

2019 Report from the Earth Observatory of Singapore:

Rapid response to natural disasters in South and Southeast Asia using the Advanced Rapid Imaging and Analysis Singapore (ARIA-SG) system

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Devastation from the 2018 Palu earthquake. Image from the Jakarta Post.

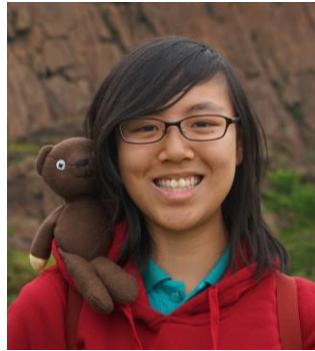
Our team



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EOS PI



Shi Tong Chin
EOS Data Systems Lead



Cheryl Tay
EOS Mission Control



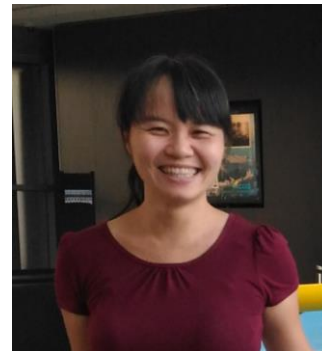
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Academia Sinica, Taiwan



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The mission of the Earth Observatory of Singapore:

- *The Earth Observatory of Singapore conducts fundamental research on earthquakes, volcanic eruptions, tsunamis and climate change in and around Southeast Asia, towards safer and more sustainable societies.*

The mission of our team:

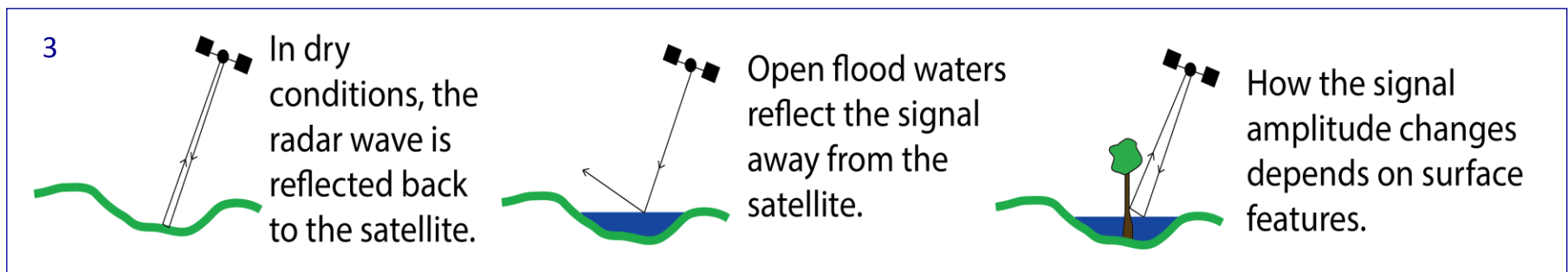
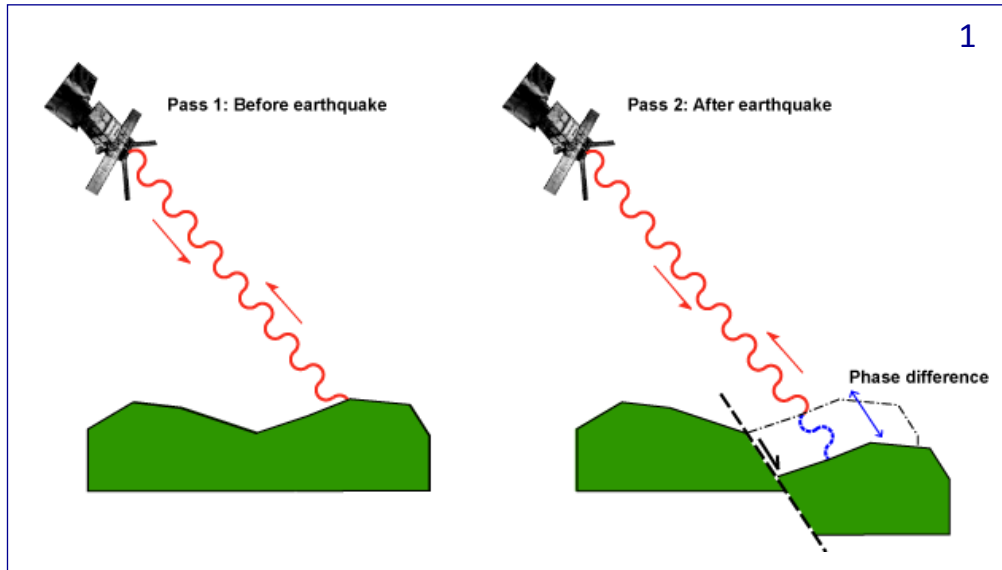
- *To support regional decision makers by monitoring and mapping regional hazards and natural disasters.*
- *To develop cutting-edge algorithms for hazards monitoring and disaster mapping.*



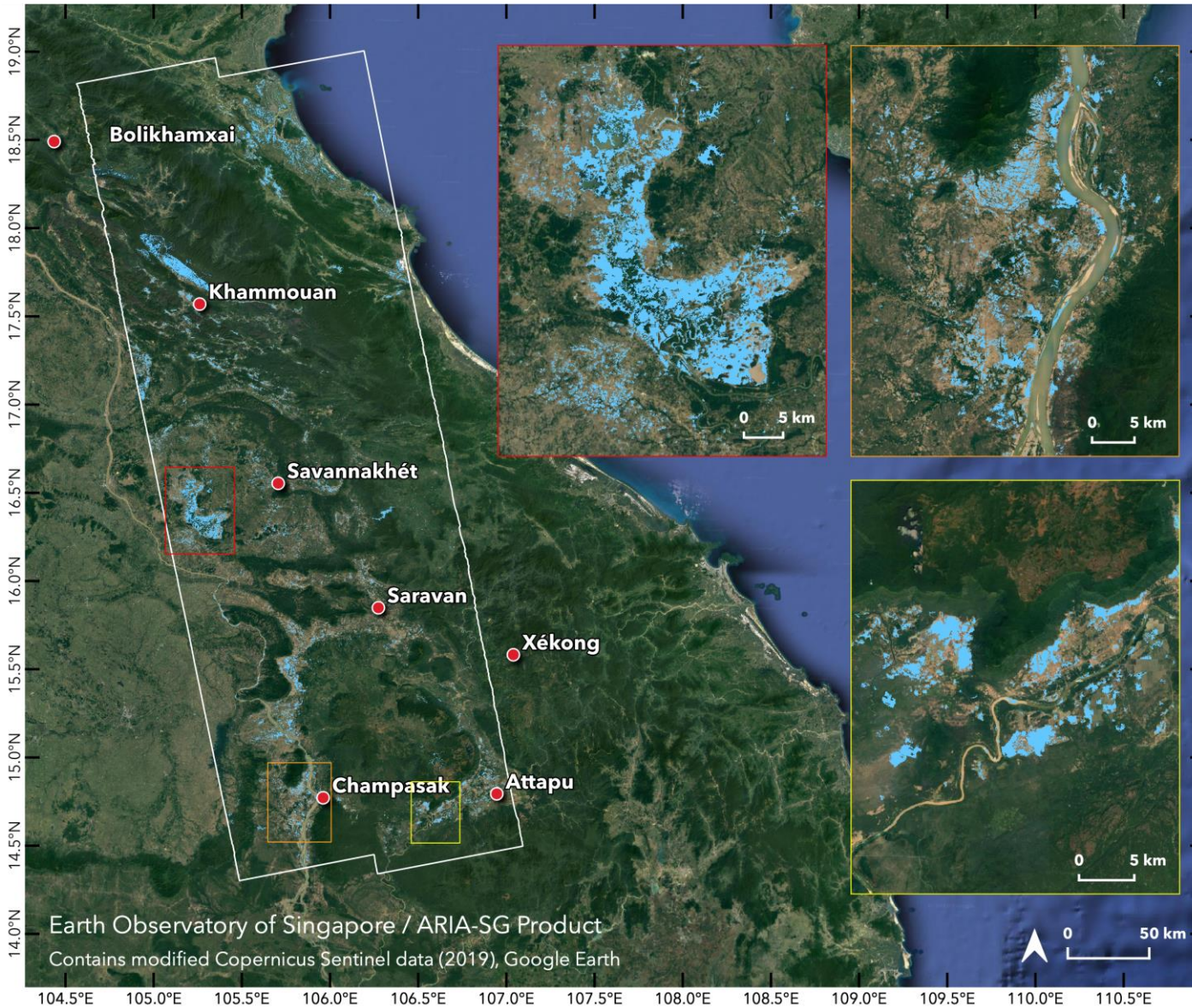
Members of our team enjoying a visit by Akira from the AHA Centre

Data products

1. SAR interferograms (earthquake deformation, etc.)
2. Damage Proxy Maps (building damage due to earthquakes, typhoons, etc.)
3. Flood Proxy Maps (flood extent)



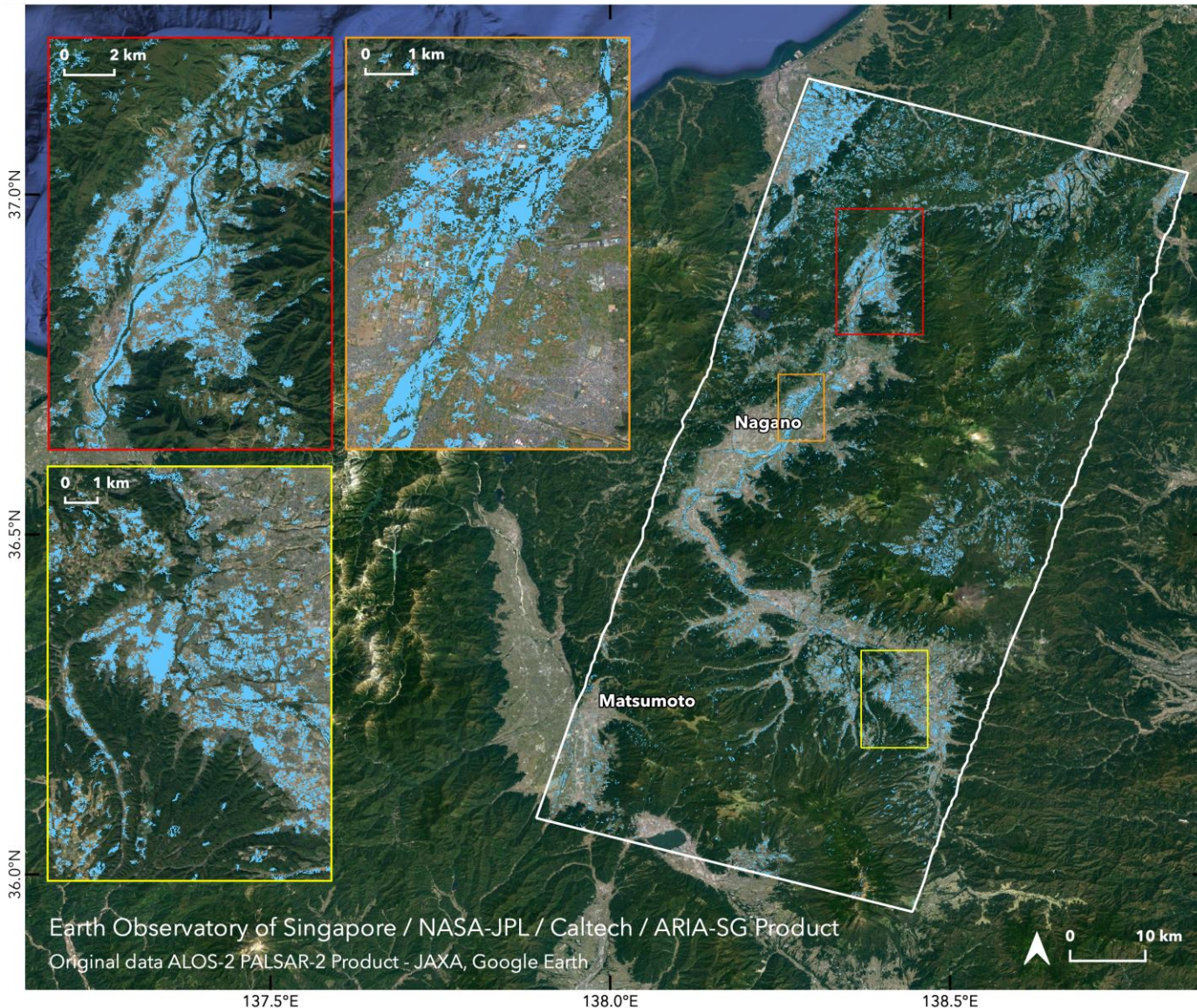
Example FPM: Laos Floods, September 2019



Light blue pixels indicate flooded areas, imaged by Sentinel-1.

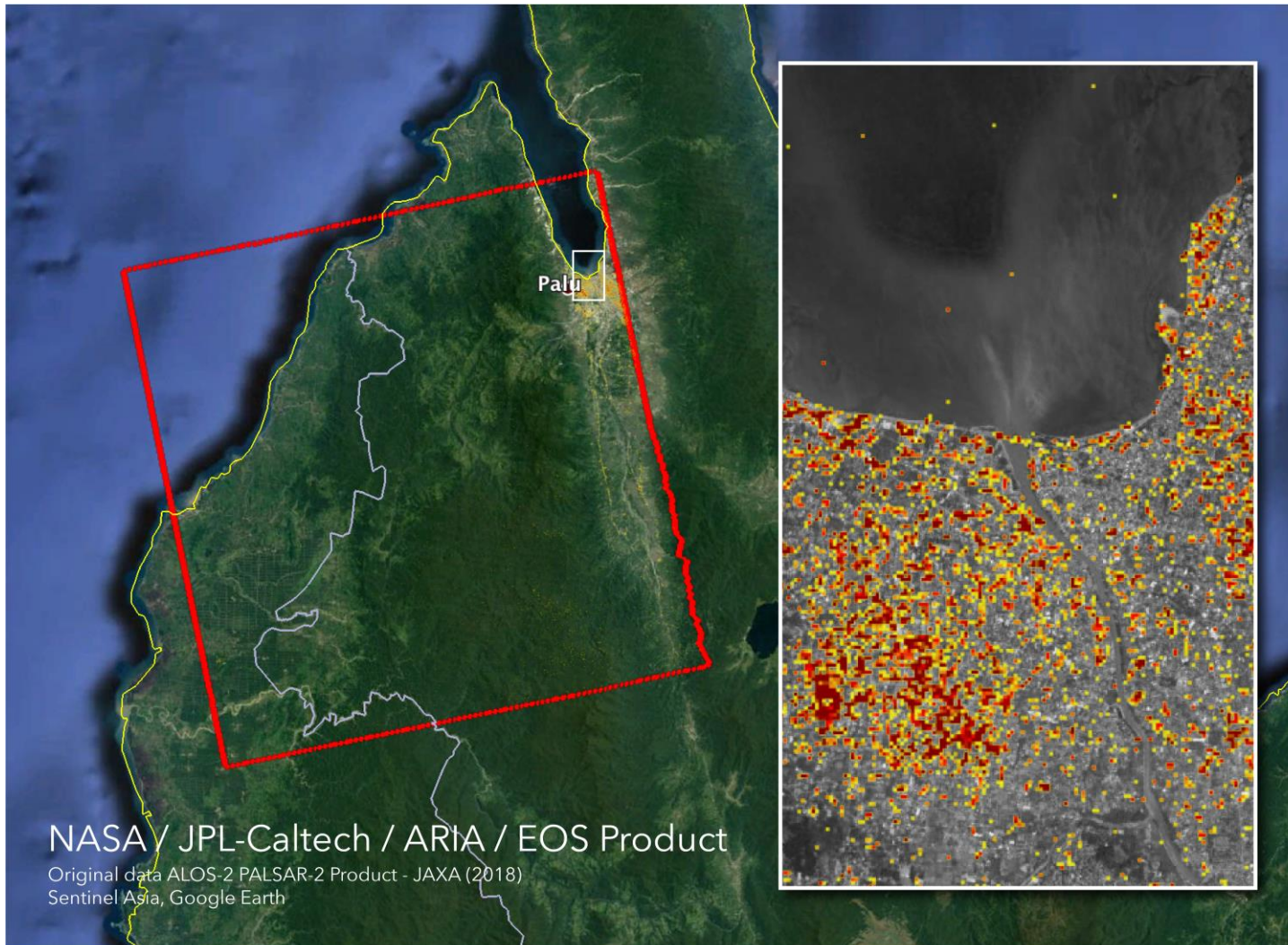
The map was used by AHA to calculate impact and needed supplies.

Example FPM: Typhoon Hagibis, October 2019



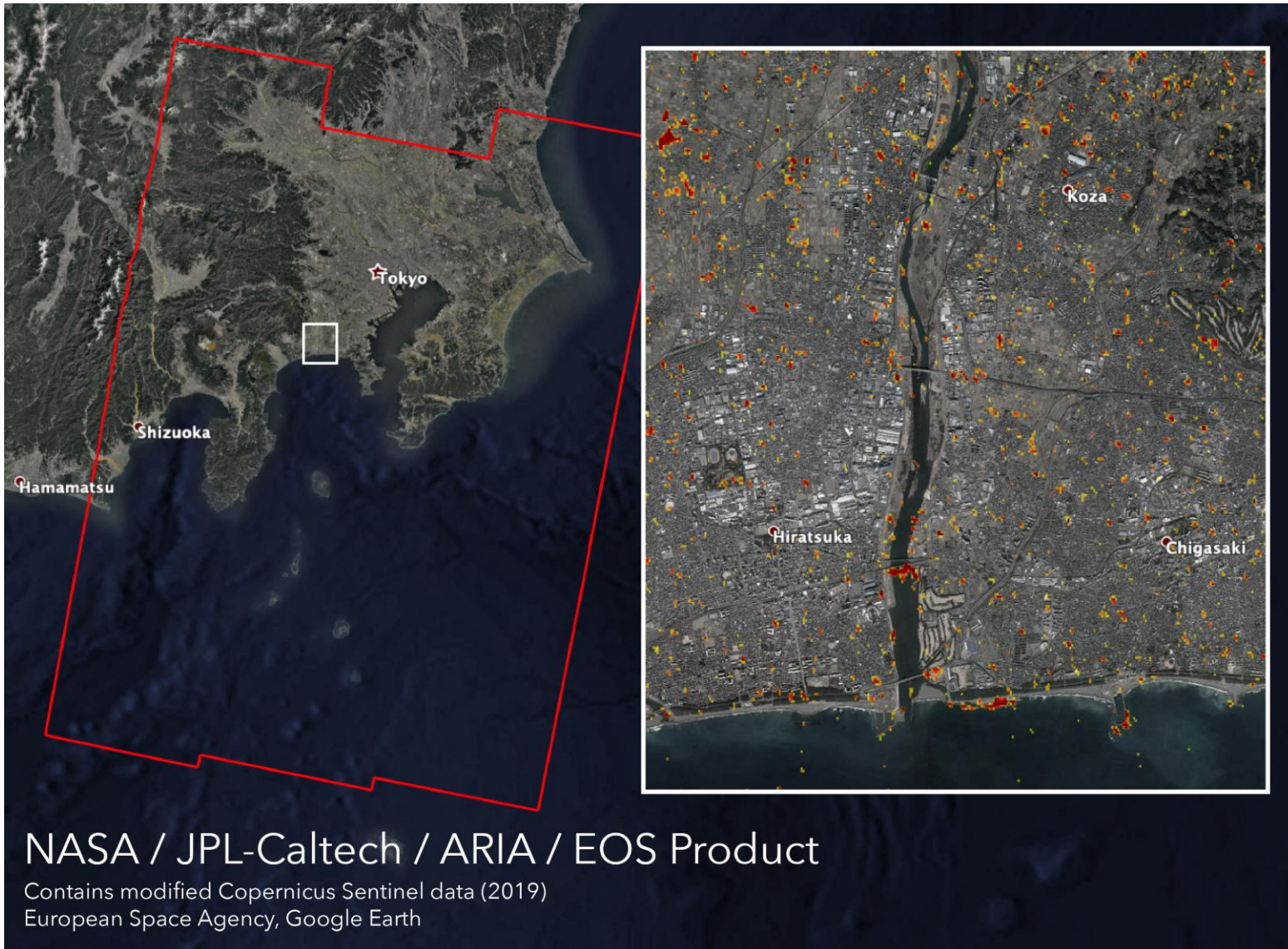
Light blue pixels show flooded areas, imaged by ALOS-2.

Example DPM: Palu Earthquake, Indonesia, Sept 2018



Red and yellow pixels show damaged buildings, imaged by ALOS-2

Example DPM: Typhoon Hagibis, October 2019

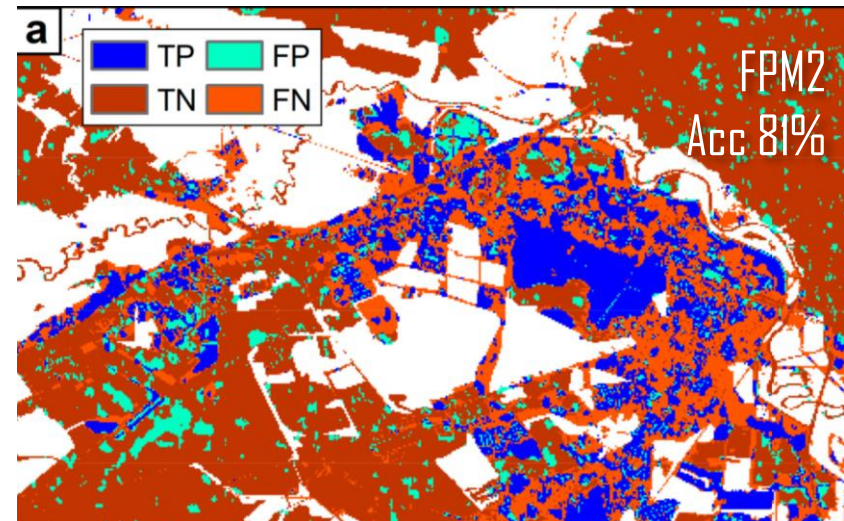
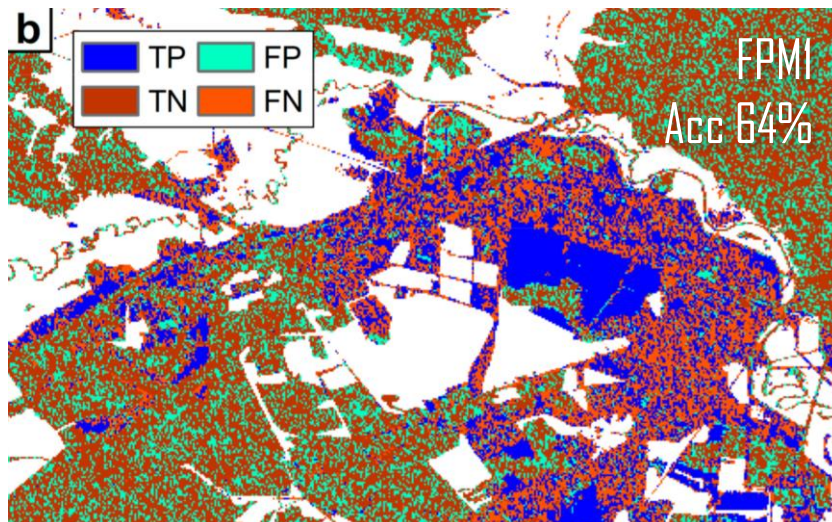
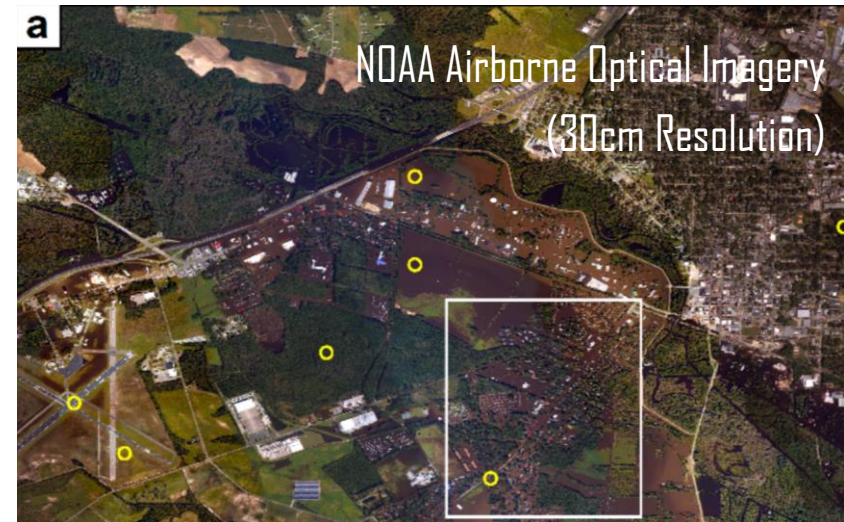


Red and yellow pixels show damaged buildings, imaged by Sentinel-1

Temporal analysis for improved accuracy: FPMs for mapping floods from Hurricane Matthew (USA, 2016)

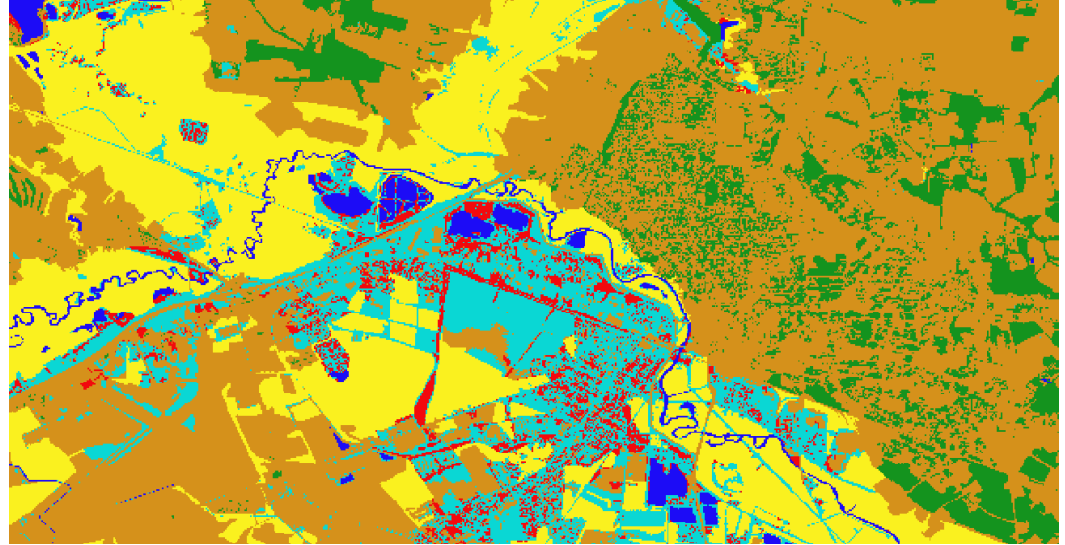
Temporal analysis results in improved accuracy from 64% to 81%, and the opportunity for more automated flood mapping.

Lin et al., 2019, *Remote Sensing*.

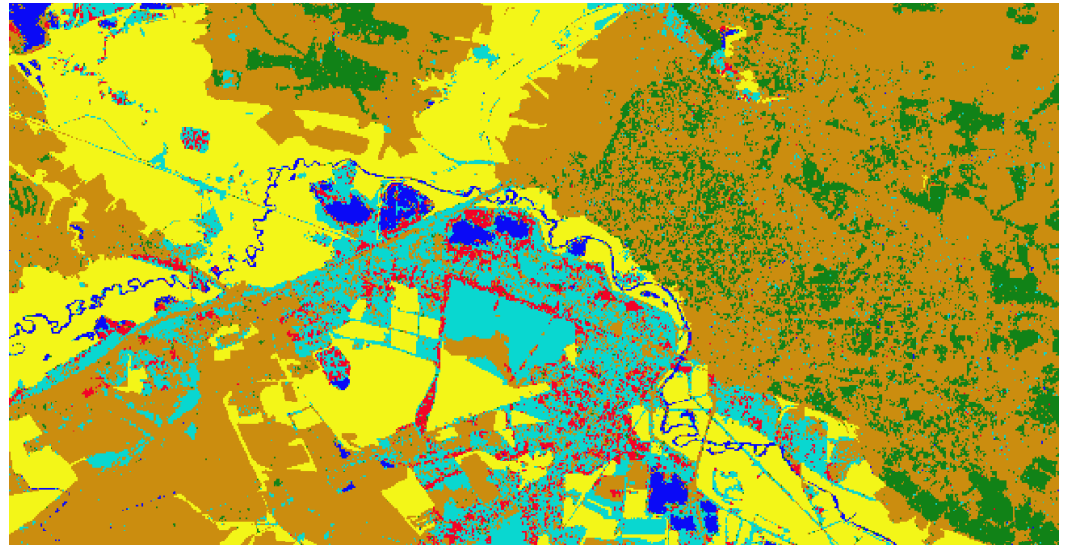


Temporal analysis for improved accuracy: FPMs for mapping floods from Hurricane Matthew (USA, 2016)

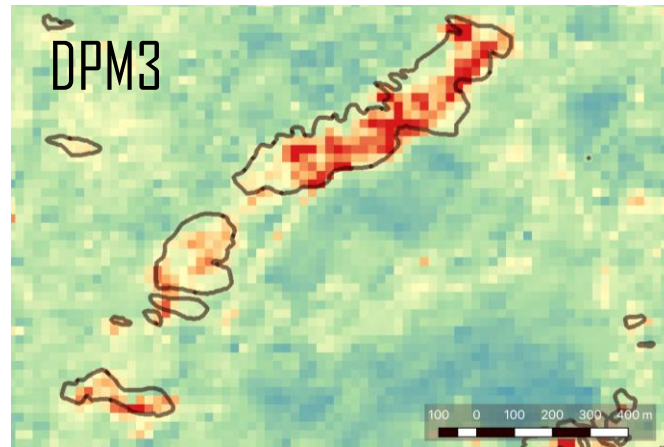
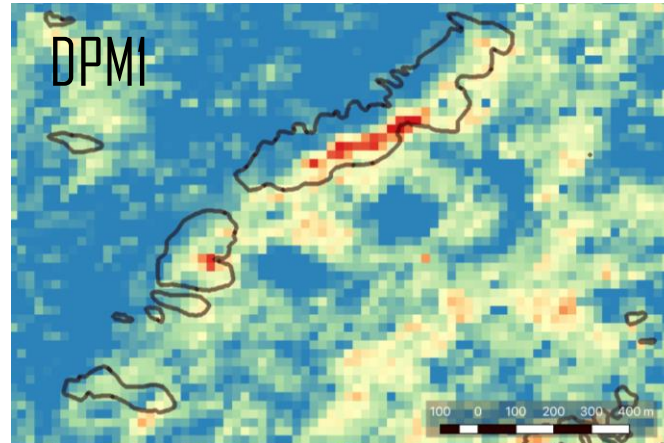
Validation and training data from
NOAA Airborne Optical Imagery



Results from applying CNN deep-
learning techniques on a stack of 66
Sentinel-1 SAR scenes



Temporal analysis for improved accuracy: DPMs for landslides triggered by the 2018 M 6.6 Hokkaido earthquake



Temporal analysis results in improved accuracy from 68% to 93%.

Recommendations to Sentinel Asia

A BIG THANK YOU to Sentinel Asia for all the great work!

Our recommendations for the future:

1. With cloud computing and temporal processing techniques, we can significantly improve the accuracy of our disaster maps (including urban areas for floods). We would like to recommend that ALOS-2 archived data are made available for download for future events.
2. With improved automation, it would be wonderful if our ARIA-SG system can be automatically triggered when users input an EOR through provision of an API.
3. More sharing of ground validation data would be really helpful to improve our products.
4. We would so much love to hear feedback from users about whether our maps were useful and how they could be more useful.

Thank you!

Please follow us on Twitter!
https://twitter.com/eos_aria

If you are taking the training tomorrow, please can you download and unzip this file?

