Tonga Meteorological Service's expectations of new-generation satellites for hazard monitoring

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6th Asia/Oceania Meteorological Satellite User Conference

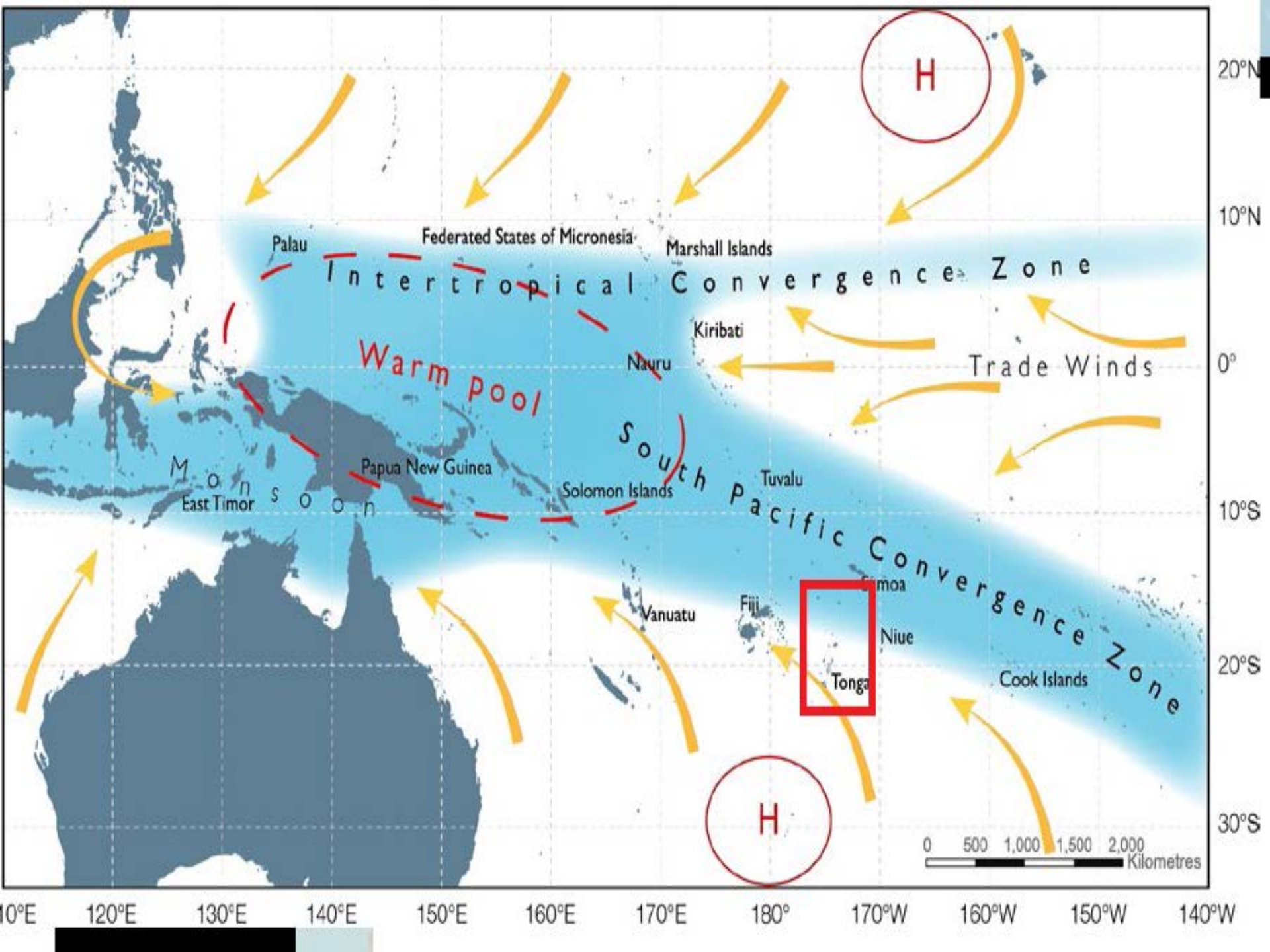
Tokyo, Japan, 9 November 2015

Tokyo International Exchange Center/Plaza Heisei Meeting Facilities

Tonga Meteorological & Martime Radio Services

TMS's top three hazards that can be monitored by satellite

- Tropical Cyclone
- Volcanic Ash and Eruption
- Torrential Rain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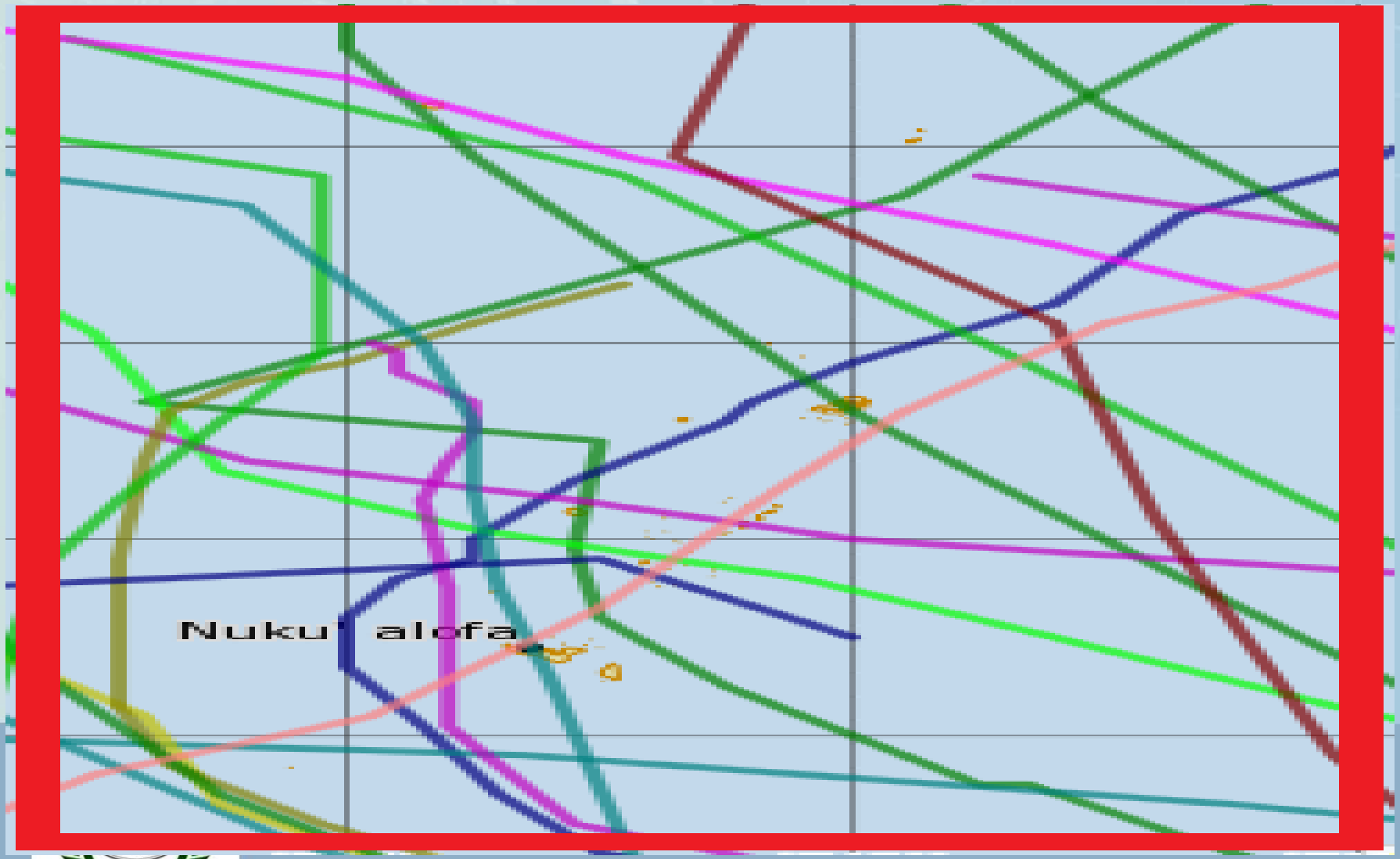
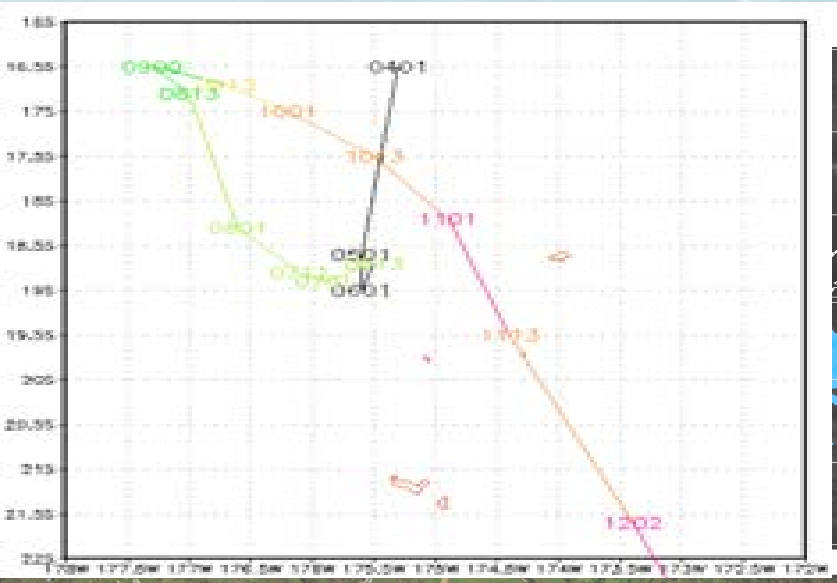
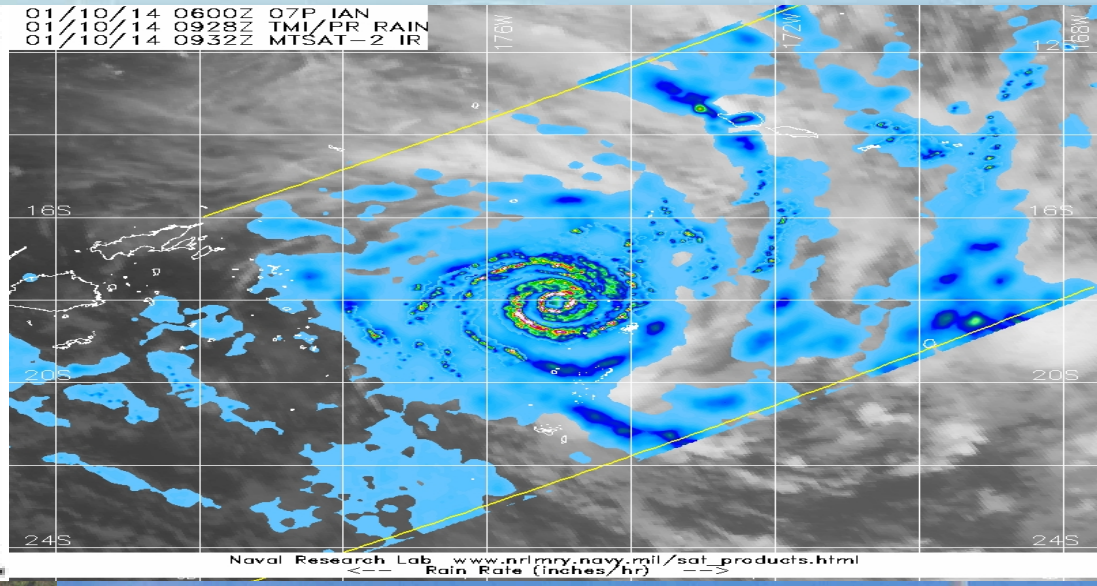
Palau
Federated States of Micronesia
Marshall Islands
Intertropical Convergence Zone
Kiribati
Warm Pool
Nauru
Trade Winds
South Pacific Convergence Zone
Monsoon
East Timor
Papua New Guinea
Solomon Islands
Tuvalu
Samoa
Vanuatu
Fiji
Niue
Tonga
Cook Islands
H
0 500 1,000 1,500 2,000
Kilometres
20°N
10°N
0°
10°S
20°S
30°S
10°E
120°E
130°E
140°E
150°E
160°E
170°E
180°
170°W
160°W
150°W
140°W

TCs between 2000-2010, avg 1.8 TCs/year (from the BOM's website)



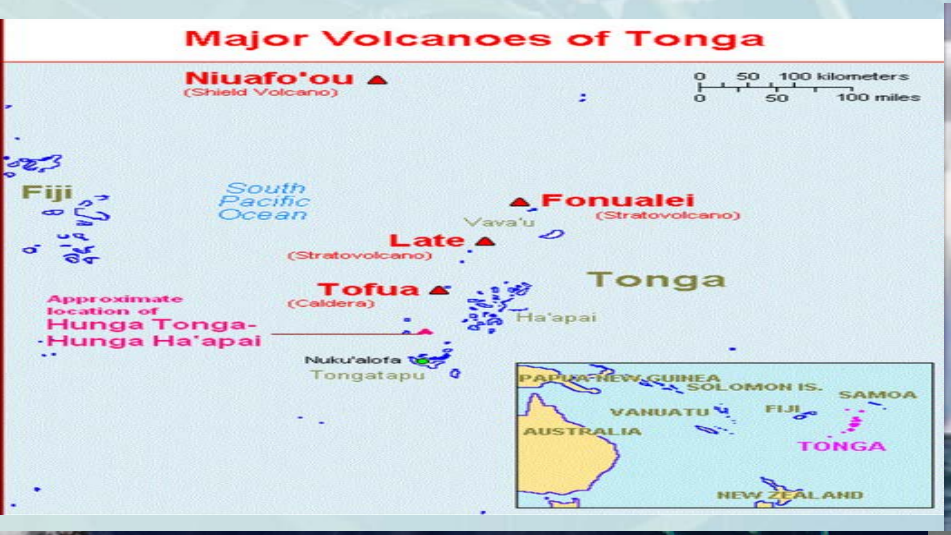
Hazard 1: Tropical Cyclone Ian (CAT5), 6-12 Jan 2014

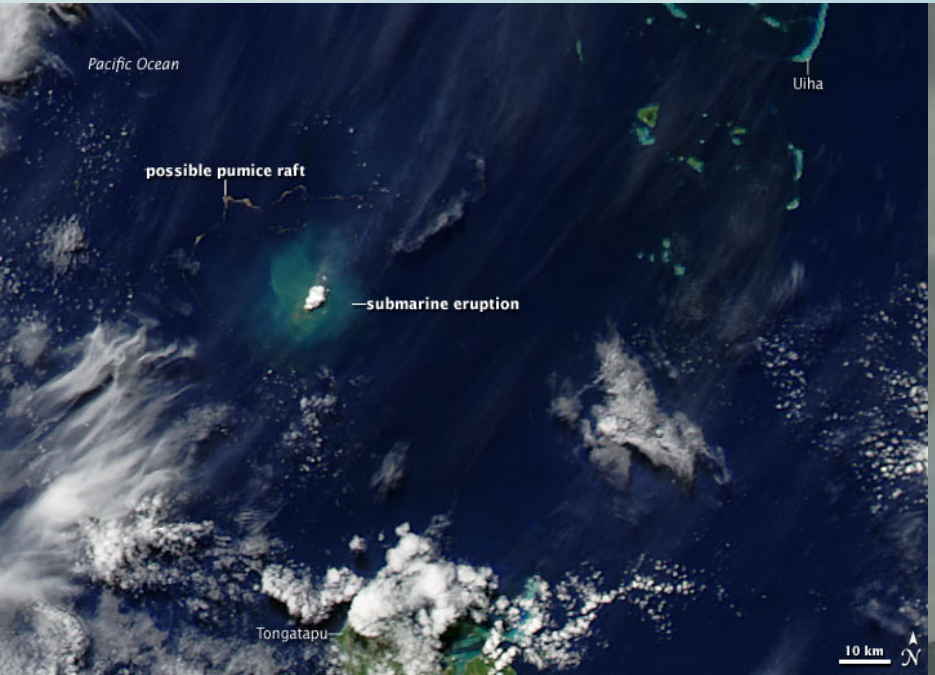




Hazard 2: volcanic eruptions and ash

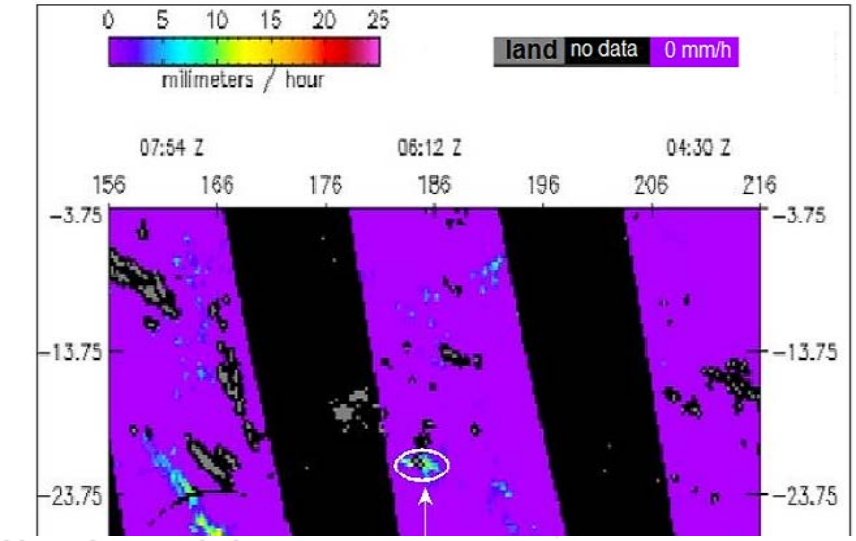
recent eruption of an under seas volcano (19 Dec 2014-28 Jan 2015)

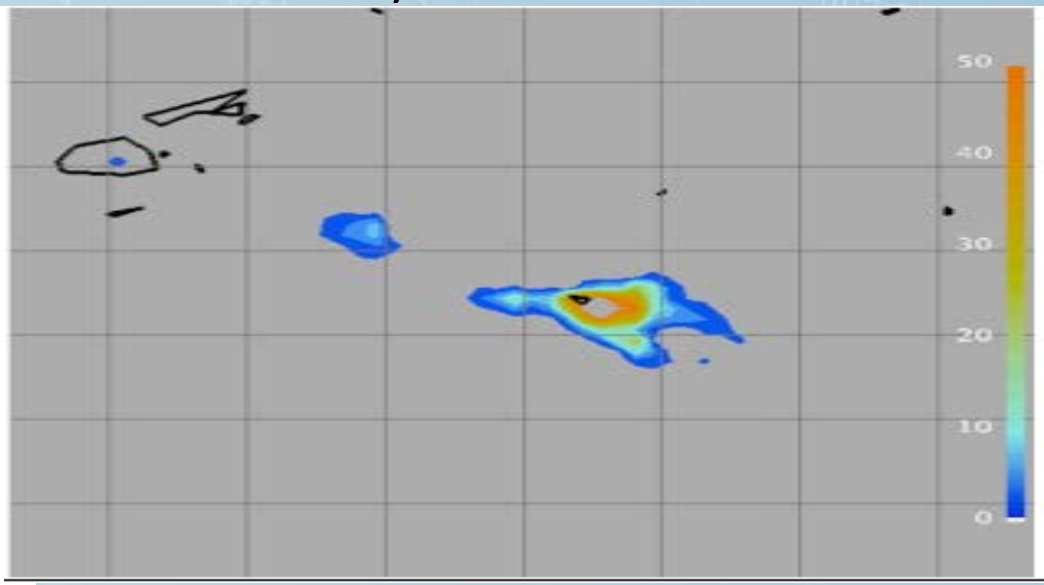


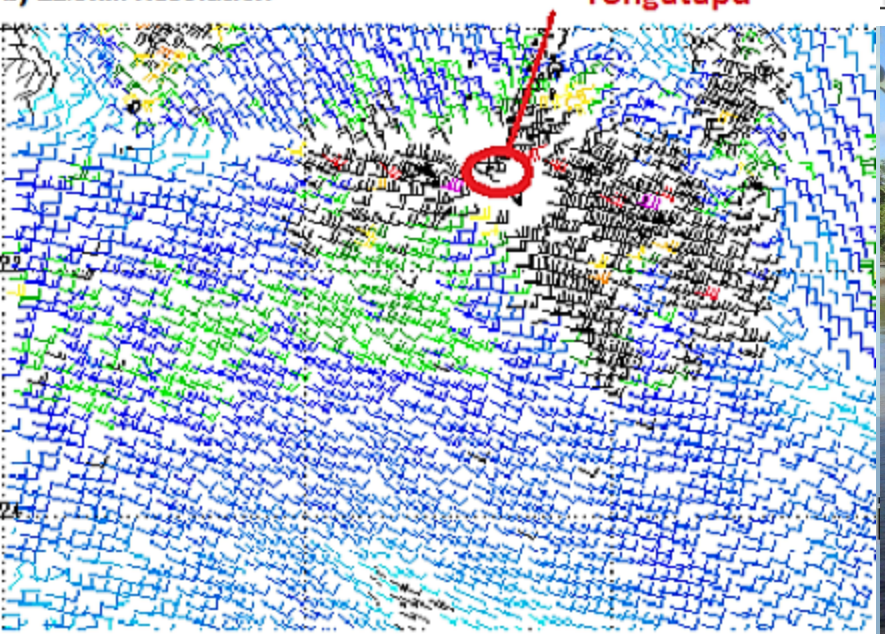


Hazard 3: torrential rain

– A flash flood caused by extremely heavy rain in Tonga (8 Feb 2008, 289.2mm in less than 12 hrs).







TMS's expectations of new series of satellites for hazard monitoring

Major hazard	Features of new generation GEO met. satellite
Hazard 1: tropical cyclones Hazard 2: volcanic eruptions and ash Hazard 3: torrential rain	**Multi-spectral bands:** *Utilisation of these additional new multi spectral bands observation data will provide more lead time for warnings of severe weather events and hence lead to an effective early warning system*
	Rapid scanning: Data from rapid scanning observation will enable early detection of volcanic eruptions and related ash flow, mesoscale convective system&tropical cyclone development, movement and structure and the environment.
	High spatial resolution *resolutions of 0.5 and 1.0 km for visible bands and 2.0 km for infrared bands will help to clarify structure of mesoscale convective system and TCs, which responsible for extreme heavy rainfall in our area.*

TMS's requirements to get desired benefits from the new generation of satellites

Major hazard	Features of new generation GEO met. satellite
Hazard 1: tropical cyclones Hazard 2: volcanic eruptions and ash Hazard 3: torrential rain	**Training in multi spectral imagery analysis and rapid scanning:** Training in processing RGB composition imagery using SATAID and employing it to do case studies of all the hazards. Training on how to interpret and use close-up RGB composition imageries already available for Tonga area in JMA website
	Product algorithms: The provision of product algorithms would support the creation of a volcanic product applicable to TMS.
	Easy-to-understand product: TMS would be interested in using a product made primarily for early detection of signal especially for development of Mesoscale Convective Systems from multi-spectral band data

TMS's plans/expectations for utilization of new-generation geostationary meteorological satellite data

- To improve provisions of services by using the new products from Humawari 8 multi spectral products to issue Trend Type Forecast for all of the 6 airports in Tonga
- Capacity development of Forecasters by training them to a level of being competent on how to interpret multispectral products of Himawari 8 imageries using SATAID (or JMA website and others) to increase lead time of providing warnings and hence will lead to an effective Early warning system
- To use the enhanced features of new-generation satellites high spatial resolution and multi-spectral bands to assist with the formulation of an impact-based forecast for Tonga.
- To do research, especially lessons learnt from case studies, using the himawari imageries to develop our knowledge about weather and climate in Tonga
- Active participation in scientific meetings with focus on the utilization of new-generation satellite imagery.

Thank you for your attention!!