



Satellite Imagery as a Tool for Informed Disaster Risk Management: NDRMO Tonga's Path Forward

Case Study: HTHH Volcanic Eruption





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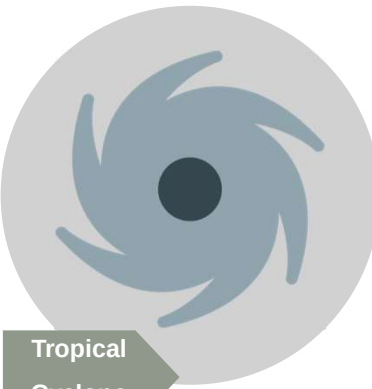


Induction


Where is Tonga?



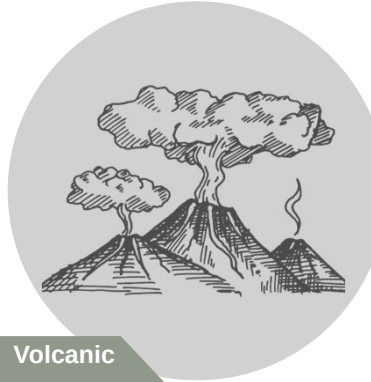
Tonga's Risk Profile




Tropical
Cyclone



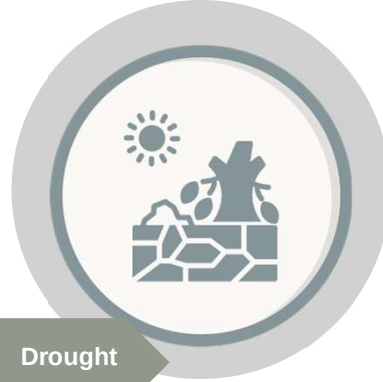
Earthquake



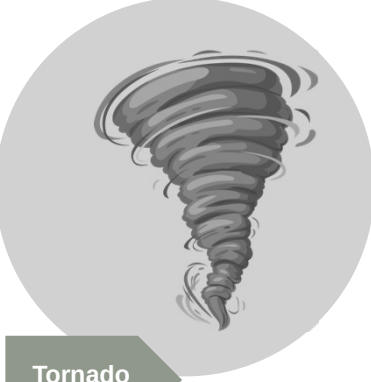
Volcanic
Eruption




Flooding



Drought



Tornado

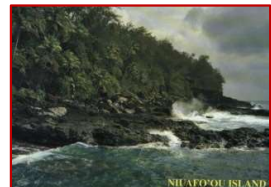


Tsunami



Tonga's Risk Profile

- Second most vulnerable country in the world
- A small island developing nation



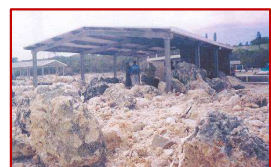
Mohemohe 'a Kuli Fafangu, Niuafu'ou
1 the 1946



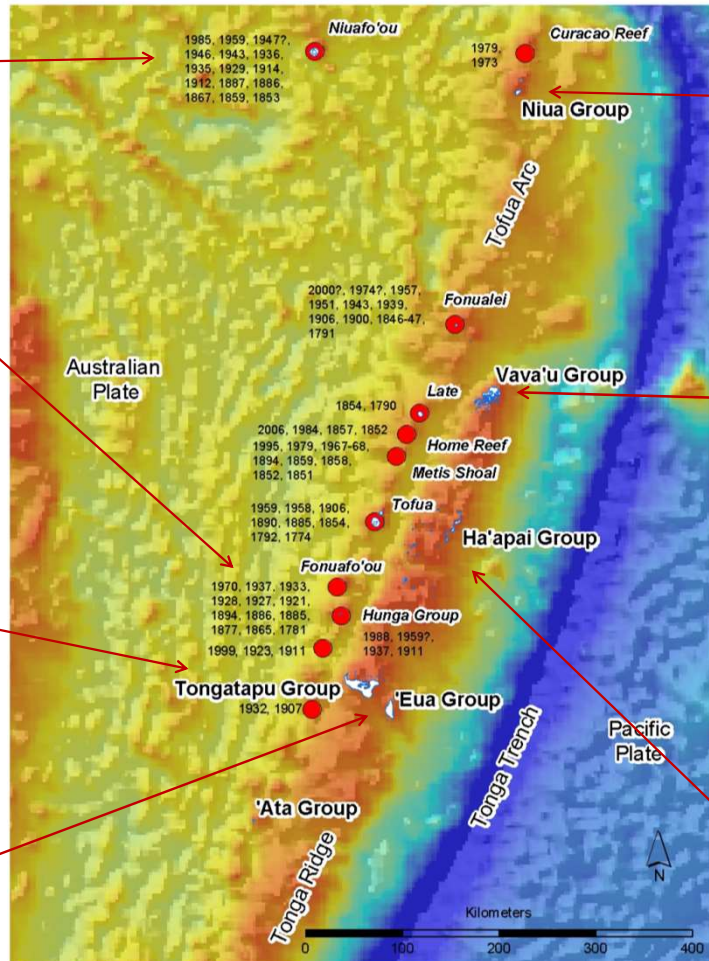
15 March 2009, Hunga Tonga Hunga Ha'apai



Tornado, Ha'akame 'i Septema 2004



Storm Surges Eua – \$1.4 milliona



Tsunami 2009



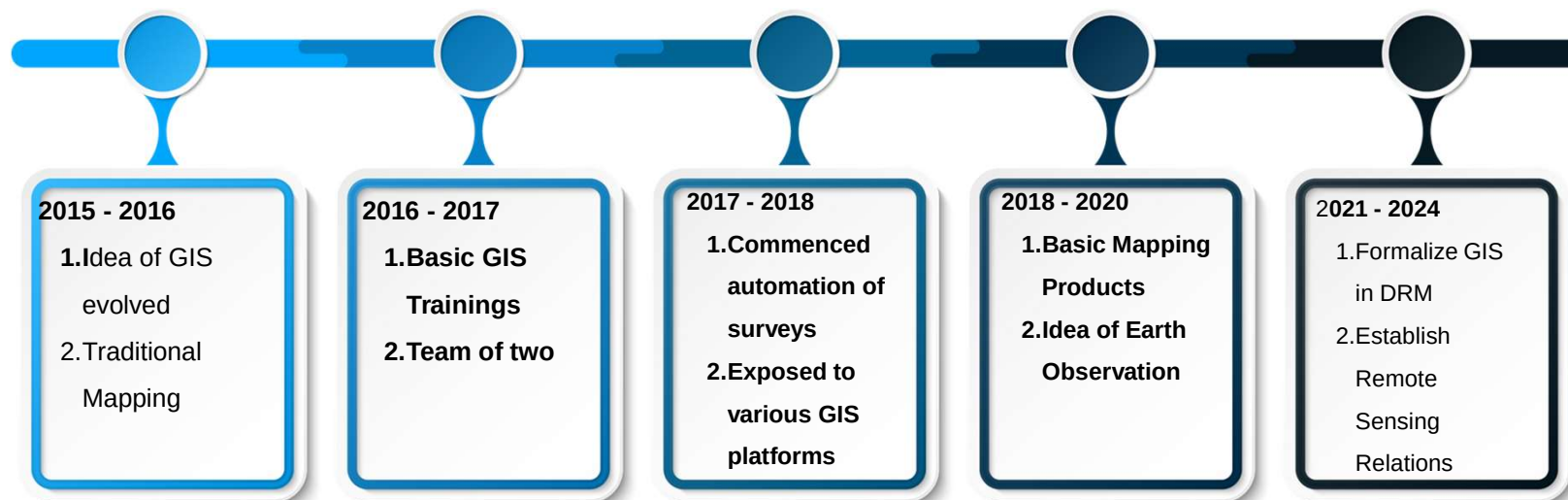
TC Waka 2001(\$104m)



Flooding, Lifuka 2009



GIS in NDRMO

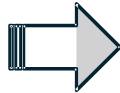




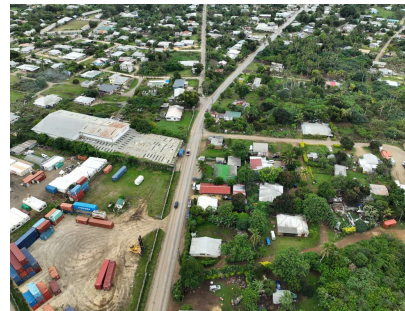
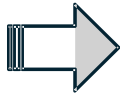
NDRMO GIS Community of Field Practice

GIS in NDRMO

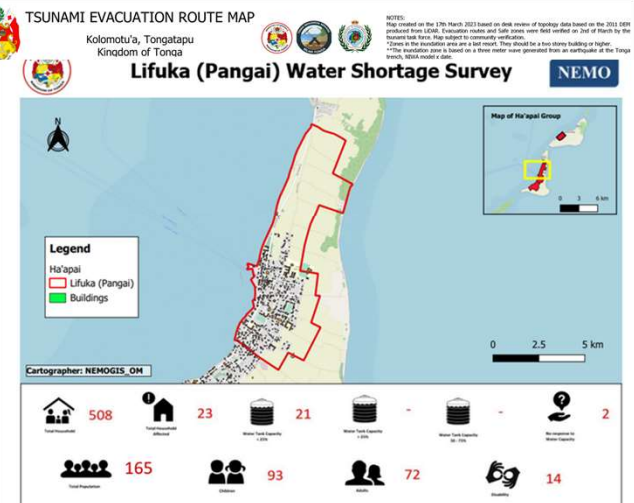
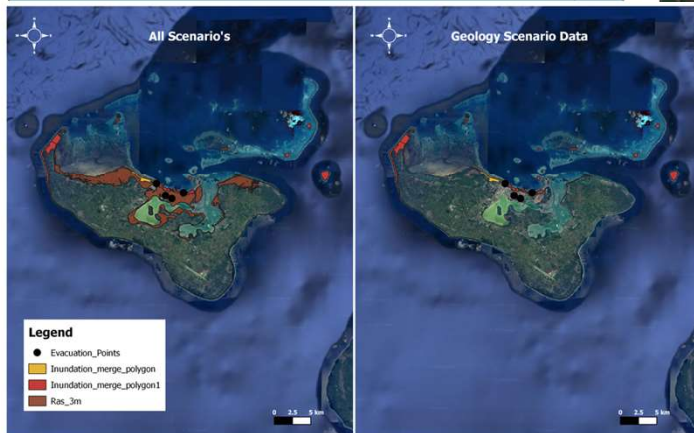
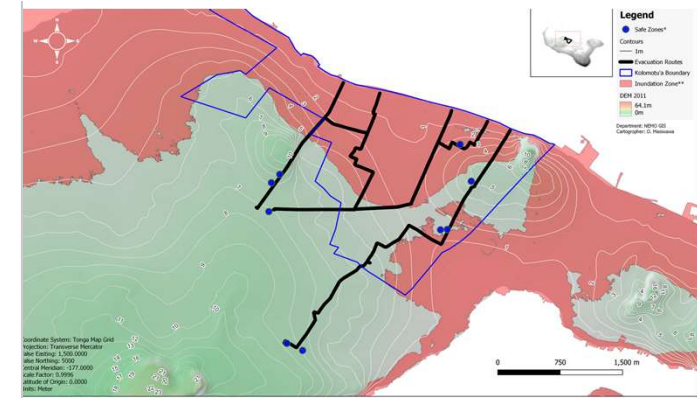
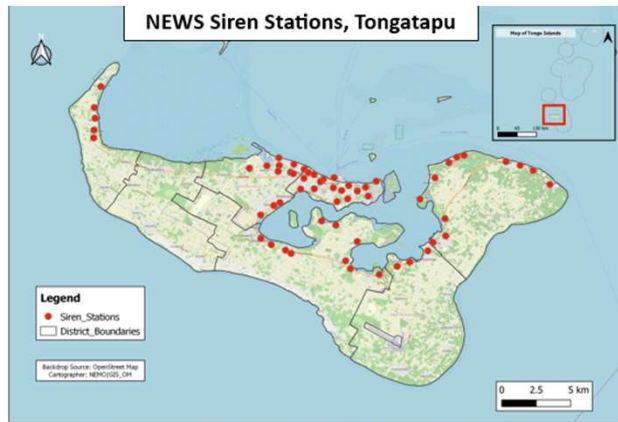
Data Collection



Drone Footage



GIS in NDRMO



Satellite Community of
Practice in the Past



- 1.Intensification of the scale of Hazards**
- 2.Multiple Hazards Occurrence**
- 3.Require Timely Response**
- 4.Robust Visualization to facilitate prioritized areas affected**
- 5.Quality Information for Critical Decision-making**
- 6.Transition from Tradition to Modern Visual Practices – RS
as Geospatial Solution.**



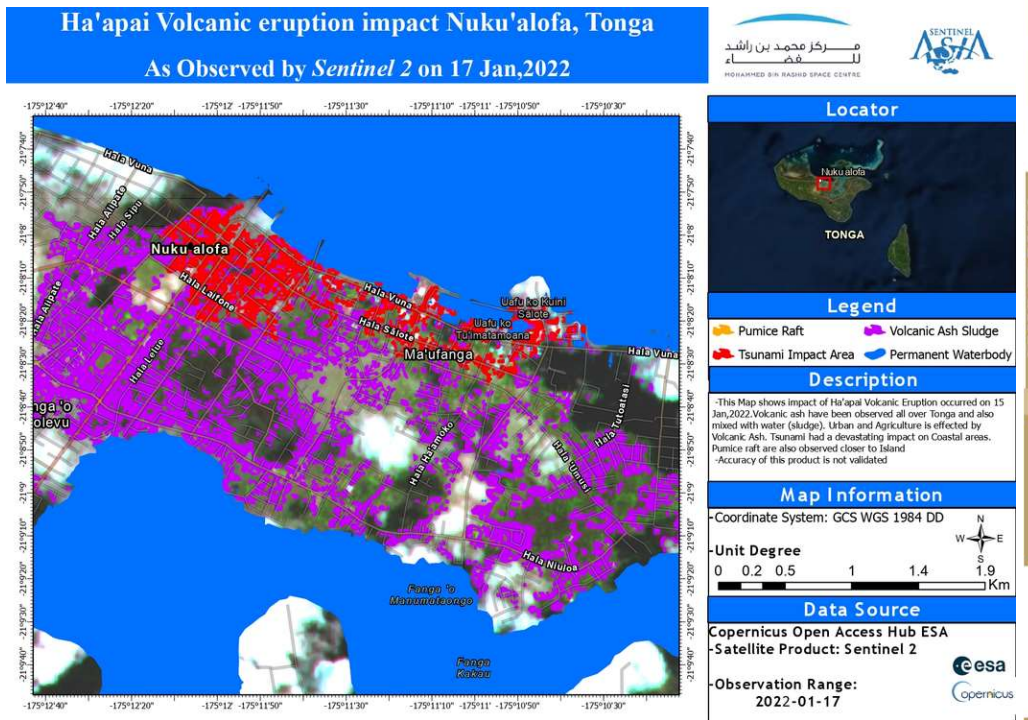


NDRMO GIS Milestones 2024



Leveraging into Modern
Community of Practice





Case Study – HTHH
Volcanic Eruption 2022



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Volcanic Eruption 2022



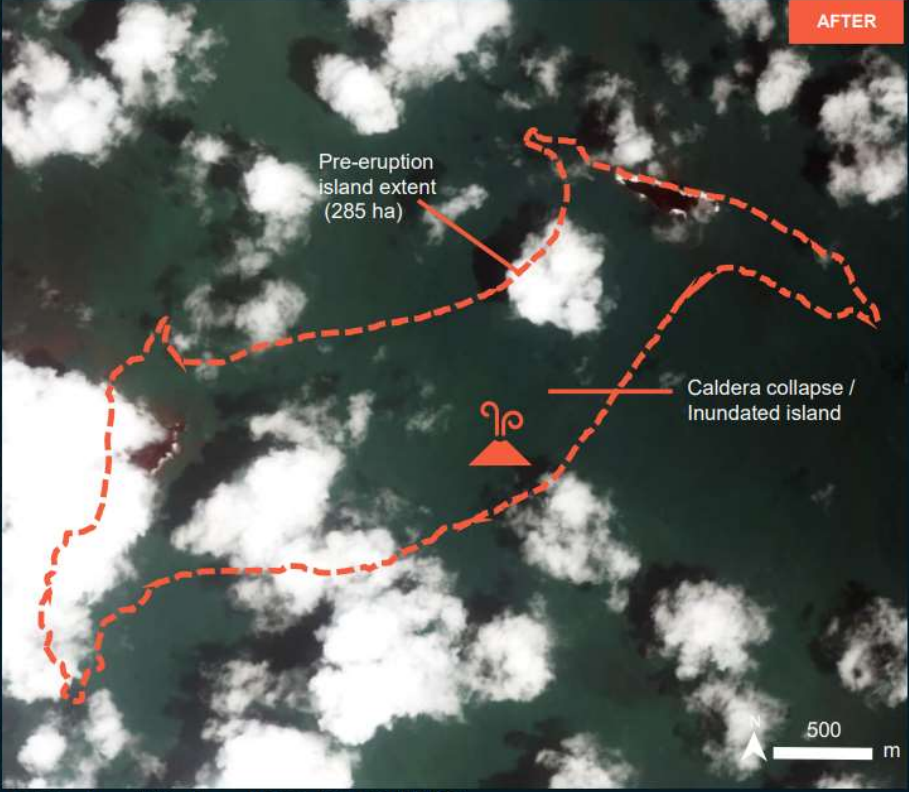
AOI 1- HUNGA TONGA - HUNGA HA'APAI VOLCANO

Destroyed area around the volcano / Collapse of the caldera

Image center:
175°23'26.689"W
20°32'39.82"S



Sentinel-2 / 8 Dec 2021



Pléiades / 16 Jan 2022 (21:53 UTC)



Case Study – HTHH
Volcanic Eruption 2022

**AOI 3-2, PANGAI TOWN, PANGAI DISTRICT,
HA'APAI DIVISION**

Water Invasion evidence and affected structures

Image center:
174°21'1.624"W
19°48'14.767"S

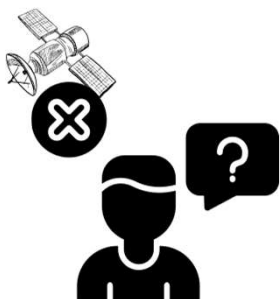


ESRI Basemap / Worldview-2 / 19 April 2020

Pléiades / 16 Jan. 2022



Challenges



Lack of awareness of
satellite advancements



Lack of capacity
knowledge & skills



Timeliness



Lack of analysis
capacity



Prolonged procedures for
response & prioritization



Images are very costly for SID
combating climate change



Low resolution
imageries



Accessibility



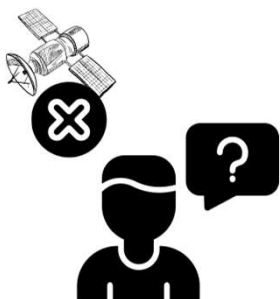


Recommendations

- Streamline focus on empowering SID disaster management officers for satellite advancements
- Streamline capacity strengthening of disaster management GIS officers of satellite analysis
- Expedite the process for the provision of high-resolution images for small island development
- Enhance archive satellite to provide practices of understanding the trends in support of Multi-Hazard Risk for
Tonga
- Provide mentorship or internship for our GIS disaster management team to be able to analyze the national level.



Challenges



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imageries



Accessibility





Malo 'Aupito

