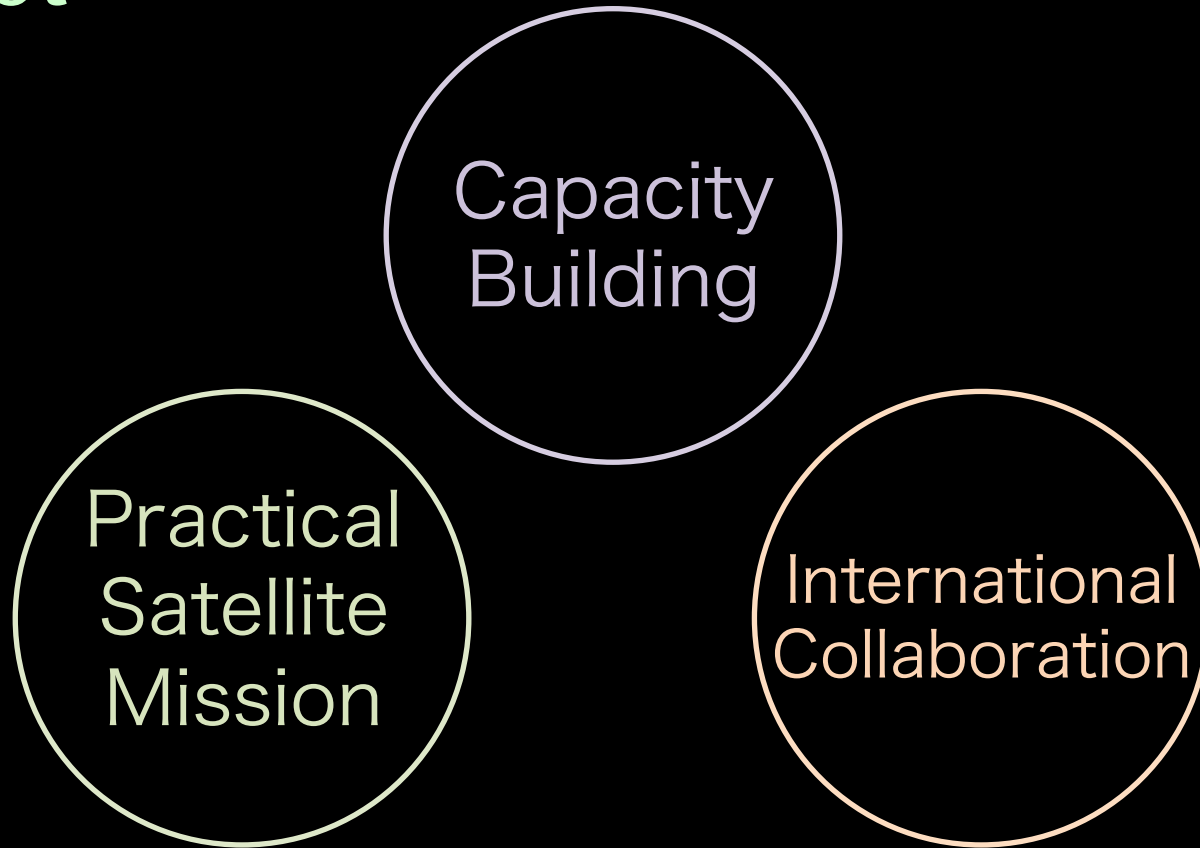
Takashi Hiramatsu, Shusaku Yamaura, Keio University
Hiroaki Akiyama, Naoko Sato, Katsumi Morita,
& Tomomi Otani, Wakayama University
Kikuko Miyata, Nagoya University
Toru Koyama, Soushi Kato, Advanced Institute for
Science and Technology
Miki Ito, Yuta Araki, Astroscale Japan

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UNIFORM Overview

- Japan government-funded (MEXT) project



Goal 1: Capacity Building

Increase the number of engineers who can develop satellites



Goal2: Practical Satellite Mission

Capacity
Building

Practical
Satellite
Mission

International
Collaboration

Choose a utility mission to contribute to the community, attract people to join

Goal3: International Collaboration

Work with other countries to build more satellites

Capacity Building

Practical Satellite Mission

International Collaboration

Ultimate Goal

More Satellite Engineers

Esp. from New Countries

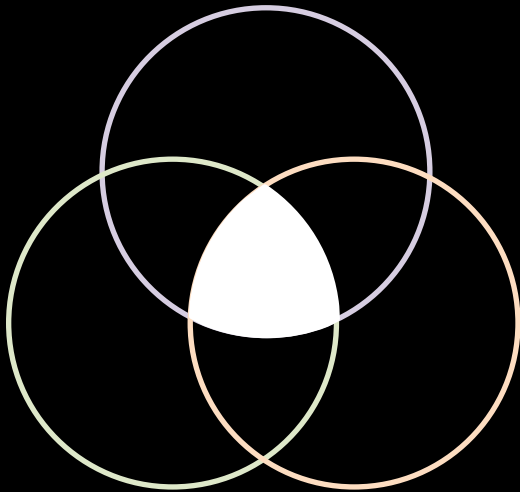
More Satellites

Higher Utilities

Attract More Participants

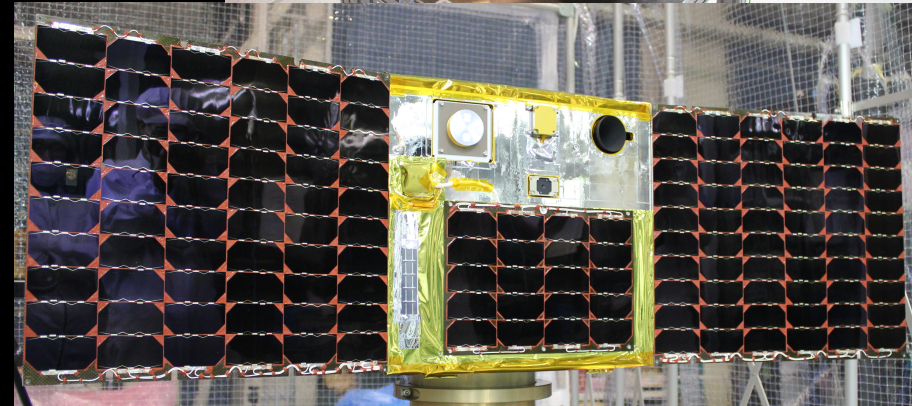
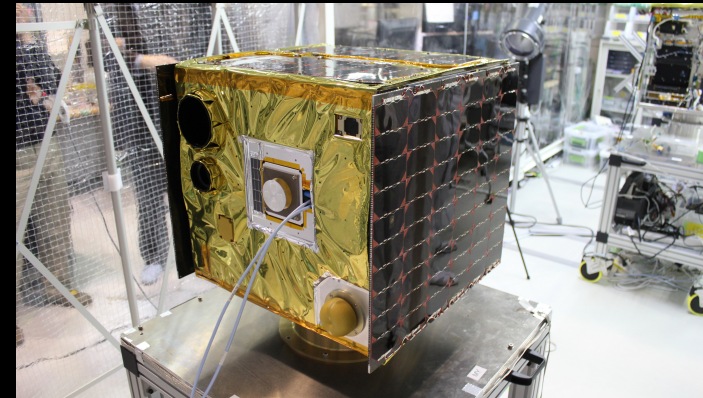


Broaden Space Activities



UNIFORM-1

- Microsatellite (50kg, 50cm cube)
- Payload: microbolometer
 - Thermal Infrared Imager
- Comm: S-band, X-band
- ADCS: 3-axis, RW
- Launch: 2014/5/24

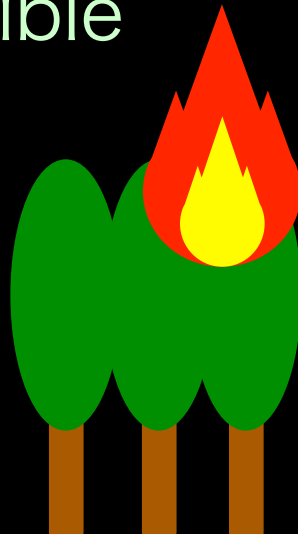


Wildfire Monitoring

- Why?

- Lots of countries affected by wildfire
- Monitoring possible without high resolution

Detect Heat Anomaly



Volcano

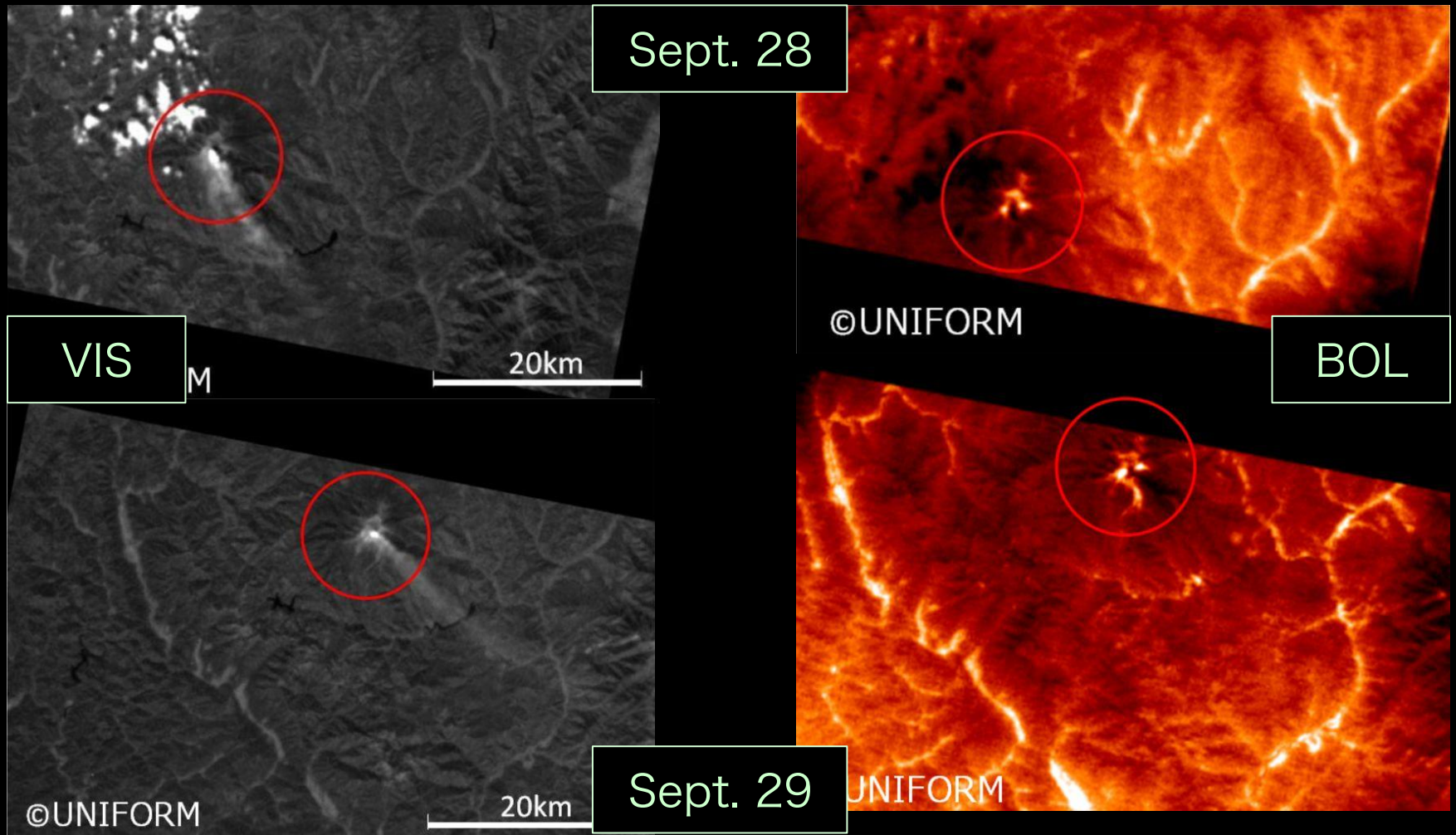
Early Results of a ~~Wildfire~~ Monitoring Microsatellite UNIFORM-1

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Volcanic Events in 2014

- Due to the several events in 2014
 - Japan
 - Ontake
 - Hakone
 - Abroad
 - Calbuco, Chile
 - Galapagos, Equador

Mt. Ontake Eruption (Sept. 27 2014)



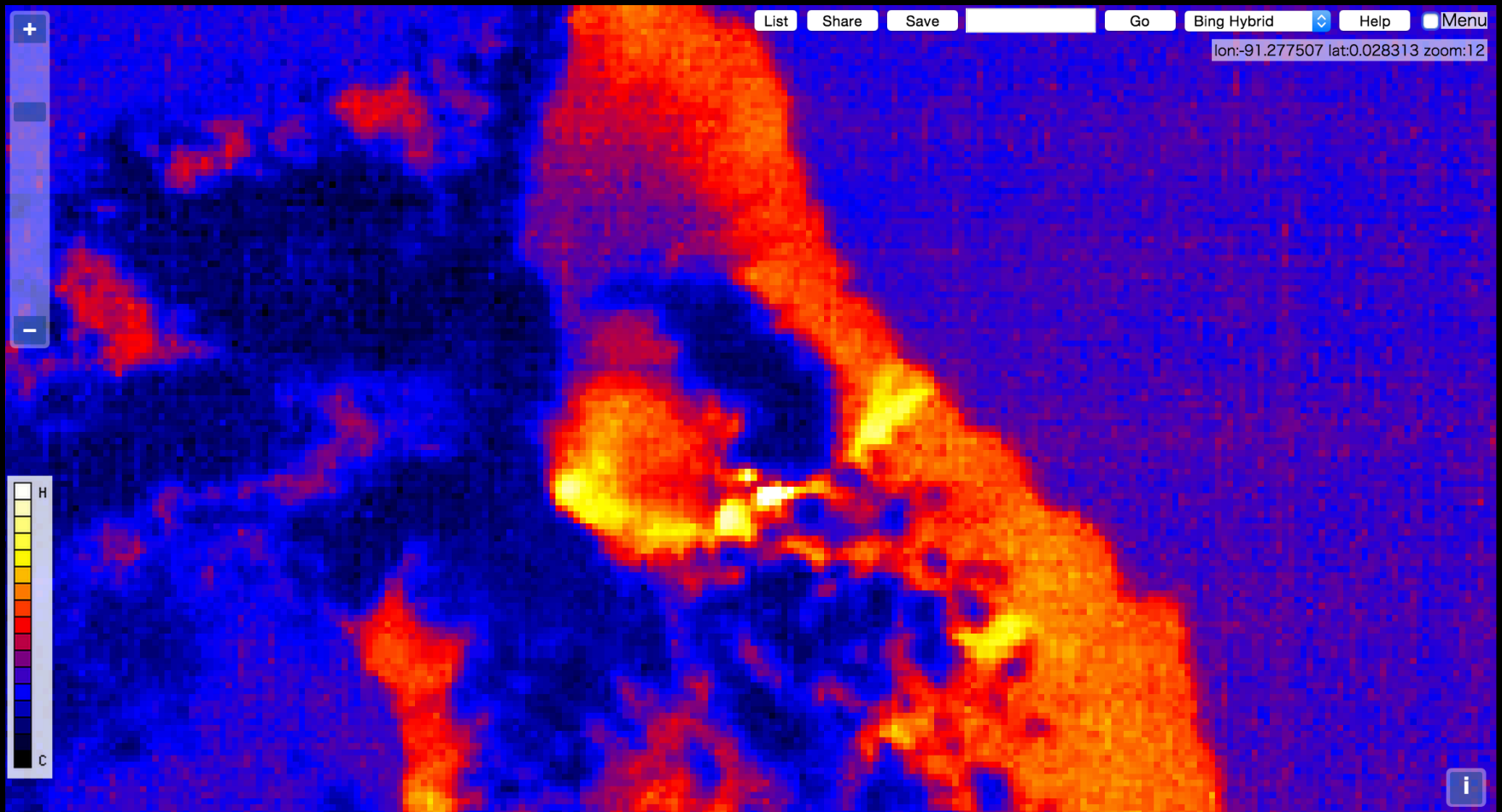
Wolf Volcano, Galapagos Islands (June 2015)

Bing Map (Not UNIFORM-1 Image!)



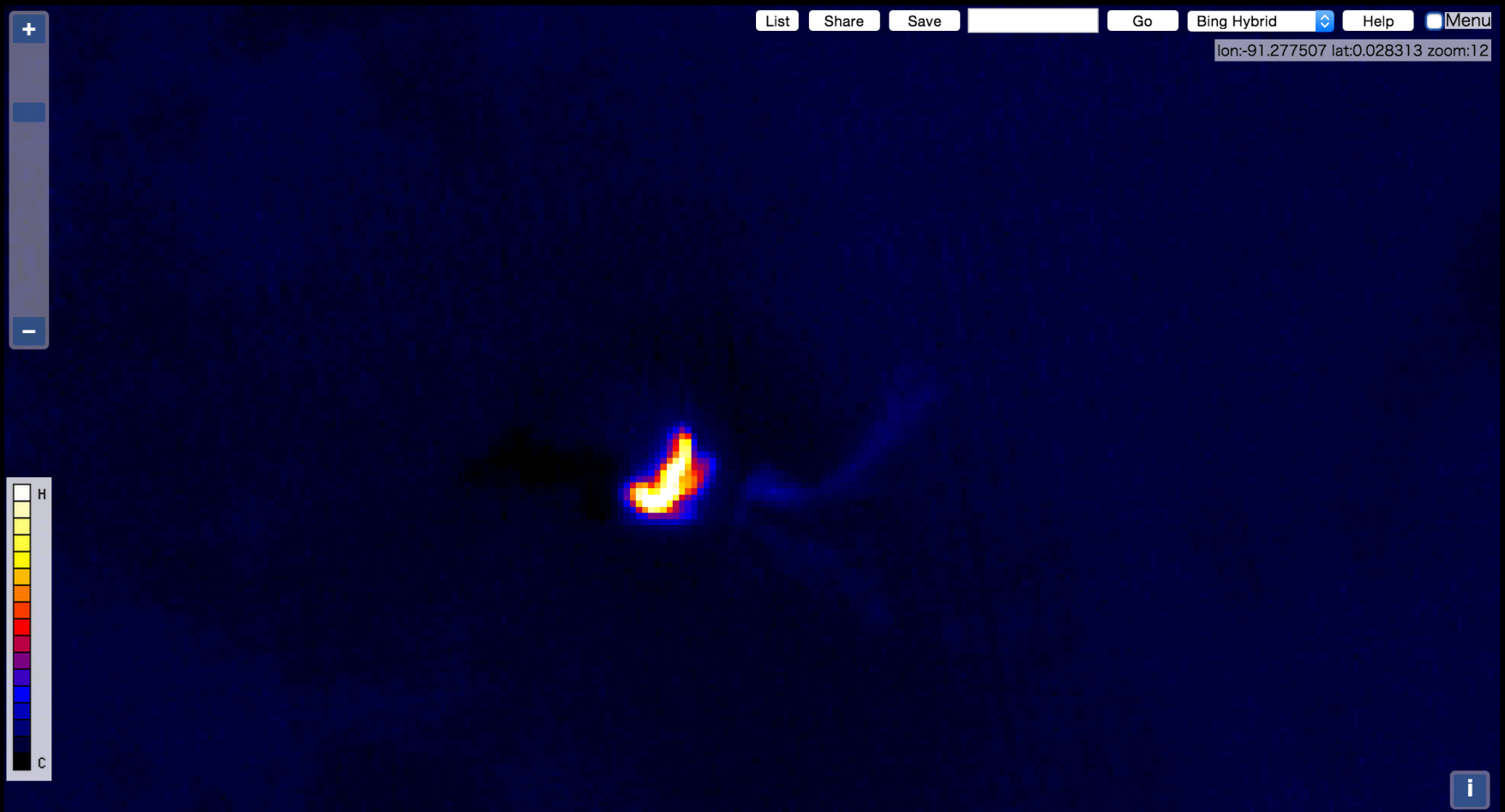
Wolf Volcano, Galapagos Islands

June 11 12:02PM



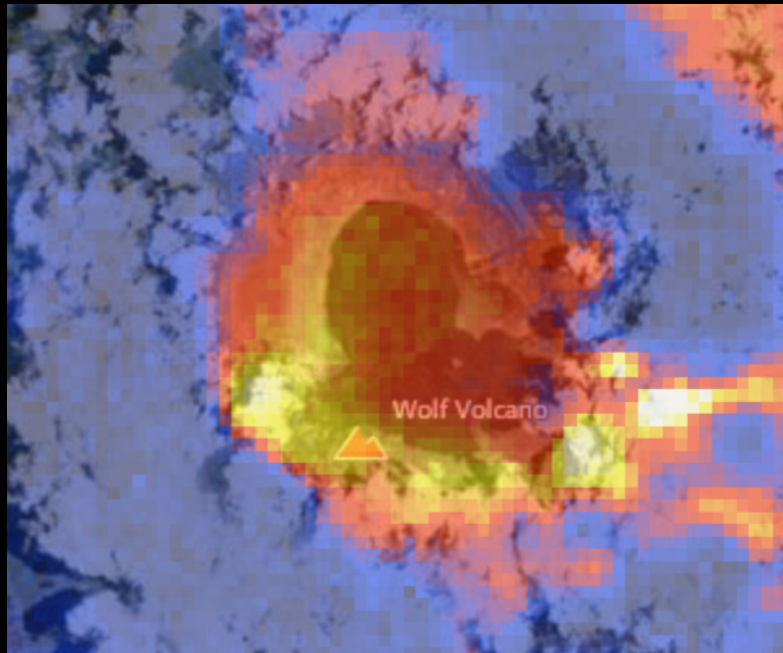
Wolf Volcano, Galapagos Islands

June 17 12:03AM

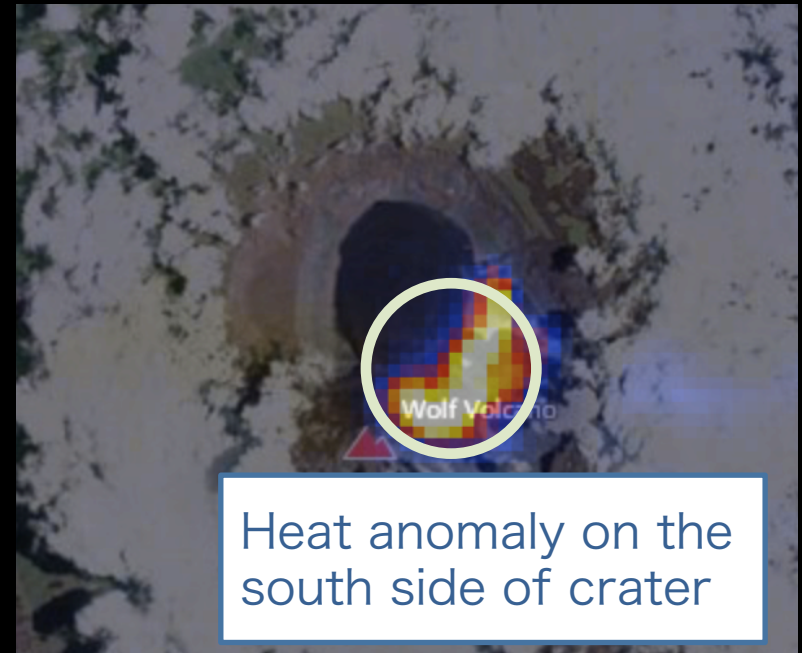


Wolf Volcano

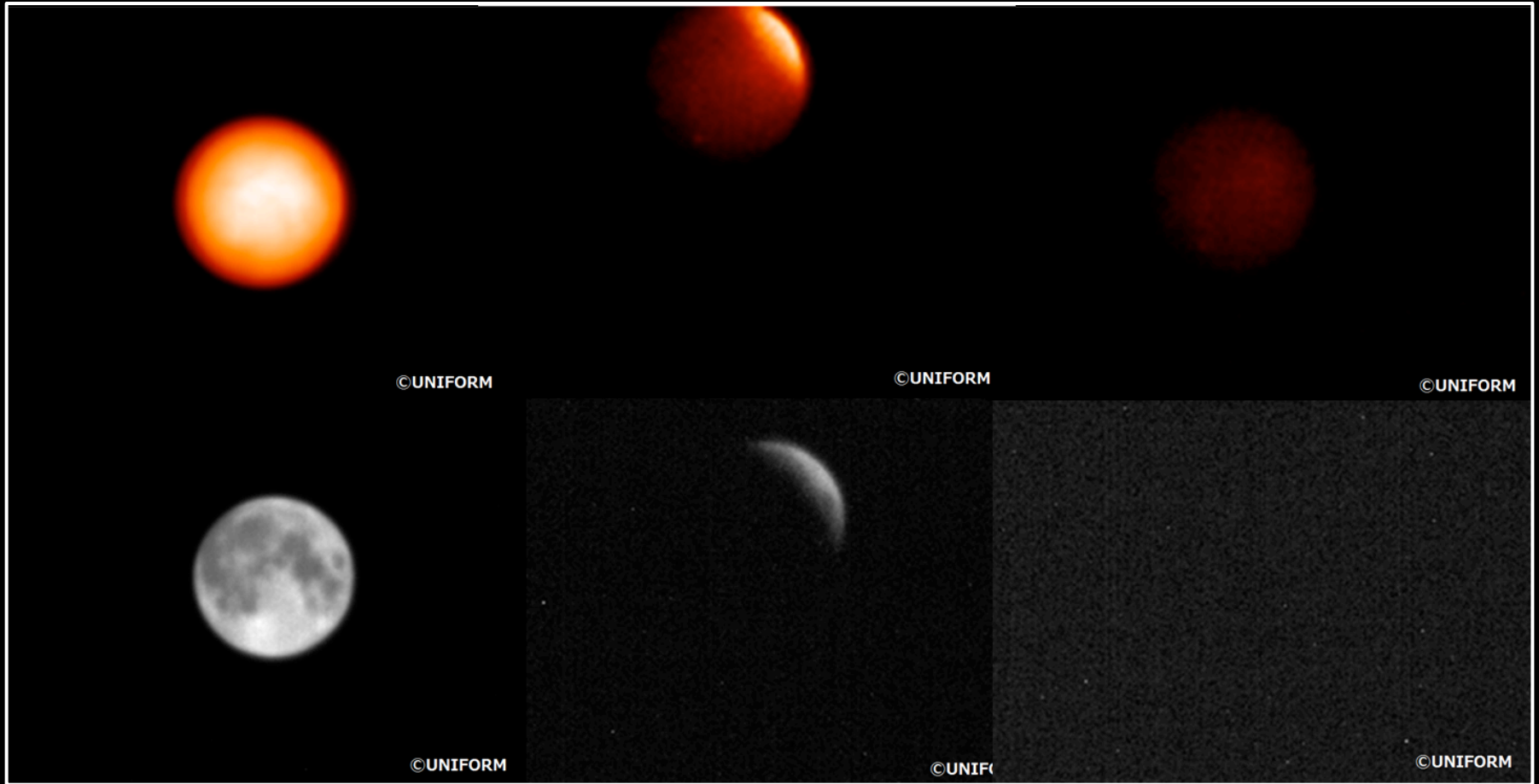
June 11



June 17



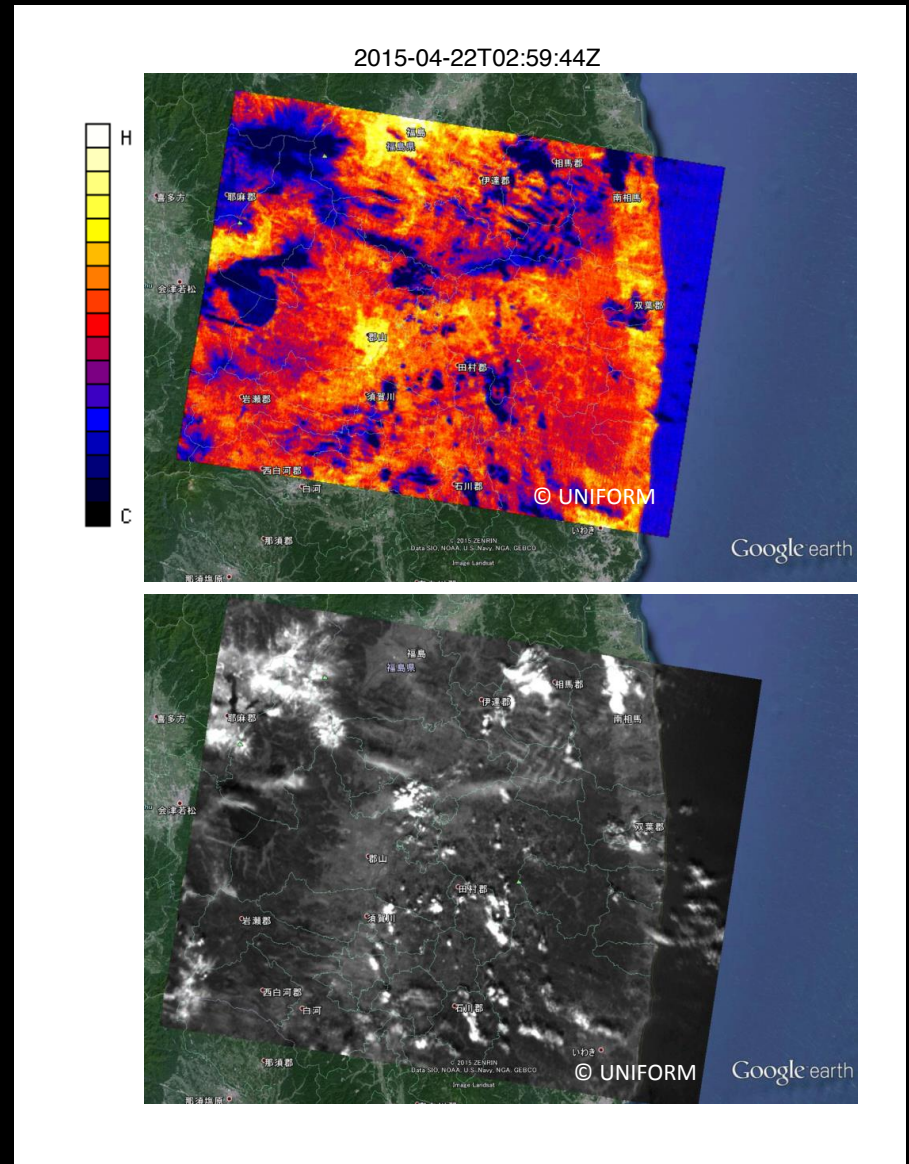
Other Observations: Moon Eclipse



Other Observations: Fukushima

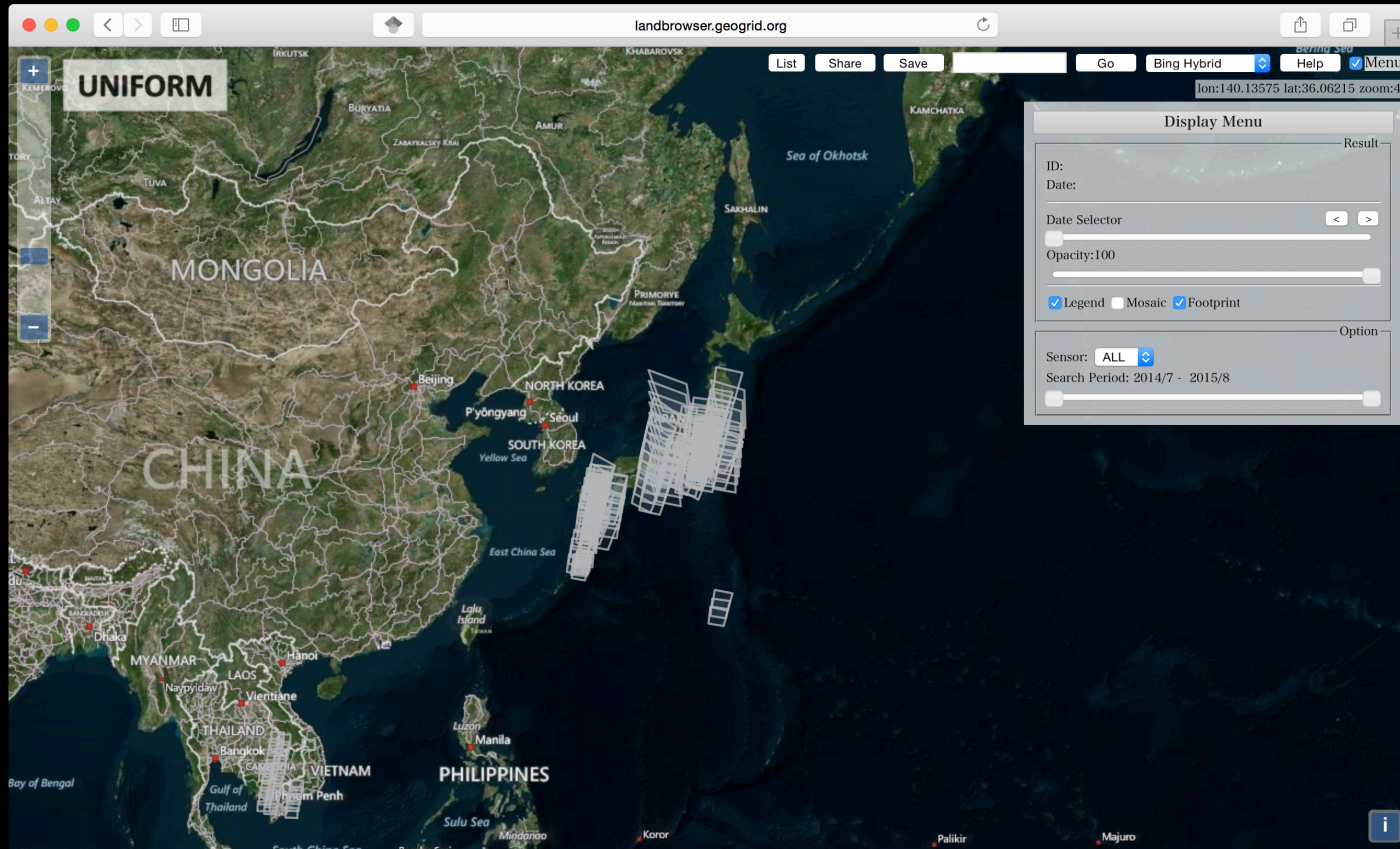
- Provides data to environment monitoring research on evacuation area

Aoyanagi Y., Iwasaki A., Nakasuka S., and Yoshimoto S., "Environmental Monitoring within Fukushima Evacuation Zone by Multiple satellites including Microsatellites," The 58th Spring Conference of the Remote Sensing Society of Japan, Chiba, Japan, 2015.



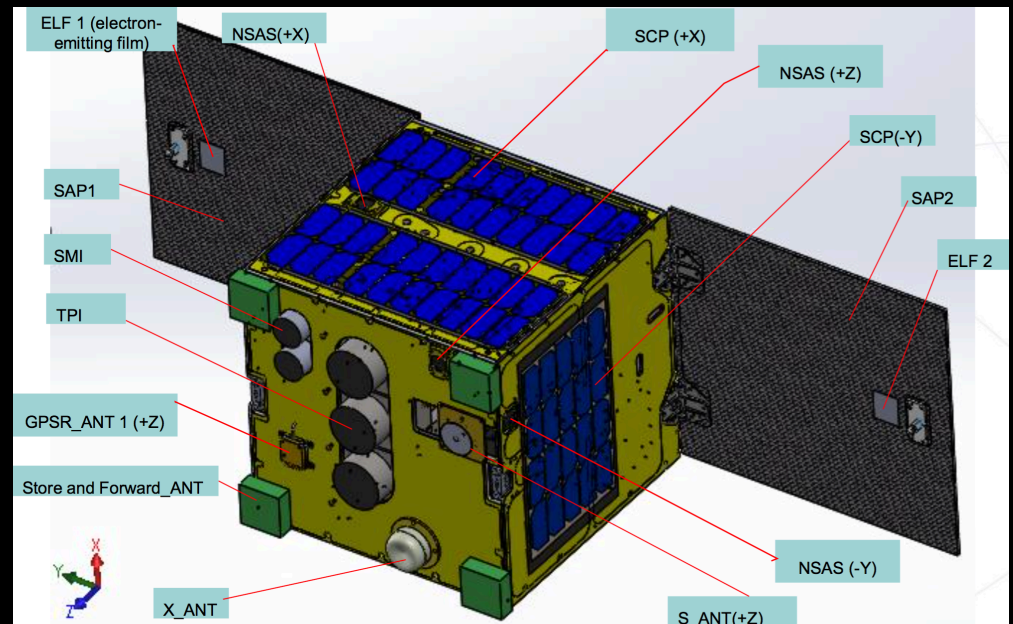
Data Available Online

<http://landbrowser.geogrid.org/uniform1/>



MicroDragon (VNSC)

- 1st Vietnamese microsatellite
 - Based on UNIFORM-1 bus
 - Main Mission: Ocean Observation
 - Multispectral Imager



We Will Take Picture for You

- UNIFORM Team solicits for requests, suggestions of ground targets with thermal infrared imager
- Acquired Data will be available at:

<http://landbrowser.geogrid.org/uniform1/>

Summary

- UNIFORM-1 successfully launched, operated, and acquiring data
- Successor satellite development in progress
- Seeking observations ideas from others

Thank You!

Please contact Takashi
takashi.hiramatsu@sdm.keio.ac.jp
for observation requests/suggestion

UNIFORM-1 Specs

Mass / Size	< 50kg, < 50 x 50 x 50 cm
Mission Payloads	Microbolometer Array Sensor Visible Light Camera
Onboard Computer	SOI-SOC Small Size OBC x 2 RS422, Discrete, Active Analog, Passive Analog
Communication	S-band Transmitter (HK) 64kbps S-band Receiver (HK) 4kbps S-band Antenna x 2 X-band Transmitter (Mission) 10Mbps X-band Iso-Flux Antenna x 1 CCSDS compliant
Power	Max Generation > 100W Solar Array: GaAs
	Li-ion Battery: 8 series x 2 parallel $2.9 \sim 4.1 \times 8 = 23.2 \sim 32.8V$ 5.2 Ah @ 25degC
Attitude Control Sensors	GPS Receiver (GPS Antenna x2) Sun Sensors x 3, Star Tracker x 1 Fiber Optics Gyroscope x1, Magnetometer x 1
Attitude Control Actuators	Magnetic Torquer Rods x 3 Reaction Wheels x 4