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Commission

4.11 Tsunami Generated by Volcanos

Australian SOPs

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JATWC Non-Seismic SOPs

1. Source Types
2. SOPs for Non-Seismic Events
3. Future Development

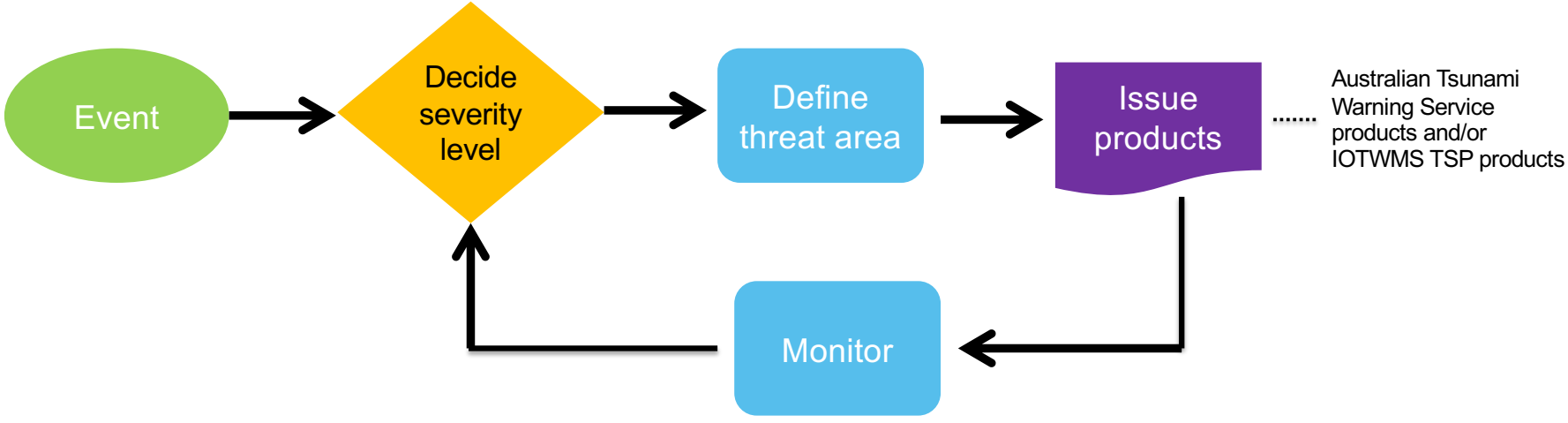
Volcanic Eruption

Celestial Impact

Landslide

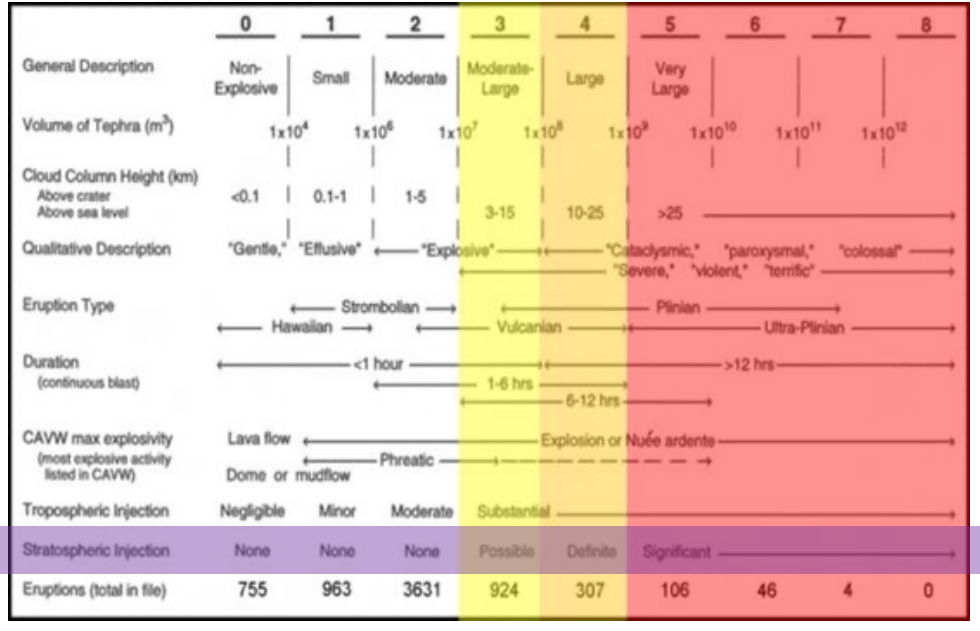
Unknown

At a glance - JATWC SOPs for Non-Seismic Events



Severity	Threat Area	Default Threat Level	Upgrade possible?
Level 1	within 1-hour travel time isochrone	Marine	Yes, if above marine level observations
Level 3	within 3-hour travel time isochrone	Marine	Yes, if above marine level observations
Level 6	The expanding 6-hour travel time isochrone	Marine	Yes, if above marine level observations

JATWC SOPs for Volcanic Events



Severity	Action
Level 1	The threat area is defined to be within the 1 hour travel time isochrone
Level 3	The threat area is defined to be within the 3 hour travel time isochrone
Level 6	The expanding threat area is defined by the elapsed time since event + 6 hour travel time isochrone

(1) *Issue no products and monitor for any potential tsunami*: This action should be taken if there is little to no stratospheric injection and there is no evidence a tsunami has been generated.

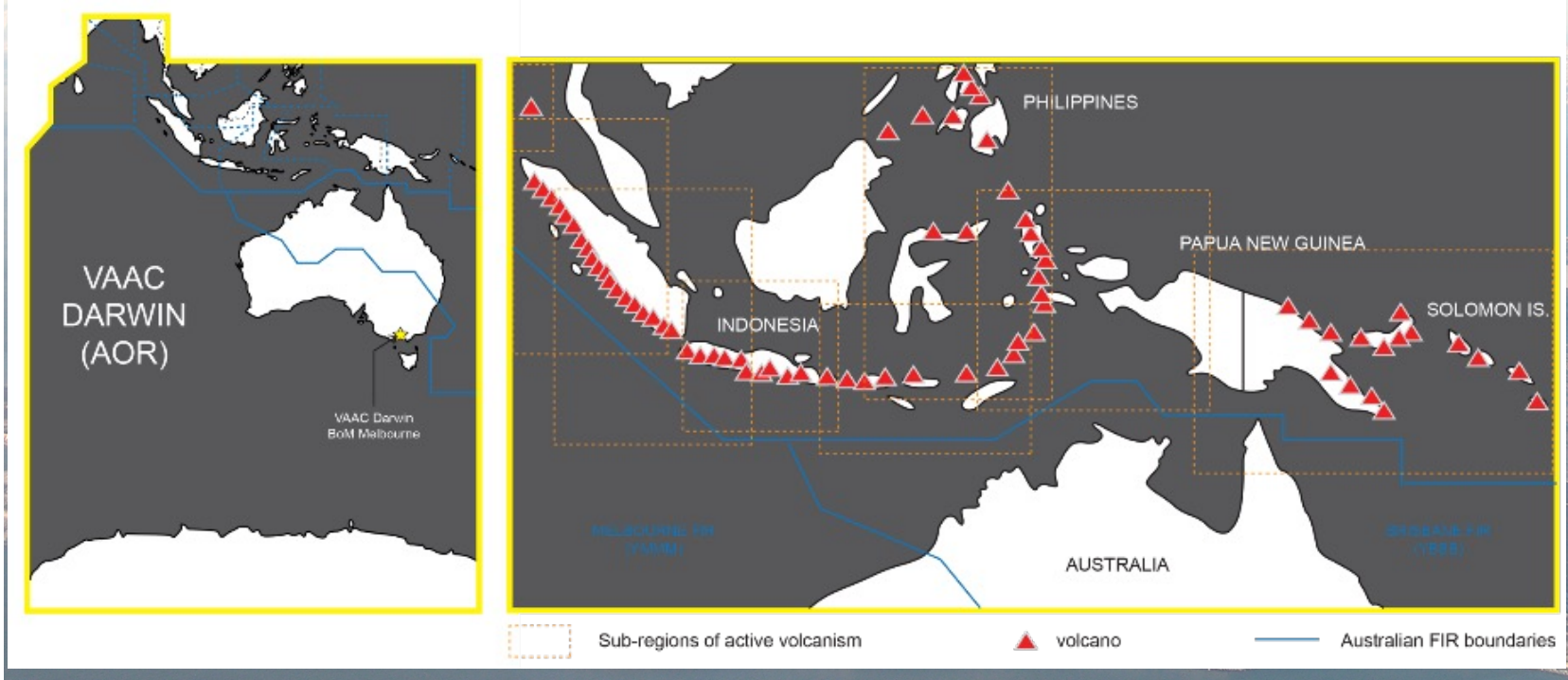
(2) *Create the event with a Severity of 1 hour*: This action should be taken if there is little to no stratospheric injection and there is evidence that a small tsunami has been generated and the impacts are consistent with a low-level Marine Threat.

(3) *Create the event with a Severity of 3 hours*: This action should be taken if there is obvious stratospheric injection consistent with a VEI of 4 and/or there are reliable observations or reports that indicate a tsunami has been generated and the impacts are consistent with a high-level Marine Threat or low-level Land Threat.

(4) *Create the event with a Severity of 6 hours*: This action should be taken if there is significant stratospheric injection consistent with a VEI of 5+ and/or there are reliable observations or reports that indicate a catastrophic tsunami has been generated.

Volcanic Ash Advisory Centre Darwin

1. VAAC Darwin Area of Responsibility



To its east , that's VAAC Wellington's Area of Responsibility

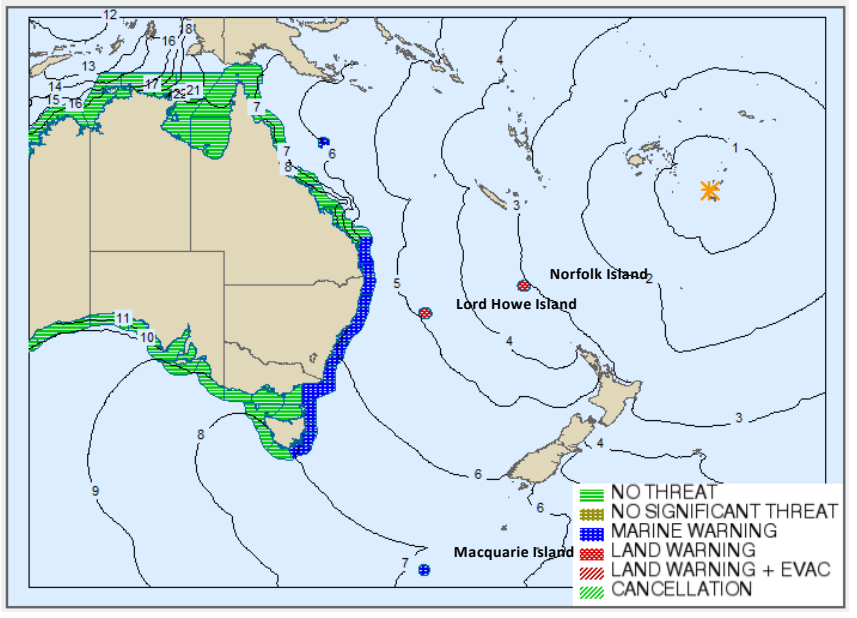
JATWC Actions in the HTHH Event

Time (AEDT)	Elapsed Time (hh:mm)	Key Event: 15 January 2022
15:10	00:00	Explosive volcanic eruption of the Hunga Tonga-Hunga Ha'apai volcano (Tonga)
15:30	00:20	Observations confirm a tsunami was generated at 3:30 PM AEDT at Nuku Alofa.
16:58	01:48	No Threat Bulletin issued with additional text to advise that a tsunami had been generated and that the JATWC would continue to monitor observations. Initial assessment based on 3 hours travel time.
19:36	04:26	Marine Warning for Norfolk Island issued after 50 cm wave observed at the tide gauge.
20:00	04:50	Marine Warning issued for Lord Howe Island based on tide gauge measurements increasing at Norfolk Island.
20:37	05:27	Significant observations in NSW and QLD: (40cm at Twofold Bay at 8:10 PM AEDT; 25 cm at Gold Coast at 7:40 PM AEDT) prompts the issuing of Marine Warnings.
20:58	05:48	Norfolk Island Warning upgraded to Land Threat after wave observations exceed 1.0 m at the tide gauge.
21:00	05:50	Marine Warnings extended to Victoria, Tasmania and Macquarie Island using a 7 hours travel time threat assessment.
21:18	06:08	Lord Howe Island Warning upgraded to Land Threat with evacuation order issued at 10:12 PM AEDT.
10:09 +1	18:59	Land warnings for Norfolk Island and Lord Howe Island downgraded to marine.
10:30 to 11:50 +1	19:20 to 20:40	QLD, Macquarie Island, Victoria and Tasmanian marine warnings cancelled.
19:56 to 21:59 +1	28:46 to 30:49	Lord Howe Island, Norfolk Island and NSW warnings cancelled.

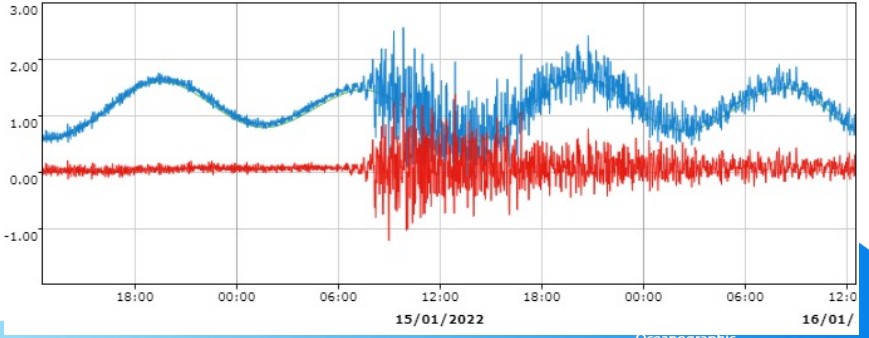
Key Challenges

- Initial detection of the volcanic eruption / tsunami and scale of eruption.
- Lack of event-specific tsunami modelling.
- Lack of a unified sea-level observing tool.

JATWC Tsunami Threat Assessment – Within 7 Hours Travel Time

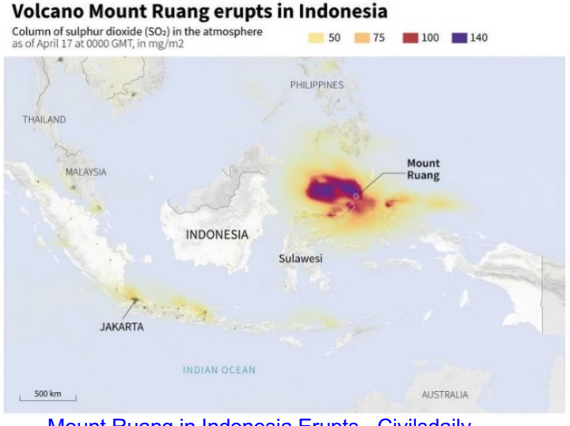


Norfolk Island – 1.27 m



First Non-Seismic TSP Product issued for Ruang Volcano

- No threat Bulletins for the Indian Ocean and Australia were issued in response to the eruption of Ruang on the 30th of April 2024.
- This is the first non-seismic product issued by a TSP for the Indian Ocean.



Mount Ruang in Indonesia Erupts - Civilsdaily

Indonesia volcano: How Ruang eruption could impact weather and climate | CNN

EARTHQUAKE: TALAUD ISLANDS, INDONESIA 18:35 UTC 29 April 2024 Mag N/A

INFORMATION FOR BULLETIN 1.No Threat Bulletin 2109UTC 29 Apr 2024

Exchange Bulletins | Threat Map | Threat Table | Deep Water Wave Amplitude Map | Travel Times Map | NTWC Status Reporting Form | Other Data

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TSUNAMI BULLETIN NUMBER 1 (TYPE-II THREAT ASSESSMENT BULLETIN)
IOTWMS TSUNAMI SERVICE PROVIDER AUSTRALIA (JATWC)
ISSUED AT 2109 UTC Monday 29 April 2024
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... NO TSUNAMI THREAT IN THE INDIAN OCEAN ...

This bulletin applies to areas within and bordering the Indian Ocean. It is
issued in support of the UNESCO/IOC Indian Ocean Tsunami Warning and Mitigation
System (IOTWMS).

1. TSUNAMI SOURCE INFORMATION
IOTWMS-TSP AUSTRALIA has detected a volcanic eruption at Ruang with the following
details:

Date:       29 Apr 2024
Origin Time: 1835 UTC
Latitude:    2.31N
Longitude:   125.36E
Location:    TALAUD ISLANDS, INDONESIA

2. EVALUATION
Based on a tsunami travel time threat assessment, there is NO THREAT to
countries in the Indian Ocean.

3. ADVICE
This bulletin is being issued as advice. Only national/state/local
authorities and disaster management officers have the authority to
make decisions regarding the official threat and warning status in
their coastal areas and any action to be taken in response.

4. UPDATES
No further bulletins will be issued by IOTWMS-TSP AUSTRALIA for this event
unless other information becomes available.

Other IOTWMS-TSPs may issue additional information at:
IOTWMS-TSP INDIA:     http://www.incois.gov.in/Incois/tsunami/eqevents.jsp
IOTWMS-TSP INDONESIA: http://rtsp.bmkg.go.id

5. CONTACT INFORMATION
IOTWMS-TSP AUSTRALIA
Joint Australian Tsunami Warning Centre (JATWC)
Bureau of Meteorology
GPO BOX 1289 Melbourne, Victoria, Australia, 3001
http://reg.bom.gov.au/tsunami/rtsp

END OF BULLETIN
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Define Severity for Celestial Impact

Approximate impactor radius	Approximate equivalent earthquake magnitude
10m	M6.5
20m	M7.0
30m	M7.5
60m	M8.0
110m	M8.5
200m	M9.0

Severity Level 3
(i.e., areas under threat being within 3 hours of isochrone)

Severity Level 6
(i.e., areas under threat being within 6 hours of isochrone)

Define Severity for Landslide Events

Severity Level 1, if there are reliable observations or reports that indicate a **small tsunami** has been generated.

Severity Level 3, if there are reliable observations or reports that indicate a tsunami has been generated and the impacts are consistent with a **Marine Threat**.

Severity Level 6, if there are reliable observations or reports that indicate a **catastrophic tsunami** has been generated and the impacts are consistent with a high-level Marine Threat or low-level Land Threat.

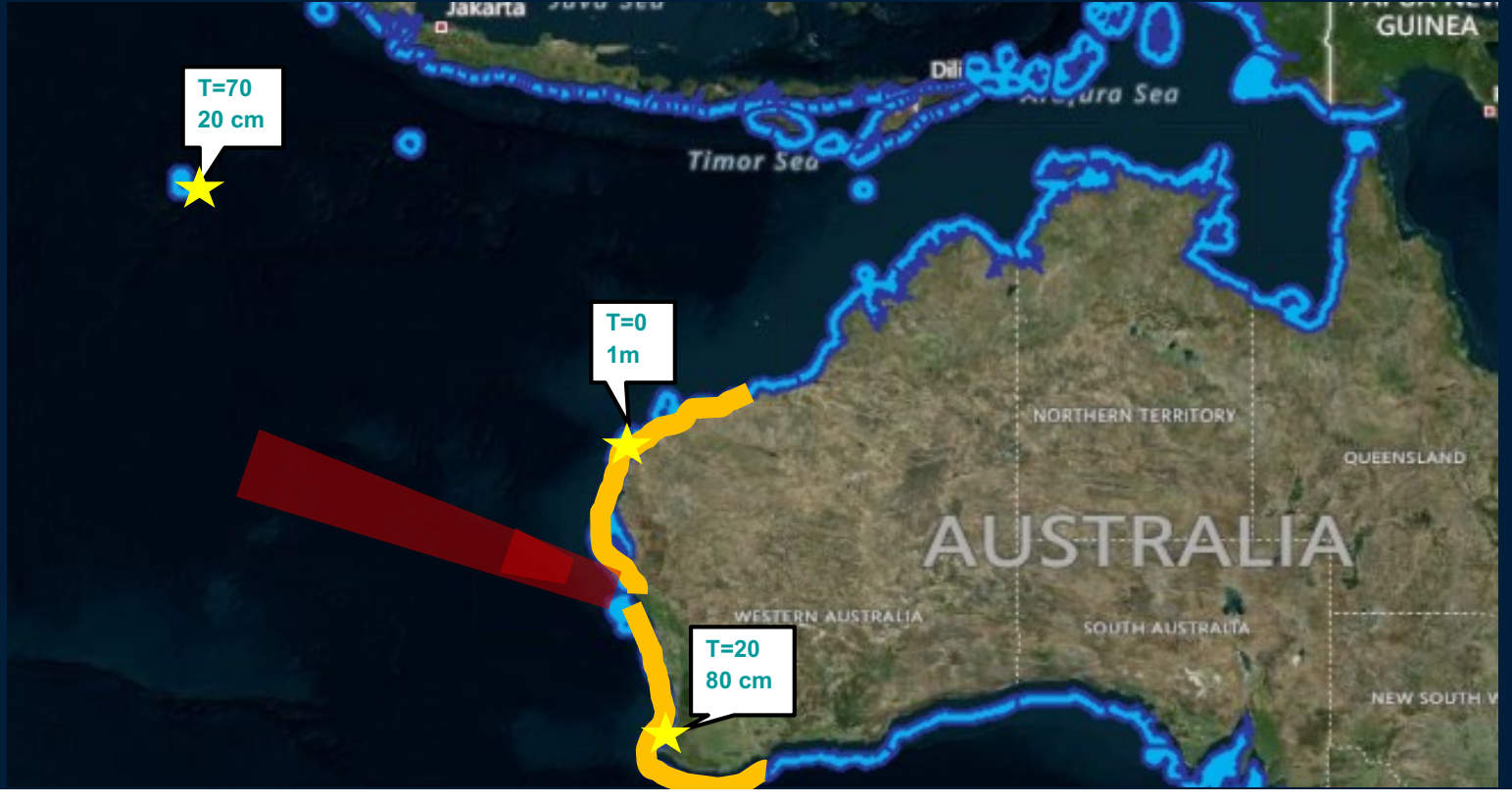
Define Severity for Unknown Sources

Severity Level 1, if there are reliable observations or reports that indicate a tsunami has been generated and the impacts are consistent with a l**ow-level Marine Threat**

Severity Level 3, if there are reliable observations or reports that indicate a tsunami has been generated and the impacts are consistent with a **high-level Marine Threat or low-level Land Threat**.

Severity Level 6, if there are reliable observations or reports that indicate a **catastrophic tsunami** has been generated.

Unknown


Jakarta
Dili
GUINEA
Timor Sea
T=70
20 cm
T=0
1m
NORTHERN TERRITORY
QUEENSLAND
AUSTRALIA
WESTERN AUSTRALIA
SOUTH AUSTRALIA
T=20
80 cm

Future developments

- Improve the source identification
- Improve detection - Near real time sea level alerting
- Improve Modelling
  - Scenario database
  - Real time

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THANK YOU

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