

Kingdom of Tonga Tsunami Operation

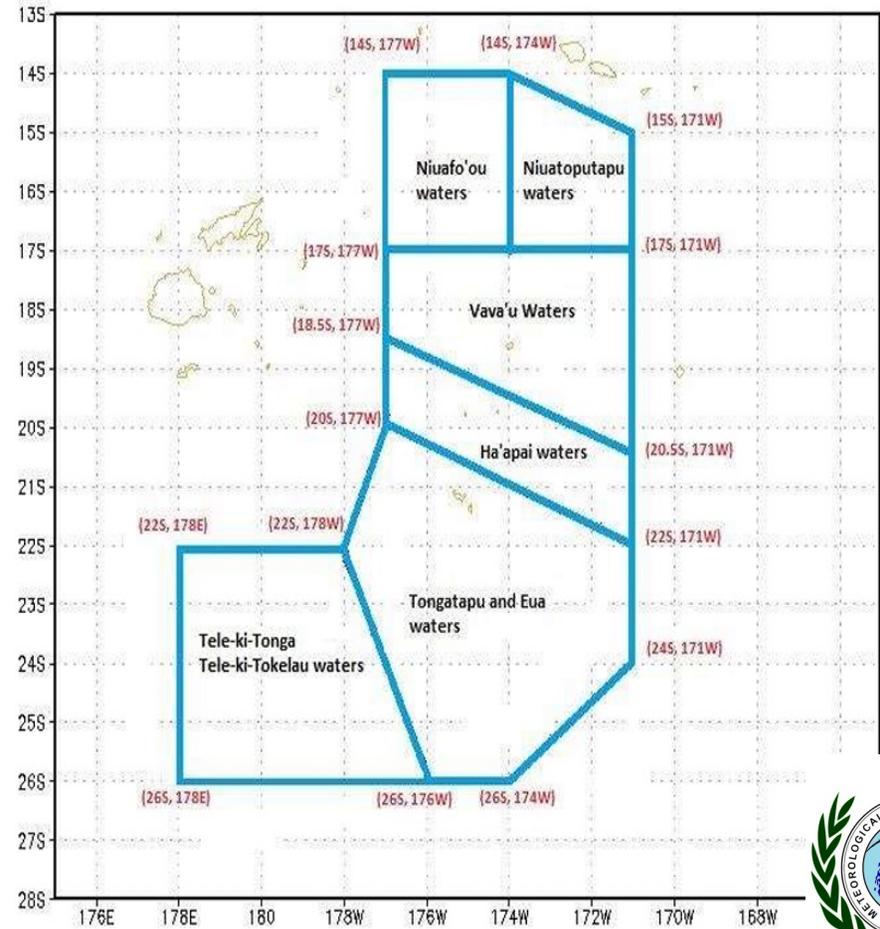
**Ministry of Meteorology, Energy, Information, Disaster
Management, Environment, Climate Change &
Communications (MEIDECC)**

By

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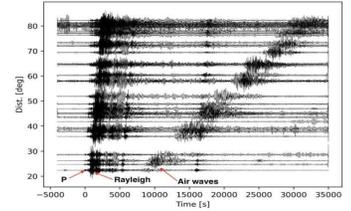
Tonga Area of Responsibility



Tsunami Operations Responsible



Issue earthquake information



Issue tsunami warning



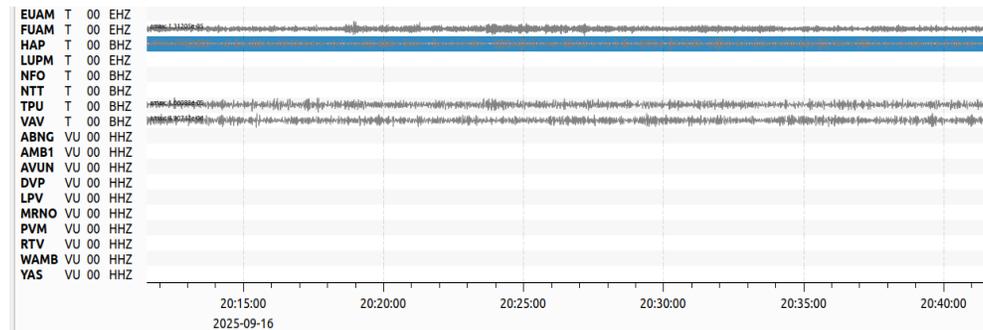
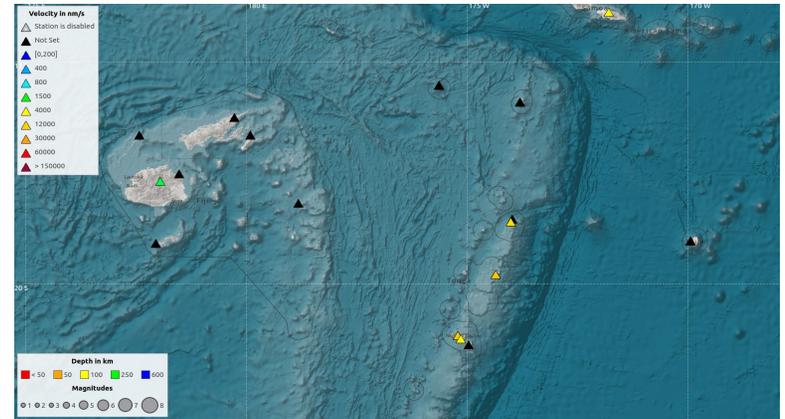
Advise public & Response



Monitoring system

Earthquake Monitoring.

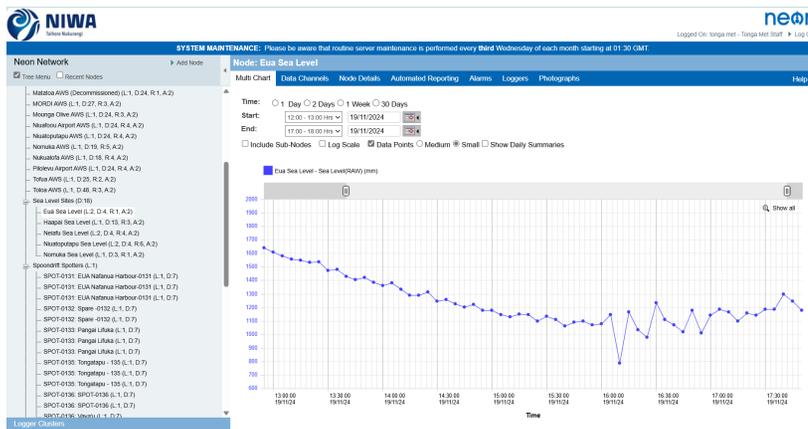
- Seismic station 8 (TGS), seiscomp 5
- USGS
- CISN
- PTWC
- ORSNET
- CCPT (email)



Monitoring system

Sea level Monitoring

- 6 local tide gauges
- Tide tool
- UNESCO-IOC – Sea level station monitoring facility (international)



Monitoring system

Tsunami Wave forecast

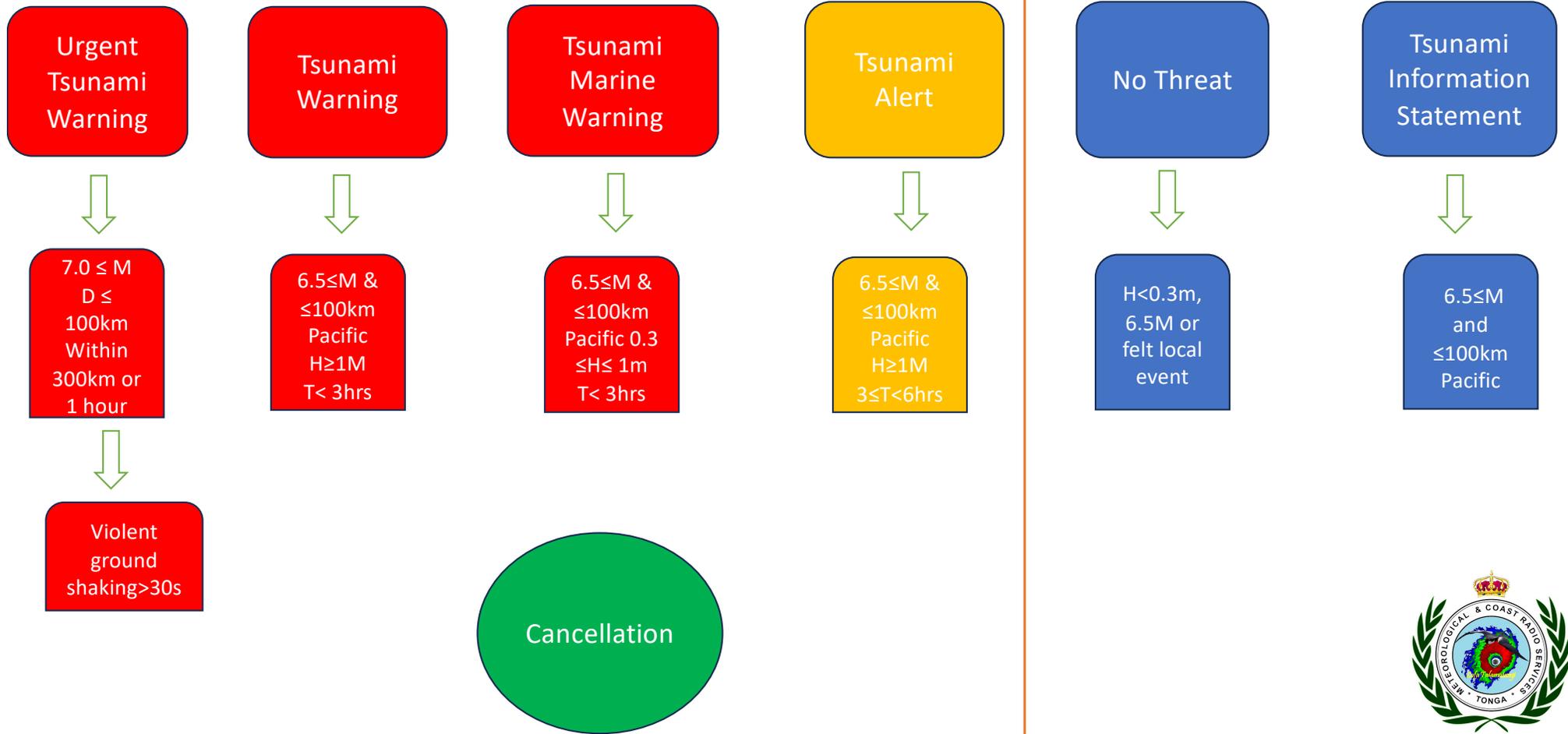
- Tsucat (ETA and height)

Additional Information

- PTWC (earthquake information and forecast)
 - Email and via phone call
- National Nearby agency
 - Social media



Types of Warnings and Information



Flow Chart

1. To be issued when a Long or strong Local earthquake is felt (observed) where strong shaking lasts for 30sec or more, but no tsunami wave has been recorded on tide gauges and no official earthquake parameters has been received from earthquake monitoring stations.
 2. Earthquake 7.15M and <100km deep detected within 300km in any of Tonga's Coastline and/or tsunami wave travel time of <1Hr from its source.

Urgent Tsunami Warning

Dissemination and Activation of Template 1

1. Activation Tsunami siren "URGENT TSUNAMI WARNING"
2. RAR system (Pre-recorded message 1).
3. Provide Radio Interview
4. Urgent tsunami warning via email through the approved distribution list.
5. Issue urgent tsunami warning via Facebook (Tonga MET).

Monitoring

1. Set-all local tide gauge to output 10 minutes sea level data readings.
2. Monitor and Assess
Local Tide gauges: Nuku'alofa, 'Eua, Nomuka, Pangai, Neiafu, Niuaotupapu + Regional & International gauges
3. Monitor and Assess
Local Seismic Station: Nuku'alofa, 'Eua, Ha'apai, Tofua, Vava'u, Niuafo'ou, Niuaotupapu+ Regional & International gauges.
4. Run Analysis Tools and Assessment: Tsucat, Seiscomp5

Update Warning Template with new information received & Call to TGS via VHF for further updated earthquake parameters (call to TGS during official working hours)

Briefing

1. Brief Director of TMS (and others if needed)
2. Answering public calls of concerns for the event

Downgrading of Warning when criteria is met

Cancellation of Warning when criteria is met

Expected wave height 0.3M ≤H< 1M with expected arrival time of T≤3hr

Tsunami Marine Warning

Dissemination and Activation of Template

1. Activation Tsunami siren "Tsunami Marine Warning"
2. RAR system (Pre-recorded message 3).
3. Provide Radio Interview
4. Tsunami marine warning via email through the approved distribution list.
5. Issue tsunami marine warning via Facebook (Tonga MET).

Monitoring

1. Set-all local tide gauge to output 10 minutes sea level data readings.
2. Monitor and Assess
Local Tide gauges: Nuku'alofa, 'Eua, Nomuka, Pangai, Neiafu, Niuaotupapu + Regional & International gauges
3. Monitor and Assess
Local Seismic Station: Nuku'alofa, 'Eua, Ha'apai, Tofua, Vava'u, Niuafo'ou, Niuaotupapu+ Regional & International gauges.
4. Run Analysis Tools and Assessment: Tsucat, Seiscomp5

Update Warning Template with new information received & Call to TGS via VHF for further updated earthquake parameters (call to TGS during official working hours)

Briefing

1. Brief Director of TMS (and others if needed)
2. Answering public calls of concerns for the event

Downgrading of Warning when criteria is met

Cancellation of Warning when criteria is met

Expected wave height is 1M ≤H with expected arrival time of 3hr≤T≤6hr

Tsunami Alert

Dissemination and Activation of Template

1. Activation Tsunami siren "TSUNAMI ALERT"
2. RAR system (Pre-recorded message 4).
3. Provide Radio Interview
4. Tsunami Alert via email through the approved distribution list.
5. Issue Tsunami Alert via Facebook (Tonga MET).

Monitoring

1. Set-all local tide gauge to output 10 minutes sea level data readings.
2. Monitor and Assess
Local Tide gauges: Nuku'alofa, 'Eua, Nomuka, Pangai, Neiafu, Niuaotupapu + Regional & International gauges
3. Monitor and Assess
Local Seismic Station: Nuku'alofa, 'Eua, Ha'apai, Tofua, Vava'u, Niuafo'ou, Niuaotupapu+ Regional & International gauges.
4. Run Analysis Tools and Assessment: Tsucat, Seiscomp5

Update Warning Template with new information received & Call to TGS via VHF for further updated earthquake parameters (call to TGS during official working hours)

Briefing

1. Brief Director of TMS (and others if needed)
2. Answering public calls of concerns for the event

Downgrading of Warning when criteria is met

Cancellation of Warning when criteria is met

To be issued when earthquake $5M < 7.1$ and $> 100km$ (Deep depth) and/or has been felt in our area or anywhere in the Pacific Basin and assessments has been made and there is no tsunami threat

Tsunami Information Statement

Dissemination and Activation of Template

1. Issue tsunami information statement via email through the approved distribution list.
2. Issue tsunami information statement via Facebook (Tonga MET).

Monitoring

1. Run Analysis Tools and Assessment: Tsucat, Seiscomp5.
2. Provide Live Radio Interview/Briefings on the event (for felt events).
3. Monitoring of Tide gauges & Seismic stations for updated information & Call TGS via VHF for discussions (during official hours)

Update Warning Template with new information received & Call to TGS via VHF for further updated earthquake parameters (call to TGS during official working hours)

Briefing

1. Brief Director of TMS (and others if needed)
2. Answering public calls of concerns for the event

Downgrading of Warning when criteria is met

END

Dissemination of Warnings

- VHF Radio



- Tsunami agencies
- Testing in working hours at 10am

- Email



- Tsunami operations agency, Stakeholders, partnerships, government ministries and NGOs

- Radio Tonga (all frequency FM's station disseminate information in 1 channel)

- Public

- Facebook social media

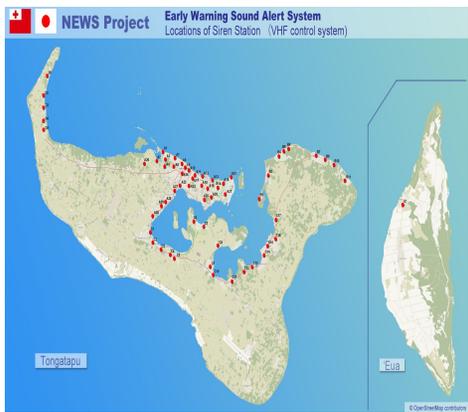


- Public

Disseminations (English-Tonga)



- Siren: VHF (Tongatapu and 'Eua) & Remote Activated Receiver (all island group)



Dissemination of Warnings



Challenges faced

- TGS are not 24 hours operation
- Gap response in the local event and distant even more then 6 hours
- Siren station located at vulnerable areas
- Limitations of experiences due to
 - No international training staff
 - Less exercises inside the early warning systems operations
- Short staff



(NDRMO) Response Division

- 1) Activation/De-activation of the NEOC according to the DRM Act 2021
- 2) Structure of the EOC
- 3) Activities
- 4) Emergency Operation Center
- 5) Challenges

Activation of EOC

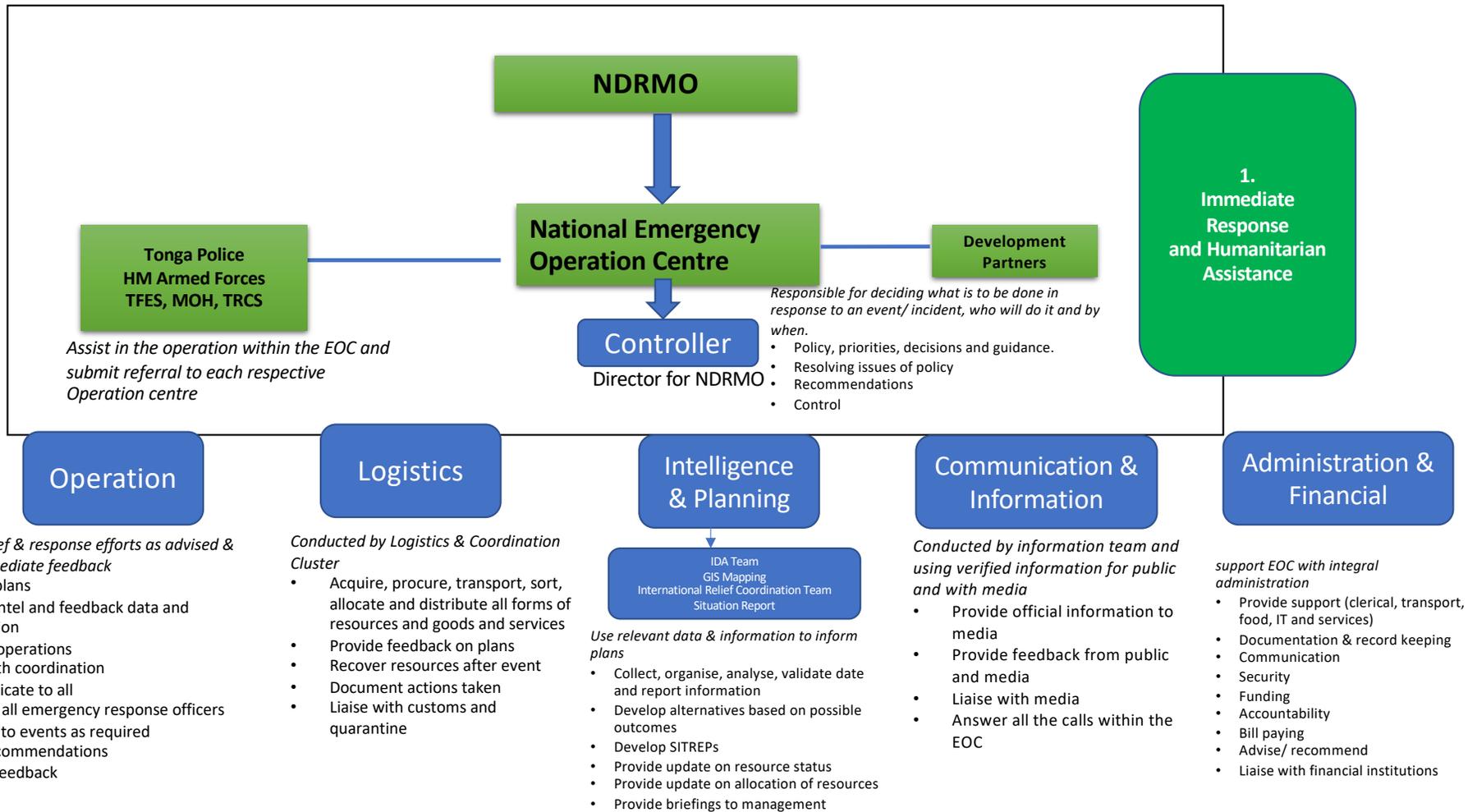
62 Activation of the National Emergency Operations Centre and Island EOC (2 Types)

63 Standby mode: EOC Activate if there is a Tsunami Alert (distance Tsunami)

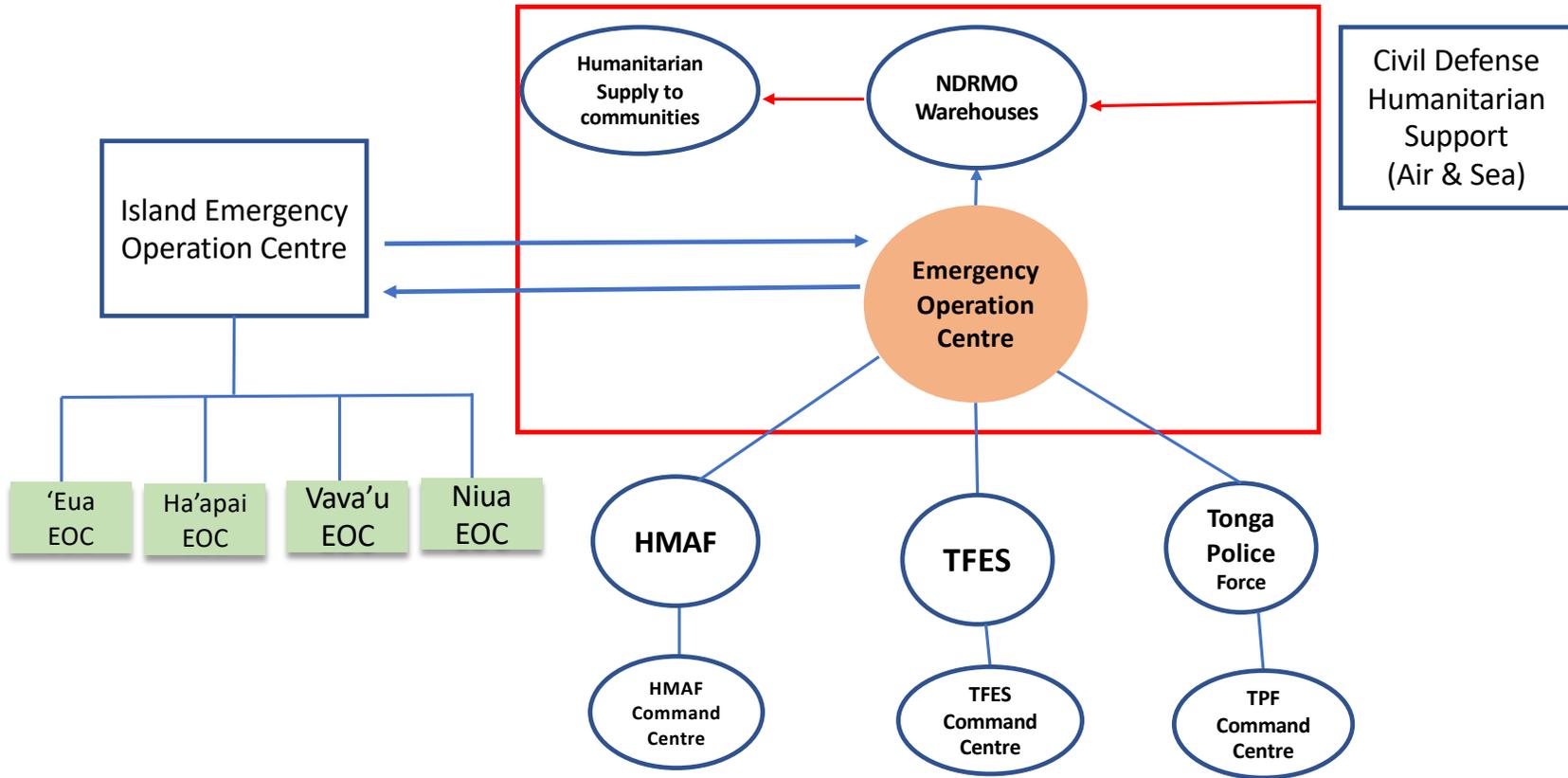
64 Full activation: EOC Activate if there is a Tsunami Warning (Local & Regional Tsunami)

65 Deactivation of EOC: When the NTWC issue a Cancellation message to the EOC.

Structure of the Emergency Operation Centre



Early Warning & Response National EOC Link to Island EOC & First Responders



EOC Equipment

- VHF/HF radio
- Computers
- SAT phone
- Disaster stakeholders contact list
- Tsunami Evacuation Maps for Tongatapu
- Evacuation Centres

Activities

Mitigation and Preparedness

- Conducted a Refresher Tabletop and Simulation Exercises to the First Responders and Surge Staff
- Implementation of the VEOC training for the 5 villages in Vava'u (pilot)
- Operated during the Tsunami Drill in November, 2024 (Exercises)
- Assist the Planning, Policy and Project for the upcoming review of the EOC SOPs in order to align with DRM Act
- TV and Radio program(ongoing).
- Conducted EOC training with all NDRMO staff and first responders
- NEOC and IEOC

- Installation of Tsunami Evacuation Route sign board
- Schools and Community Outreach programs
- Tsunami Drill with vulnerable communities and schools
- Replenishing of preposition stock
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Challenges

- a) Short Staff
- b) Time of Tsunami
- c) Staff capabilities



MALO 'AUPITO

