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TSP Product Demonstration (Arrival Time Predictions and Product Examples)

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ICG Indian Ocean Tsunami Warning & Mitigation System Training Workshop August 2023
North-Western Indian Ocean Member States Training Workshops :
Review Standard Operating Procedures (SOPs) and Tsunami Service Provider (TSP) Products in Preparation for Exercise IOWave23

Outline

1. TSP Predicted Tsunami Arrival Times
   - What is a CFZ
   - Explanation of the four times T1, T2, T3, T4 and wave amplitudes

2. TSP Product Examples

Coastal Forecast Zones (CFZs)

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Coastal Forecast Zones (CFZs)

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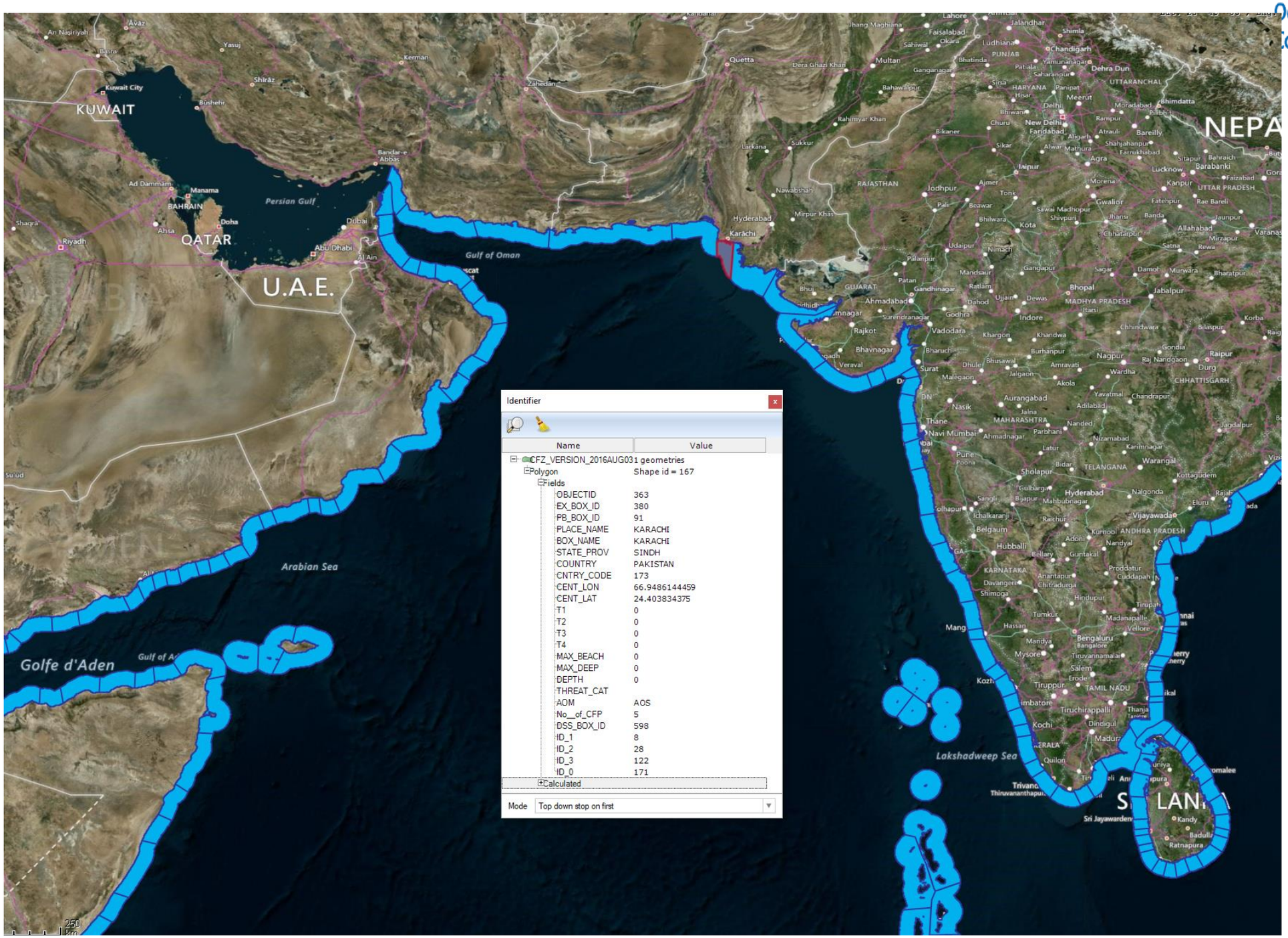
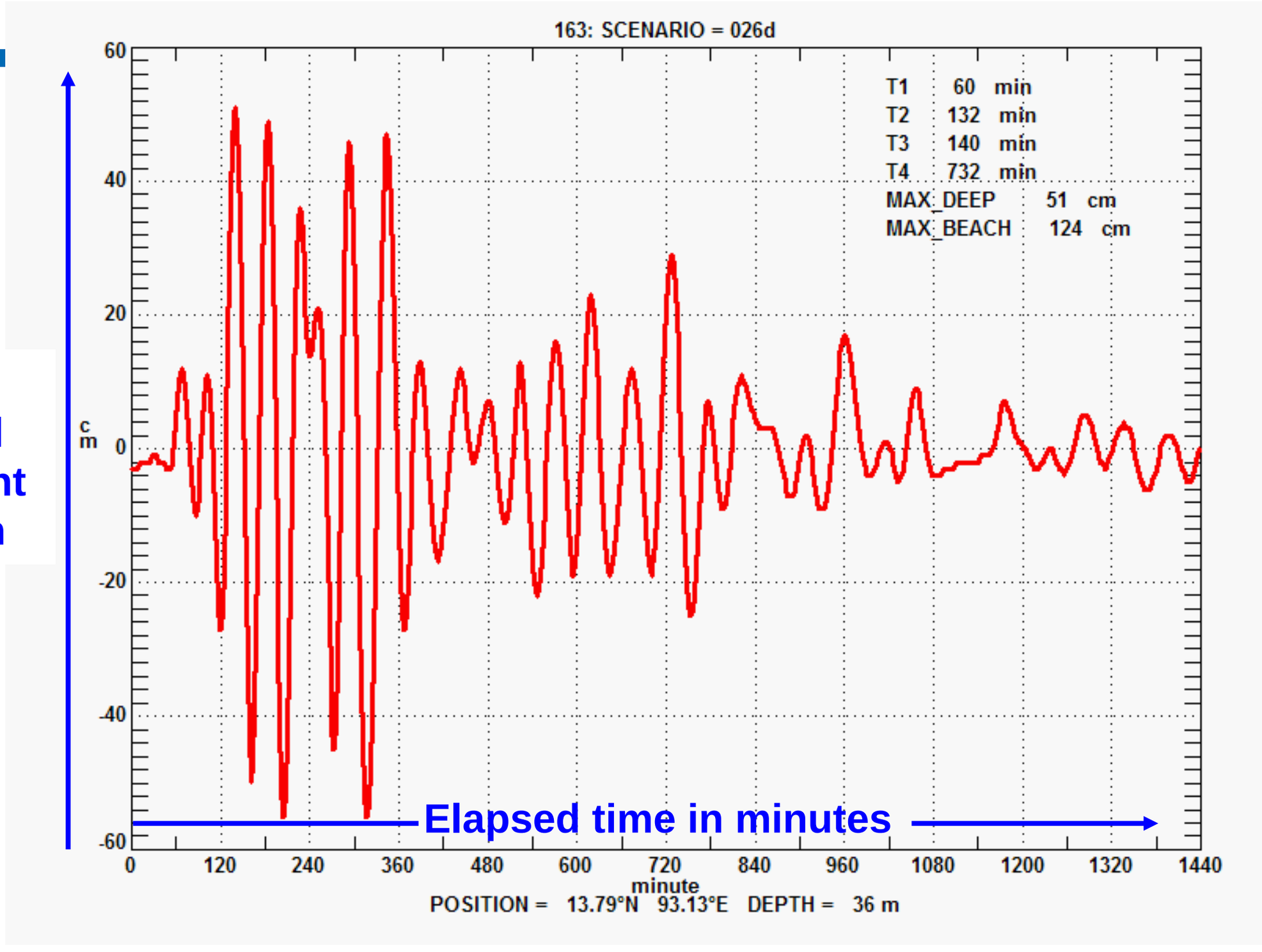


Predicted Tsunami Arrival Times:

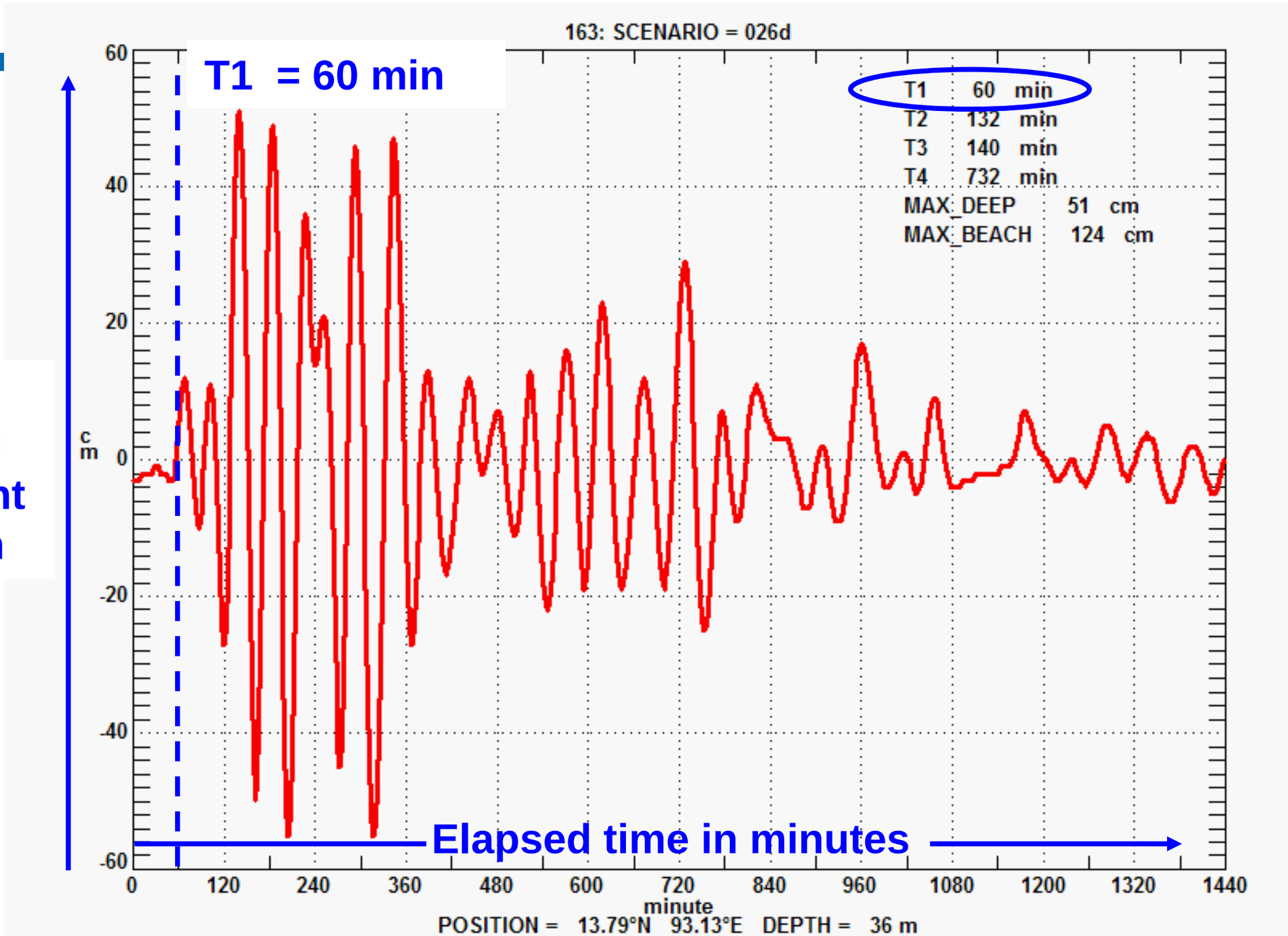
- T1 = Time of arrival of *first discernible tsunami wave* (amplitude > +2cm)
- T2 = Time of arrival of *first wave over +50cm* amplitude on the beach
- T3 = Time of arrival of *largest wave ("max beach")*
- T4 = Time of arrival of *last wave over +50cm* amplitude

Predicted Tsunami Arrival Times:



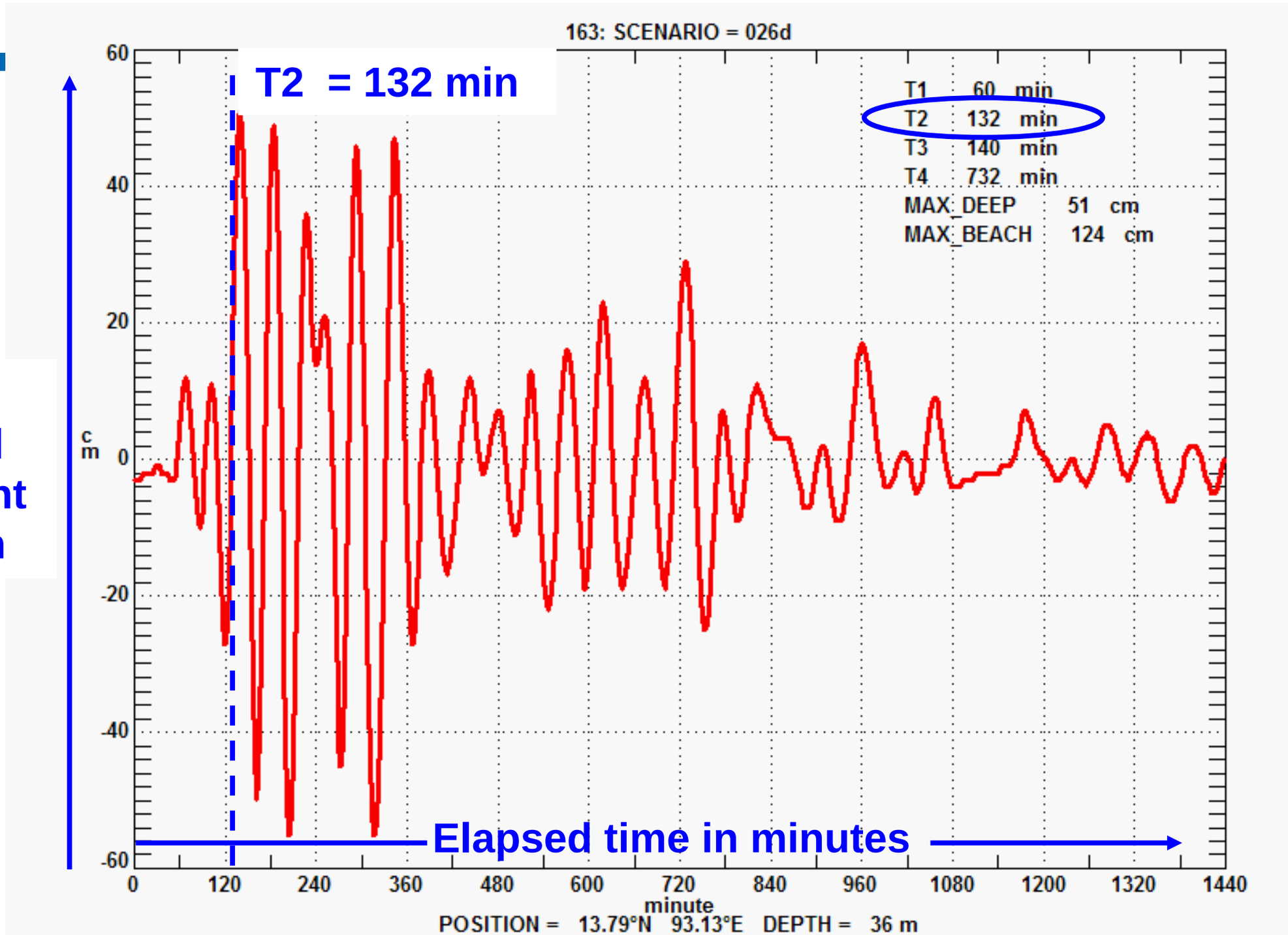
Sea Level Height in cm

Predicted Tsunami Arrival Times:



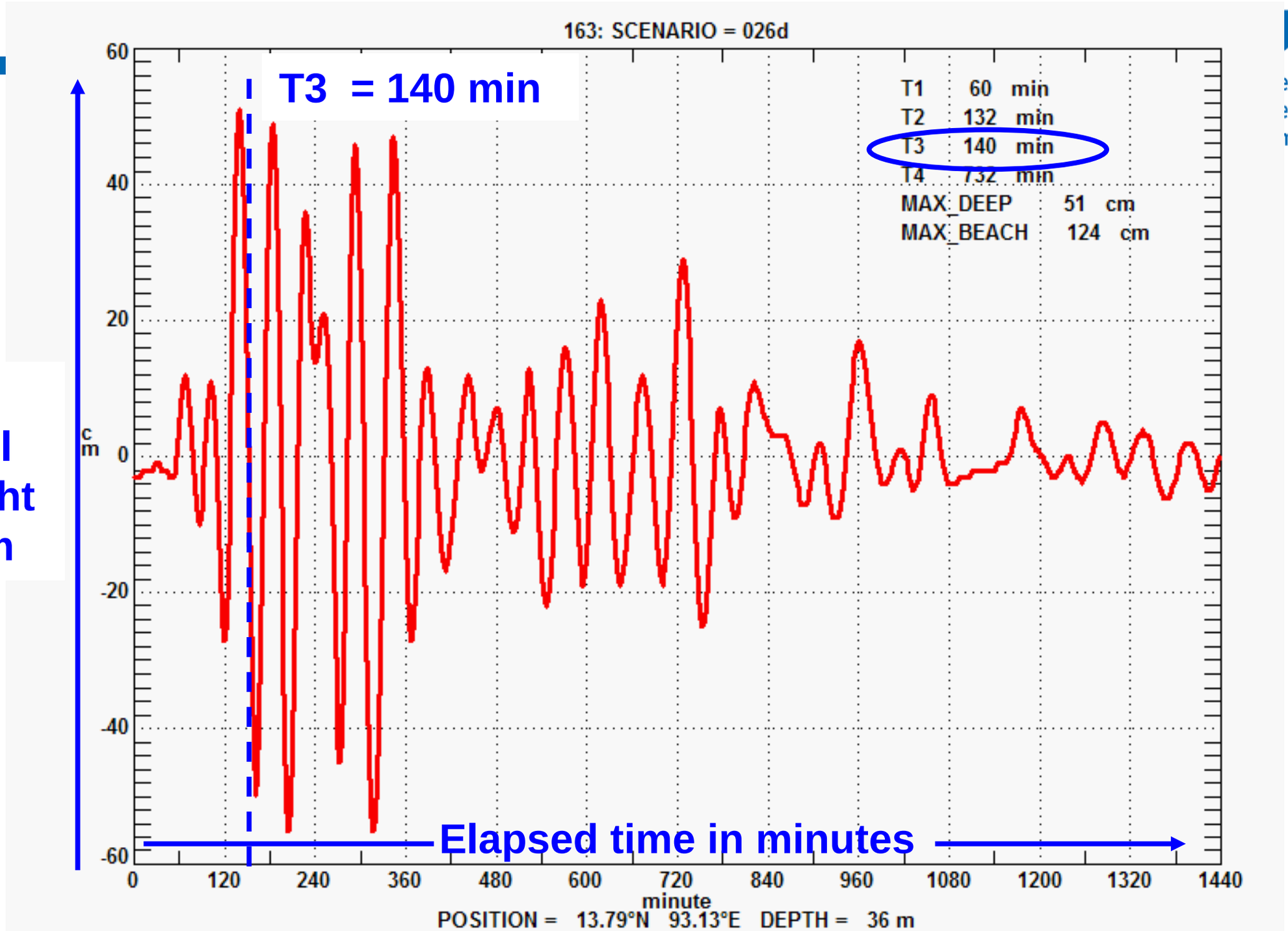
T1 = time of first discernible tsunami wave (amplitude ≥ +2cm)

Predicted Tsunami Arrival Times:



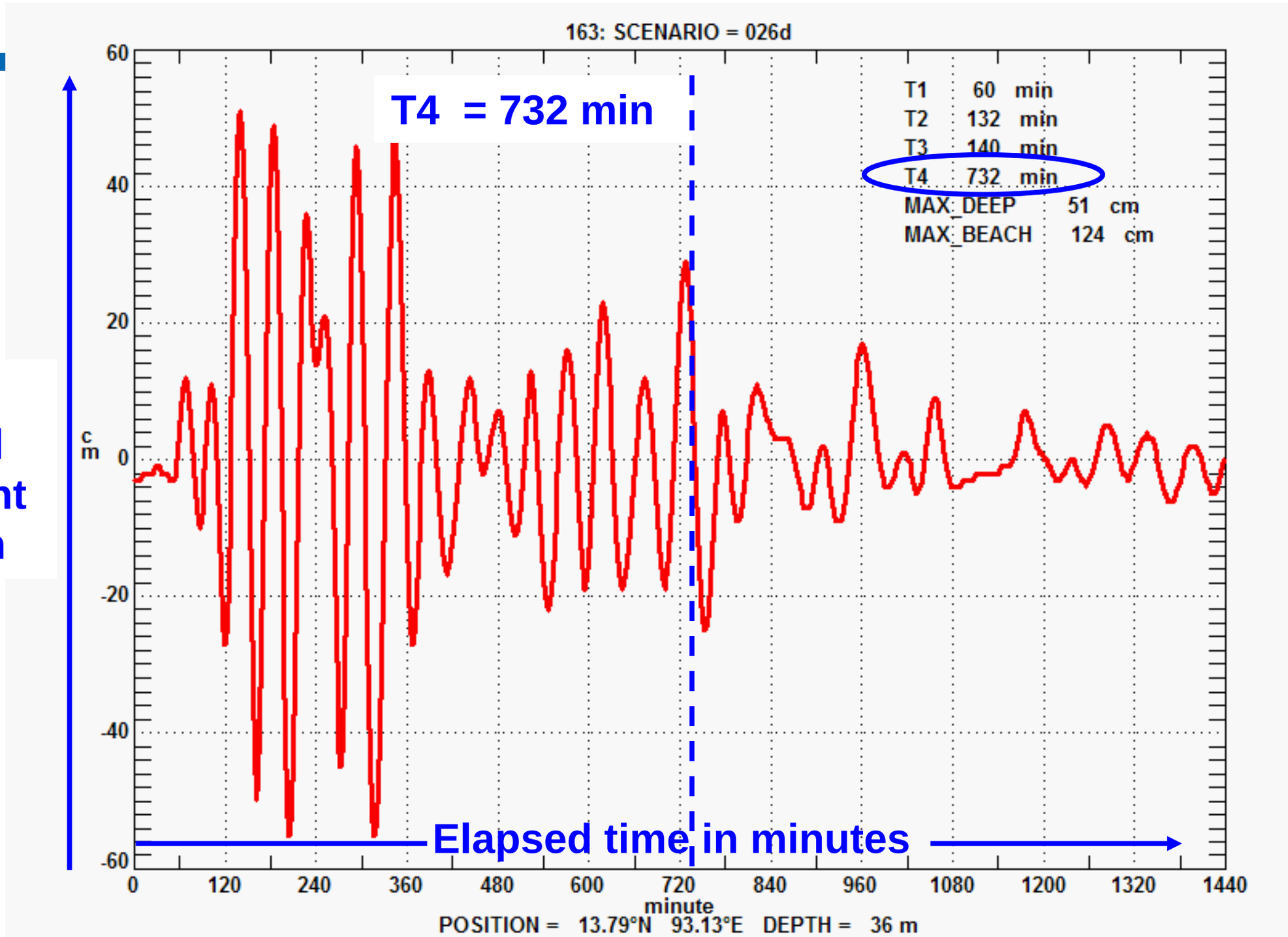
T2 = time of first wave to exceed amplitude ≥ +50cm on the beach

Predicted Tsunami Arrival Times:



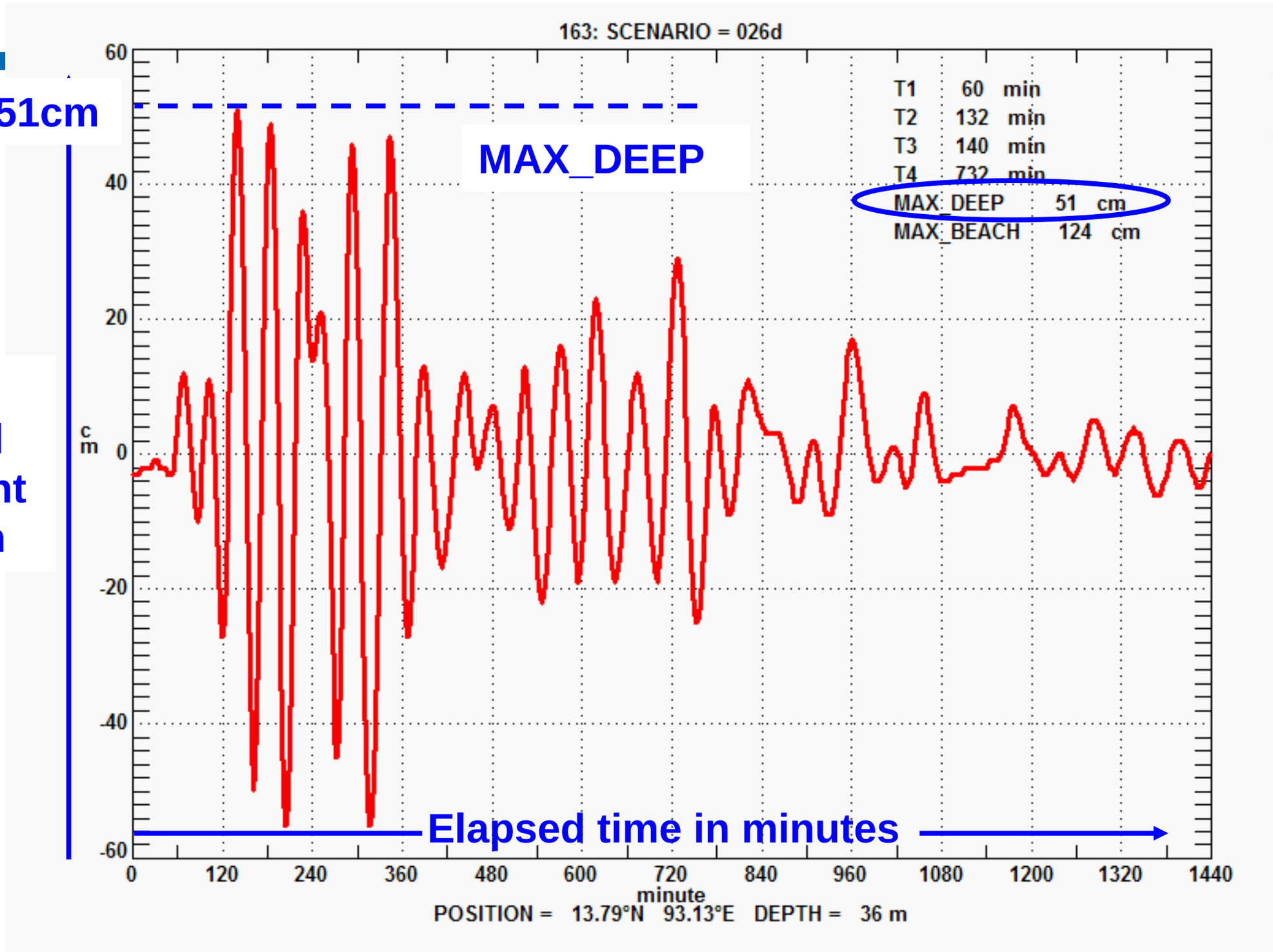
T3 = time of largest wave

Predicted Tsunami Arrival Times:



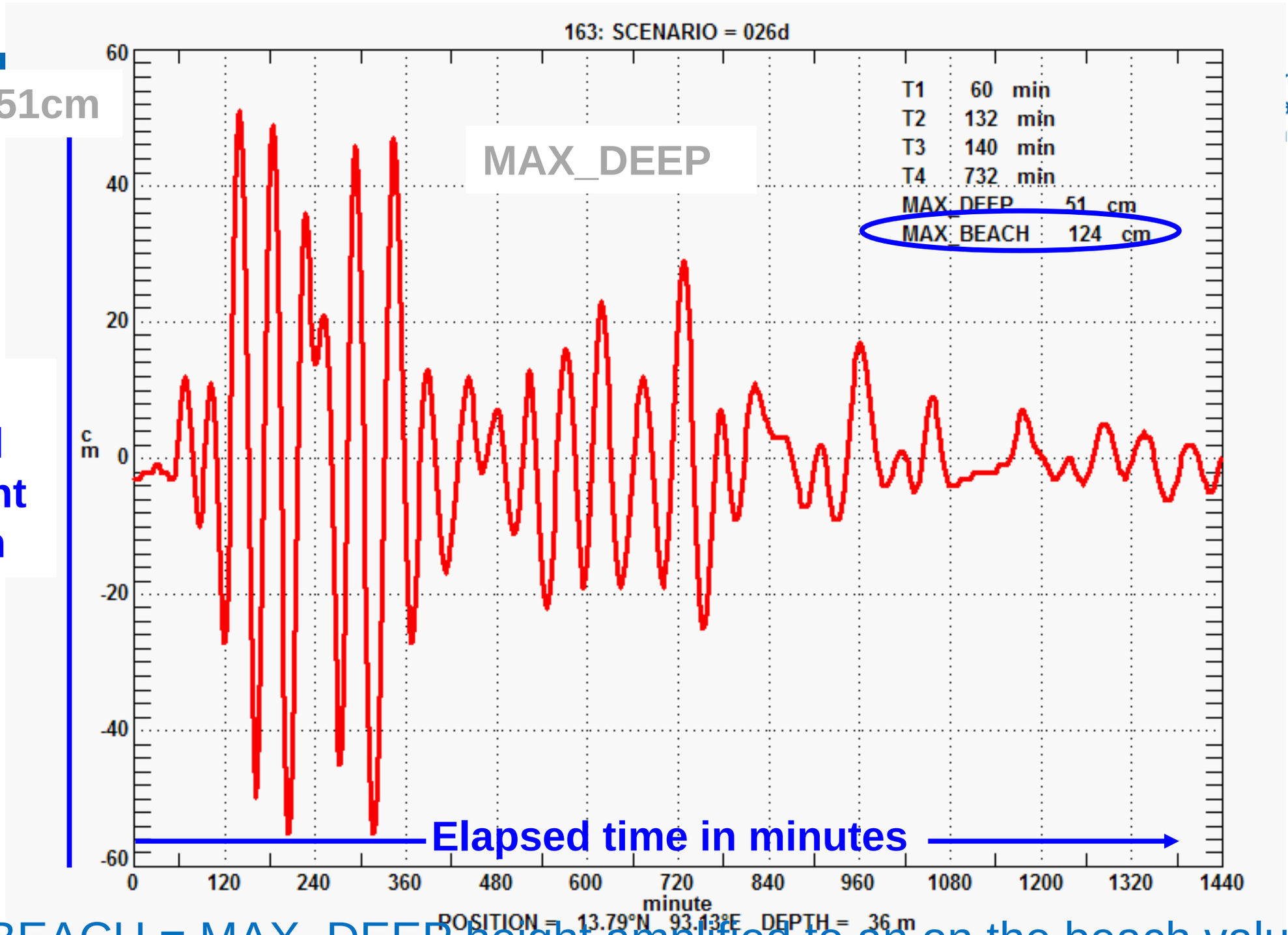
T4 = time of last wave exceeding amplitude ≥ +50cm on the beach

Predicted Tsunami Arrival Times:



MAX_DEEP = Largest positive wave amplitude in the time series

Predicted Tsunami Arrival Times:



MAX_BEACH = MAX_DEEP height amplified to an on the beach value using Greens Law

TSP Product Examples

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- Travel Times Map
- Sea Surface Height Max Map
- Zone Threat Assessment Map
- Zone Threat Assessment Table
- TSP Public Page Example

Travel Times Map

Sea Surface Height Max Map

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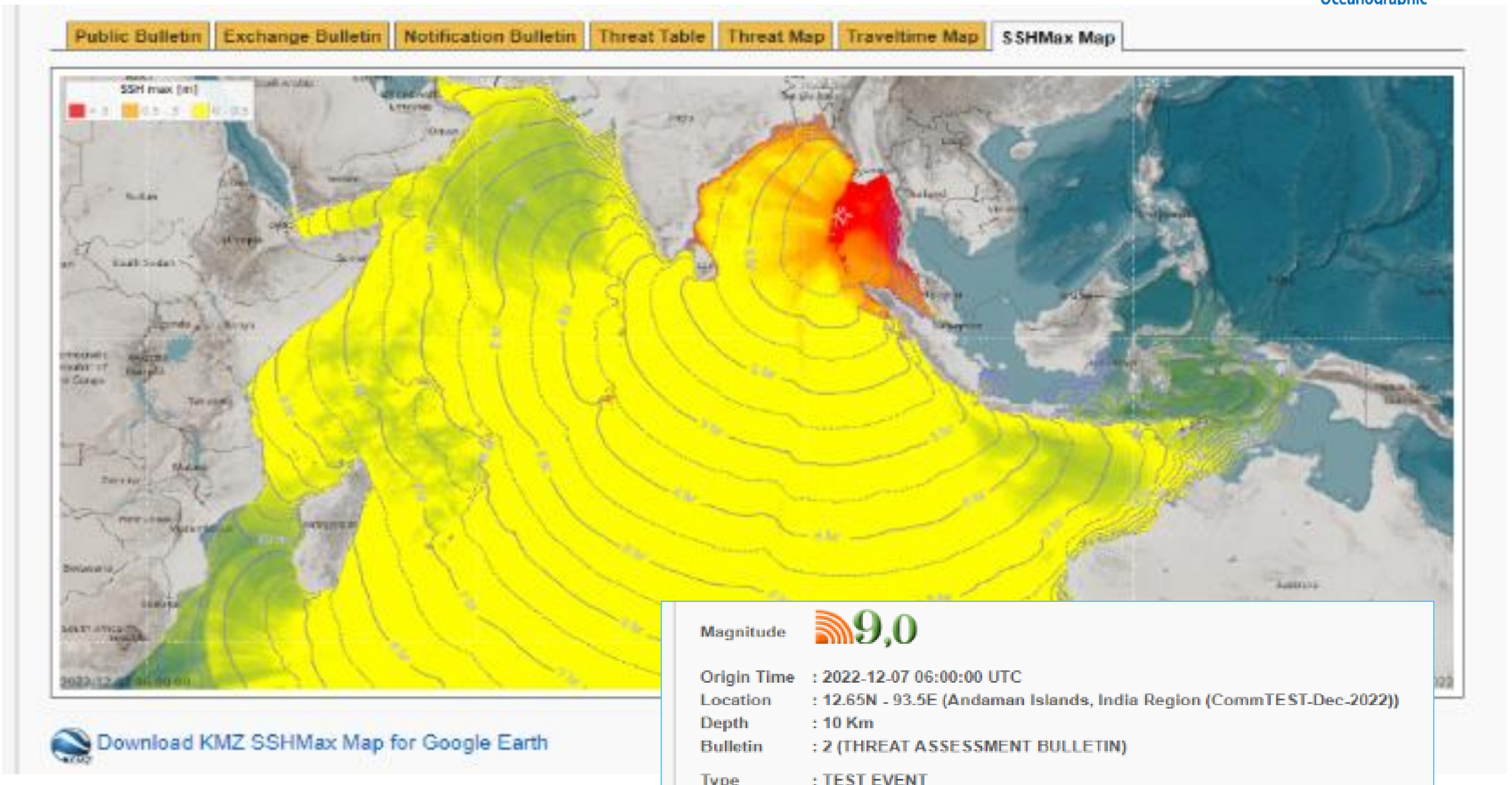
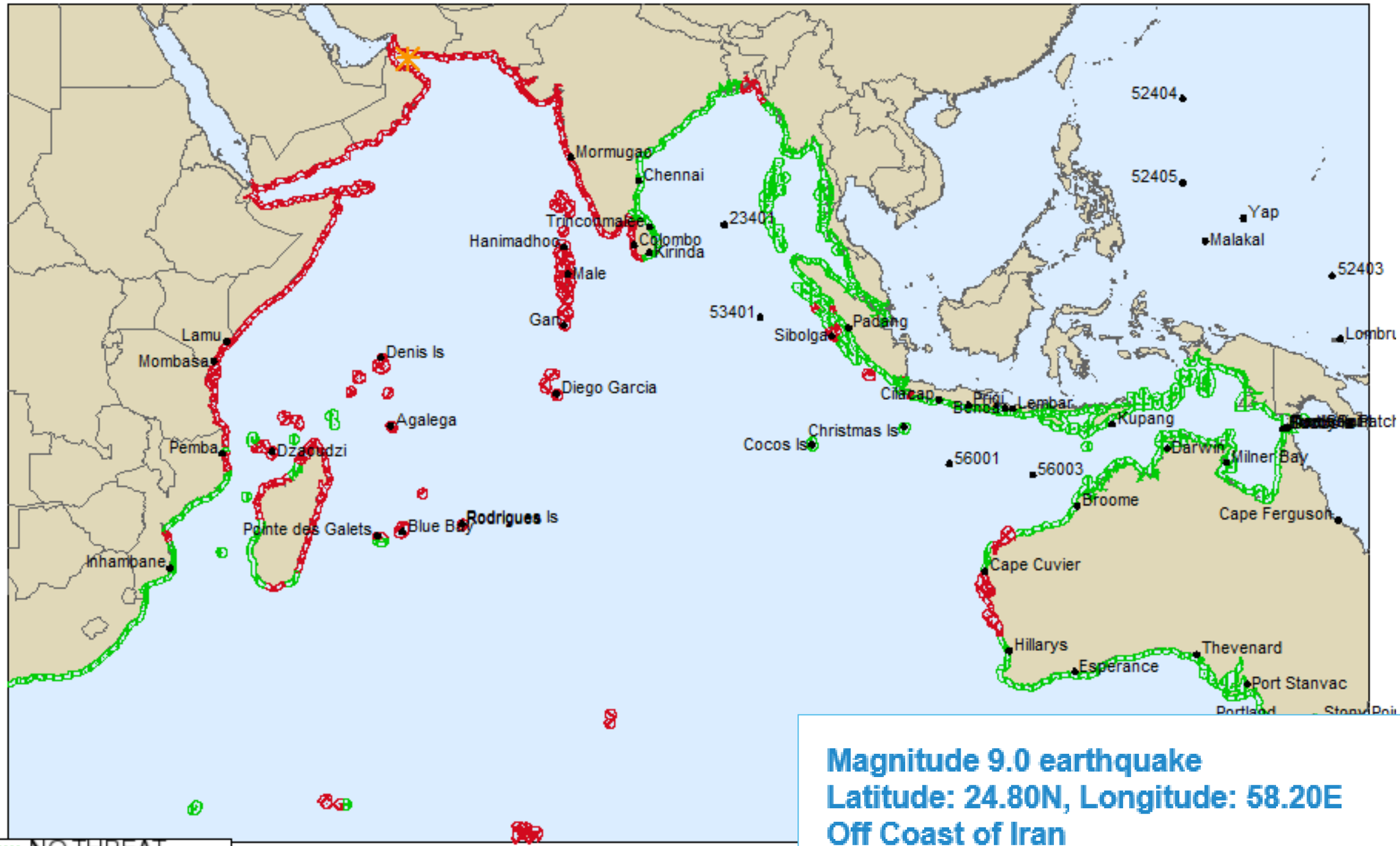


Zone Threat Assessment Map



Magnitude 9.0 earthquake
Latitude: 24.80N, Longitude: 58.20E
Off Coast of Iran
Earthquake Time: 0600UTC, 04/09/2018

Zone Threat Assessment Table

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Public Bulletin | Exchange Bulletin | Notification Bulletin | **Threat Table** | Threat Map | Traveltime Map | SSHMax Map

Country: ALL IO COUNTRIES

- ALL IO COUNTRIES
- 1. AUSTRALIA
- 2. BANGLADESH
- 3. BRITISH INDIAN OCEAN TERRITORY
- 4. COMOROS
- 5. DJIBOUTI
- 6. FRENCH SOUTHERN AND ANTARCTIC LA
- 7. INDIA
- 8. INDONESIA
- 9. IRAN
- 10. KENYA
- 11. MADAGASCAR
- 12. MALAYSIA
- 13. MALDIVES
- 14. MAURITIUS
- 15. MOZAMBIQUE
- 16. MYANMAR
- 17. OMAN
- 18. PAKISTAN
- 19. REUNION

Location	T1 (UTC)	T2 (UTC)	T3 (UTC)	T4 (UTC)	EWH	Status
COCOS ISLAND	2023-06-07 08:25:30	2023-06-07 08:28:30	2023-06-07 13:57:30	2023-06-07 17:41:15	1.32	Threat
CHRISTMAS ISLAND	2023-06-07 08:45:00	2023-06-07 11:59:45	2023-06-07 15:48:30	2023-06-07 17:57:45	1.15	Threat
GASCOYNE COAST	2023-06-07 11:40:00	2023-06-07 12:06:15	2023-06-07 17:37:30	2023-06-07 18:00:00	1.18	Threat
LEEUWIN COAST	2023-06-07 12:43:00	2023-06-07 13:36:45	2023-06-07 17:43:15	2023-06-07 17:47:00	0.88	Threat
PILBARA COAST WEST	2023-06-07 11:32:15	2023-06-07 13:49:30	2023-06-07 17:32:15	2023-06-07 17:58:00	0.85	Threat
NINGALOO COAST	2023-06-07	2023-06-07	2023-06-07	2023-06-07	0.71	Threat

Magnitude 9,0

Origin Time : 2022-12-07 06:00:00 UTC
Location : 12.65N - 93.5E (Andaman Islands, India Region (CommTEST-Dec-2022))
Depth : 10 Km
Bulletin : 2 (THREAT ASSESSMENT BULLETIN)
Type : TEST EVENT

TSP Indonesia Public Page Example

Public Bulletin

Event List | Event Map

Page 1 of 12
Event 1-50 of 555 Events

Date	Time (UTC)	Magnitude	Depth (Km)	Latitude	Longitude	Location	Type	Bulletin Number	Bulletin Type	Event Group
2023-06-15	18:06:22	6.9	161	22.82S	176.44W	South of Fiji Islands	REAL EVENT	1	EARTHQUAKE BULLETIN	202306151806
2023-06-07	06:00:00	9.0	10	7.2N	92.9E	Nicobar Islands, India Region (CommTEST-Jun-2023)	TEST EVENT	4	FINAL BULLETIN	202306070600COM
2023-06-07	06:00:00	9.0	10	7.2N	92.9E	Nicobar Islands, India Region (CommTEST-Jun-2023)	TEST EVENT	3 3.1	CONFIRMED THREAT BULLETIN	202306070600COM
2023-06-07	06:00:00	9.0	10	7.2N	92.9E	Nicobar Islands, India Region (CommTEST-Jun-2023)	TEST EVENT	2	THREAT ASSESSMENT BULLETIN	202306070600COM
2023-06-07	06:00:00	9.0	10	7.2N	92.9E	Nicobar Islands, India Region (CommTEST-Jun-2023)	TEST EVENT	1	EARTHQUAKE BULLETIN	202306070600COM
2023-05-20	01:50:59	7.5	17	22.96S	170.57E	Southeast of Loyalty Islands	REAL EVENT	1	EARTHQUAKE BULLETIN	202305200150
2023-05-19	02:57:05	7.9	28	23.13S	170.81E	Southeast of Loyalty Islands	REAL EVENT	1	EARTHQUAKE BULLETIN	202305190257

TSP Bulletin Types

TSP Bulletin Type 1: Earthquake Bulletin

- Issued within 5-10 minutes of earthquake
- Contains earthquake details and optional qualitative tsunami threat assessment

TSP Bulletin Type 2: Potential Tsunami Threat Bulletin

- Issued with 10-20 minutes of earthquake
- Contains earthquake details, plus model predictions: T2 (arrival of first wave over threshold) and Max Beach height.

TSP Bulletin Type 3: Confirmed Tsunami Threat Bulletin

- Issued hourly following Type 2 Bulletin, or earlier if tsunami observations received
- Contains all Type 2 Bulletin information, plus observations of tsunami waves

TSP Bulletin Type 4: Final Tsunami Bulletin

-Issued 2 hours after last arrival time in Indian Ocean of a wave over 0.5m:
Issue Time = (last Indian Ocean T4) + 2 hours
- Contains observations of tsunami waves only
- Tsunami impacts on the beach and in the water could last beyond this time

TSP Bulletin Examples: Notification Message

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TEST TSUNAMI BULLETIN NOTIFICATION MESSAGE NUMBER 1 IOTWMS TSUNAMI SERVICE PROVIDER AUSTRALIA [JATWC] ISSUED AT 0612 UTC TUESDAY 04 SEPTEMBER 2018

TO: INDIAN OCEAN NATIONAL TSUNAMI WARNING CENTRES [NTWCs]
FROM: IOTWMS-TSP AUSTRALIA

NOTIFICATION:
IOTWMS-TSP AUSTRALIA HAS JUST ISSUED TSUNAMI BULLETIN NUMBER 1 FOR THE INDIAN OCEAN, BASED ON THE FOLLOWING EARTHQUAKE EVENT:

MAGNITUDE: 7.8 MWP
DEPTH: 10KM
DATE: 04 SEP 2018
ORIGIN TIME: 0600 UTC
LATITUDE: 24.80N
LONGITUDE: 58.20E
LOCATION: OFF COAST OF IRAN

TO VIEW THE BULLETIN GO TO THE IOTWMS-TSP AUSTRALIA WEBSITE AT:

http://reg.bom.gov.au/tsunami/rtsp/index.shtml

NOTE: THIS IS A RESTRICTED-ACCESS WEBSITE CONTAINING TECHNICAL DATA FOR NATIONAL TSUNAMI WARNING CENTRES ONLY. IT IS NOT FOR GENERAL PUBLIC ACCESS.

GENERAL PUBLIC INFORMATION FOR THIS EVENT IS AVAILABLE FROM:

JOINT AUSTRALIAN TSUNAMI WARNING CENTRE [JATWC] BUREAU OF METEOROLOGY MELBOURNE, AUSTRALIA http://www.bom.gov.au/tsunami

END OF NOTIFICATION MESSAGE

TSP Bulletin Examples: Type 1 Earthquake Bulletin

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TEST TSUNAMI BULLETIN NUMBER 1 (TYPE-I EARTHQUAKE BULLETIN)
IOTWMS TSUNAMI SERVICE PROVIDER AUSTRALIA (JATWC)
ISSUED AT 0612 UTC Tuesday 04 September 2018
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... EARTHQUAKE BULLETIN ...

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. EARTHQUAKE INFORMATION

IOTWMS-TSP AUSTRALIA has detected an earthquake with the following
preliminary information:

Magnitude:   7.8 Mwp
Depth:       10km
Date:        04 Sep 2018
Origin Time: 0600 UTC
Latitude:    24.80N
Longitude:   58.20E
Location:    Off Coast of Iran

2. EVALUATION
Based on historical data and tsunami modelling, this earthquake may
be capable of generating a tsunami affecting the Indian Ocean region.
IOTWMS-TSP AUSTRALIA will monitor sea level gauges near the
earthquake to determine if a tsunami was generated and will issue
further bulletins for this event.

Further information on this event will be available at:
http://reg.bom.gov.au/tsunami/rtsp

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. OTHER INDIAN OCEAN TSUNAMI SERVICE PROVIDERS:
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
Website: http://reg.bom.gov.au/tsunami/rtsp

END OF BULLETIN
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TSP Bulletin Examples: Type 2 No Threat Bulletin

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TSUNAMI BULLETIN NUMBER 2 (TYPE-II THREAT ASSESSMENT BULLETIN)
IOTWMS TSUNAMI SERVICE PROVIDER AUSTRALIA (JATWC)
ISSUED AT 1214 UTC Friday 02 August 2019

... 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. EARTHQUAKE INFORMATION
IOTWMS-TSP AUSTRALIA has detected an earthquake with the following details:

Magnitude: 7.1 Mwp
Depth: 69km
Date: 02 Aug 2019
Origin Time: 1203 UTC
Latitude: 7.47S
Longitude: 104.58E
Location: Southwest of Sumatra, Indonesia

2. EVALUATION
Based on pre-run model scenarios, 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

TSP Bulletin Examples: Type 2 Potential Threat Bulletin

TEST TSUNAMI BULLETIN NUMBER 2 (TYPE-II THREAT ASSESSMENT BULLETIN)
IOTWMS TSUNAMI SERVICE PROVIDER AUSTRALIA (JATWC)
ISSUED AT 0613 UTC Tuesday 04 September 2018

... POTENTIAL 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. EARTHQUAKE INFORMATION
IOTWMS-TSP AUSTRALIA has detected an earthquake with the following details:

Magnitude: 7.8 Mwp
Depth: 10km
Date: 04 Sep 2018
Origin Time: 0600 UTC
Latitude: 24.80N
Longitude: 58.20E
Location: Off Coast of Iran

2. EVALUATION
Earthquakes of this size are capable of generating tsunamis. However, so far there is no confirmation about the triggering of a tsunami.

An investigation is under way to determine if a tsunami has been triggered. This TSP will monitor sea level gauges and report if any tsunami wave activity has occurred.

Based on pre-run model scenarios, the zones listed below are POTENTIALLY UNDER THREAT.

3. TSUNAMI THREAT FOR THE INDIAN OCEAN
The list below shows the forecast arrival time of the first wave estimated to exceed 0.5m amplitude at the beach in each zone, and the amplitude of the maximum beach wave predicted for the zone. Zones where the estimated wave amplitudes are less than 0.5m at the beach are not shown.

The list is grouped by country (alphabetic order) and ordered according to the earliest estimated times of arrival at the beach.

Please be aware that actual wave arrival times may differ from those below, and the initial wave may not be the largest. A tsunami is a series of waves and the time between successive waves can be five minutes to one hour.

The threat is deemed to have passed two hours after the forecast time for last exceedance of the 0.5m threat threshold for a zone. As local conditions can cause a wide variation in tsunami wave action, CANCELLATION of national warnings and ALL CLEAR determination must be made by national/state/local authorities.

IRAN		
BIR	0600Z 04Sep2018	1.66m
OMAN		
MUSCAT	0616Z 04Sep2018	0.90m
AL KHABURAH	0620Z 04Sep2018	0.89m
BARKA	0620Z 04Sep2018	0.82m
SOHAR	0636Z 04Sep2018	0.57m

4. 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.

5. UPDATES
Additional bulletins will be issued by IOTWMS-TSP AUSTRALIA for this event as more information becomes available.

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

6. 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

TSP Bulletin Examples: Type 3 Confirmed Threat Bulletin

TEST TSUNAMI BULLETIN NUMBER 6 (TYPE-III CONFIRMED THREAT BULLETIN)
IOTWMS TSUNAMI SERVICE PROVIDER AUSTRALIA (JATWC)
ISSUED AT 0832 UTC Tuesday 04 September 2018

... CONFIRMED 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. EARTHQUAKE INFORMATION
IOTWMS-TSP AUSTRALIA has detected an earthquake with the following details:

Magnitude: 9.0 Mwp
Depth: 10km
Date: 04 Sep 2018
Origin Time: 0600 UTC
Latitude: 24.80N
Longitude: 58.20E
Location: Off Coast of Iran

2. EVALUATION
Sea level observations have confirmed that a TSUNAMI WAS GENERATED.
Maximum wave amplitudes observed so far:

Gwadar	PAKISTAN	25.00N	62.00E	7.10m	04 Sep 06:10 UTC
Chabahar	IRAN	25.33N	60.50E	6.00m	04 Sep 06:15 UTC
Jask	IRAN	25.60N	57.77E	3.00m	04 Sep 06:20 UTC
Muscat	OMAN	23.60N	58.57E	5.50m	04 Sep 06:20 UTC
DART 23228	ARABIAN SEA	20.80N	65.35E	0.30m	04 Sep 06:52 UTC
DART 23226	ARABIAN SEA	20.20N	67.33E	0.26m	04 Sep 06:57 UTC
Masirah	OMAN	20.70N	58.87E	2.00m	04 Sep 07:05 UTC

Based on pre-run model scenarios, the zones listed below are POTENTIALLY UNDER THREAT.

3. TSUNAMI THREAT FOR THE INDIAN OCEAN
The list below shows the forecast arrival time of the first wave estimated to exceed 0.5m amplitude at the beach in each zone, and the amplitude of the maximum beach wave predicted for the zone. Zones where the estimated wave amplitudes are less than 0.5m at the beach are not shown.

The list is grouped by country (alphabetic order) and ordered according to the earliest estimated times of arrival at the beach.

Please be aware that actual wave arrival times may differ from those below, and the initial wave may not be the largest. A tsunami is a series of waves and the time between successive waves can be five minutes to one hour.

The threat is deemed to have passed two hours after the forecast time for last exceedance of the 0.5m threat threshold for a zone. As local conditions can cause a wide variation in tsunami wave action, CANCELLATION of national warnings and ALL CLEAR determination must be made by national/state/local authorities.

IRAN
PUSHT 0600Z 04Sep2018 7.88m
BIR 0600Z 04Sep2018 12.69m
MISKI 0640Z 04Sep2018 3.60m

PAKISTAN
ORMARA 0600Z 04Sep2018 11.71m
WINDER 0602Z 04Sep2018 5.15m
KARACHI 0652Z 04Sep2018 4.04m
SINDH 0708Z 04Sep2018 3.30m

4. 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.

5. UPDATES
Additional bulletins will be issued by IOTWMS-TSP AUSTRALIA for this event as more information becomes available.

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

6. 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

TSP Bulletin Examples: Type 4 Final Bulletin

TEST TSUNAMI BULLETIN NUMBER 16 (TYPE-IV FINAL BULLETIN)
IOTWMS TSUNAMI SERVICE PROVIDER AUSTRALIA (JATWC)
ISSUED AT 1832 UTC Tuesday 04 September 2018

... FINAL TSUNAMI BULLETIN FOR THE INDIAN OCEAN ...

1. EARTHQUAKE INFORMATION
IOTWMS-TSP AUSTRALIA has detected an earthquake with the following details:

Magnitude: 9.0 Mwp
Depth: 10km
Date: 04 Sep 2018
Origin Time: 0600 UTC
Latitude: 24.80N
Longitude: 58.20E
Location: Off Coast of Iran

2. EVALUATION
Data from sea-level gauges confirmed that a tsunami was generated.

The expected period of significant tsunami waves is now over for all threatened Indian Ocean countries, based on IOTWMS-TSP AUSTRALIA modelling.

Because local conditions can cause a wide variation in tsunami wave action, CANCELLATION of national warnings and ALL CLEAR determination must be made by national/state/local authorities. Please be aware that dangerous currents can continue for several hours after the main tsunami waves have passed.

3. TSUNAMI WAVE OBSERVATIONS
Listed below are maximum wave amplitudes recorded at the specified locations.
Note that wave amplitude is measured relative to normal sea level; it is NOT the crest-to-trough wave height.

Gwadar	PAKISTAN	25.00N	62.00E	7.10m	04 Sep 06:10 UTC
Chabahar	IRAN	25.33N	60.50E	6.00m	04 Sep 06:15 UTC
Muscat	OMAN	23.60N	58.57E	5.50m	04 Sep 06:20 UTC
DART 23228	ARABIAN SEA	20.80N	65.35E	0.30m	04 Sep 06:52 UTC
DART 23226	ARABIAN SEA	20.20N	67.33E	0.26m	04 Sep 06:57 UTC
Masirah	OMAN	20.70N	58.87E	2.00m	04 Sep 07:05 UTC
Salalah	OMAN	16.90N	54.01E	0.80m	04 Sep 08:30 UTC
Ormara	PAKISTAN	25.20N	64.07E	3.50m	04 Sep 08:40 UTC
Minicoy	INDIA	8.30N	73.05E	0.40m	04 Sep 09:30 UTC
Hanimadhoo	MALDIVES	6.80N	73.17E	0.60m	04 Sep 10:15 UTC
Gan	MALDIVES	0.70S	73.15E	0.75m	04 Sep 10:30 UTC
Aden	YEMEN	12.80N	44.97E	0.75m	04 Sep 11:00 UTC
Colombo	SRI LANKA	7.00N	79.85E	0.40m	04 Sep 11:30 UTC
Male	MALDIVES	4.20N	73.53E	0.50m	04 Sep 11:40 UTC
Jask	IRAN	25.60N	57.77E	3.50m	04 Sep 11:50 UTC
Karachi	PAKISTAN	24.83N	66.83E	1.90m	04 Sep 13:00 UTC
Mombasa	KENYA	4.10S	39.65E	0.30m	04 Sep 13:20 UTC
Pt Louis	MAURITIUS	20.17S	57.33E	0.55m	04 Sep 13:25 UTC
DART 23401	NICOBAR ISLA	8.90N	88.50E	0.02m	04 Sep 13:27 UTC
Cocos Island	AUSTRALIA	12.10S	96.89E	0.30m	04 Sep 14:20 UTC
Rodrigues	MAURITIUS	19.70S	63.42E	0.60m	04 Sep 14:40 UTC
Seblat	INDONESIA	3.17S	101.50E	0.20m	04 Sep 14:45 UTC
Christmas Is	AUSTRALIA	10.40S	105.67E	0.30m	04 Sep 15:25 UTC
Sittwe	MYANMAR	20.00N	92.83E	0.15m	04 Sep 16:00 UTC
Pangandaran	INDONESIA	7.83S	108.50E	0.15m	04 Sep 16:00 UTC
DART 56001	INDIAN OCEAN	13.99S	110.10E	0.09m	04 Sep 16:08 UTC
Comores	COMORES	11.70S	43.25E	0.95m	04 Sep 16:50 UTC
Denis Island	SEYCHELLES	3.80S	55.67E	0.90m	04 Sep 16:50 UTC
DART 56003	INDIAN OCEAN	15.02S	117.94E	0.07m	04 Sep 17:08 UTC
Point Murat	AUSTRALIA	21.80S	114.19E	0.65m	04 Sep 17:30 UTC

4. 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.

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

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

6. 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

Cancellation Times for National Warnings

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Cancellation time for National Warnings to be decided by NTWC - likely to be after the country's last T4 time has passed, or after all tsunami wave observations have stopped coming in for the country, or both.

unesco

Intergovernmental
Oceanographic
Commission

THANK YOU