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Unmanned Aerial Vehicles (UAV) to assist Disaster Response and Recovery

– Experience from Cyclone Gita Tonga (Feb 2018) -

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May 18th 2018

Understanding Risk conference 2018, Mexico City

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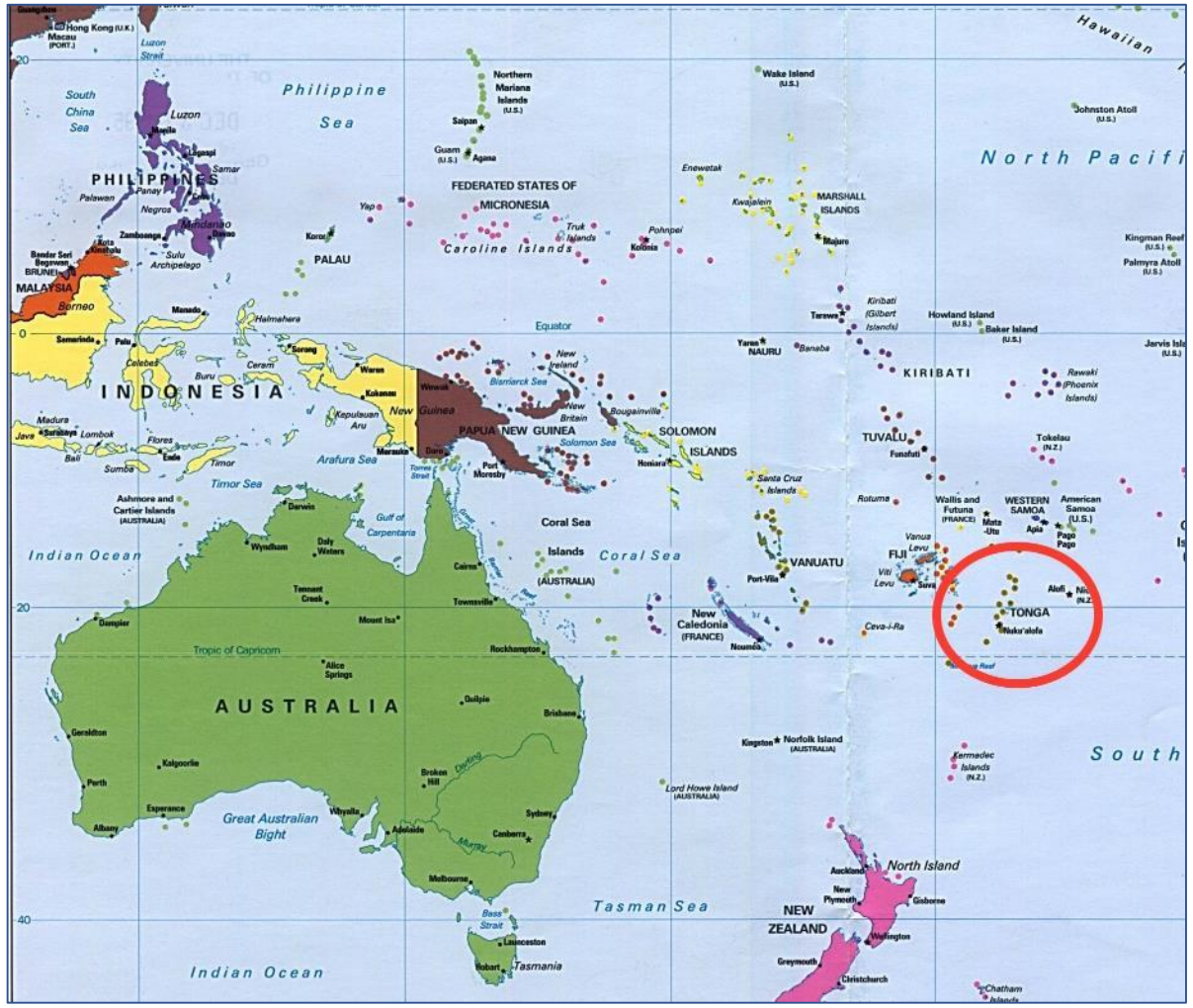

Location : The South Pacific/Oceania. East of Fiji and South of Samoa.

Total Land Area : 750 square kilometers, Consists of 169 islands, 36 are inhabited.

Population : 107,122 (2016 census)

Government : Parliamentary Constitutional Monarchy

Economics : Tourism, Agriculture, Fisheries
Ranked 2nd most vulnerable in the world to Natural Disaster. (UN Natural Disaster Risk Index)

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Tropical Cyclone Gita

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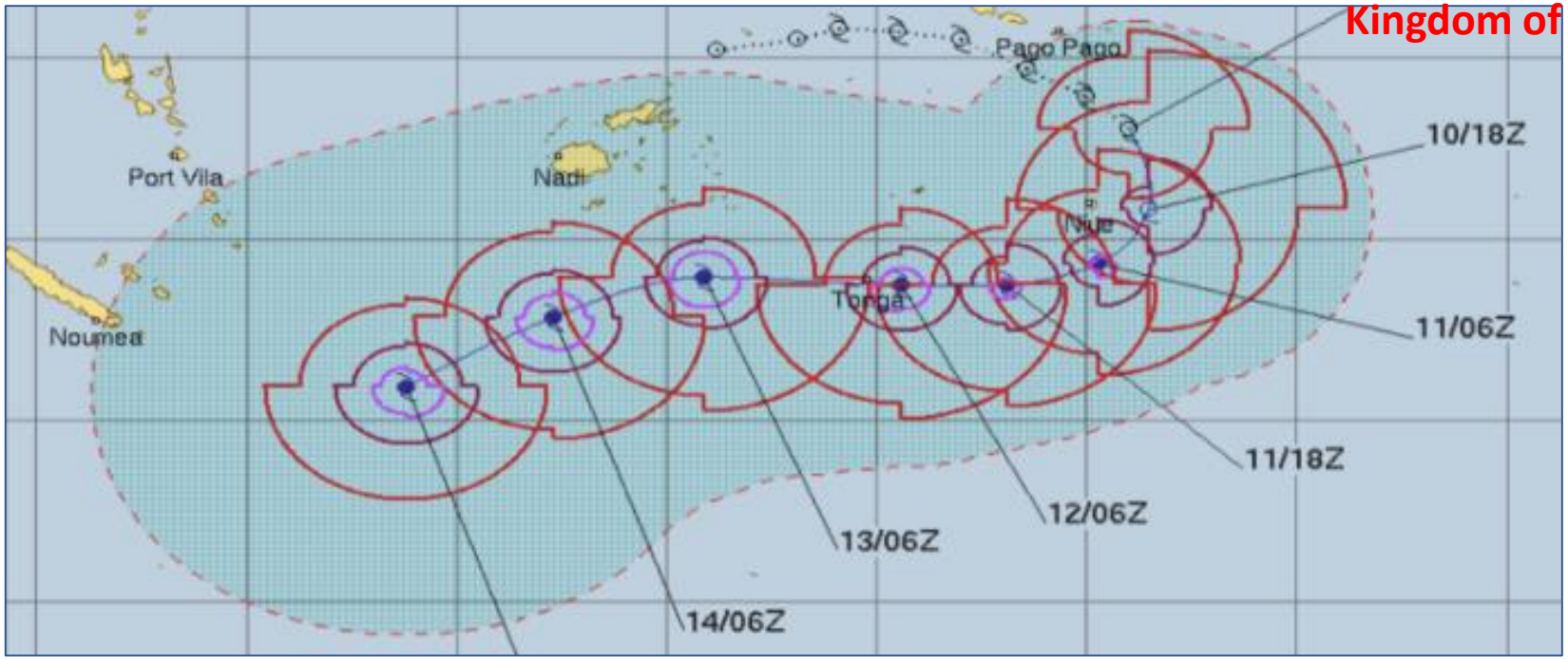

Areas affected : Tongatapu and Eua
Time : Monday 12th February 2018
Average Wind Speed : 130km/h – 195km/h
Storm Surge : 1m above average high tide level
Rainfall : 200mm within 24hrs
Last Tropical Cyclone of this category : 1982

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Impact

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- Approx. 75% of population (80,000 people) affected
- Essential Services : power lines, 75% schools affected,
- 25% houses affected (approx. 800 houses destroyed, 4,000 damaged)
- Public Buildings affected

  : Domestic Airport

  : Parliament Building

  : Tonga Metrological Services Building
- No loss of life

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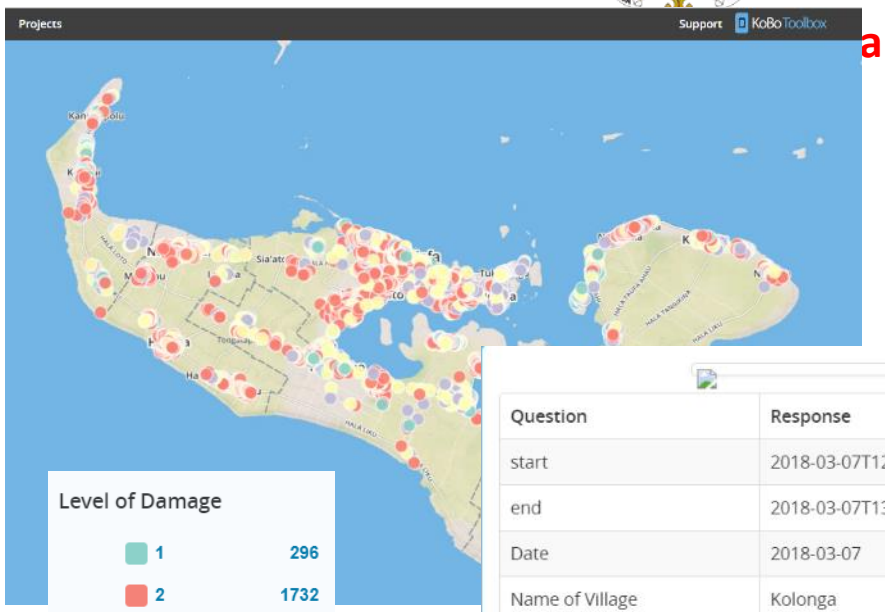
Response

- Data collection: use of Kobo tools
- Clusters activated
- Immediate relief effort : from preposition of emergency relief goods and NEMO NFI stock.
- Coordination of international relief efforts
- National Emergency Fund, CERC fund WB, PCRFI insurance ADB facilities.



Level of Damage

1	296
2	1732
3	819
4	489
Not Specified	2

Display options without data

Question	Response
start	2018-03-07T12:58:25.751+13
end	2018-03-07T13:00:17.962+13
Date	2018-03-07
Name of Village	Kolonga
Name of Affected House Hold	Semisi Filikitonga
Owner of the Building	AUTOMATIC
Level of Damage	partially_damage
Partially Damage	
GPS Location	-21.12620729 -175.073227 60.0 4.0
version	vrusZ5m8EDqoYej2TLhioi
meta/instanceID	uuid:c8a59e3a-1fad-441f-8d02-5719eafcce19

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UAV data collection for TC Gita

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Day 2: NEMO/Tonkin&Taylor rapid situation survey @ below 100ft

Day 2: Joint MFAT/NZ fire department and DFAT/Rapid Response team collected 360^{o} UAV data of destroyed public buildings for rapid safety survey database @ below 100ft

Day 8: NEMO/WB UAV mapping@1000 ft

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UAV mapping for TC Gita

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Why use UAVs?

- More affordable than satellite and aircrafts **at the small island scale (< 250 km2)**
- Very rapid to deploy on site (less than 12 hours)
- The cost of flying the same area multiple times a year is marginal

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UAV mapping under emergency situations

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Baseline data from October 2017

Post event data from February 2018

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WB UAV4Resilience campaign in Oct 2017

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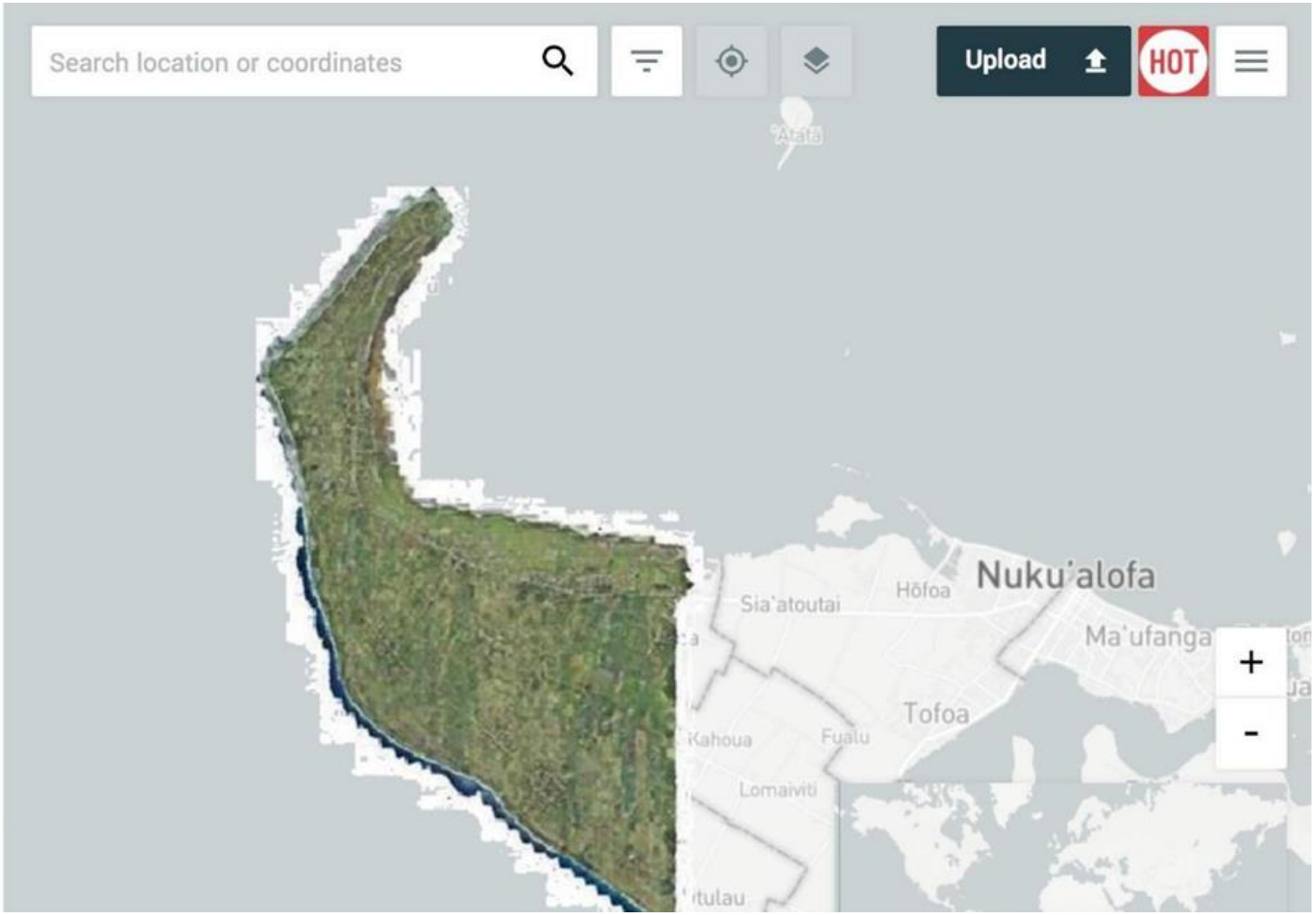
2.5 weeks 200km^2 with Fixed wing UAV to understand best practices



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UAV mapping under emergency situations

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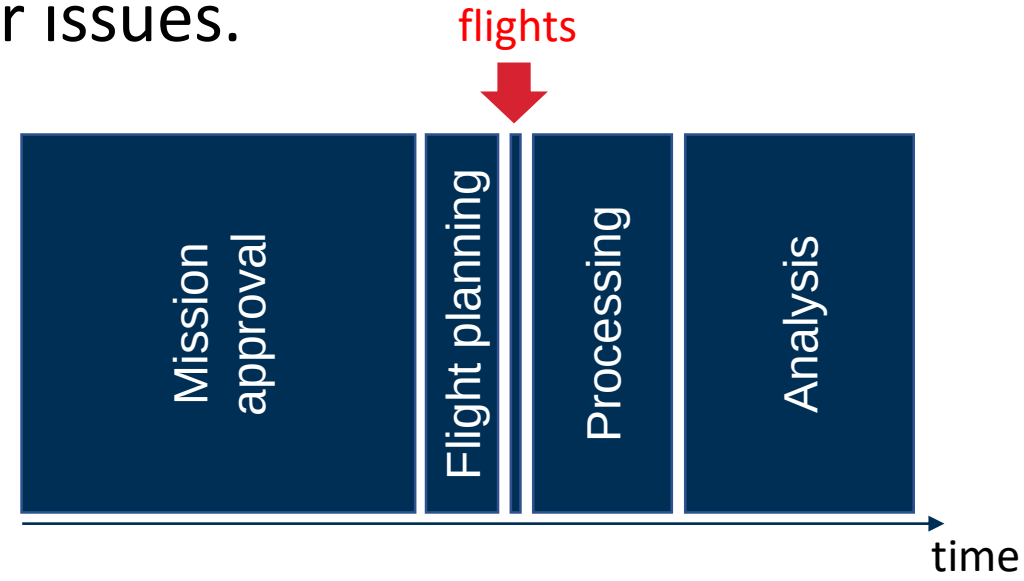
- Team started flying one week after event, for **6 days**, covered **300km²**
- Lower quality compared to pre-Gita images
- Flying the UAV is only a tiny part of the workflow. Preparation and post-data collection take long. ***Low internet bandwidth*** and ***processing power*** are major issues.



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Use case 1: Remote Housing Damage Assessment

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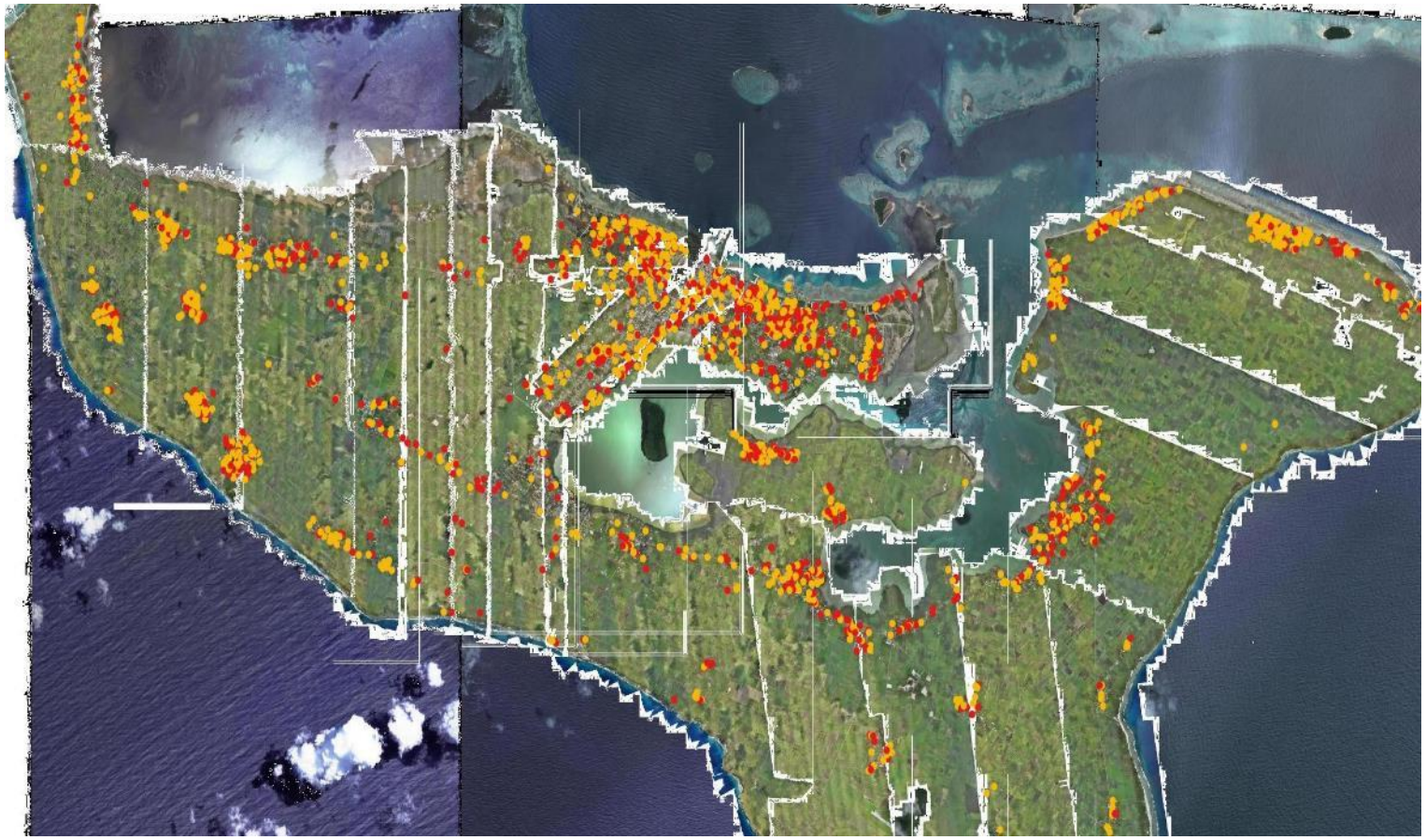
Coordinated within a small group of volunteers

Simple classification of “damaged” (<50%) and “destroyed” (>50%)

Results:

UAV assessment identified **~2450** damaged structures

Ground survey identified **~4000**



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Use case 2: School reconstruction planning using the pre- and post-Gita UAV images

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GPS Kahoua

2 classrooms destroyed

GPS Fuuatamou

GPS Holonga

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Use case 3: Validation of claims for housing damage support

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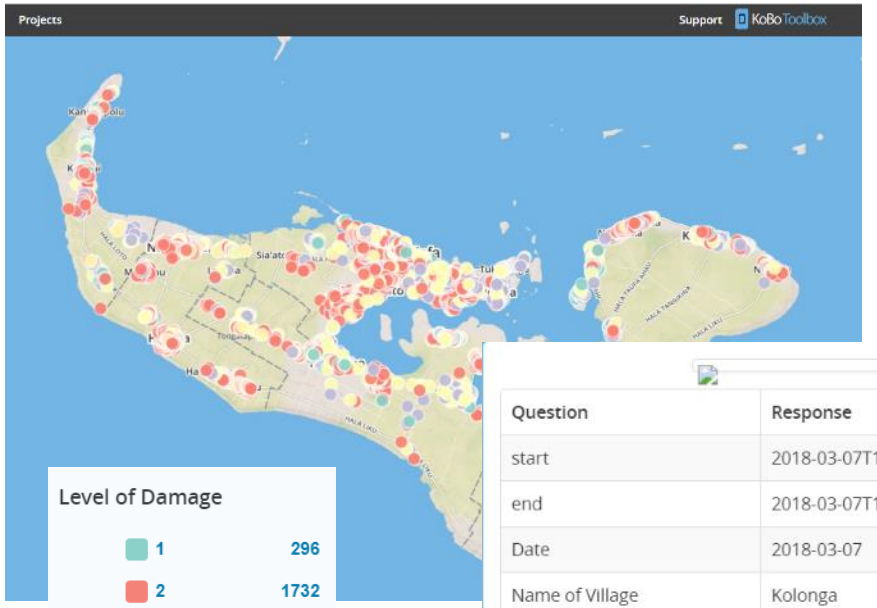

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__version__	vrusZ5m8EDqoYej2TLhioi
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Summary

- Compliment Kobo tool data collection for damage and claims validation
- Create Baseline data, compare post-disaster data against baseline

Challenges

- Can UAVs be used to capture images of Remote islands in emergencies?
- Fast mobilization of the team (MFAT/DFAT)
- Post-processing, analysis needs to be faster
- Air safety – need permission from CAA well ahead of time, especially if flying at high altitude

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Malo aupito.