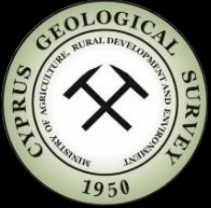


IOC EU ECHO NEAMTWS

# Strengthening the Resilience of Coastal Communities in the North East Atlantic, Mediterranean Region to the Impact of Tsunamis and Other Sea Level-Related Coastal Hazards Project



2021  
2030 United Nations Decade  
of Ocean Science  
for Sustainable Development

## CoastWAVE: Larnaka

### CoastWAVE Coordination Meeting

5 February 2024

Dr Sylvana Pilidou

Seismologist, Senior Geological Officer

Cyprus Geological Survey Department

*-Seismicity Monitoring Coordinator in Cyprus*

*-Head of Cyprus Tsunami Board*



# CoastWAVE, Cyprus: Getting Larnaka



## Collaborations



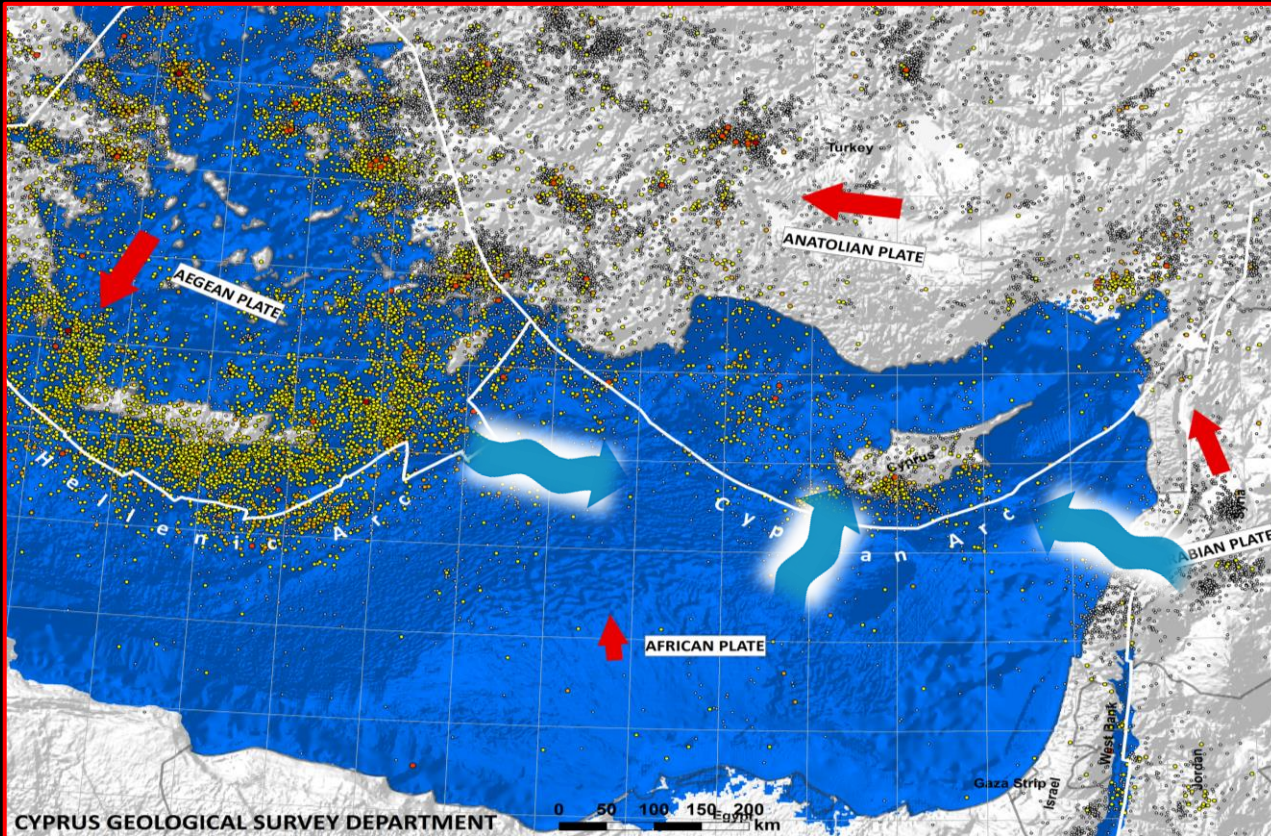
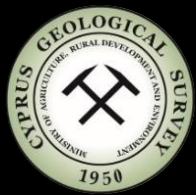
- Tsunami Modelling
- Tsunami Hazard Maps
- Tsunami Evacuation Maps



- St. Operating Procedures



# CoastWAVE, Cyprus: Getting Larnaka



## Main tsunami sources that affect Cyprus:

1. Local, strong, shallow earthquakes.
2. Regional, strong, shallow earthquakes.
3. Submarine landslides (Levantine coast) triggered by large EQ on the Dead-Sea transform fault.

## LOCAL TSUNAMI

### 1. Natural Warning Signs:

- Earthquake ground shaking
- Quick change (usually drop) of sea-level

### 2. Tsunami Warning System

## DISTANT TSUNAMI

### 1. Tsunami Warning System

### 2. Natural Warning Signs

Statistics of ONLY *historical* data

Tsunami intensity	Wave height - m	Repeat Period - Y
Moderate	< 1	30
Strong	≥ 1	120
Very Strong	≥ 4	375

# Historic Tsunami of 1222 (11 May)



Source:

Local, strong earthquake at the Cyprus Arc. Strongly felt in eastern Mediterr.

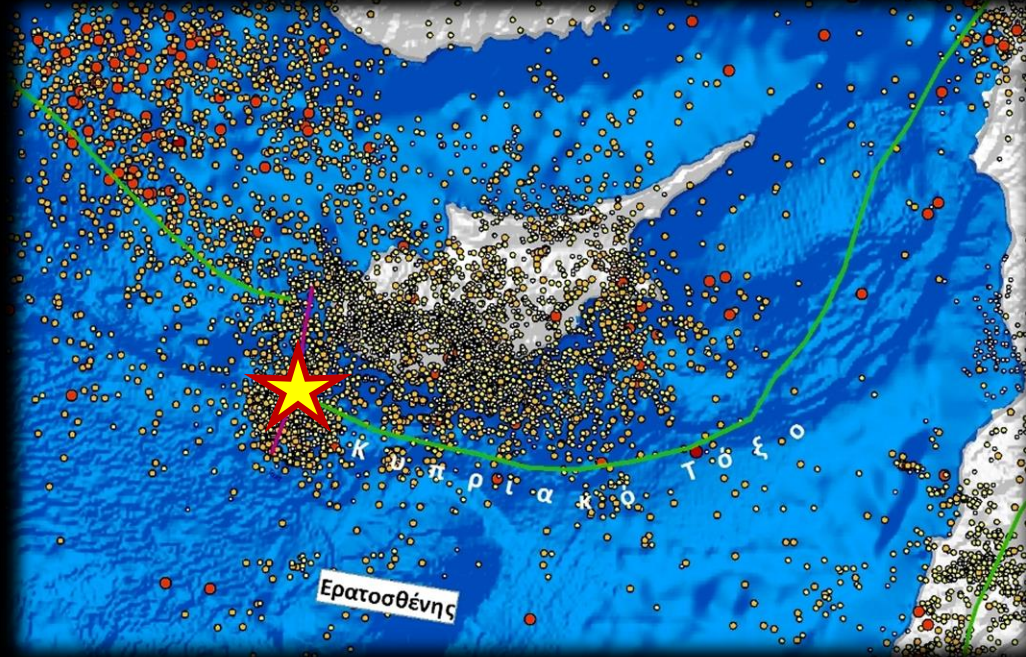
**$M \approx 7.0-7.5$**

**Fault: 50km x 25km**

**Displacement: 3m**

Ogerius Panis & Marchisius Scriba (1294)  
experience the tsunami and describe:

*... at Cyprus, the sea was lifted up by the shock and rushed inland; the sea in places opened up in huge masses of water big as mountains and surged inland, razing buildings to the ground and filling villages with fish ... Baffa (Pafos), they say, suffered most ... the harbor dried up and then the town was submerged by the sea ... the town and its castle were completely ruined and its inhabitants wiped out.*



- One of the most devastating tsunamis of the Mediterranean.
- It claimed lives in Pafos.
- The city and castle of Pafos were leveled.
- It cause extensive damage at the Pafos and Lemesos ports.
- The Pafos port was left drained from water.
- The coastline of Pafos shifted outwards.

# Historic Tsunami of 1222 (11 May) **NOA, INGV, IHC**

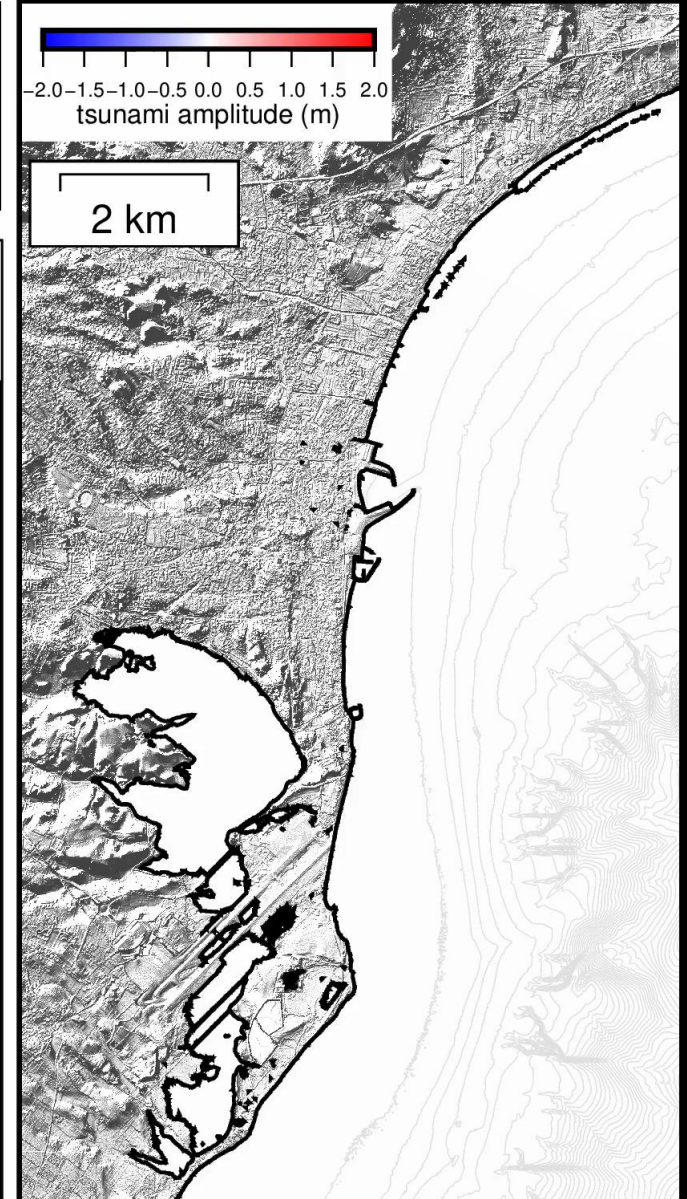
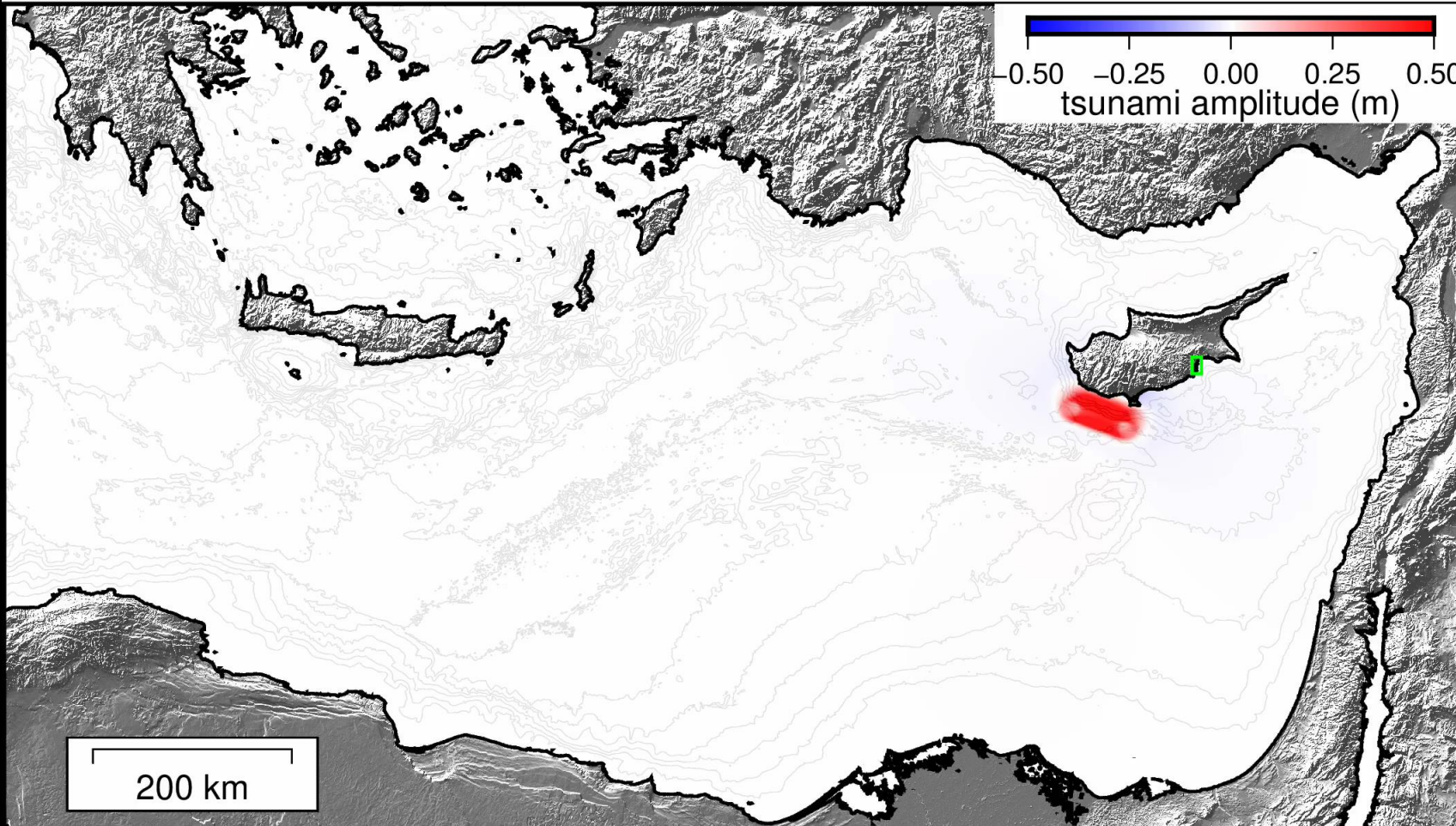


**Project:** "Tsunami modelling, inundation and evacuation mapping in Larnaca area within the framework of the CoastWAVE project"

**Reference historical event:**  
11 May 1222 Cyprus earthquake

**Reference:** Tinti et al. (2013)

**t = 0 min**



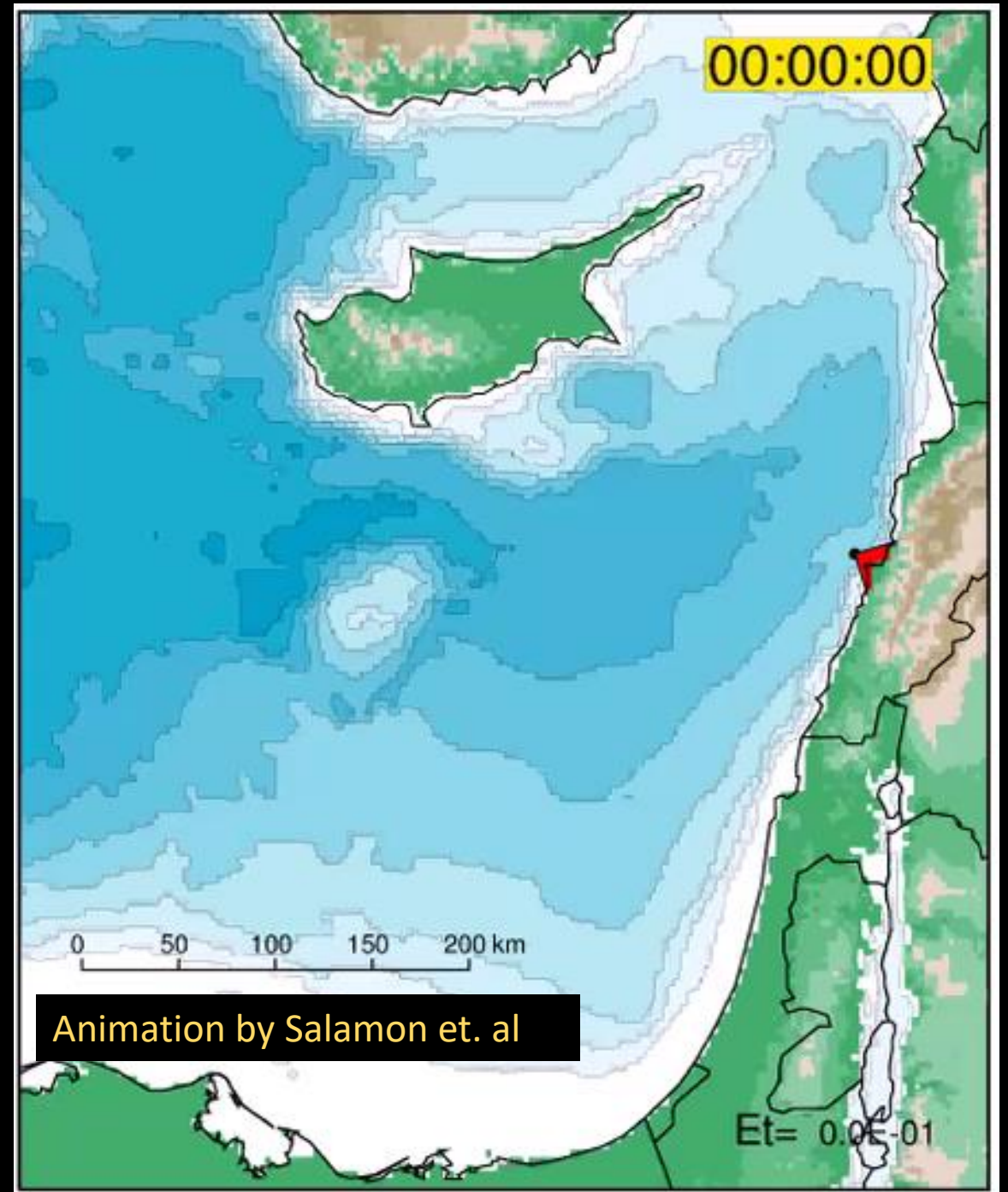
# Historic Tsunami of 1202 (20 May)

## Source:

Submarine landslide at the coast of Lebanon caused by a very strong earthquake ( $M \approx 8.0$ ) at the Dead-Sea-Fault.

*Felt within a radius of 1,200km.*

**Testimonies describe huge waves, claiming lives and throwing ships inland in east Cyprus.**



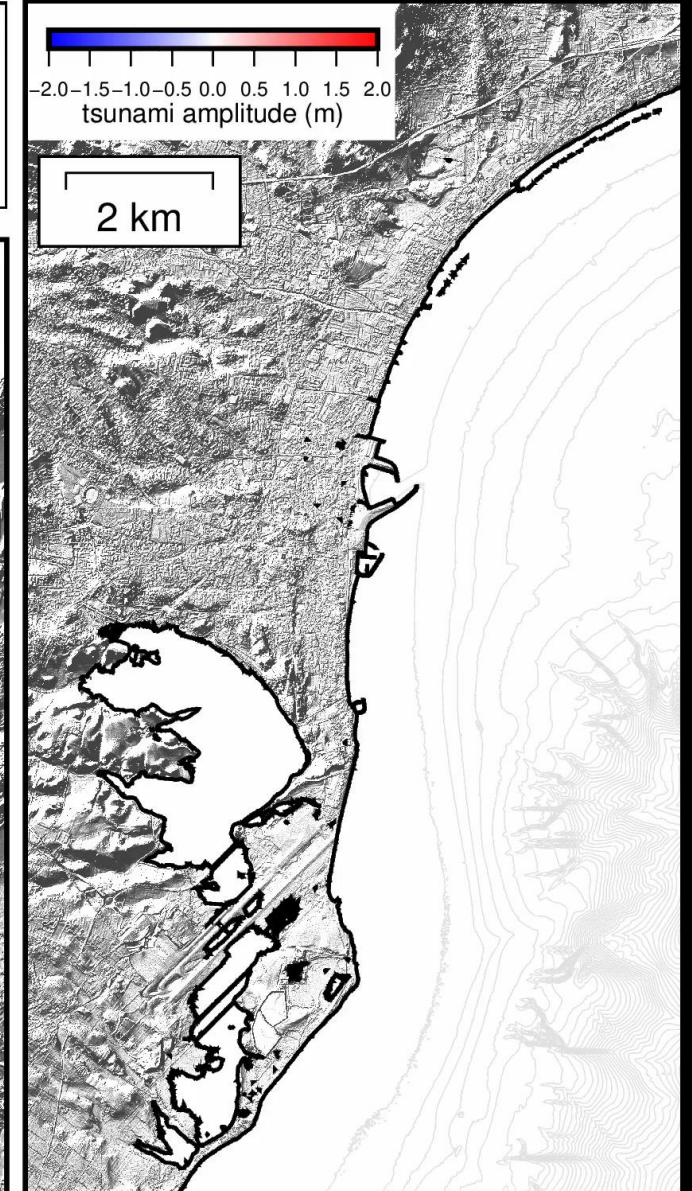
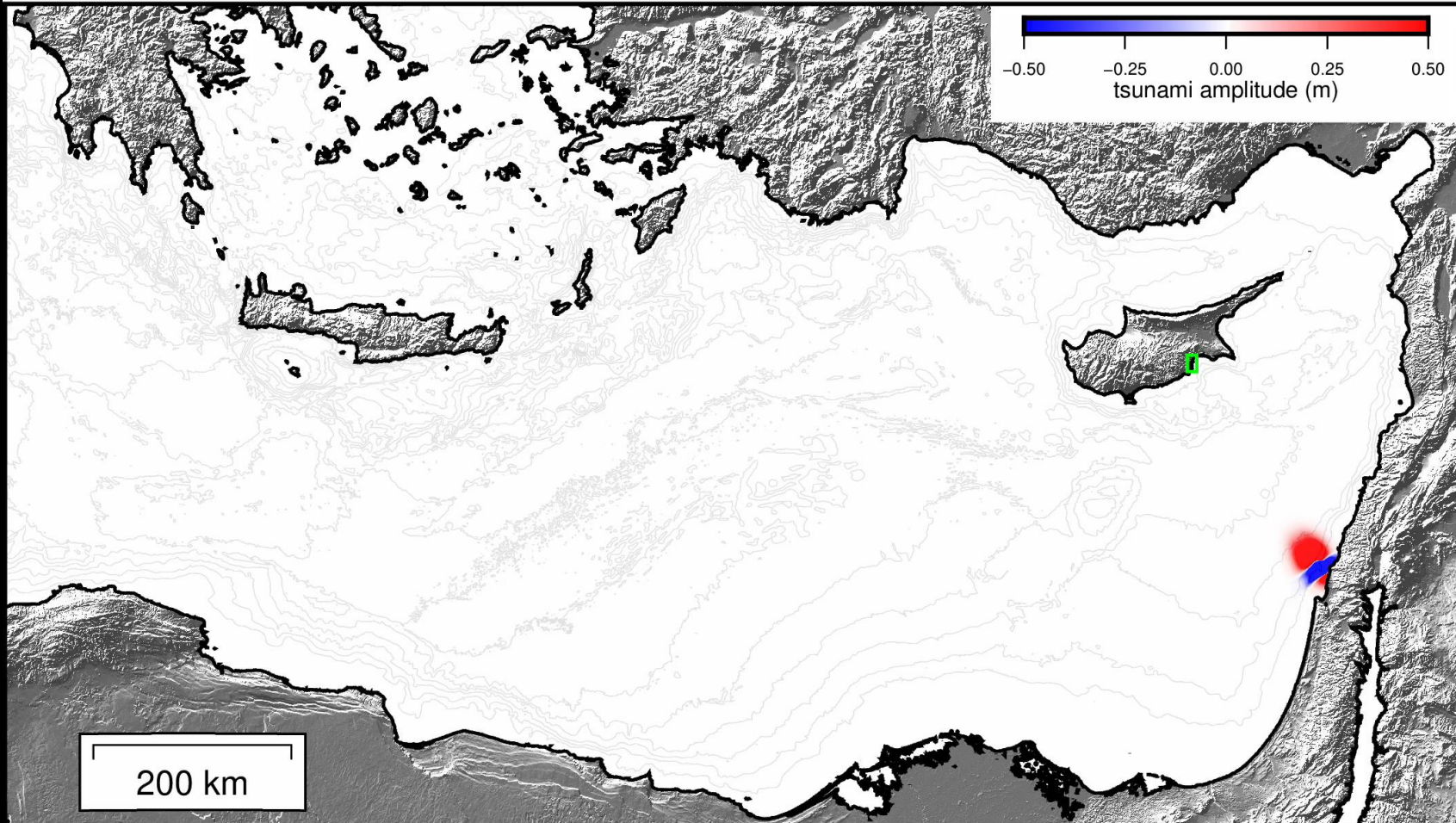
# Historic Tsunami of 1202 (20 May) **NOA, INGV, IHC**



**Project:** "Tsunami modelling, inundation and evacuation mapping in Larnaca area within the framework of the CoastWAVE project"

**Tsunami source:** submarine landslide scenario in the Levantine Sea  
**Simulation case:** 2  
**Reference:** Salamon et al. (2007)

**t = 0 min**



# Historic Tsunami of 551 (9 July) **NOA, INGV, IHC**

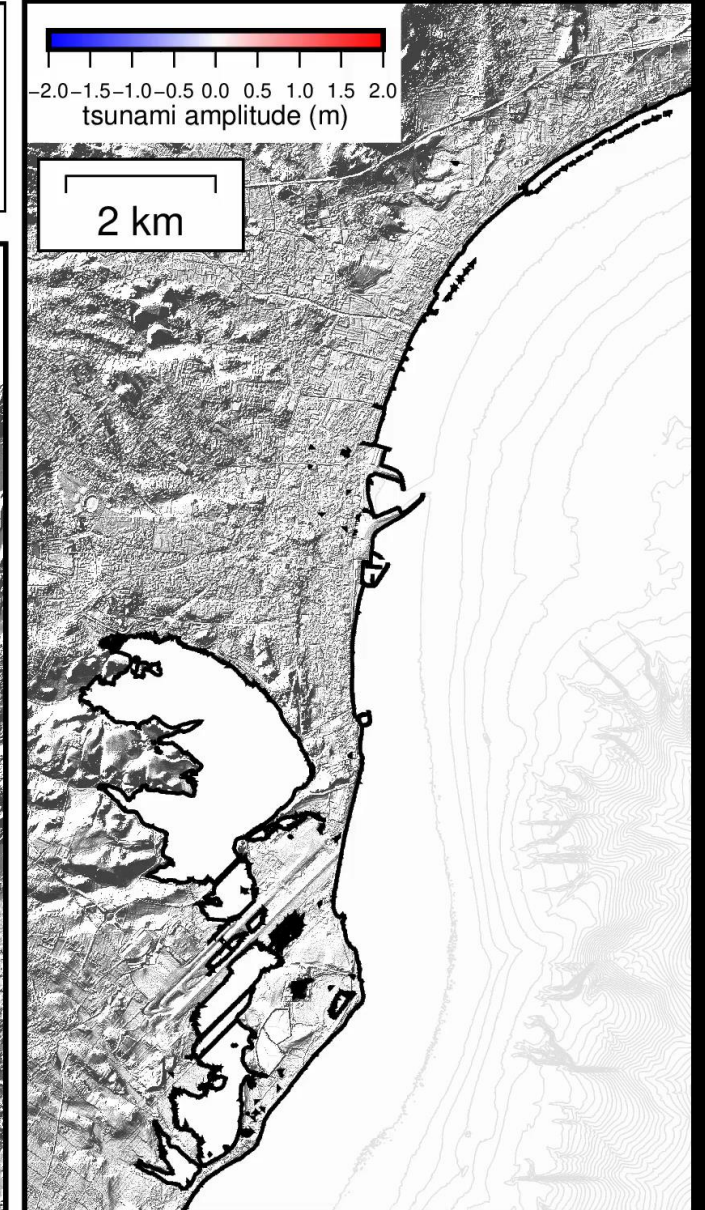
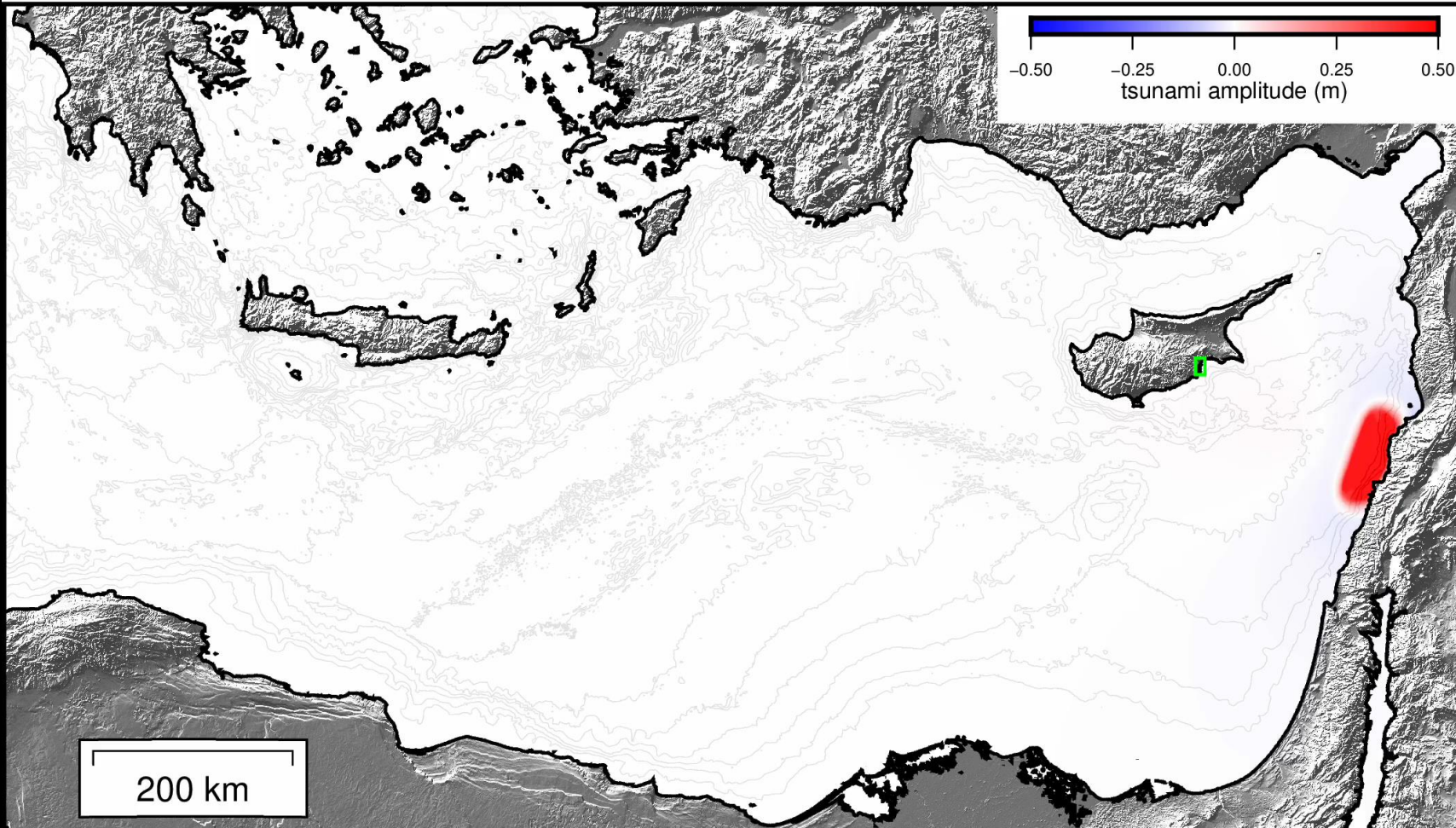


**Project:** "Tsunami modelling, inundation and evacuation mapping in Larnaca area within the framework of the CoastWAVE project"

**Reference historical event:** 9 July 551 AD Beirut earthquake

**Reference:** Tinti et al. (2013)

**t = 0 min**





# Historic Tsunami of 1303 (8 August)

Prof. Steven Ward, University of California



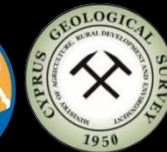
Source: Strong, submarine earthquake at the east part of the Hellenic Arc. Strongly felt throughout the E. Mediterranean.

**$M \approx 8.0$**

**Fault Plane: 100km x 30km**  
**Displacement: 8m**

- One of the most well documented and destructive tsunamis of the Mediterranean.
- The earthquake was felt within a radius of 1,500km. & caused extensive damage in Crete.
- The tsunami claimed lives caused extensive damage in Greece and Egypt.
- The tsunami affected also Turkey, Cyprus and the Levantine coast

# Historic Tsunami of 1303 (8 August) **NOA, INGV, IHC**

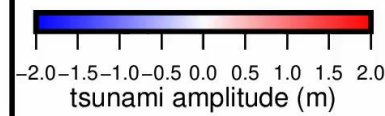


**Project:** "Tsunami modelling, inundation and evacuation mapping in Larnaca area within the framework of the CoastWAVE project"

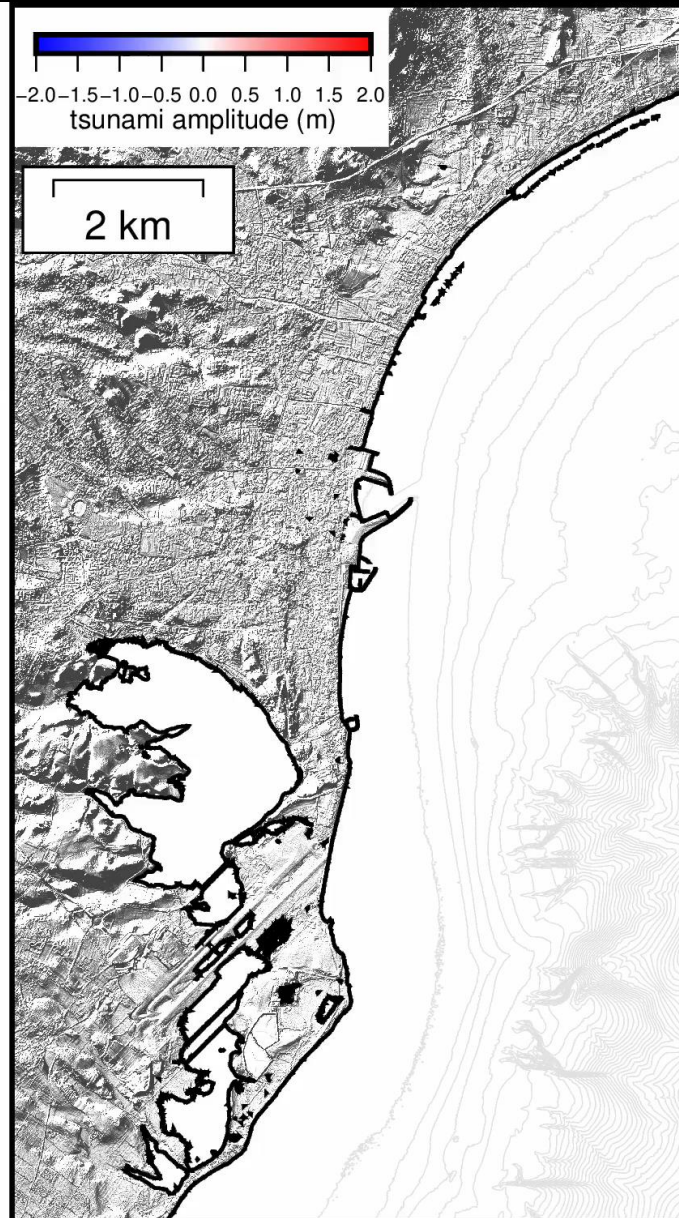
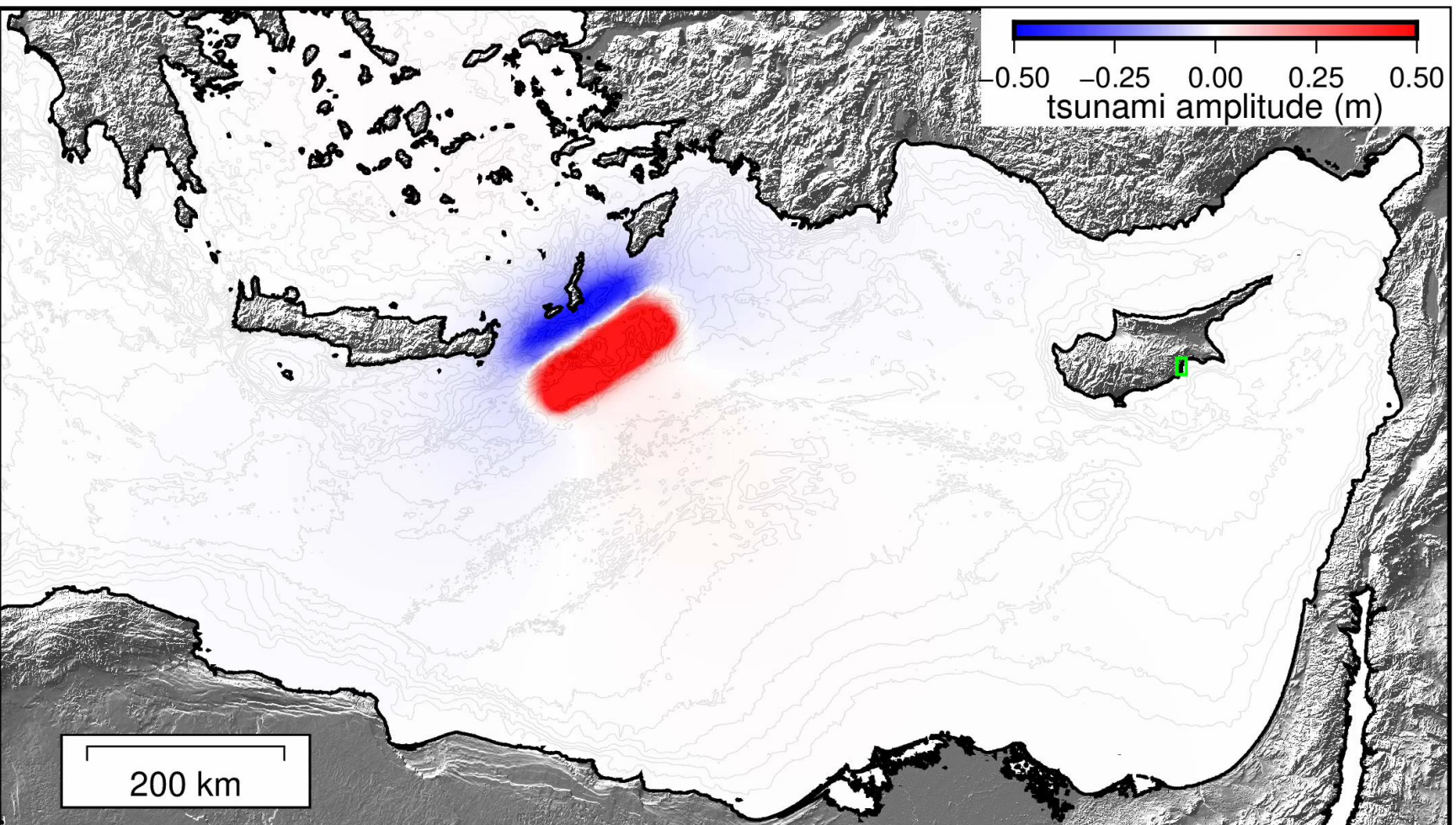
**Reference historical event:** 8 August 1303 Crete earthquake

**Reference:** Tinti et al. (2013)

**t = 0 min**



2 km



# Historic Mega-tsunami of 365AD (21 July)

Prof. Steven Ward, University of California



Source:  
The strongest earthquake  
that has ever occurred  
in the Mediterranean

**$M \approx 8.5$**

**Fault Plane: 200km x 50km**  
**Displacement: 15m**

- Crete was leveled & uplifted by 10m
- Great loss of life (50,000 deaths in Alexandria alone)
- Heavy damage in Eastern Mediterranean
- Ships thrown on building roofs, 2 miles in-land in Alexandria

# Historic Mega-tsunami of 365AD

NOA, INGV, IHC

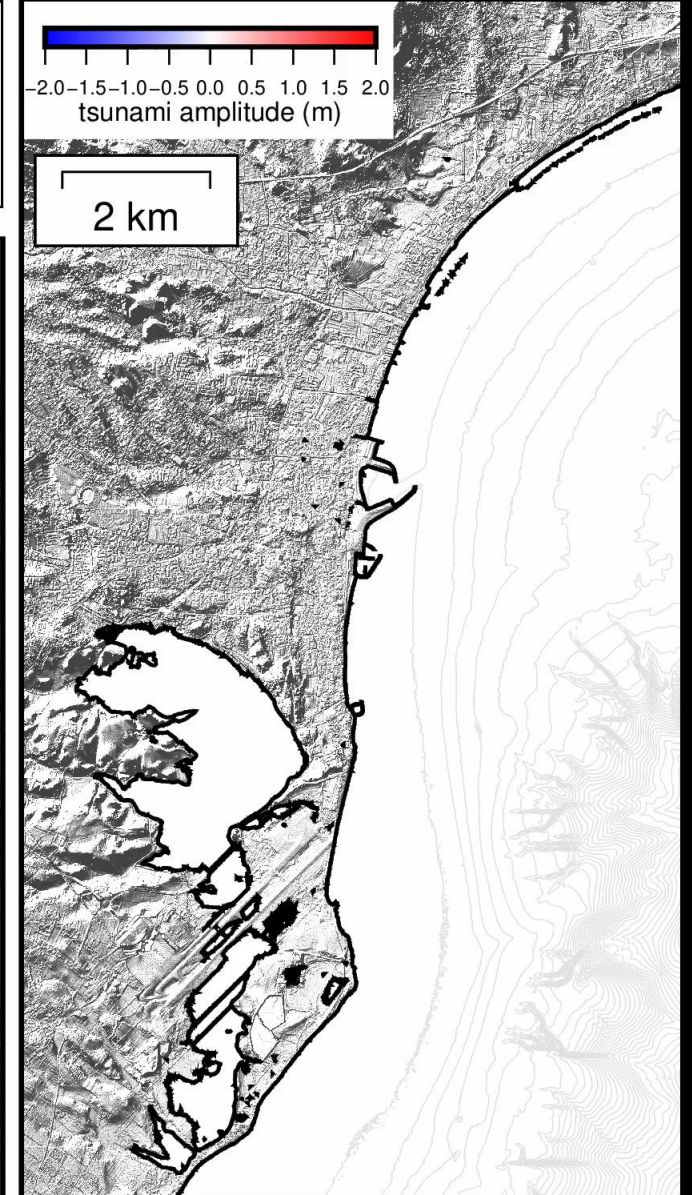
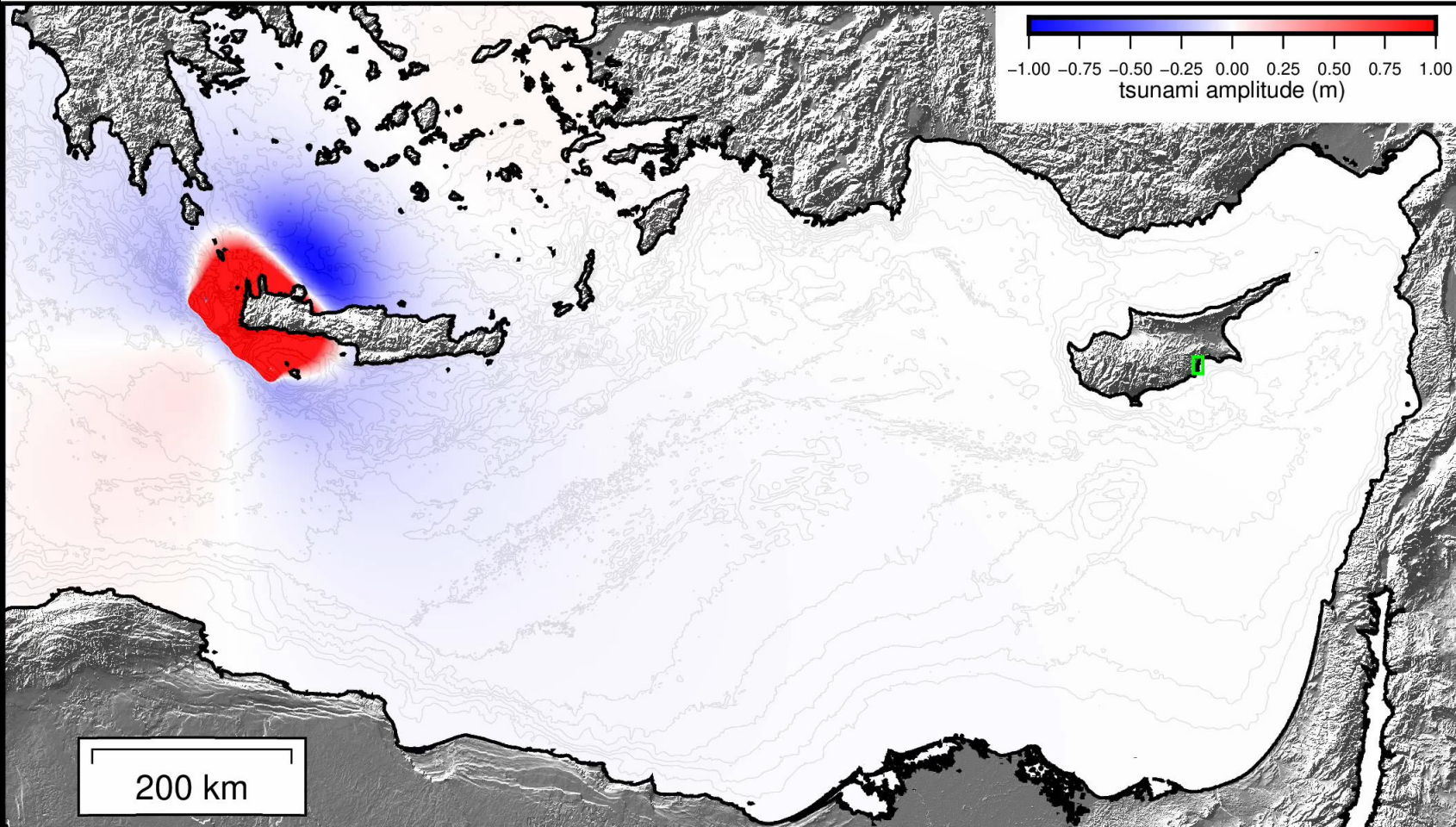


**Project:** "Tsunami modelling, inundation and evacuation mapping in Larnaca area within the framework of the CoastWAVE project"

**Reference historical event:** 21 July 365 AD Crete earthquake

**Reference:** Shaw et al. (2008)

**t = 0 min**



# CoastWAVE, Cyprus: Getting Larnaka

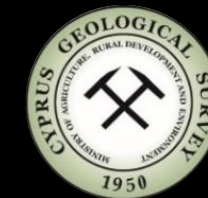


- Tsunami Modelling – Hazard Maps  
*Completed - July 2023*
- Tsunami Evacuation Maps  
*Completed - December 2023* – Currently approved by  
*Larnaka Municipality*
- Infrastructure  
*Ongoing* – Sea-level station installed so far
- St. Operating Procedures  
*Ongoing* – Workshop 2024 – Exercises 2023,2024
- Public Awareness Education-Training  
*Ongoing* – Awareness events & exercises

# CoastWAVE, Cyprus: Getting Larnaka



NOA, INGV, IHC

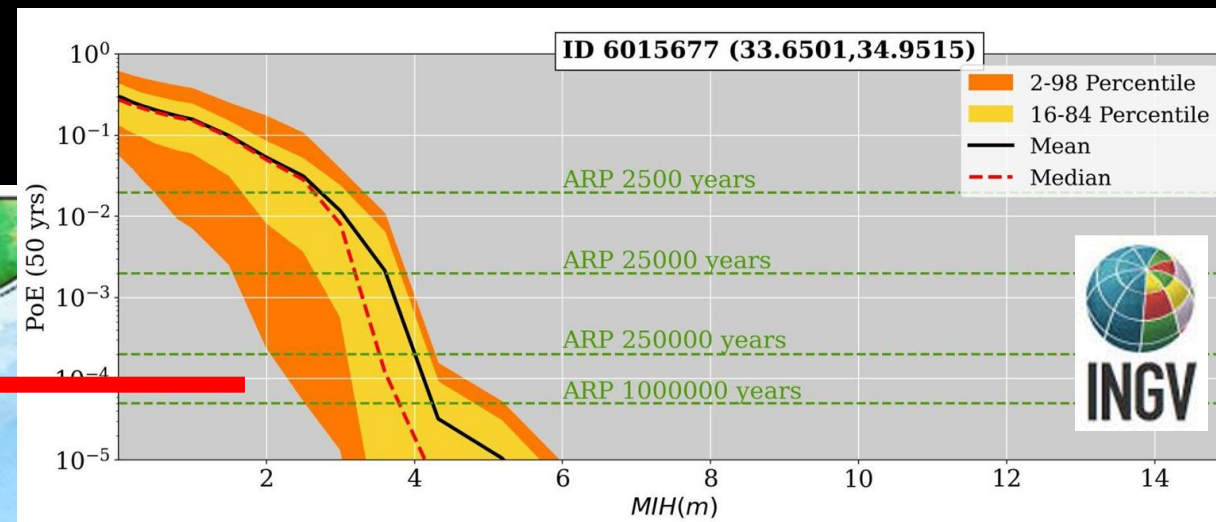
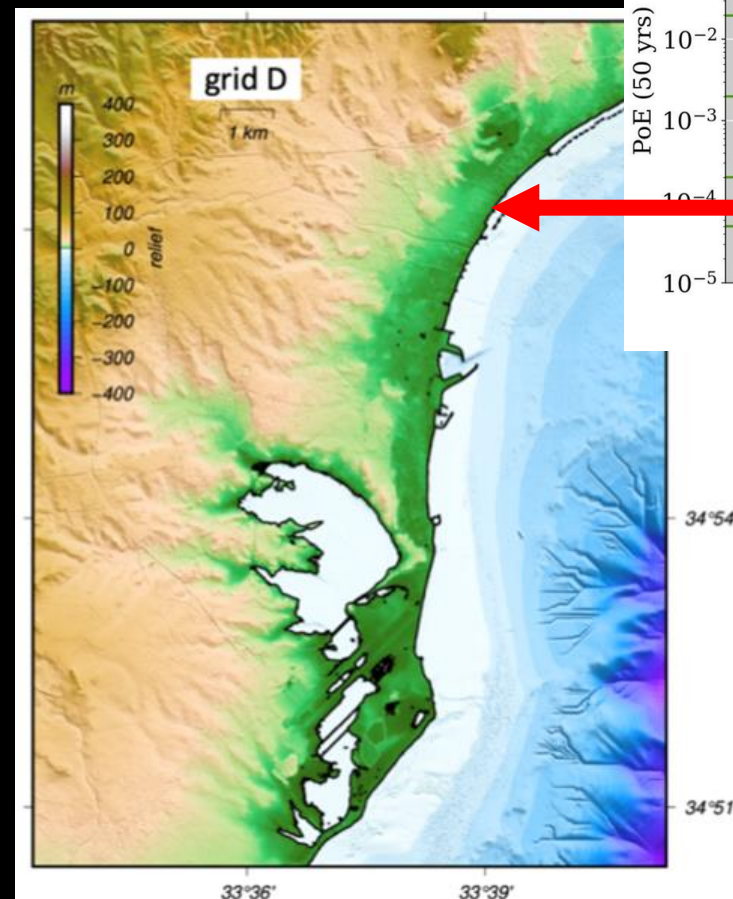
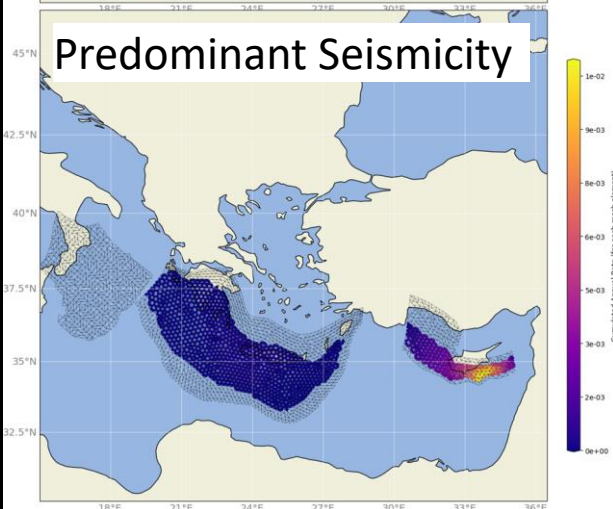


## Tsunami Modeling (Inundation Maps) Activity 8a: *Completed*

Adoption of a probabilistic tsunami hazard assessment method (PTHA). Source selection from the regional model NEAMTHM18 for Larnaka.



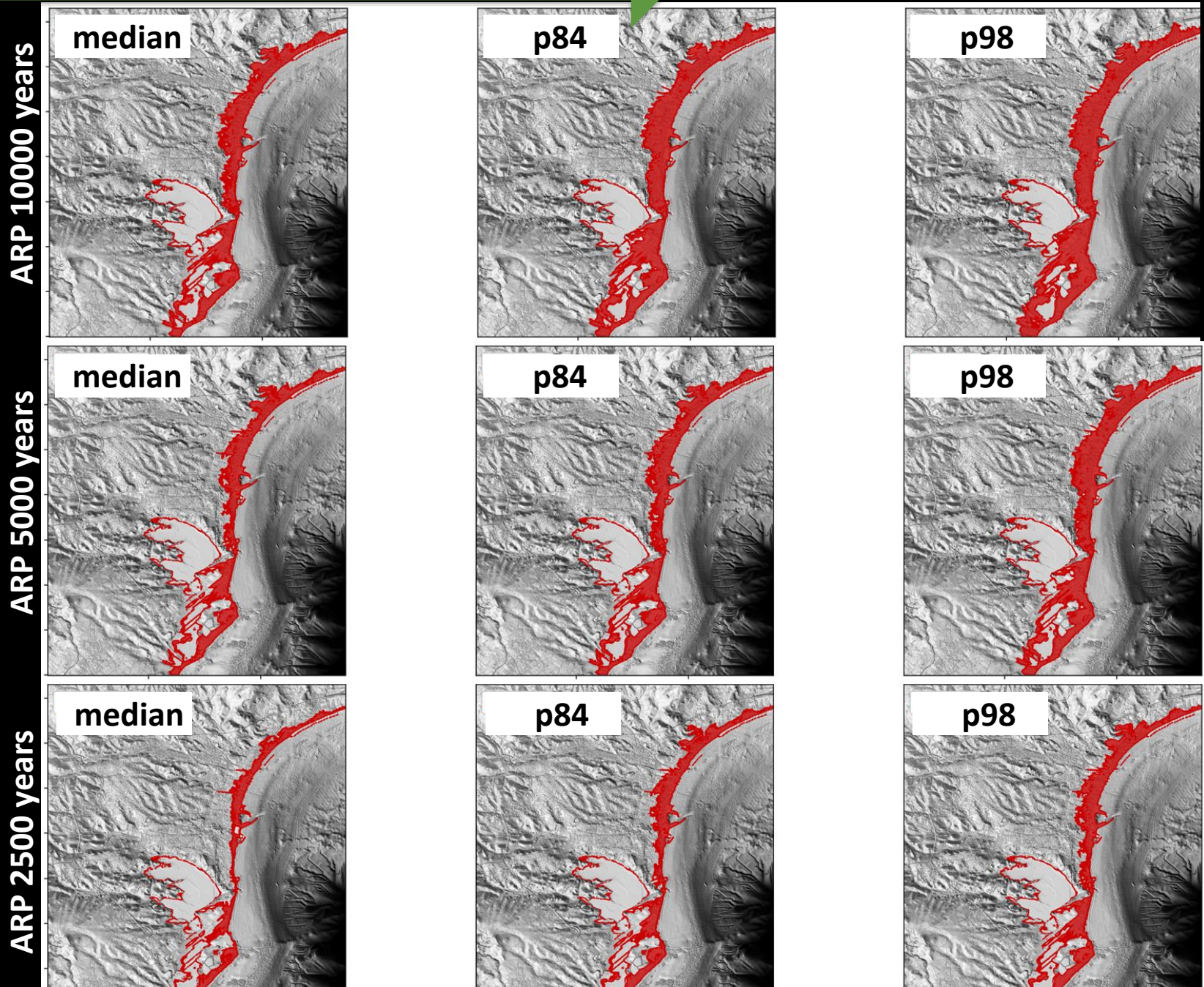
Possible to perform high-resolution simulations @ INGV Computational Facility



Tsunami hazard curves for each grid node (5m) in the municipality of Larnaka: Maximum inundation height (MIH) w.r.t. the average return period (ARP) and uncertainty level.

Higher incorporated uncertainty

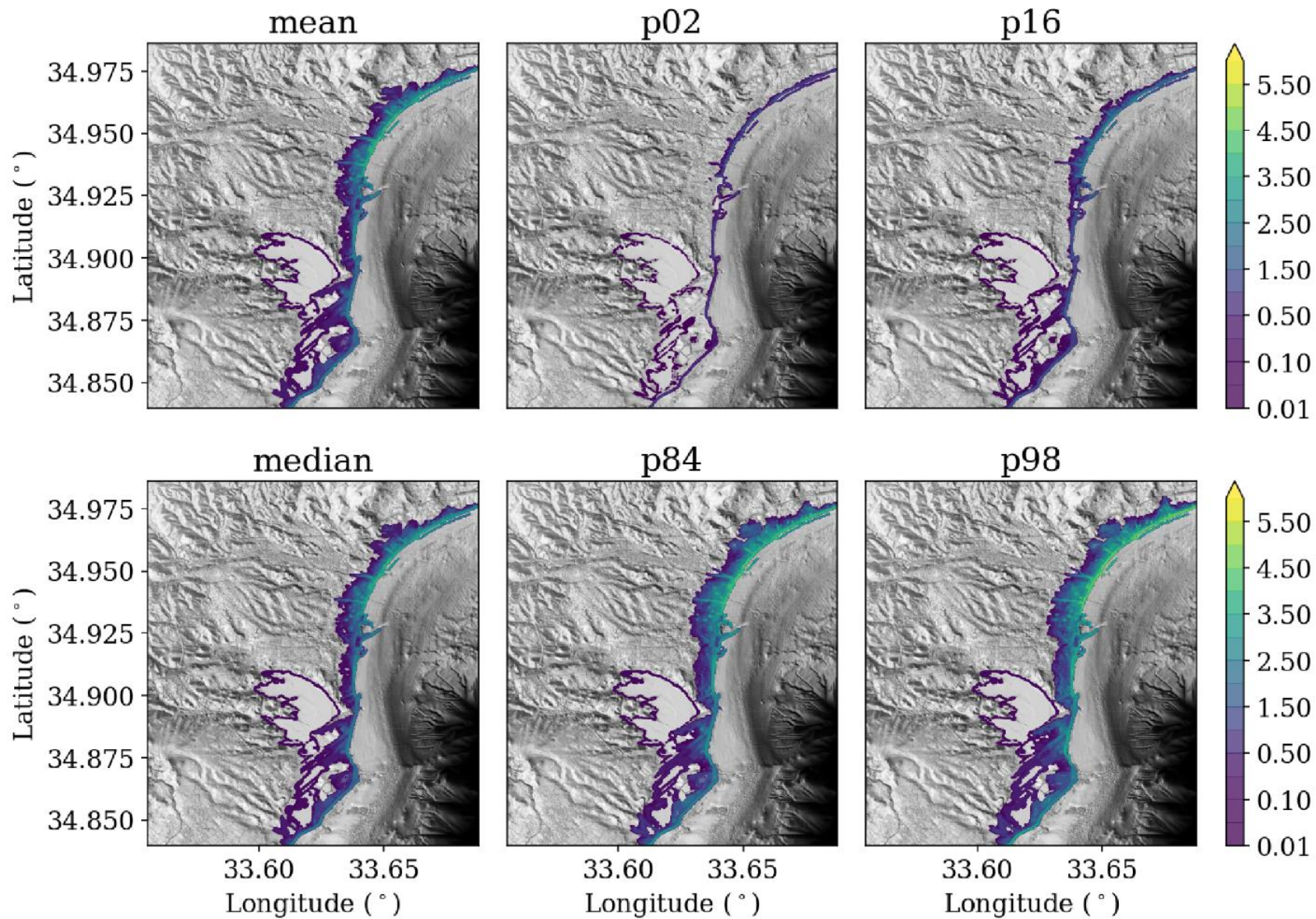
Higher ARP



The adoption of probabilistic tsunami hazard assessment (PTHA) methodology, makes Larnaka the first in the NEAM region to employ high-resolution simulations for evacuation planning.

# Flow Depth Data: e.g. 5000yr ARP

## Flow depth [m]; ARP = 5000 years





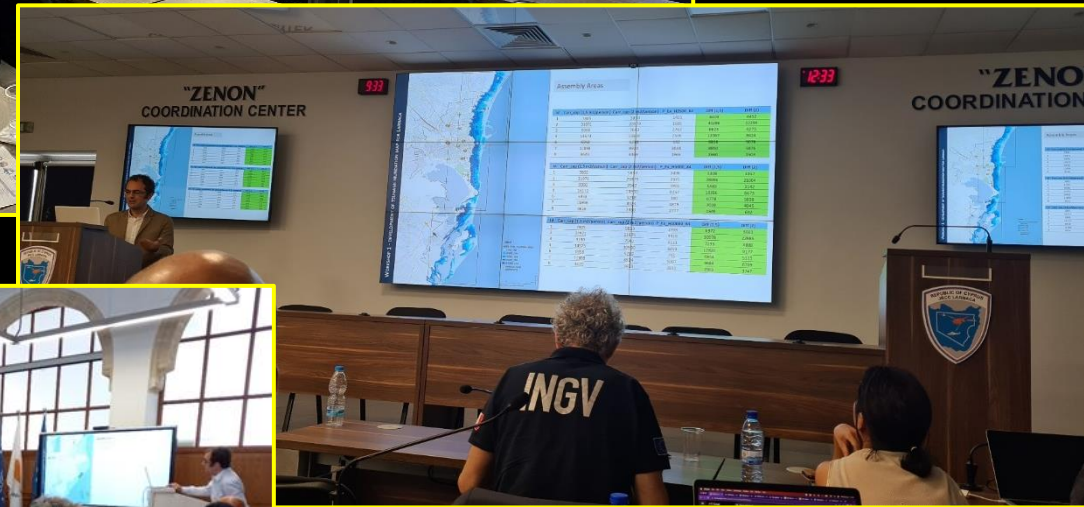
# CoastWAVE, Cyprus: Getting Larnaka



NOA, INGV, IHC



## Workshops: Larnaka Inundation Maps 28-29 June 2023



# CoastWAVE, Cyprus: Getting Larnaka



## Workshops: Larnaka Inundation Maps 27-28 June 2023



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### Cyprus on the path to making Larnaca Tsunami Ready

A workshop held on 28 June 2023 in Larnaca helped advance Cyprus' tsunami preparedness efforts.



6 October 2023

Cyprus is gearing up to enhance its preparedness for potential tsunami events by partnering with [the IOC/UNESCO](#) in the [UNESCO-IOC EU DG ECHO CoastWAVE project](#). The [Geological Survey Department of Cyprus](#) is leading preparations to declare the coastal town of Larnaca "Tsunami-Ready" by June 2024. Larnaca was chosen because its low-elevation, flat terrain and high flow of tourists make it particularly vulnerable to tsunamis. The city's bustling seafront area houses critical infrastructure, including Cyprus' largest national airport.

To address the lack of emergency national plans related to sea-level hazards, Cyprus is developing inundation maps, evacuation plans, national and local standard operating procedures, bolstering infrastructure, increasing public awareness, and conducting training activities.

A workshop held on 28 June 2023 in Larnaca helped advance Cyprus' tsunami preparedness efforts. The event was jointly organized by Cyprus's Geological Survey Department and three CoastWave Project partners: Spain's Instituto de Hidráulica Ambiental de la Universidad de Cantabria ([IHCantabria](#)), Italy's Instituto Nazionale di Geofisica e Vulcanologia ([INGV](#)) and Greece's National Observatory of Athens

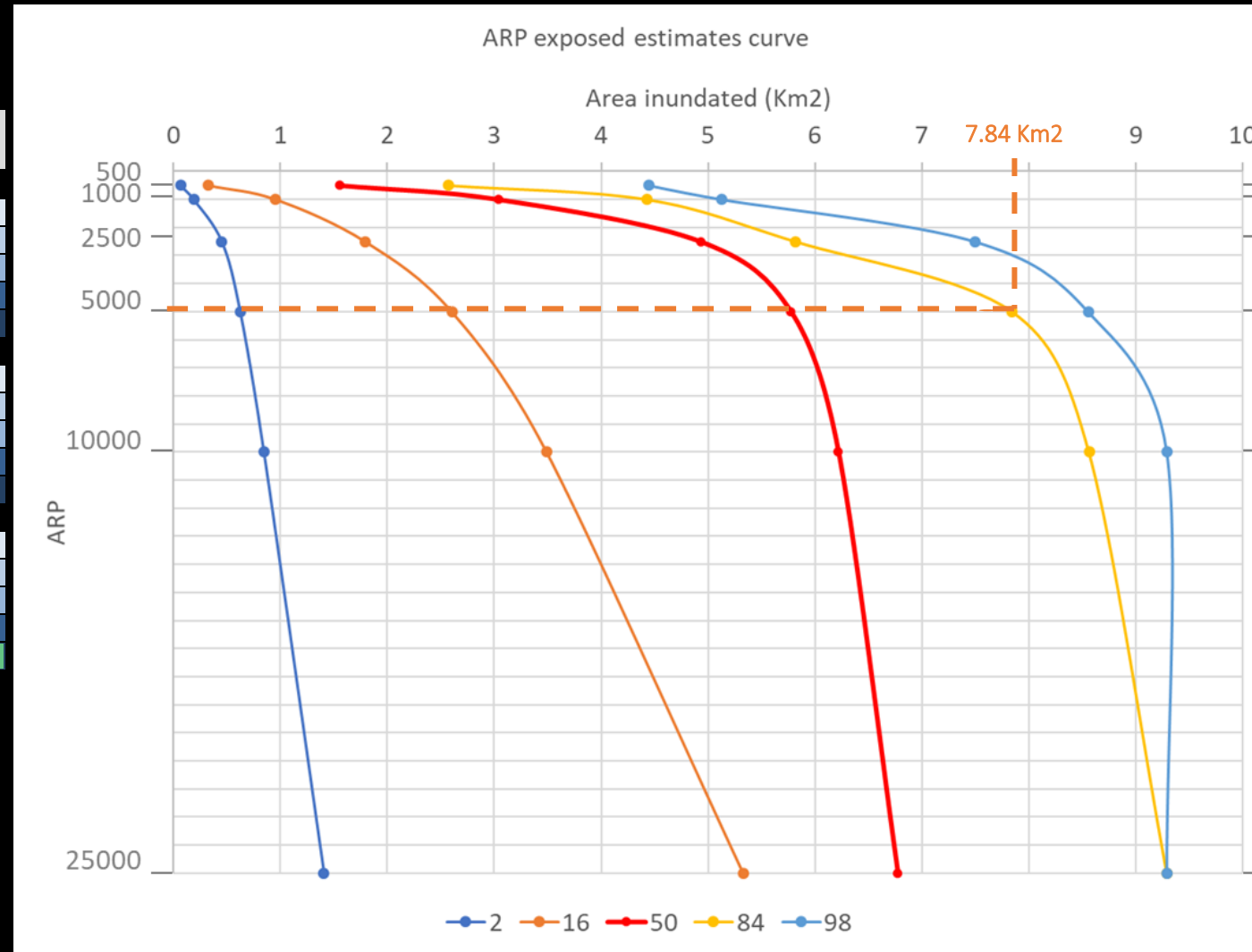
# CoastWAVE, Cyprus: Getting Larnaka



## Tsunami Modeling (Hazard Zone) Activity 8a: *Completed*

NOA, INGV, IHC

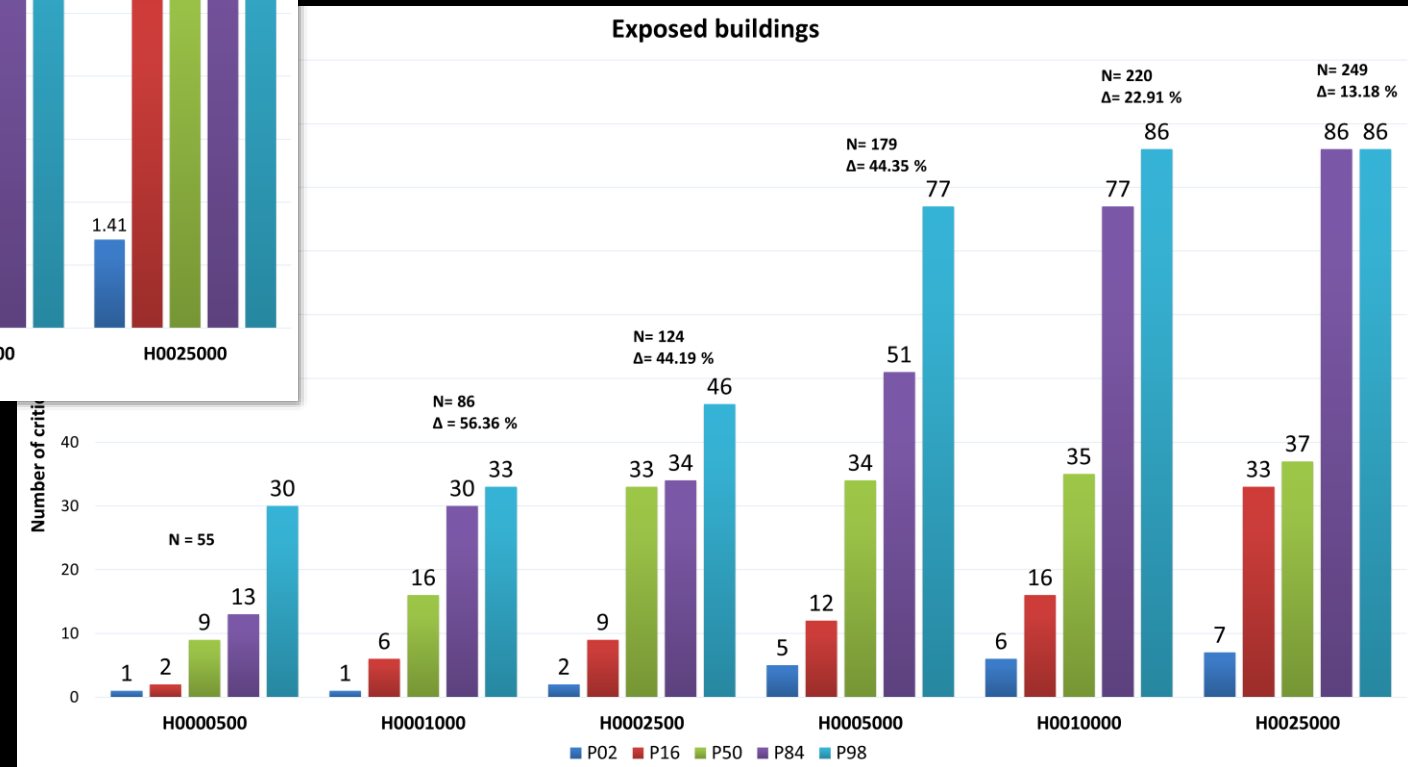
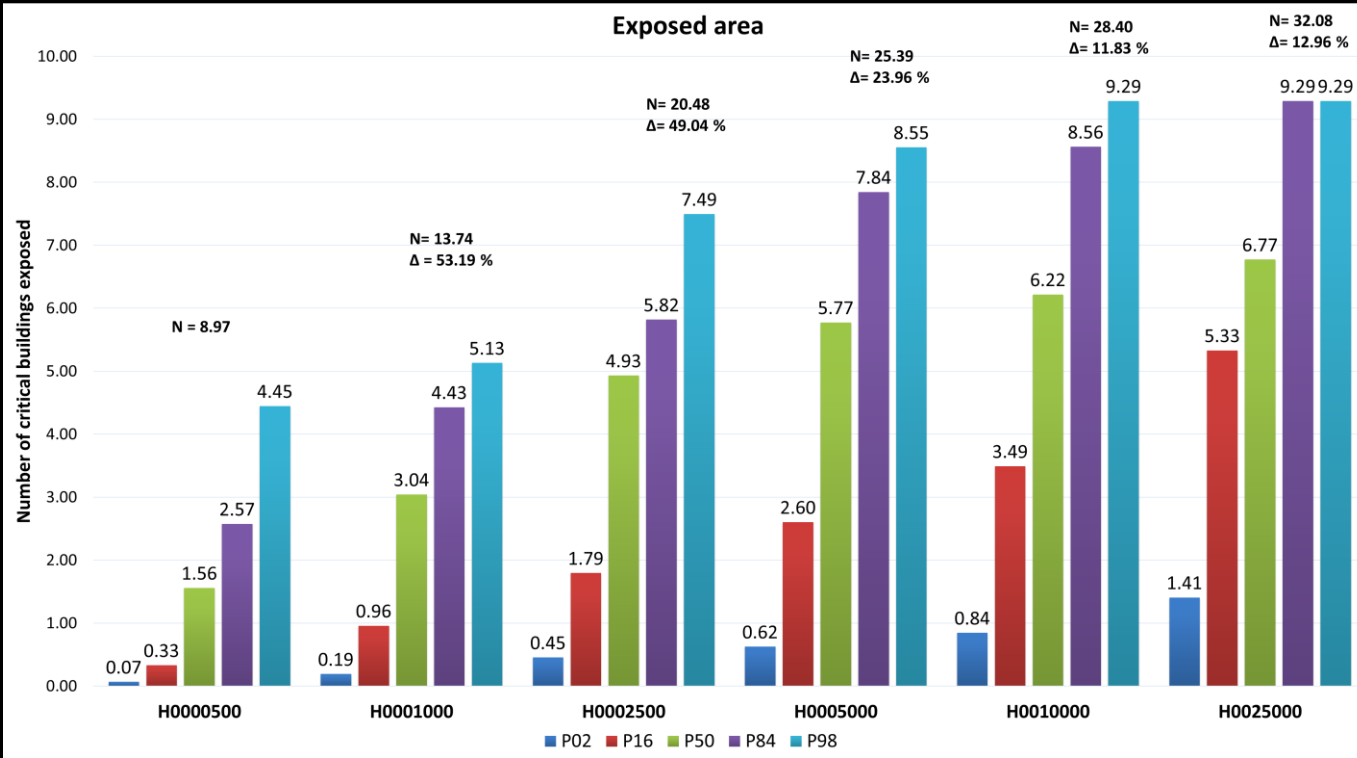
Perc.	ARP	Annual probability (%)	50 years probability (%)	Area (km <sup>2</sup> )	Max Inun. depth (m)	Population Exposed	Crit. Bld. Exposed
P50	500	0.2	10	1.56	2.64	736	9
P50	1000	0.1	5	3.04	3.1	1976	16
P50	2500	0.04	2	4.93	3.8	4946	33
P50	5000	0.02	1	5.77	4.1	6202	34
P50	10000	0.01	0.5	6.22	4.3	7435	35
P84	500	0.2	10	2.57	3	1474	13
P84	1000	0.1	5	4.43	3.6	4198	30
P84	2500	0.04	2	5.82	4.2	6265	34
P84	5000	0.02	1	7.84	4.5	10597	51
P84	10000	0.01	0.5	8.56	4.9	11320	77
P98	500	0.2	10	4.45	3.7	4190	30
P98	1000	0.1	5	5.13	4.1	5360	33
P98	2500	0.04	2	7.49	4.4	9623	46
P98	5000	0.02	1	8.55	4.8	11303	77
P98	10000	0.01	0.5	9.29	5	11562	86



# CoastWAVE, Cyprus: Getting Larnaka



## Tsunami Modeling (Hazard Zone) Activity 8a: *Completed*



# CoastWAVE, Cyprus: Getting Larnaka

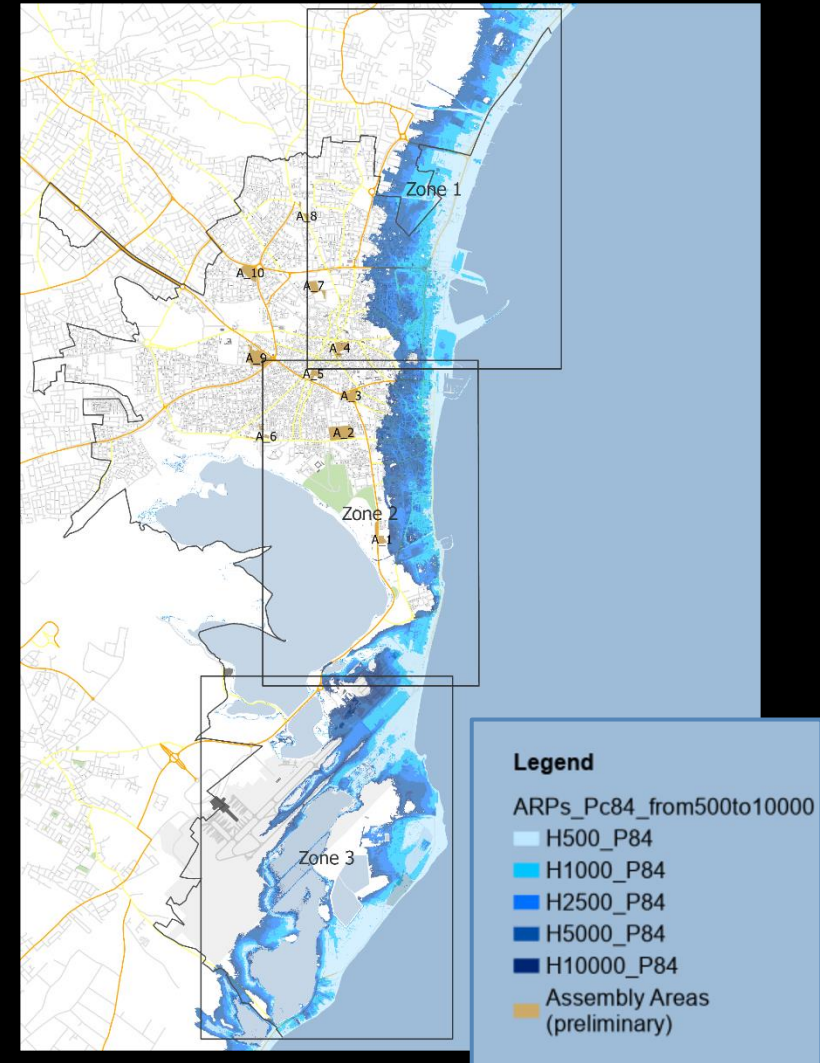
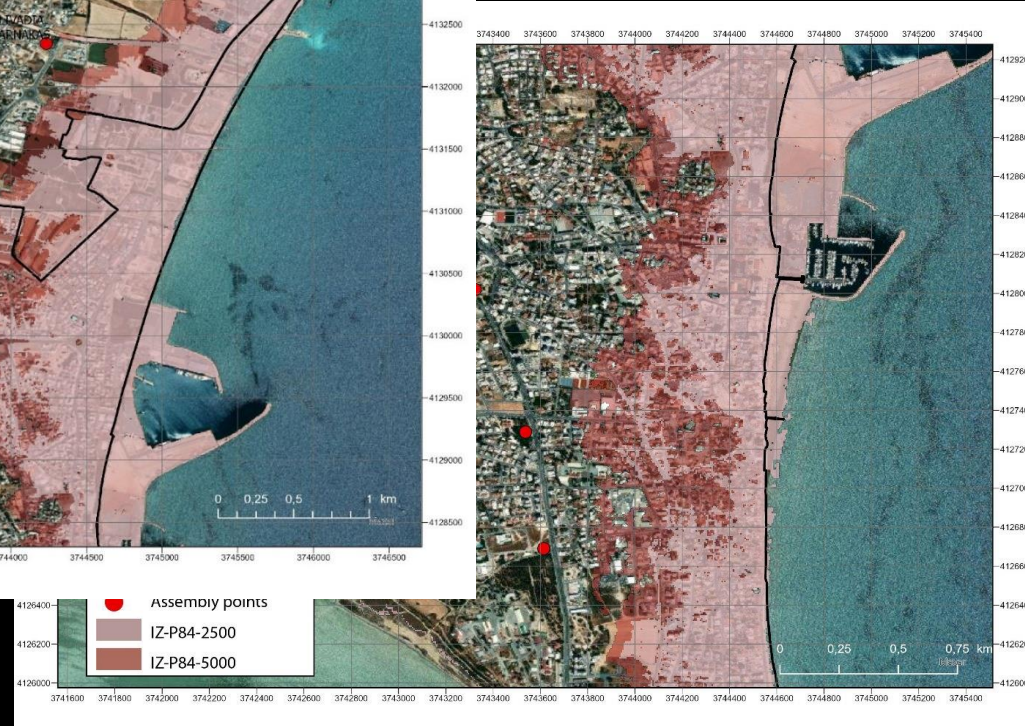
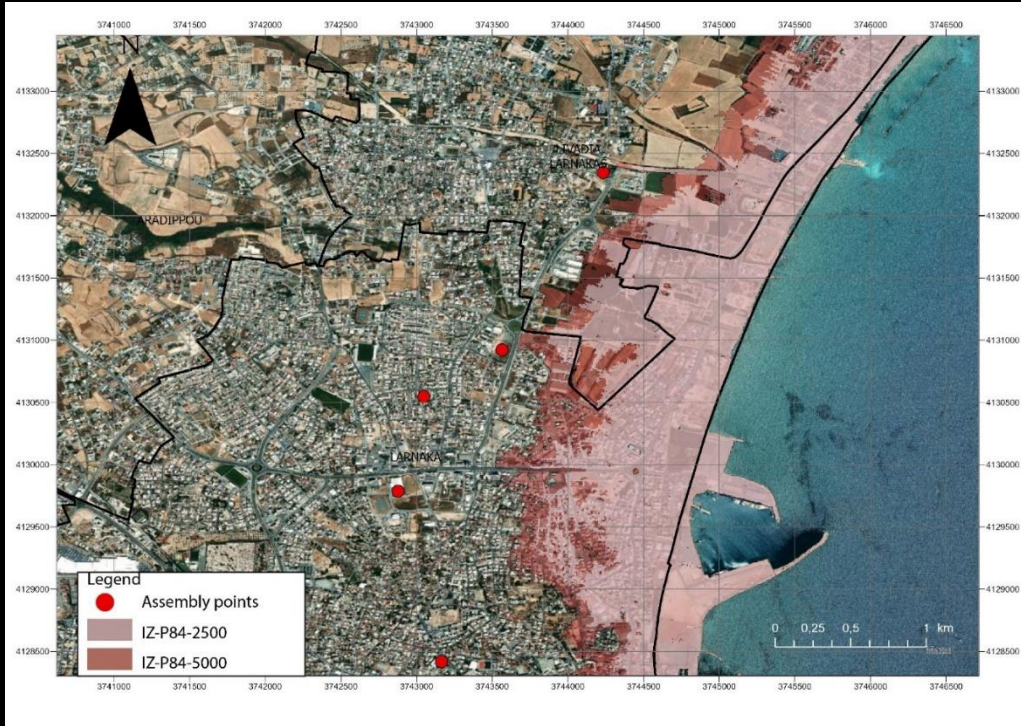


NOA, INGV, IHC



## Tsunami Modeling (Hazard Zone)

### Activity 8a: *Completed*



Criteria for hazard param. choice: Extent of zones, critical Infrastructures within, total population & related issues, assembly-points locations, feedback of Tsunami Board & Stakeholders

# CoastWAVE, Cyprus: Getting Larnaka Tsunami Modeling (Hazard Zone)



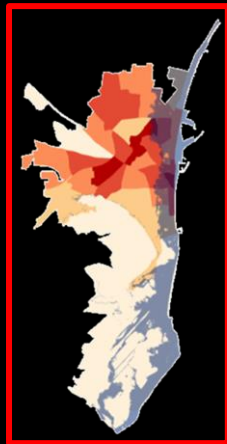
Activity 8a: *Completed*

NOA, INGV, IHC

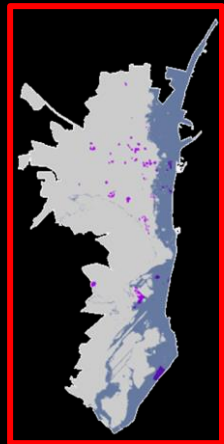
5,000yr ARP, 84%  
Area  $\approx 8 \text{ km}^2$   
Max inundation  $\approx 1\text{km}$   
Population  $\approx 15,000$   
Critical buildings  $\approx 51$



Area  
inundated

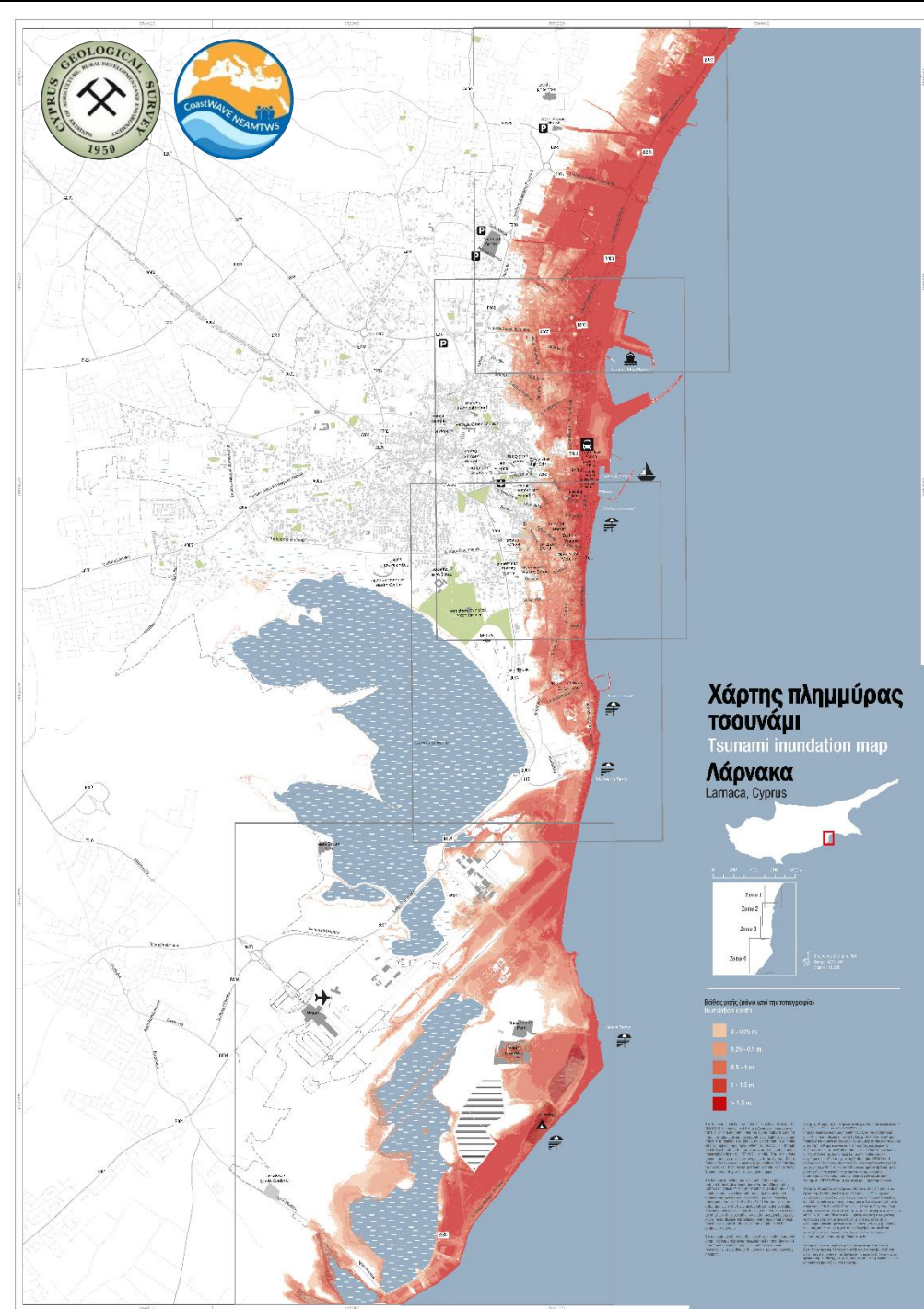


Pop. exposed



Crit.  
buildings

- 5 Touristic
- 4 Religious
- 1 Gov. Bld.
- 1 Police St.
- 1 School
- 1 Airport
- 1 Camping

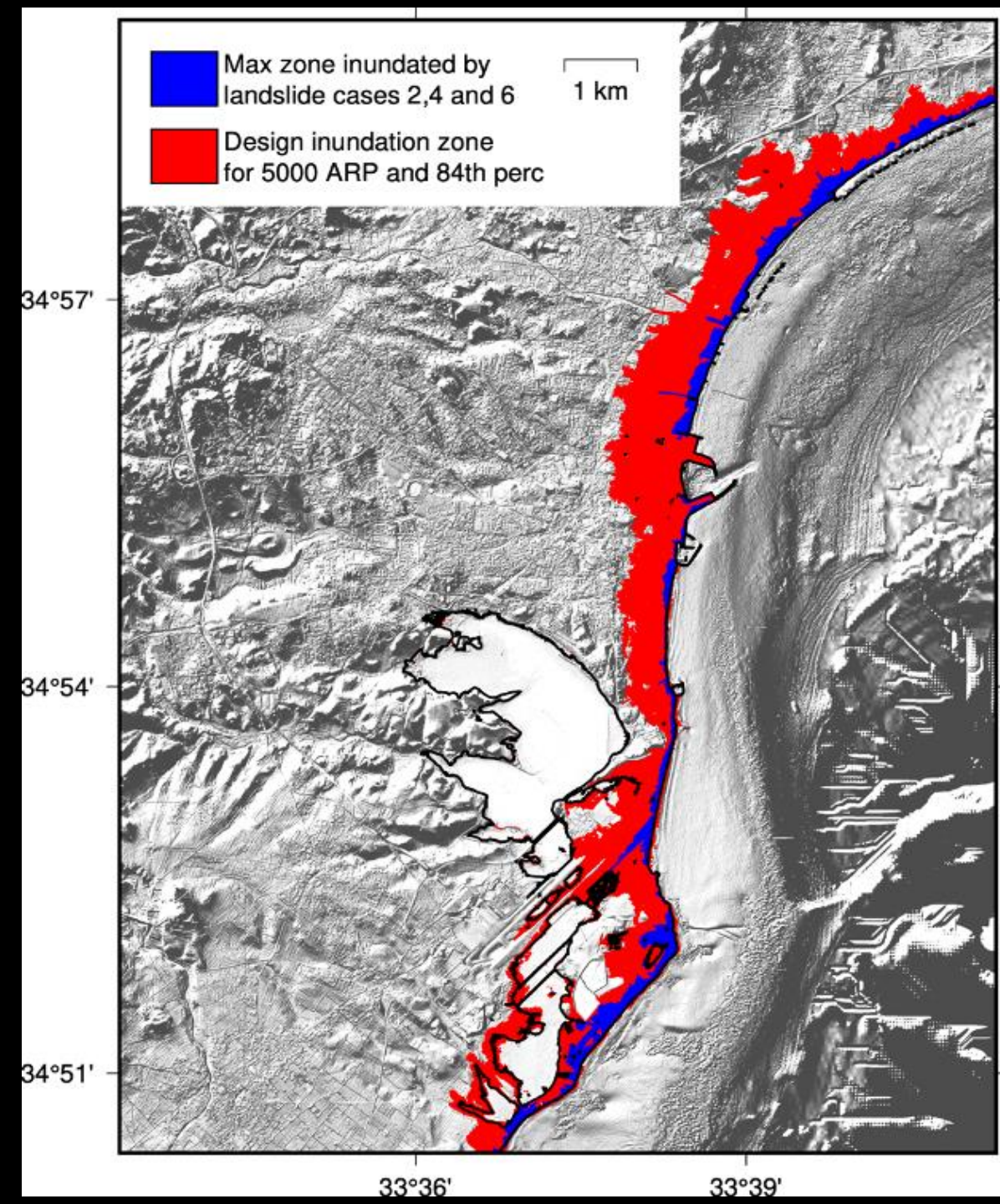


# CoastWAVE, Cyprus: Getting Larnaka Tsunami Modeling (Hazard Zone)



Activity 8a: *Completed*  
NOA, INGV, IHC

*How do inundation zones compare for  
**Earthquake** vs **Landslide**  
triggered **Tsunamis***



# CoastWAVE, Cyprus: Getting Larnaka



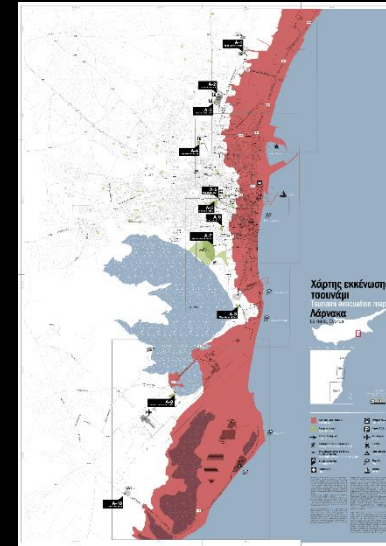
NOA, INGV, IHC



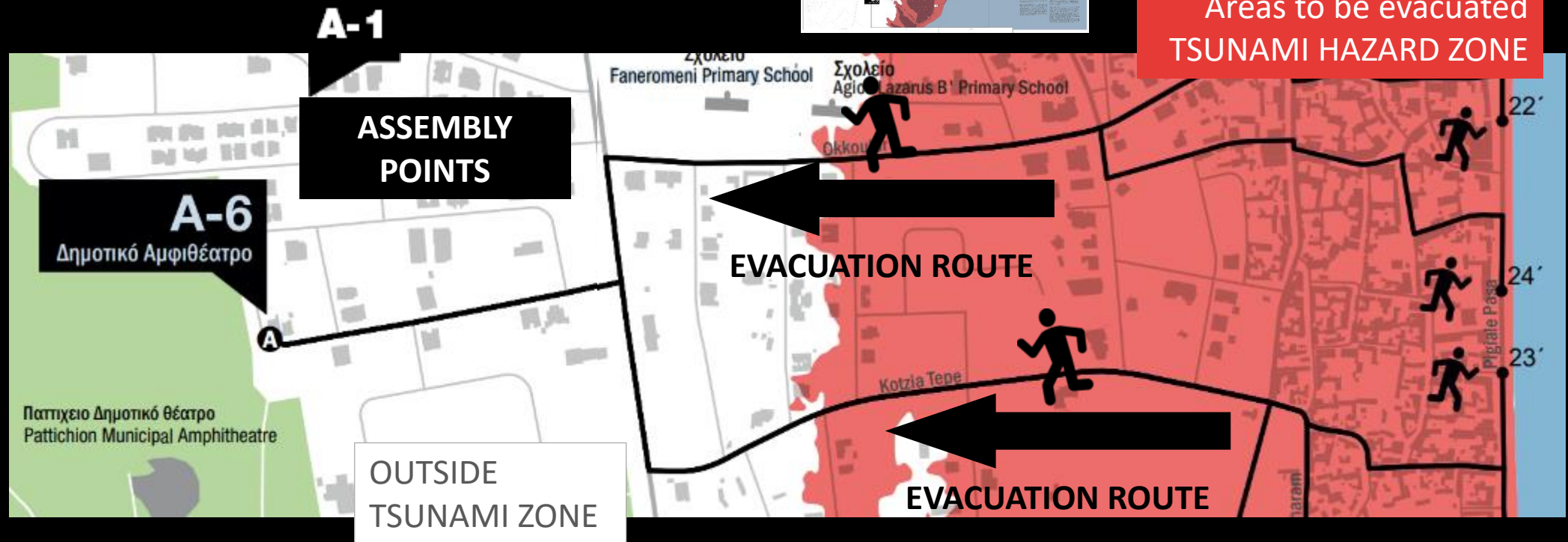
## Tsunami Evacuation Maps

### Activity 8b: *Completed & in validation*

- ✓ Identified area to be evacuated
- > Identify appropriate assembly areas
- > Establish the optimal paths/routes to reach them



Areas to be evacuated  
TSUNAMI HAZARD ZONE





# CoastWAVE, Cyprus: Getting Larnaka

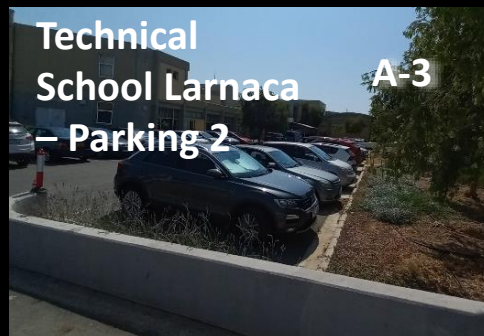
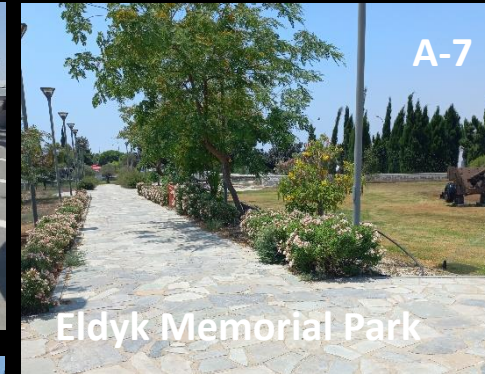
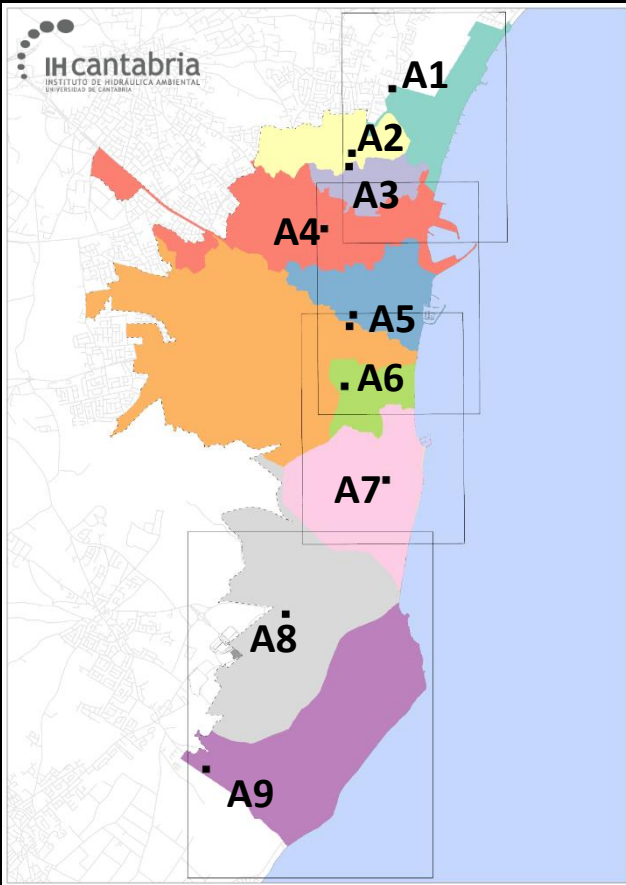
## Tsunami Evacuation Maps

Activity 8b: *Completed & in validation*



Criteria for the selection of assembly areas:

- ✓ Located out of the tsunami hazard zone
- ✓ Located out of other potential hazardous areas
- ✓ Ownership
- ✓ Accessibility
- ✓ Optimal physical conditions
- ✓ Services, supplies (water and electricity)
- ✓ Capacity of assembly points



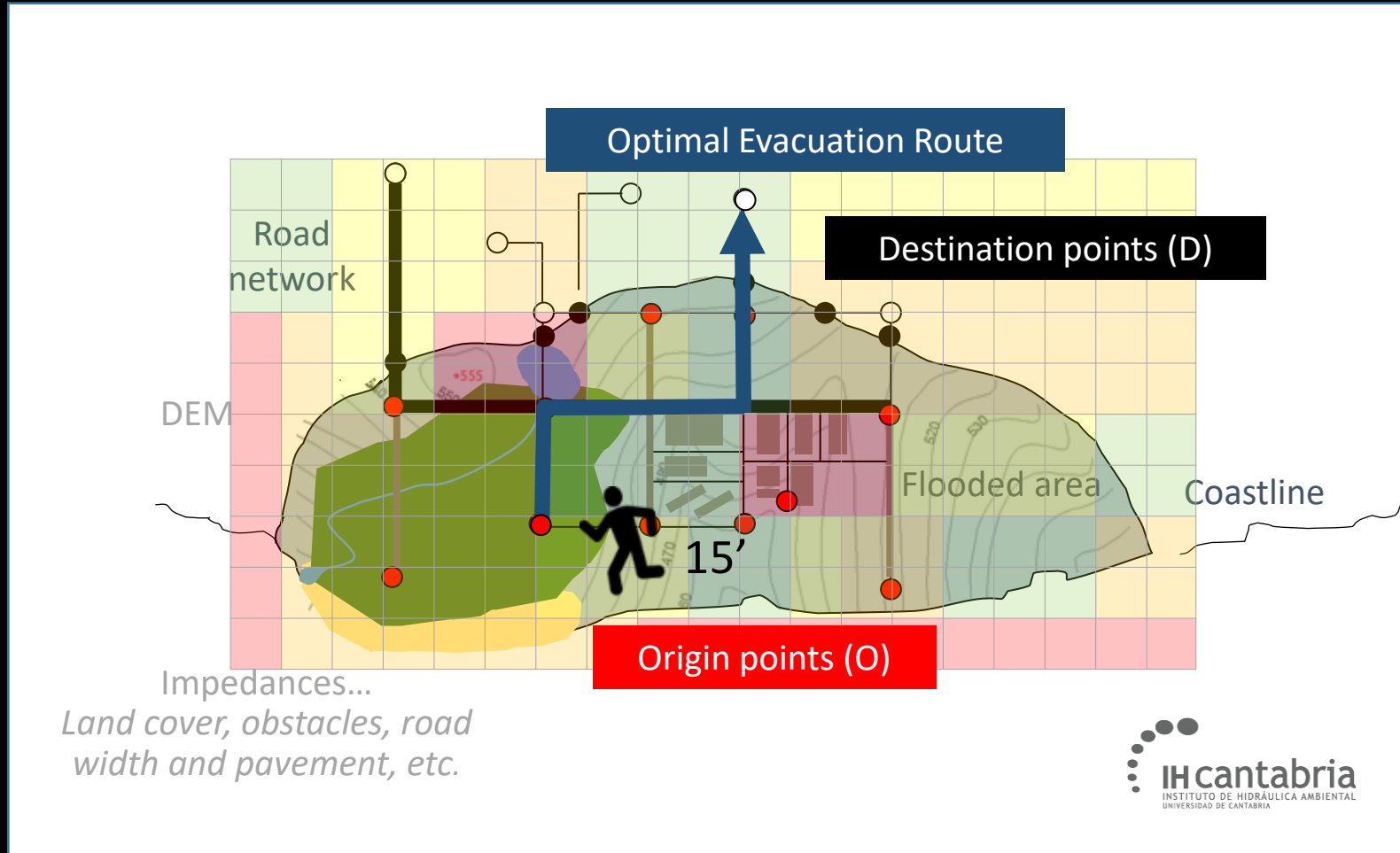
# CoastWAVE, Cyprus: Getting Larnaka



## Tsunami Evacuation Maps

### Activity 8b: *Completed & in validation*

Identification of the **optimal evacuation routes** (least costly in terms of time).



# CoastWAVE, Cyprus: Getting Larnaka

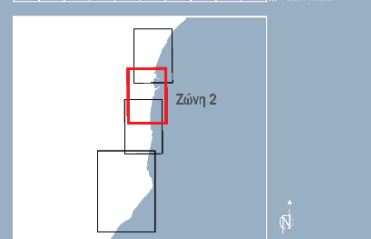


## Tsunami Evacuation Maps

Activity 8b:  
Completed & in validation  
by Larnaka Municipality

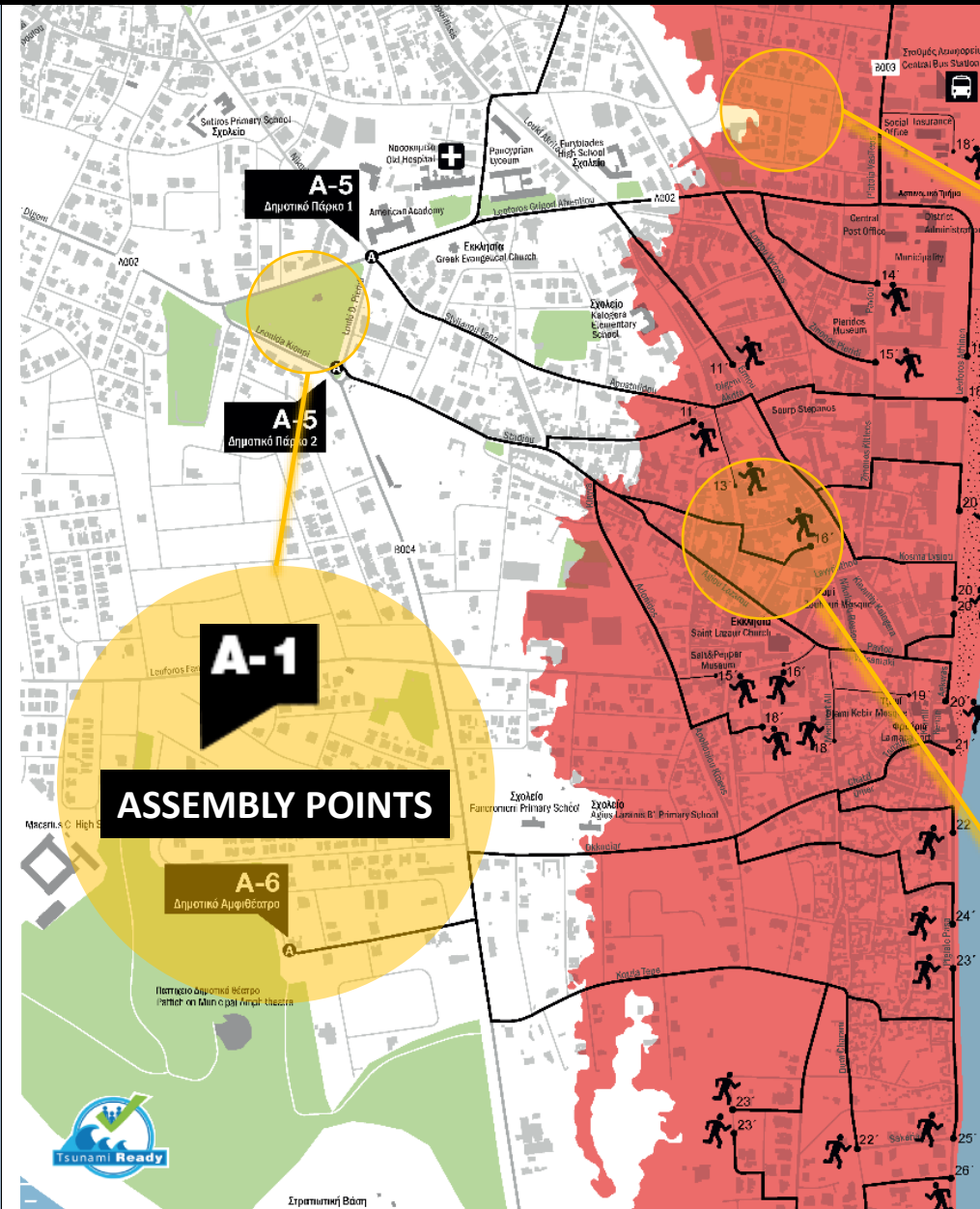
### Χάρτης εκκένωσης τσουνάμι Tsunami evacuation map

### Λάρνακα Cyprus



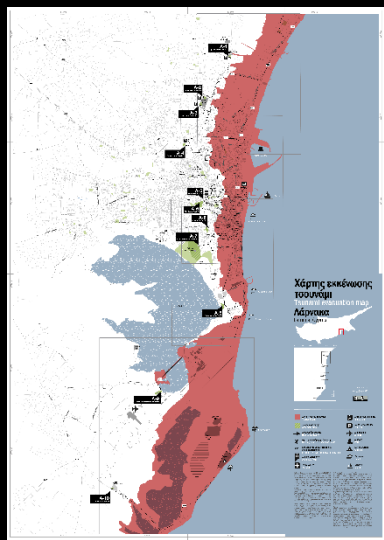
- Ζώνη Κινδύνου Τσουνάμι  
Tsunami zone
- Διαδρομή Διαφυγής  
Evacuation Route
- ➔ Αφετηρία διαδρομής διαφυγής  
Starting Point of Evacuation Route
- 32' Εκτιμώμενος χρόνος άφιξης σε σημείο καταφυγής  
Estimated Arrival time to Assembly Point
- A Σημείο καταφυγής  
Assembly Point
- 🚗 Σταθμός Λεωφορείων  
Bus Station
- P Πάρκινγκ  
Parking
- + Νοσοκομείο  
Hospital
- ✈️ Αεροδρόμιο  
Airport
- 🏠 Αιμόλιος  
Point
- ⛴ Κατασκήνωση  
Camping
- 🏖️ Παραλία  
Beach
- ⚓ Μαρτίνα  
Marina
- 🚑 Ερυθρός Σταυρός  
Red Cross
- 👮 Αστυνομία  
Local Police
- 🚒 Πολιτική Άμυνα  
Civil Protection

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Areas to be evacuated  
**TSUNAMI HAZARD ZONE**

**EVACUATION ROUTE**  
15'



# CoastWAVE, Cyprus: Getting Larnaka



## Workshop: Larnaka Evacuation Maps 26-27 September 2023



# CoastWAVE, Cyprus: Getting Larnaka



## Workshop: Larnaka Evacuation Maps 26-27 September 2023

*Field Validation of evacuation routes & assembly points*



# CoastWAVE, Cyprus: Getting Larnaka



## Workshop: Larnaka Evacuation Maps 26-27 September 2023



**unesco**

Intergovernmental  
Oceanographic  
Commission

# CoastWAVE, Cyprus: Getting Larnaka

## Workshop: Larnaka Evacuation Maps 26-27 September 2023



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### National Stakeholders in Larnaca Town Gathered to Decide on the State-of-the-Art Mapping Tools for Tsunami Evacuation

In the pursuit of enhancing the tsunami preparedness of coastal communities, the IOC/UNESCO together with the Seismology Team at the Geological Survey Department of Cyprus, organized between 26-27 September, 2023 a workshop focused on developing tsunami evacuation maps for Larnaca, a coastal town that aspires to attain UNESCO IOC Tsunami Ready status by mid-2024.



30 October 2023 - Last update: 6 November 2023

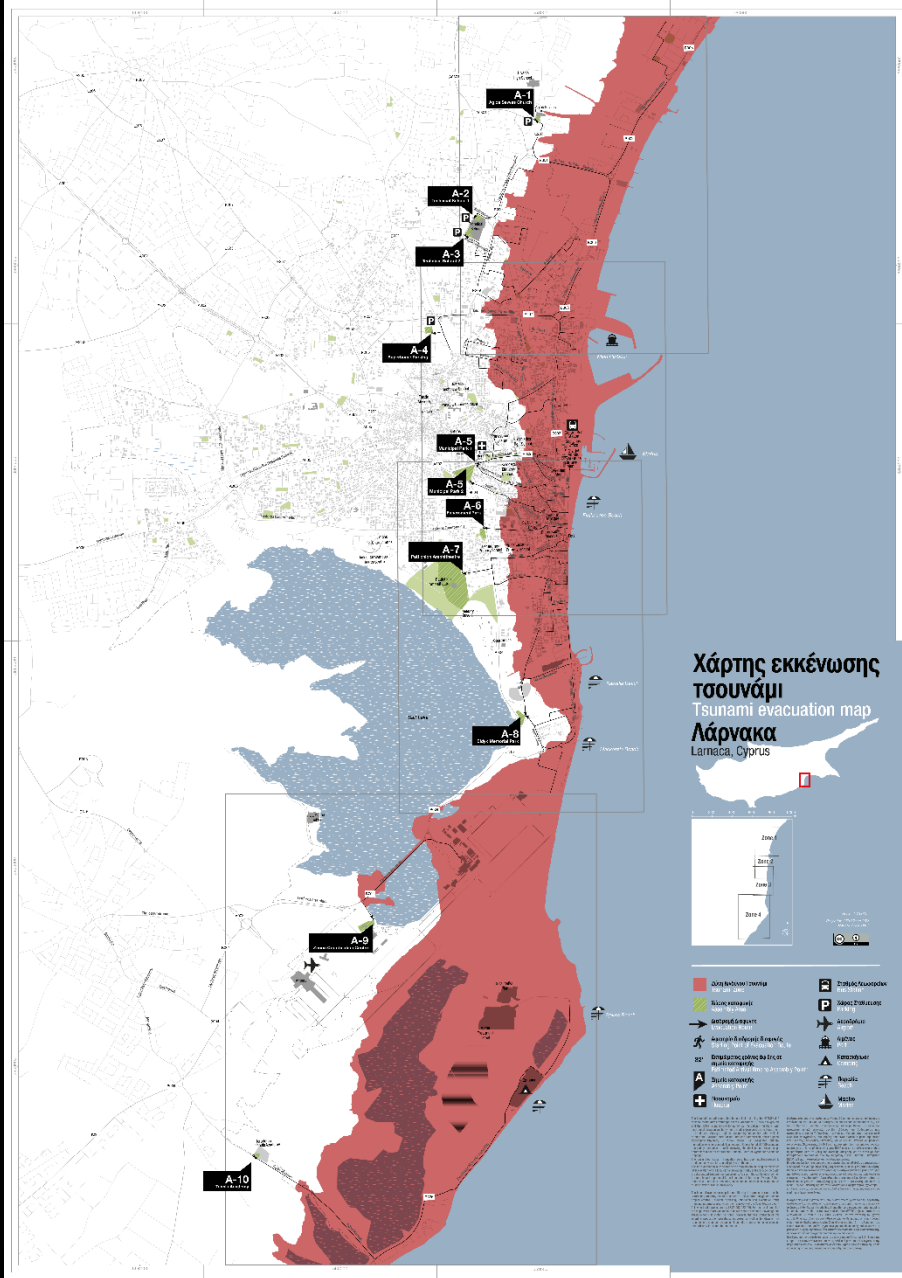


UNESCO

This essential workshop, a constituent of the IOC EU DG ECHO CoastWave project, facilitated constructive engagement with relevant stakeholders, including Cyprus Civil Defense. The event leveraged local expertise and experience, allowing stakeholders to validate the evacuation base map while also identifying potential challenges linked to the mapping of tsunami evacuation routes and assembly areas.

Participants undertook a comprehensive discussion encompassing various facets of coastal evacuation principles. This entailed considerations of potential risks associated with prolonged coastal journeys before reaching the safety of evacuation zones, deliberations

# CoastWAVE, Cyprus: Getting Larnaka



Tsunami Evacuation Maps  
Activity 8b: *Completed*  
*Currently in validation*







# CoastWAVE, Cyprus: Getting Larnaka



## Tsunami Evacuation Maps

Activity 9: Signage installations in the Municipality: *Pending*



**ΚΙΝΔΥΝΟΣ ΓΙΑ ΤΣΟΥΝΑΜΙ**  
**TSUNAMI HAZARD**

### ΣΕ ΠΕΡΙΠΤΩΣΗ

- Σεισμού
- Απότομης απόσυρσης της θάλασσας
- Προειδοποίησης τσουνάμι

**ΑΠΟΜΑΚΡΥΝΘΕΙΤΕ ΑΠΟ ΤΗΝ ΠΑΡΑΚΤΙΑ ΠΕΡΙΟΧΗ ΑΜΕΣΩΣ**  
**ΜΕΤΑΒΕΙΤΕ ΓΡΗΓΟΡΑ ΣΕ ΜΕΓΑΛΥΤΕΡΟ ΥΨΟΜΕΤΡΟ**  
**ΑΚΟΛΟΥΘΗΣΤΕ ΤΙΣ ΔΙΑΔΡΟΜΕΣ ΔΙΑΦΥΓΗΣ**

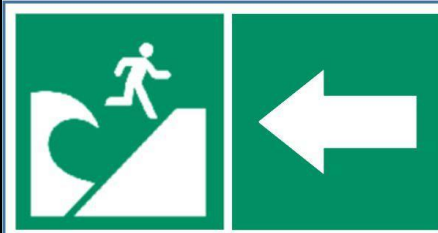
Επισκεφτείτε την ιστοσελίδα [http:// .....](http://.....)  
Πληροφορηθείτε για το τοπικό σχέδιο πολιτικής προστασίας του Δήμου

### IN CASE OF

- Earthquake
- Sudden withdrawal of the sea
- Tsunami Alert

**LEAVE THE COASTAL AREA IMMEDIATELY**  
**QUICKLY REACH HIGH GROUND**  
**FOLLOW THE EVACUATION ROUTES**

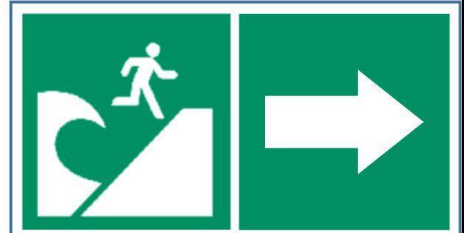
Go to [http:// .....](http://.....)  
Get informed on the civil protection plan of the municipality



**ΔΙΑΔΡΟΜΗ ΔΙΑΦΥΓΗΣ**  
**EVACUATION ROUTE**



**ΔΙΑΔΡΟΜΗ ΔΙΑΦΥΓΗΣ**  
**EVACUATION ROUTE**



**ΔΙΑΔΡΟΜΗ ΔΙΑΦΥΓΗΣ**  
**EVACUATION ROUTE**

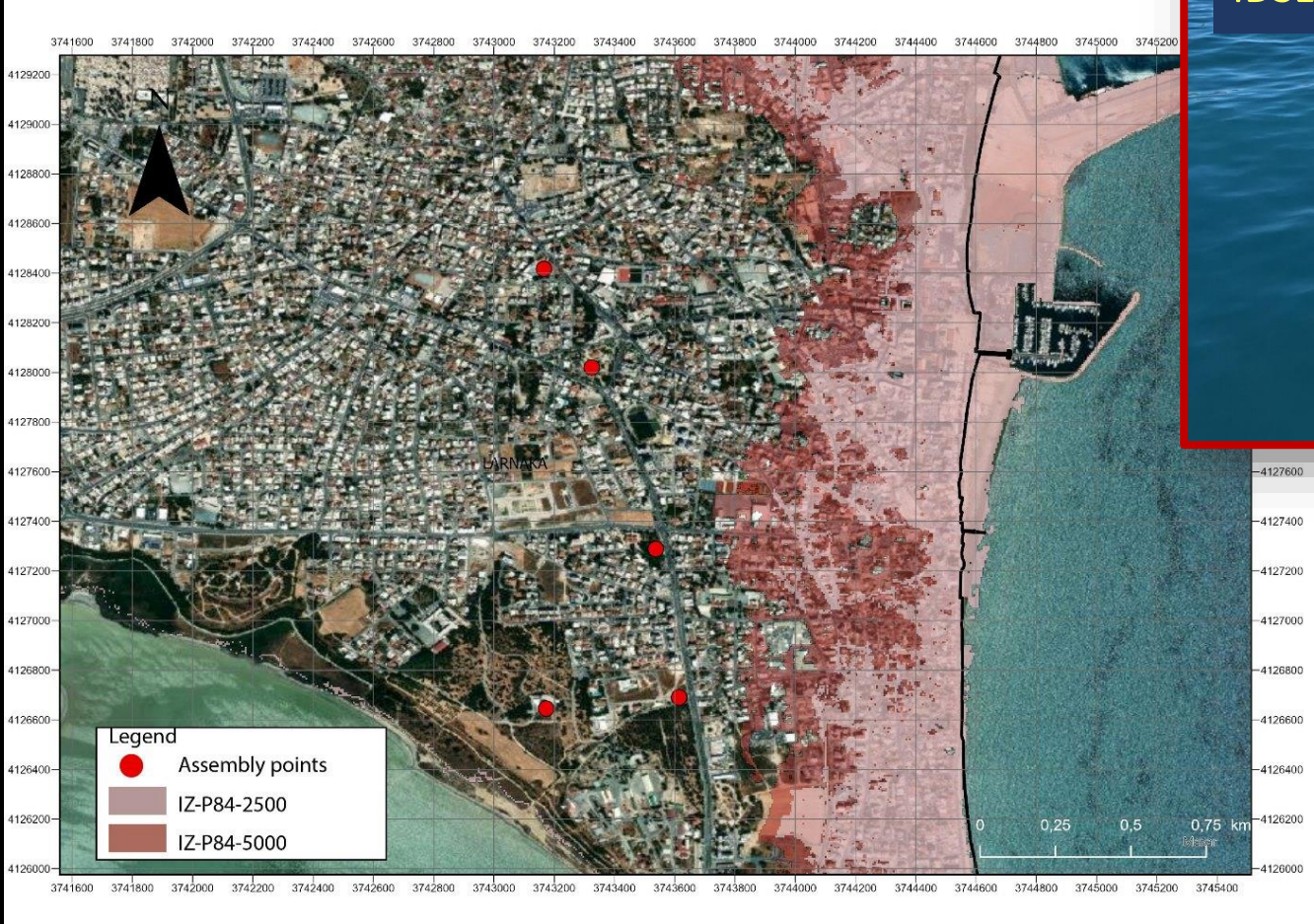


# CoastWAVE, Cyprus: Getting Larnaka



## Infrastructure

## Activity 11: *Ongoing*



# CoastWAVE, Cyprus: Getting Larnaka



## Infrastructure

### Activity 11: *Ongoing*

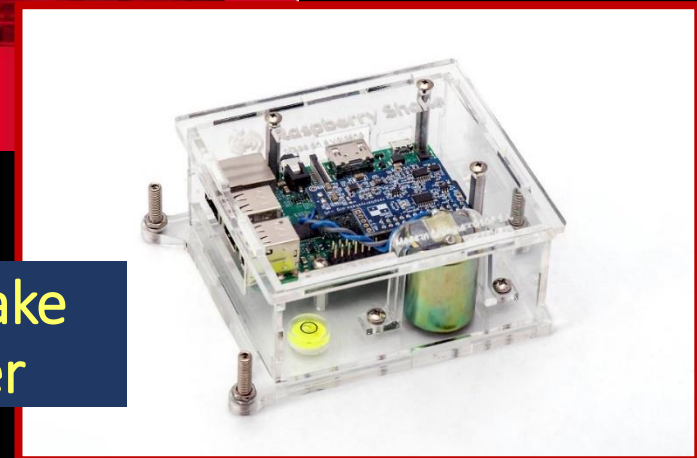
#### Sirens

Currently developing a plan for the new siren system to complement the existing siren network of Cyprus (same manufacturer).



WARNING AND NOTIFICATION

Electronic Siren ECN-D



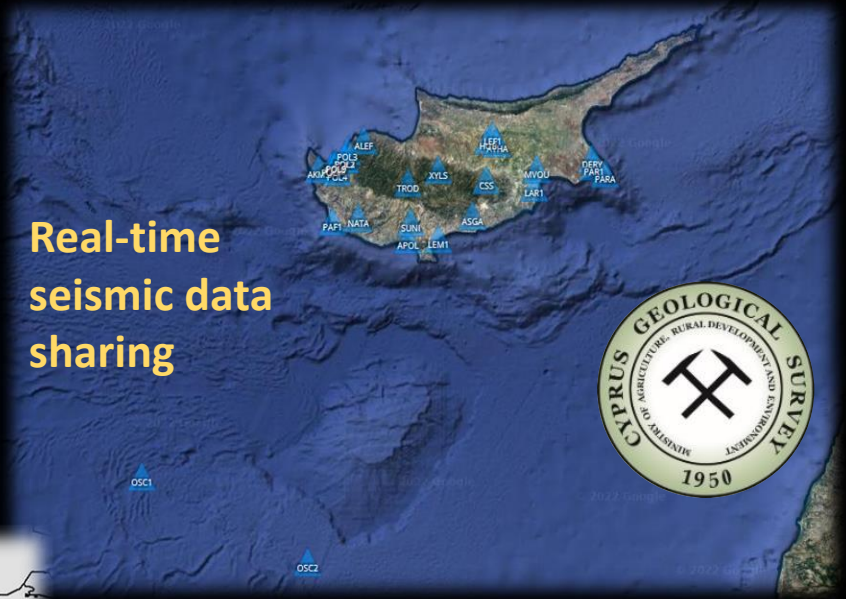
Raspberry Shake  
Seismometer

Our existing national sea-level stations, by the end of 2024 will be networked with Unesco's real-time sea-level system.

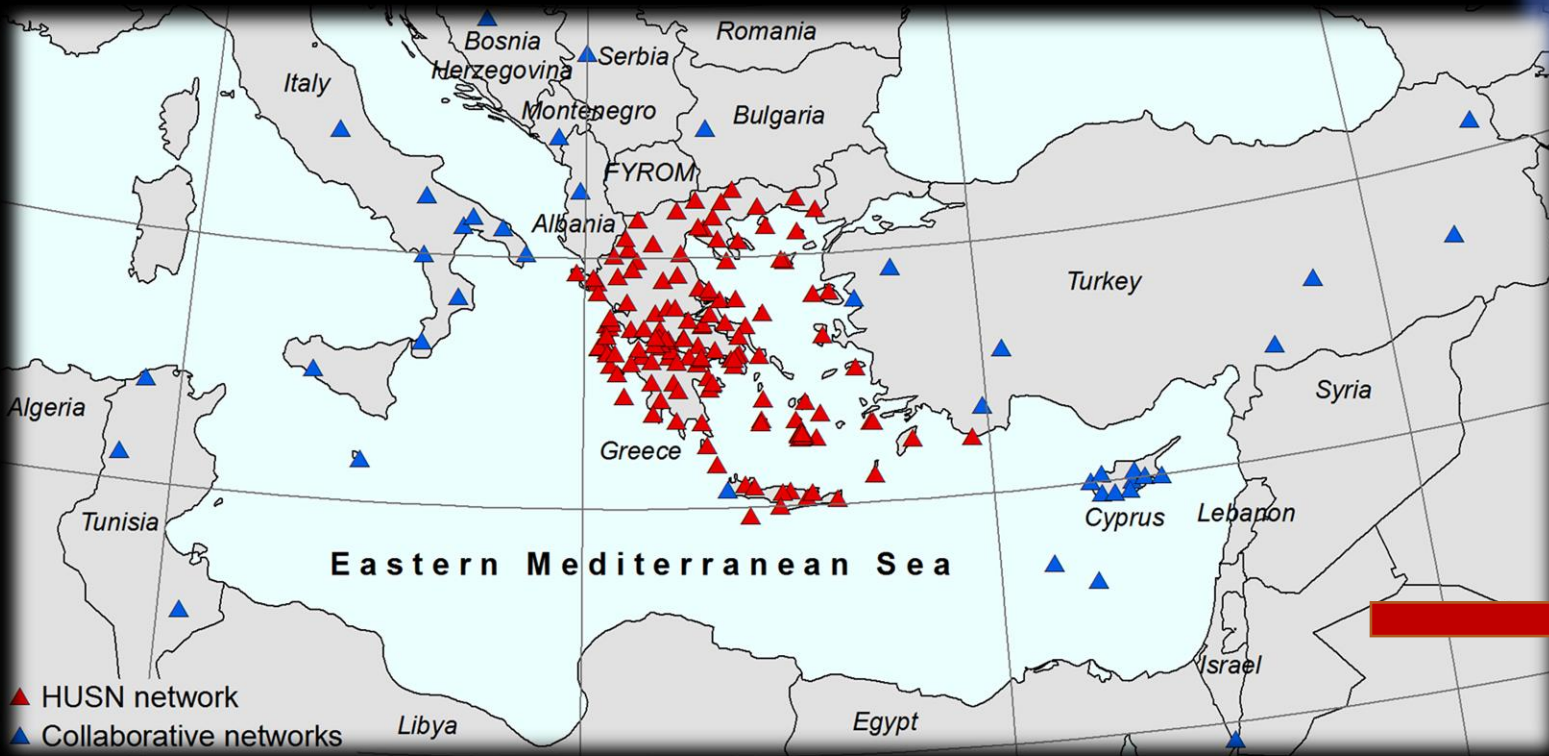
# St. Operating Procedures *Ongoing*

## Activity 7: National & Local Tsunami Warning Emergency Plan - Chains and SOPs

The National Seismic Network of Cyprus (**Tsunami National Contact**) provides real-time seismic data to the **NOA** and **INGV NEAMTWS TSPs**



Real-time seismic data sharing



CCD is currently **WORKING** on establishing a local and national **TSUNAMI EMERGENCY PLAN** ⚠️



**Cyprus Civil Defense (24/7)**  
**Tsunami National Focal Point**  
of Cyprus receiving tsunami warnings from NOA, INGV, KOERI TSPs

# 11 January 2022

## M6.5 Cyprus

St. Operating Procedures *Ongoing*

### Activity 7: National & Local Tsunami Warning Emergency Plan

ISSUED AT **0114** 11 JAN 2022  
ORIGIN TIME – **0107** UTC TUE JAN 11  
2022

... TSUNAMI ADVISORY ...  
THIS ALERT APPLIES TO CYPRUS

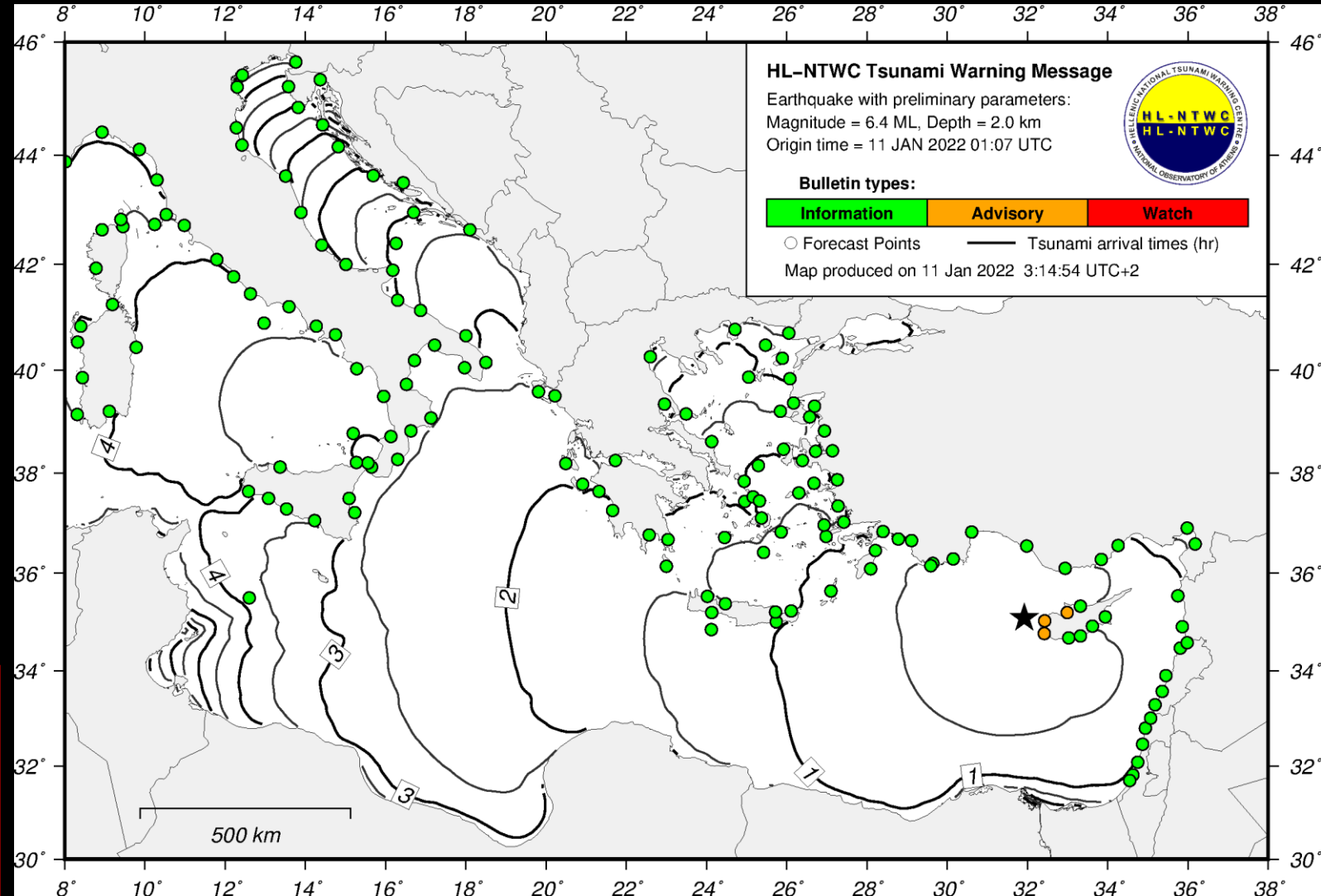
LOCATION FP COORDINATES ARRIVAL  
TIME ALERT LEVEL

CYPRUS-PAFOS 0116 **8' / 2'**

CYPRUS-POLIS 0119 **11' / 5'**

CYPRUS-MORFOU 0126 **18' / 12'**

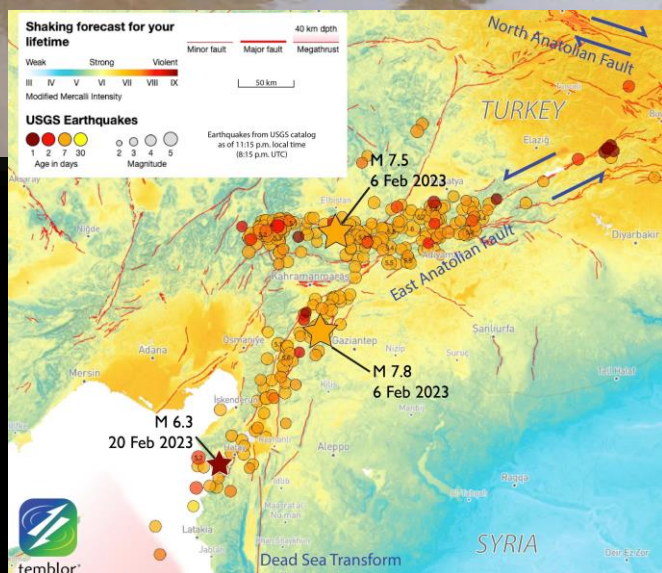
There was no emergency plan in place. We were very lucky for not experiencing a destructive tsunami, totally unprepared.



# Turkey Tsunami February 2023 (M 7.8)



Lekkas et al. 2023



# 6 February 2023

## M7.8 Turkey

ISSUED AT 0125 06 FEB 2023  
EQ ORIGIN TIME - 0117 06 FEB 2023

... TSUNAMI WATCH ...

THIS ALERT APPLIES CYPRUS

CYPRUS - PARALIMNI 0240 **23'/15'**  
CYPRUS - AMMOCHOSTOS 0242 **25'/17'**  
CYPRUS - LARNAKA 0246 **29'/21'**  
CYPRUS - KERYNEIA 0249 **32'/24'**  
CYPRUS - VASILIKO 0255 **38'/30'**  
CYPRUS - LEMESOS 0301 **44'/36'**  
CYPRUS - POLIS 0305 **42'/34'**  
CYPRUS - MORFOU 0306 **43'/35'**  
CYPRUS - PAFOS 0308 **45'/37'**

## St. Operating Procedures *Ongoing*

### Activity 7: National & Local Tsunami Warning Emergency Plan

Source: Paralimni Marine Station, Police Border Marine of Cyprus

A small fish boat sank near Aya Triada beach

Sea withdrawal: sea level inside the marina was significantly lowered

Total bottom exposure

**Paralimni:**  
60cm sea-level disturbance,  
30 minutes after the  
earthquake occurrence

There was no emergency plan in place. A tsunami WAS indeed formed and affected Cyprus. We were again very lucky for not experiencing a destructive tsunami, totally unprepared.



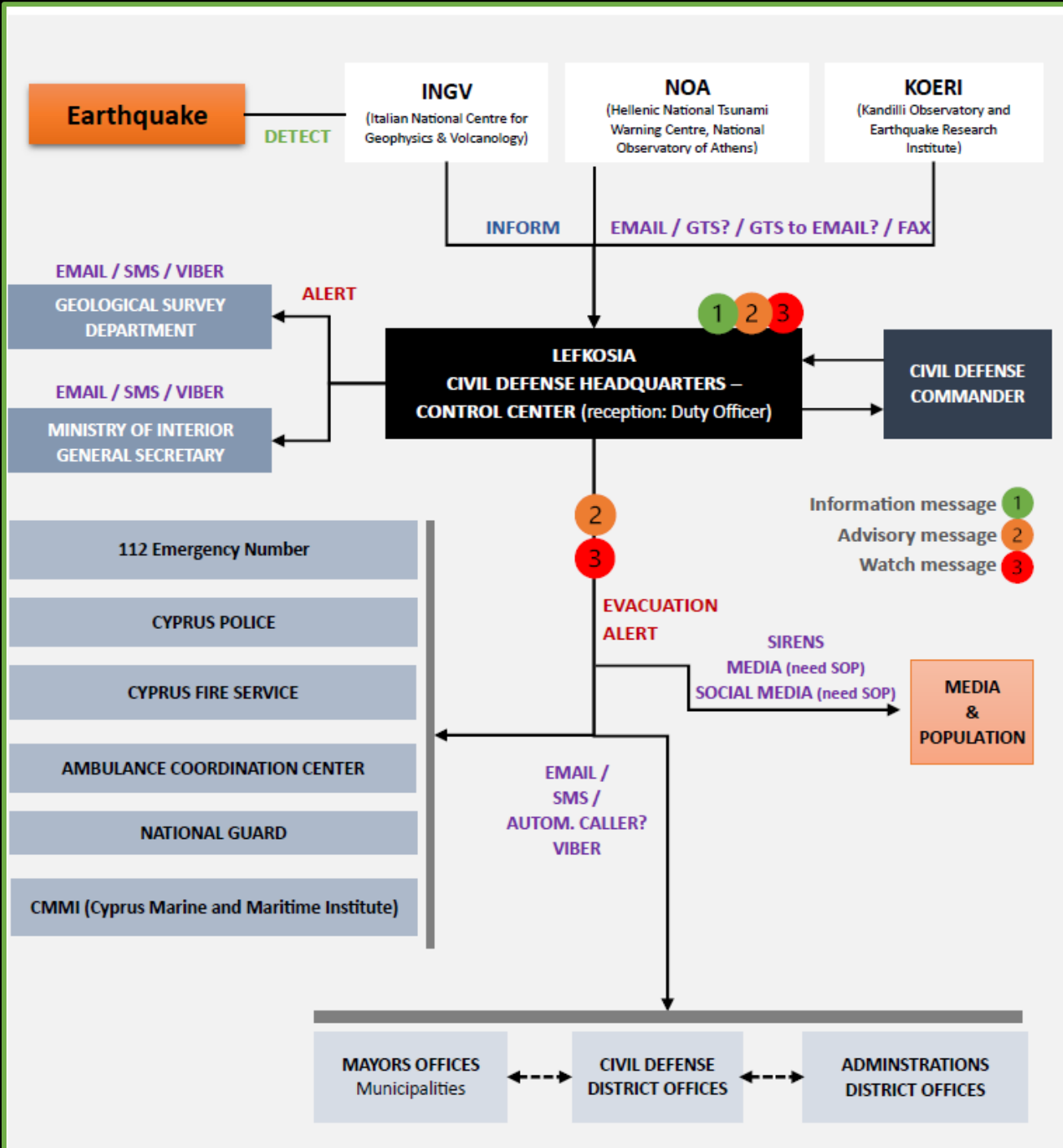
# St. Operating Procedures *Ongoing*

## Activity 7: National & Local Tsunami Emergency Plan – Alert Chains and SOPs

**NEAMWAVE 23 TSUNAMI EXERCISE**  
6-7 November 2023  
Subscription: From 15 August 2023 to 10 October 2023.  
SAVE THE DATE  
A Tsunami Warning and Communication Exercise for the North-Eastern Atlantic, the Mediterranean, and Connected Seas Region.

Scenario	Date and Time	Duration	Region	TSPs
1761 ATLANTIC EARTHQUAKE [8.5 MW]	6 November 2023, 08:00 UTC	6 hours	North-Eastern Atlantic [35°N, 12°E, 10 km]	IPMA - CENALT
HELLENIC ARC [8.1 MW]	7 November 2023, 08:00 UTC	3½ hours	Eastern Mediterranean [34.52°N, 24.57°E, 10 km]	INGV - NOA - KOERI

CONTACT: Denis CHANG SENG - Technical Secretariat/CG/NEAMTWS | d.chang\_seng@unesco.org



# CoastWAVE, Cyprus: Getting Larnaka



## Public Awareness, education and training *Ongoing*

### Activity 9: *Exercises and Drills*

### First Tabletop Exercise: *NEAMwave23, 7 November 2023*



# CoastWAVE, Cyprus: Getting Larnaka



Public Awareness, education and training *Ongoing*

Activity 9: *Exercises and Drills*  
First Tabletop Exercise: *NEAMwave23*



# CoastWAVE, Cyprus: Getting Larnaka



## Public Awareness, education and training *Ongoing*

### Activity 9: *Exercises and Drills*

### Tabletop NEAMwave23, 7 November 2023

### Real-time broadcast of messages on X (Twitter)

**Sylvana Pilidou** @SylvanaPilidou · Nov 7, 2023

#NEAMWave23 #Tsunami #Exercise @IocUnesco

Σε λίγο ξεκινά η άσκηση!

Η Κύπρος (tabletop for @DimosLarnakas) συμμετέχει με το σενάριο ισχυρού σεισμού στο Ελληνικό Τόξο.

Έναρξη 10:00 τοπική ώρα.  
Λήξη 14:00 τοπική ώρα.

Follow this for information and updates.

**UNESCO Ocean** @IocUnesco · Oct 12, 2023

#Larnaca Prepares for NEAMWave23: Unite for Tsunami Readiness!

Larnaca, #Cyprus, takes a significant step for coastal safety in NEAMWave23 Exercise. Together, we stand strong and prepared!

**Sylvana Pilidou** @SylvanaPilidou · Nov 7, 2023

#NEAMWave23 #Tsunami #Exercise

10:00  
🌊 Earthquake M8.1 hits south Crete

10:07  
@CivilDefenceCy receives a tsunami warning message from the 🇮🇹 Tsunami Service Provider (TSPs), LEVEL 🟠 ("WATCH").

FORECAST: Tsunami expected at 🚨 Pafos @ 11:03  
🚨 Larnaka @ 11:24

NOA-HLNTWC DECISION MATRIX (effective 01/03/2021)						
Depth	Epicenter Location	M	Tsunami Potential	Type of Bulletin		
< 100 km	Offshore or close the coast (≤ 40 km inland)	5.5 ≤ M ≤ 6.0	Nil	Information Bulletin	Information Bulletin	
		6.0 < M ≤ 6.5	Weak potential of local tsunami	Local Tsunami Advisory	Information Bulletin	
	Inland (> 40 km and ≤ 100 km)	5.5 ≤ M ≤ 6.5	Nil	Information Bulletin	Information Bulletin	
		6.5 < M ≤ 7.0	Potential of destructive local tsunami (≤ 100 km)	Local Tsunami Watch	Regional Tsunami Advisory	
	Offshore or close the coast (≤ 100 km inland)	7.0 < M ≤ 7.5	Potential of destructive regional tsunami (≤ 400 km)	Local Tsunami Watch	Regional Tsunami Watch	Basin-wide Tsunami Advisory
		M > 7.5	Potential of destructive tsunami in the whole basin (> 400 km)	Local Tsunami Watch	Regional Tsunami Watch	Basin-wide Tsunami Watch
≥ 100 km	Offshore or inland (≤ 100 km)	M ≥ 5.5	Nil	Information Bulletin	Information Bulletin	

**Sylvana Pilidou** @SylvanaPilidou · Nov 7, 2023

#NEAMWave23 #Tsunami #Exercise

10:16  
@CivilDefenceCy alerts population and local authorities through sirens, sms, email and activates Larnaka evacuation 🚨🚨🚨🚨

**CIV.DEFENCE**

Tuesday, 7 November

EXERCISE EXERCISE EXERCISE

A tsunami of seismic origin in Crete-Greece threatens the whole island of Cyprus. The first effects on the coastline of Larnaca are estimated at 11:24 am. Activate the TSUNAMI measures of your SOPs to alert and bring the population to safety as quickly as possible. Find th

View all

**Sylvana Pilidou** @SylvanaPilidou · Nov 7, 2023

#NEAMWave23 #Tsunami #Exercise

10:30  
@CivilDefenceCy confirms that a tsunami is in progress (measured by sea-level stations in Greece) and alerts accordingly population and local authorities through sirens, sms, email.

EXERCISE EXERCISE EXERCISE

Tsunami in progress. The time of arrival on the coastline of Larnaca is still estimated at 11:24 am. Pursue TSUNAMI measures in your SOPs to alert the population and bring them to safety. Civil Defence has been activated and

**Sylvana Pilidou** @SylvanaPilidou · Nov 7, 2023

#NEAMWave23 #Tsunami #Exercise

11:18  
@CivilDefenceCy confirms that a tsunami has hit Pafos (from eyewitnesses) and alerts accordingly.

Forecast for Larnaka: WAVE EXPECTED in a few minutes 🚨🚨🚨

EXERCISE EXERCISE EXERCISE

Tsunami has been observed on the West Coast of Cyprus and has affected Pafos. The time of arrival on the coastline of Larnaca is still estimated at 11:24 am. Pursue TSUNAMI measures in your SOPs to alert the population and bring them to safety. Civil Defence has been acti

View all

# CoastWAVE, Cyprus: Getting Larnaka



## Public Awareness, education and training *Ongoing*

### Activity 9: *Exercises and Drills*

### First Tabletop Exercise: *NEAMwave23*, 7 November 2023

#### Η πρώτη άσκηση επί χάρτου

Στις 7 Νοεμβρίου πραγματοποιήθηκε η πρώτη άσκηση επί προειδοποίησης σε εθνικό και τοπικό για τη Λάρνακα επί NEAMWAVE23.

**Sylvana Pilidou** @SylvanaPilidou · Follow

Σήμερα ετοιμαστήκαμε, αύριο τρέχουμε την άσκηση ταυτόχρονα με όλη την υπόλοιπη Μεσόγειο και Β. Ατλαντικό, Τετάρτη αξιολογούμε, αναθεωρούμε, βελτιώνουμε τις αλυσίδες επικοινωνίας. Μετά κτιζουμε το εθνικό κ τοπικό σχέδιο, και το 2024 full-scale άσκηση με εκκένωση του Δήμου Λάρνακας

Η #Κύπρος θα συμμετέχει στην άσκηση ετοιμότητας για #τσουνάμι Μεσογείου και Β. Ατλαντικού #NeamWAVE23 με άσκηση επί χάρτου (tabletop) με το σενάριο 7/11/2023 (υποθαλ. σεισμός στο Ελληνικό Τόξο), μέσω του προγράμματος @CoastWave\_IOC. Καλή προετοιμασία και επιτυχία @CivilDefenceCy!

Powered by: **omega LIVE** **ecommbx**

ΚΥΠΡΟΣ ΑΣΤΥΝΟΜΙΚΑ ΠΟΛΙΤΙΚΗ ΟΙΚΟΝΟΜΙΑ ΕΛΛΑΔΑ ΚΟΣΜΟΣ EU MATTERS ΑΘ

TALKERS LIFESTYLE AGORA

ΕΙΔΗΣΕΙΣ / Κύπρος

### Σενάριο άσκησης για σεισμό 8,1 βαθμών στην κλίμακα Ρίχτερ που φέρνει τσουνάμι στην Κύπρο – Τι θα γίνει ακριβώς, τα μηνύματα και η εκκένωση (Εικόνες)

**omega LIVE** OmegaLive 07/11/2023 15:39

**SIGMALIVE** DIAS MEDIA ΣΗΜΕΡΙΝΗ SIGM

Αρχική Ειδήσεις Υγεία Κύπρος Ελλάδα Διεθνή Sportime Magazine Economy Today

**Breaking News:** Ωράριο καταστημάτων: Η «ντρίμπλα» Παναγιώτου και οι αναφορές στον Μαυρογιάννη

News/ Local/ Λάρνακα: Στόχος να γίνει tsunami-ready μέχρι το 2024 - Το πλάνο και τα ορόσημα

## Λάρνακα: Στόχος να γίνει tsunami-ready μέχρι το 2024 - Το πλάνο και τα ορόσημα

13.11.2023 09:27 **Κύπρος**

SigmaLive

ΥΠΗΡΕΣΙΑ ΑΣΘΕΝΟΦΟΡΩΝ

# St. Operating Procedures *Ongoing*

## Activity 7: National & Local Tsunami Emergency Plan - Chains and SOPs

## Activity 9: *Exercises and Drills* First Tabletop Exercise: *NEAMwave23*, 7 November 2023

### FEEDBACK OF THE 07.11.23 EXERCISE

#### Synthesis of evaluation grid

**100%** of participants (national and local level) have received the warning and end messages.

Did 100% of the TSP messages get through?

INGV	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
NOA	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
KOERI	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No

While the INGV and KOERI ensured that the bulletins were issued in accordance with the scenario, this was not the case for the NOA, where failures were observed with delays.

Figure 10 : Chronology of messages received during the exercise

#### Means of communication for type of messages (survey data)

The results of the evaluation grid are not representative of the reception of information on the occurrence of a potential tsunami and the final message. The observations showed that emails, text messages and Viber were used systematically to relay information to the TSPs.

**Rapid retransmission** of TSP messages by the MCC (< 10min)

- The data showed that it was faster to relay information by SMS and the Viber application than by email.

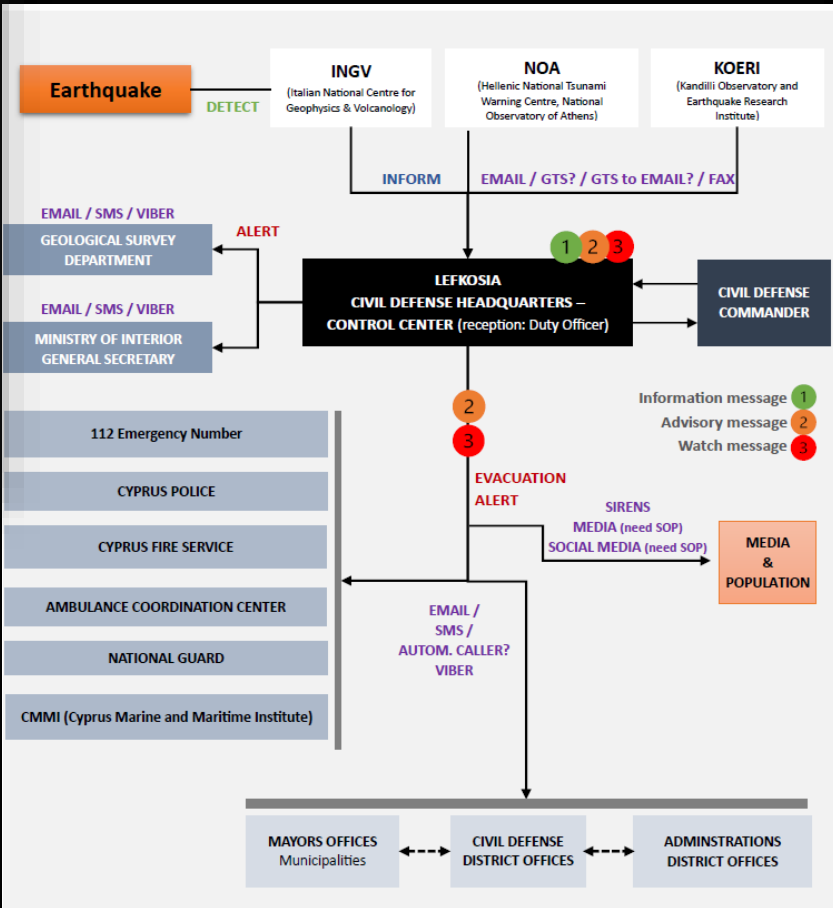
**Rapid decision** of Larnaca Civil Defense for activation of the sirens after reception of first message (13 min)

#### Results of hot debriefing

A hot debriefing was made the day after the exercise in Larnaca at the Civil Defense. First of all, the observers have presented a reminder of the objectives of the exercise, the specifications of the tabletop exercise, the schedule of events list of alert messages, the dissemination of warning messages the day before (the dissemination of the message has followed the forecast model, the population has been alerted with sirens and PWS, the messages haven't been validated before being send) and the return of the participants about procedures to be created or updated, resources to be put in place and points for improvement).

#### Procedures to be created or updated:

- SOP for personnel and volunteer teams of Larnaca Civil Defence Offices



# CoastWAVE, Cyprus: Getting Larnaka



## Public Awareness, education and training *Ongoing*

Offsite news

#ΠΑΡΑΣΚΗΝΙΟ #ΕΓΚΛΗΜΑ ΚΡΙΣΗ ΑΣΦΑΛΕΙΑΣ #Ο ΕΦΕΤΗΣ #ΕΚΠΣ

ΚΟΙΝΩΝΙΑ

### CoastWave: Λάρνακα η 1η που θα μπορεί να αντιμετωπίσει τσουνάμι

Ειδήσεις > Κοινωνία > CoastWave: Λάρνακα η 1η που θα...

Της Κωνσταντίνης Χατζηανδρέα - 03.06.2022

Facebook Twitter YouTube Instagram

Τι είναι το CoastWave & πώς θα εφαρμοστεί - Συνέντευξη ανώτερης γεωλογικής λειτουργού στην Offsite

Συνέντευξη στην Κωνσταντίνα Χατζηανδρέα

Sylvana Pilidou @SylvanaPilidou · Oct 5, 2023

Η #Λάρνακα @DimosLarnakas είναι η 1η περιοχή της Μεσογείου και Ατλαντικού (@NEAMTIC) που εφαρμόζει αυτή τη λεπτομερή πιθανολογική μέθοδο, με δεκάδες χιλιάδες προσομοιώσεις διάδοσης τσουνάμι από δεκάδες χιλιάδες σενάρια σεισμών, με τη βοήθεια του @INGVterremoti 🌊

Sylvana Pilidou @SylvanaPilidou · Oct 5, 2023

Replying to @SylvanaPilidou

Η ζώνη κινδύνου έχει καθοριστεί με μέθοδο PTHA (probabilistic tsunami hazard assessment) και αυτό που φαίνεται στους χάρτες με αποχρώσεις ροζ είναι η ζώνη που αναμένεται να κατακλυστεί από τσουνάμι με περίοδο επανάληψης τα 5,000 χρόνια. Επιλέξαμε αυτό το πιθανολογικό σενάριο μετά

CoastWAVE, Cyprus: Getting Larnaka Tsunami Modeling (Hazard Zone) Activity 8a: Completed

5,000yr ARP, 84% ~8 km<sup>2</sup>  
Max inundation ~1km  
Population ~ 11,000

Criteria: Extent of zones, Critical Infrastructures, Assembly Points, Population issues, feedback of Cyprus Stakeholders

Sylvana Pilidou @SylvanaPilidou

με στόχο μέχρι το τέλος του 2024 ο @DimosLarnakas ενταχθεί στις #TsunamiReady παραλιακές κοινότητες του κόσμου. #Larnaka #Λάρνακα

Sylvana Pilidou @SylvanaPilidou

Η παρουσία γυναικών στην εφαρμογή του @CoastWave\_IOC στην Κύπρο για την ένταξη του @DimosLarnakas στις #TsunamiReady κοινότητες του κόσμου είναι έντονη. Εδώ με κάποιες από τις συνεργάτιδες μου από Πολιτική Άμυνα, Δήμο Λάρνακας, Πυροσβεστική Υπ. και Στρατό. #WomenInScience

Translate post

ΜΕΤΑ

TSUNAMI

ΕΠΕΡΕΓΕΣ ΠΡΙΝ, ΚΑΤΑ ΤΗ ΔΙΑΡΚΕΙΑ ΚΑΙ ΜΕΤΑ

ΠΡΙΝ

ΚΑΤΑ ΤΗ ΔΙΑΡΚΕΙΑ

Sylvana Pilidou @SylvanaPilidou · Sep 27, 2023

Αφού φτιάξαμε χάρτες εκκένωσης (#τσουνάμι) της Λάρνακας για διαφυγή του κόσμου από τη ζώνη κινδύνου, φέραμε μαζί κρίσιμους φορείς (Πολιτική Άμυνα, Δήμο, Αστυνομία, Πυροσβεστική κτλ) για συζήτηση, αναθεώρηση & επιβεβαίωση. Ευχαριστούμε όλους θερμά! @CoastWave\_IOC #TsunamiReady

#mood Δυσκολεύομαστε με το e-mail και θέλουμε και e justice

Cyprus Times

Podcast Όλες οι Ειδήσεις

Κοινωνία #Λάρνακα #τσουνάμι

Archi · Κοινωνία Advertisement

### Tsunami-Ready η Λάρνακα... Ετοιμάζεται με υποδομές, σχέδια εκκένωσης και εξοπλισμό

31/10/2023, 13:34

# CoastWAVE, Cyprus: Getting Larnaka



## Public Awareness, education and training *Ongoing*

Activity 4-5: Sea Level Related hazard Risk Perception Study - *Frederick University : Completed*

### Target Groups



Education



Tourism



Emergency responders



Public

Larnaka residents (350 questionnaires):

- ✓ are aware of the tsunami threat of their community
- ✓ believe in collective actions to reduce the tsunami impact
- ✓ anticipate the implementation of emergency evacuation plans

### Implementation Methods



Online surveys



Booth/street surveys



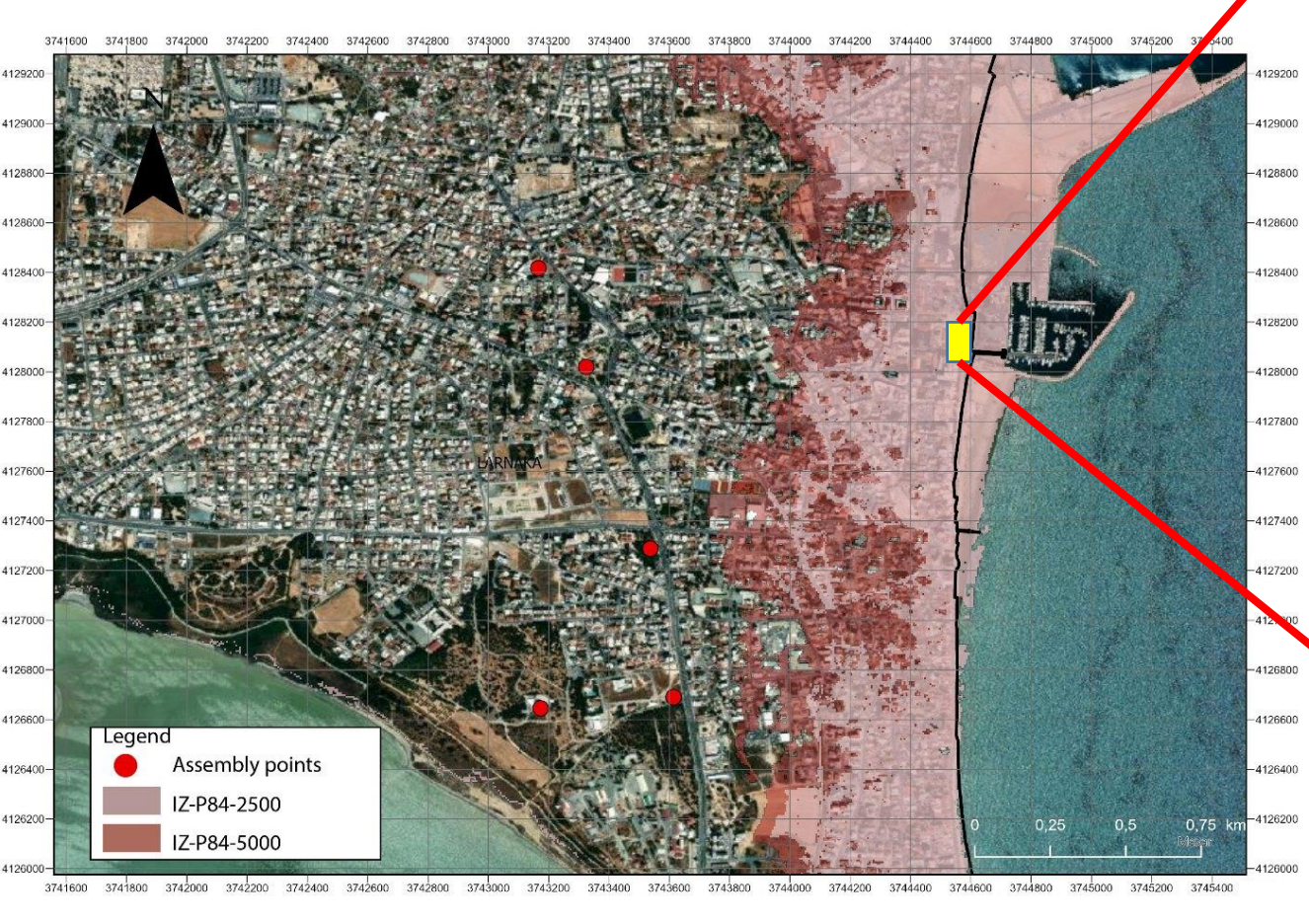
Focus groups



# CoastWAVE, Cyprus: Getting Larnaka



Evacuation Zone Population  $\approx 15,000$  in  $8 \text{ km}^2$   
This occasion  $> 70,000$  within the city square

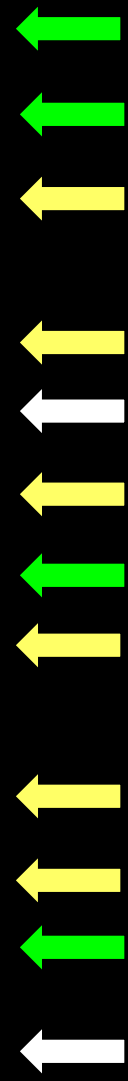


# CoastWAVE, Cyprus: Getting Larnaka

## Tsunami Ready Indicators



I	ASSESSMENT (ASSESS)
1	<b>ASSESS-1.</b> Tsunami hazard zones are mapped and designated.
2	<b>ASSESS-2.</b> The number of people at risk in the tsunami hazard zone is estimated.
3	<b>ASSESS-3.</b> Economic, infrastructural, political and social resources are identified.
II	PREPAREDNESS (PREP)
4	<b>PREP-1.</b> Easily understood tsunami evacuation maps are approved.
5	<b>PREP-2.</b> Tsunami information including signage is publically displayed.
6	<b>PREP-3.</b> Outreach and public awareness and education resources are available and distributed.
7	<b>PREP-4.</b> Outreach or educational activities are held at least three times a year.
8	<b>PREP-5.</b> A community tsunami exercise is conducted at least every two years.
III	RESPONSE (RESP)
9	<b>RESP-1.</b> A community tsunami emergency response plan is approved.
10	<b>RESP-2.</b> The capacity to manage emergency response operations during a tsunami is in place.
11	<b>RESP-3.</b> Redundant and reliable means to timely receive 24-hour official tsunami alerts are in place.
12	<b>RESP-4.</b> Redundant and reliable means to timely disseminate 24-hour official tsunami alerts to the public are in place.





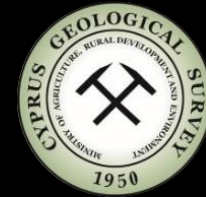
## Challenges faced



From a **logistics** point of view, since Cyprus started this TR implementation without the know-how, any basis/preparation in place (e.g. no inundation/evacuation maps, no national SOPs etc.) and having chosen a city with an airport instead of a smaller community we find it impossible to keep up with the deadlines, given that this is a multi-actor project.

From a **practical** point of view, convincing key stakeholders, including the TR municipality, about the importance of TR (so that they share our enthusiasm and keep up with our momentum towards the implementation of the project ) is challenging. Raising awareness through the impact of the historic catastrophic tsunami events of Cyprus helped, and of course the 2023 Turkey tsunami which DID affect Cyprus, played a major role.

# CoastWAVE: Getting Larnaka

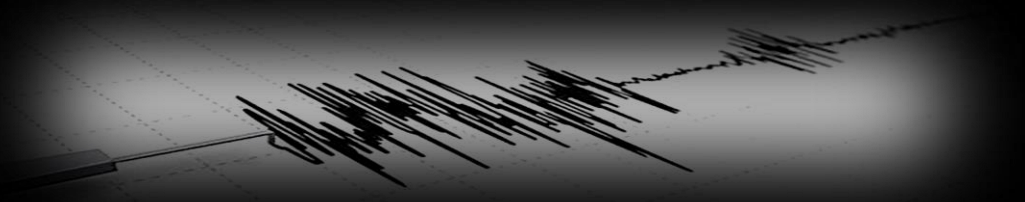


The high level of dedicated support that we receive from UNESCO and our partners from NEAM is what makes this Tsunami Ready implementation possible!

# Thank you!

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# CoastWAVE, Cyprus: Getting Larnaka



## Cyprus National Tsunami Board (NEAMTWS Cyprus Committee) members and observers:

1. **Cyprus Geological Survey Department**, the designated **Tsunami National Contact**, the technical advisor of the state for all geo-matters. It owns and operates the national seismic network.
2. **Cyprus Civil Defence**, the designated **Tsunami Warning Focal Point**, the national civil protection entity of the country.
3. **Cyprus Department of Lands and Surveys**, the national agency and state advisor for cartographic, geodetic and hydrographic issues. It operates the national GNSS and sea-level networks.
4. **Oceanography Centre of the University of Cyprus**, the leading university and the most active research institution in Cyprus. Was involved in NEAMTWS activities in the last 15 years and was a partner in various tsunami-related projects.
5. **Cyprus Marine and Maritime Institute**, Centre of Excellence for marine and maritime research, innovation and technology development. It is based in the city of Larnaca (nominated community).

## Other partners and stakeholders:

6. **Cyprus University of Technology**, one of the biggest universities in Cyprus, achieved international research excellence.
7. **Frederick University**, one of the leading research centres in Cyprus, with experience in implementing safety, risk and post-disaster management projects.
8. **Institute of Geodynamics - National Observatory Athens**: Hellenic National Tsunami Provider & Warning Center & Previous experience with tsunami-ready projects.
9. **Tsunami modelling & SOPs experts of Greece, Italy, Spain, France.**

Other partners and stakeholders: Local authorities, emergency services, tourism and education sectors, Larnaka population, volunteering groups, MEDIA.