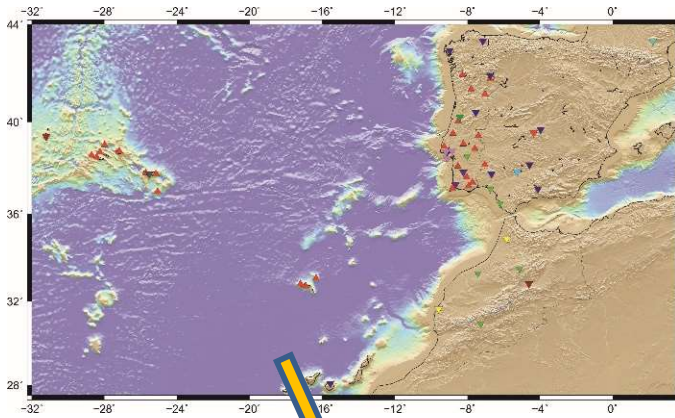


IPMA National Tsunami Warning Center - Status

Fernando Carrilho

NEAMTS Experts Meeting
Naples, 28-30 November 2022

Seismic network

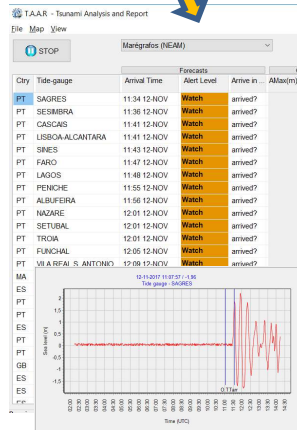


Tide-gauge network



Decision Matrix

Decision Matrix for the NE Atlantic						
Depth (km)	Epicentre Location	Earthquake Magnitude (Mw)	Tsunami Potential	Type of tsunami message		
				Local	Regional	Ocean-wide
<100km	Offshore or close to the coast (<=40km inland)	≥5.5 and <6.5	Weak potential for a destructive local Tsunami	Advisory	Information	Information
		≥6.5 and <7.0	Potential for a destructive local Tsunami	Advisory	Information	Information
	Offshore or close to the coast (<=100km inland)	≥7.0 and <7.5	Potential for a destructive local Tsunami	Watch	Advisory	Information
		≥7.5 and <7.9	Potential for a destructive regional tsunami	Watch	Watch	Advisory
		≥7.9	Potential for a destructive ocean-wide tsunami	Watch	Watch	Watch
≥100km	Offshore or inland (<=100km inland)	≥5.5	No tsunami potential	Information	Information	Information



Tsunami Analysis and Report



TAAAR: Tsunami messages - Edition & Dissemination

Area of alert

Event type: Scenario

Assunto: Mensagem de TSUNAMI #001
 Emitido em: 12-11-2017 14:15 UTC
 Autor: IEMM/PT.NTMC

NÍVEL DE ALERTA PARA PORTUGAL:
 *** WATCH (LARANJA)
 ALTURA de onda máxima superior a 0,5m e/ou run-up superior a 1m

PARAMETROS SIMULADOS PRELIMINARES
 Hora de origem: 12-11-2017 11:04 UTC
 Centro : 36,66 Norte 11,33 Oeste
 Profundidade : 27 KM
 Localização : SW San Vincent Cape
 Latitude : 8,5

PREVISÃO DOS TEMPOS CHEGADA E NÍVEIS DE ALERTA:
 Região: Lisboa (LARANJA)
 Faro (LARANJA)
 Setúbal (LARANJA)

*EXERCICIO*TSUNAMI: IEMM/PT.NTMC-WATCH-Alerta Laranja:12-11-2017 14:15 UTC:EQ MAGS.5;36,66;27;SW;33W;27N;*EXERCICIO*

Channels: EMAIL SMS FAX Apponet (ipma.pt) OTS broadcast

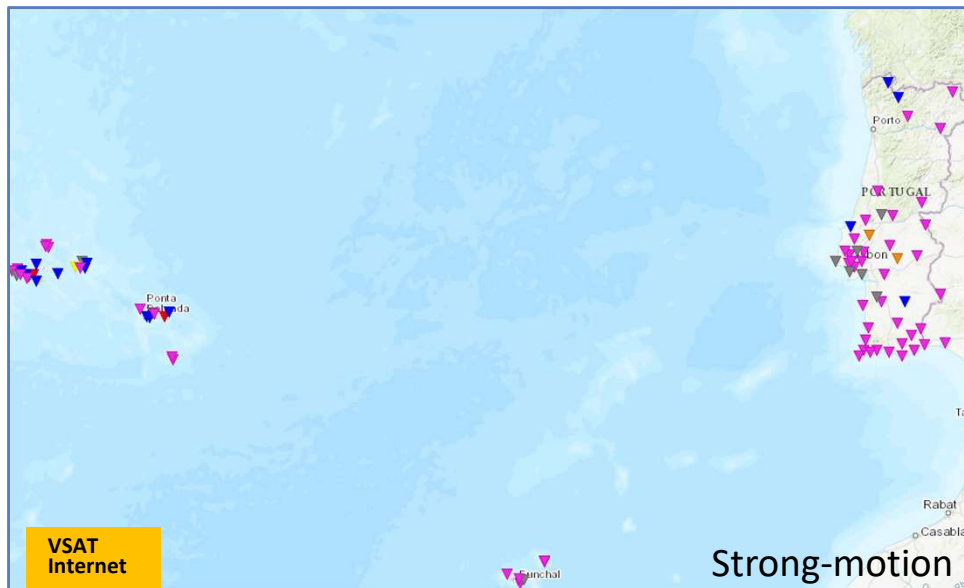
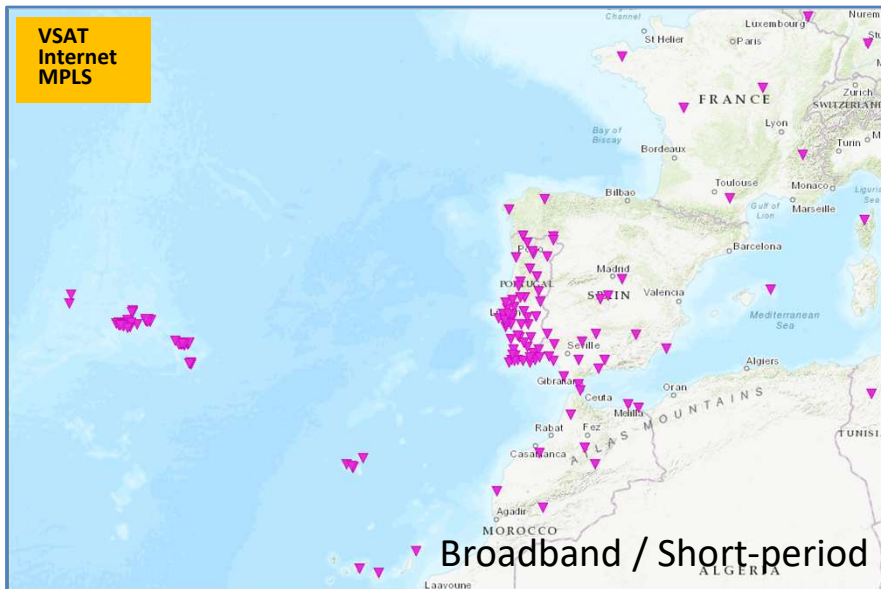
Recipients: Apponet (ipma.pt) <TESTES>

Am sender: Send message

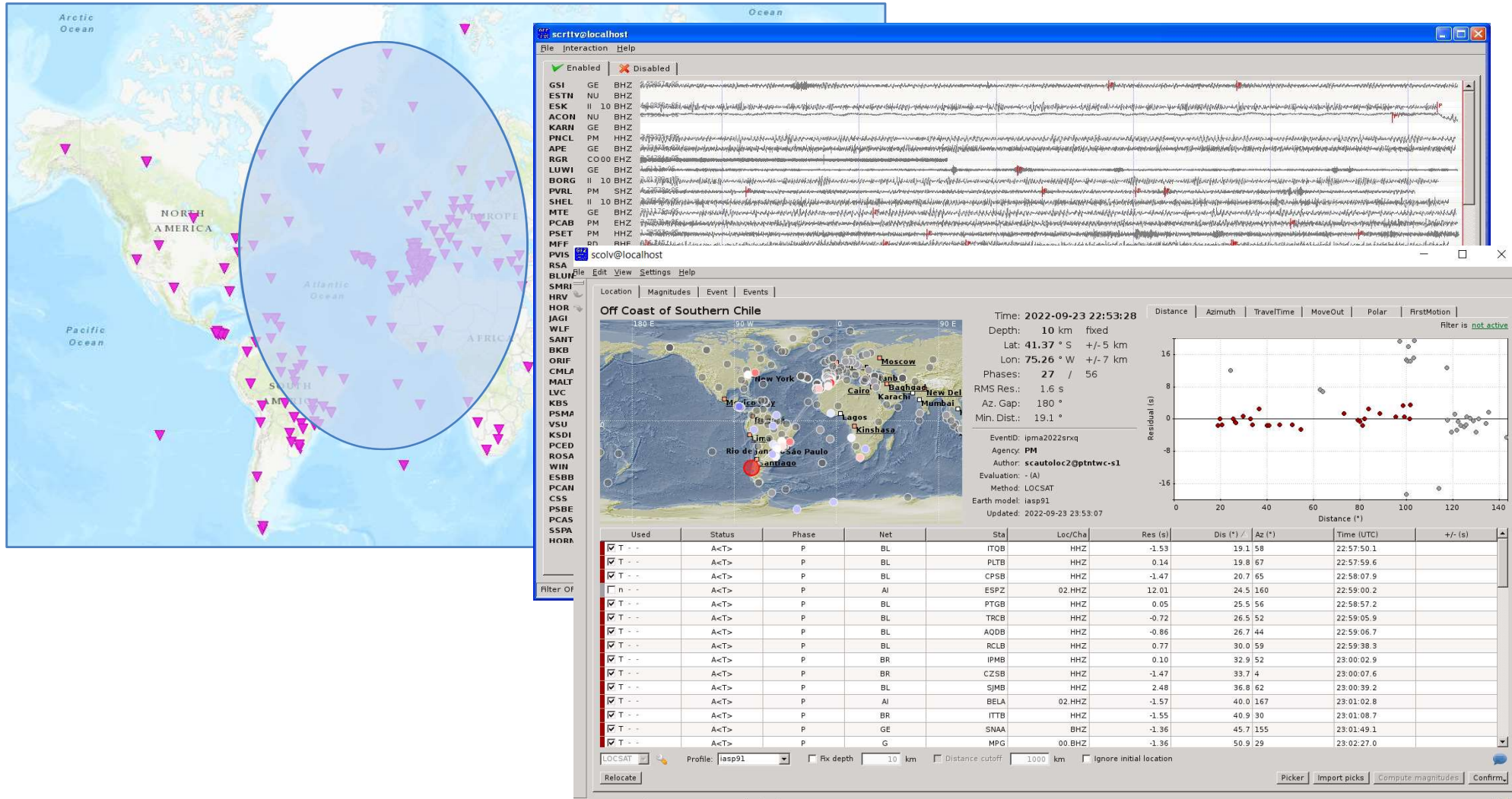
Civil Protection System

ALERT!





- **IPMA broadband network (+ SM sensors co-located)**
- **IPMA short-period network (+ SM sensors co-located)**
- **IPMA/IST strong-motion network**
- **Real-time, Internet (mobile, mini-link, fiber optic) & VSAT connection**
- **Complemented with stations from other agencies: Portugal, Spain, Morocco, France and CTBTO (Internet, VPN and MPLS);**
- **83 Broadband, 28 short-period and 97 accelerometers (real-time)**



- Fast locations
- Fast MW evaluations

MonParSIS @ IPMA 2.1.1.11

Configurar Hipocentro Ondas Modo Informação Sair

IPMA auto Reload Filtrar Next update: 2022-09-27 10:05:25

Date/Time	Age	Latit	Longit	Dept	Mag	T	Delay	Region
2022-09-27 02:23:52	6.7h	35.43	-3.13	29	2.6	ML	704s	NW Melilla
2022-09-27 02:23:52	6.7h	35.43	-3.13	29	2.6	ML	212s	NW Melilla
2022-09-27 02:23:52	6.7h	35.43	-3.13	29	2.6	ML	167s	NW Melilla
2022-09-27 02:23:53	6.7h	35.48	-3.50	10	3.3	M	149s	STRAIT OF GIBRALTAR
2022-09-27 02:23:52	6.7h	35.48	-3.45	10	3.3	M	135s	STRAIT OF GIBRALTAR
2022-09-27 02:23:59	6.7h	35.95	-3.82	10	2.6	M	113s	STRAIT OF GIBRALTAR
2022-09-27 02:23:52	6.7h	35.47	-3.44	10	2.6	M	110s	STRAIT OF GIBRALTAR
2022-09-27 02:23:52	6.7h	35.52	-3.61	10	2.3	M	103s	STRAIT OF GIBRALTAR
2022-09-26 20:30:19	12.6h	53.92	-35.23	10	6.0	Mw	805s	REYKJANES RIDGE
2022-09-26 20:30:19	12.6h	53.92	-35.25	10	4.9	Mw	649s	REYKJANES RIDGE
2022-09-26 20:30:19	12.6h	53.90	-35.26	10	4.9	Mw	575s	REYKJANES RIDGE
2022-09-26 20:30:18	12.6h	53.81	-35.54	10	4.0	Mw	430s	REYKJANES RIDGE

EMSC all Filtrar Next update: 2022-09-27 10:05:25

Date/Time	Age	Latit	Longit	Dept	Mag	T	Agy	Region
2022-09-27 08:39:48	24.6m	8.52	-83.14	12	2.7	M	IGC	COSTA RICA
2022-09-27 08:39:41	24.8m	45.86	4.63	5	2.2	ML	RNS	FRANCE
2022-09-27 08:37:19	27.1m	-38.03	-73.11	37	3.0	M	GUC	ARAUCANIA, CHILE
2022-09-27 08:36:00	28.4m	1.01	98.10	10	3.0	M	DJA	NORTHERN SUMATRA, INDONESIA
2022-09-27 08:35:39	28.8m	36.41	-90.87	15	2.4	Md	NM	ARKANSAS
2022-09-27 08:27:30	36.9m	-8.01	118.81	67	2.9	M	DJA	SUMBAWA REGION, INDONESIA
2022-09-27 08:27:27	37.0m	-22.12	-69.40	78	3.0	M	GUC	ANTOFAGASTA, CHILE
2022-09-27 08:25:20	39.1m	35.24	-97.73	5	2.2	ML	OK	OKLAHOMA
2022-09-27 08:24:03	40.4m	62.66	-149.46	45	3.2	ML	NEIC	CENTRAL ALASKA
2022-09-27 08:20:57	43.5m	42.79	13.61	18	2.2	Md	INGV	CENTRAL ITALY
2022-09-27 08:16:39	47.8m	19.18	-155.48	33	2.0	Md	HV	ISLAND OF HAWAII, HAWAII
2022-09-27 08:13:57	50.5m	54.09	-35.37	10	4.5	Mw	GFZ	REYKJANES RIDGE

EMSC MT Filtrar Next update: 2022-09-27 10:05:27

Date/Time	Age	Latit	Longit	Dept	Mag	T	Agy	Região
2022-09-26 20:30:18	12.6h	53.8	-35.3	10	5.3	Mw	GFZ	REYKJANES RIDGE
2022-09-26 19:32:19	13.5h	53.8	-35.1	10	4.8	Mw	GFZ	REYKJANES RIDGE
2022-09-26 17:16:07	15.8h	54.0	-35.2	10	5.0	Mw	GFZ	REYKJANES RIDGE
2022-09-26 14:07:12	19.0h	54.1	-35.1	10	4.7	Mw	GFZ	REYKJANES RIDGE
2022-09-26 13:58:02	19.1h	-15.3	168.3	18	5.3	Mw	GFZ	VANUATU

Parâmetros do Evento

Data 2022 09 26

Hora na Origem 20 : 30 : 19

Latitude 53.92 g m Norte Sul

Longitude 35.23 g m Oeste Este

Profundidade 10 Km

Magnitude 5.0 MW

Agência IMA

Região REYKJANES RIDGE



Tempos de chegada

Ver fases

PVAQ

PTEO

PMAR

Copy to Seisan

IPMA Automatic solutions
Other agencies solutions
(hypocenters/Mags/MT)

Parâmetros do Evento

Data 2022 09 26

Hora na Origem 20 : 30 : 18

Latitude 53.80 g m Norte Sul

Longitude 35.30 g m Oeste Este

Profundidade 10 Km

Magnitude 5.3 MW

Agência GFZ

Região REYKJANES RIDGE

Strike 175 343

Dip 40 50

Slip ... -81 -97



Tempos de chegada

Ver fases

PVAQ

PTEO

PMAR

Copy to Seisan

sis70.1: introduza hipocentro e seleccione estações

Voice alarm OFF Scroll text alarm OFF

EMSC MT Filtrar Next update: 2022-09-27 10:07:27

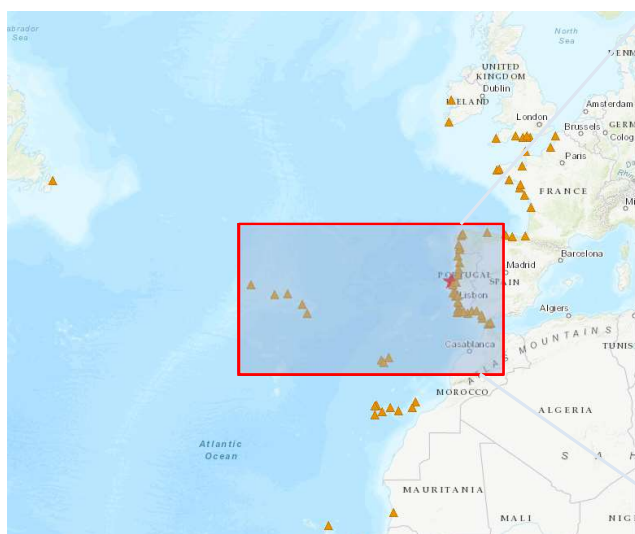
Date/Time	Age	Latit	Longit	Dept	Mag	T	Agy	Região
2022-09-26 20:30:18	12.6h	53.8	-35.3	10	5.3	Mw	GFZ	REYKJANES RIDGE
2022-09-26 19:32:19	13.6h	53.8	-35.1	10	4.8	Mw	GFZ	REYKJANES RIDGE
2022-09-26 17:16:07	15.8h	54.0	-35.2	10	5.0	Mw	GFZ	REYKJANES RIDGE
2022-09-26 14:07:12	19.0h	54.1	-35.1	10	4.7	Mw	GFZ	REYKJANES RIDGE
2022-09-26 13:58:02	19.1h	-15.3	168.3	18	5.3	Mw	GFZ	VANUATU

sis70.1: introduza hipocentro e seleccione estações

Ready

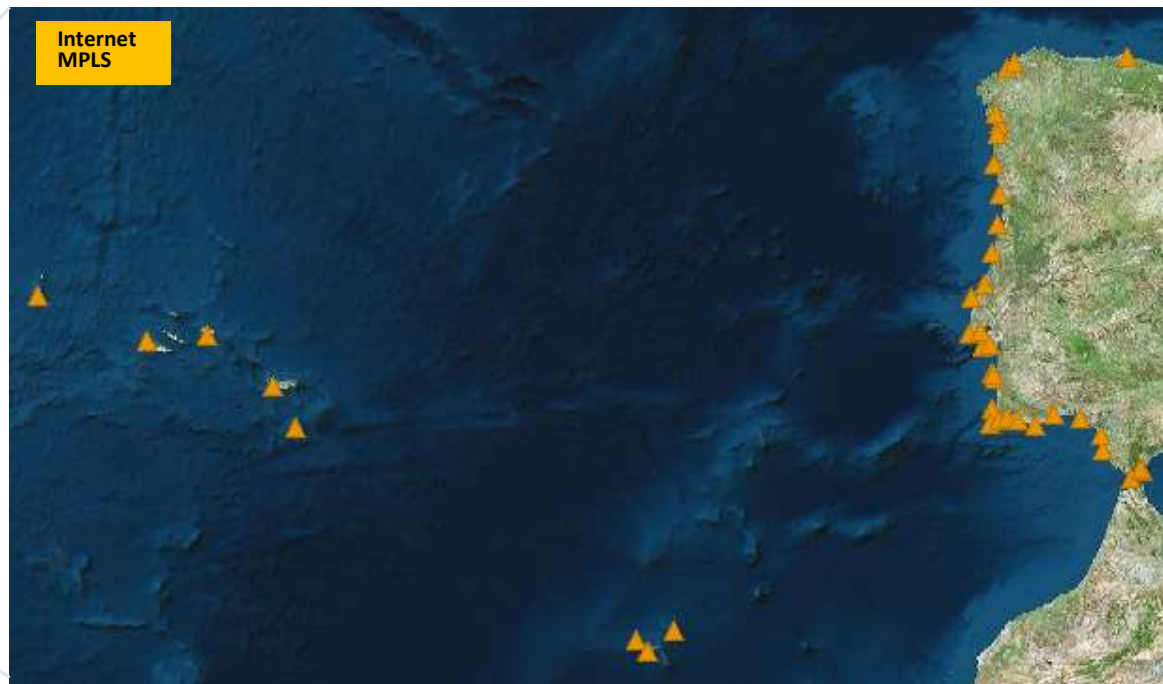
Voice alarm OFF Scroll text alarm OFF

Internet
MPLS



70 stations

Internet
MPLS

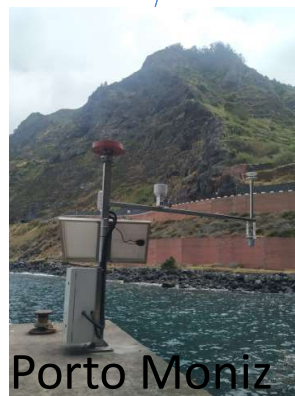
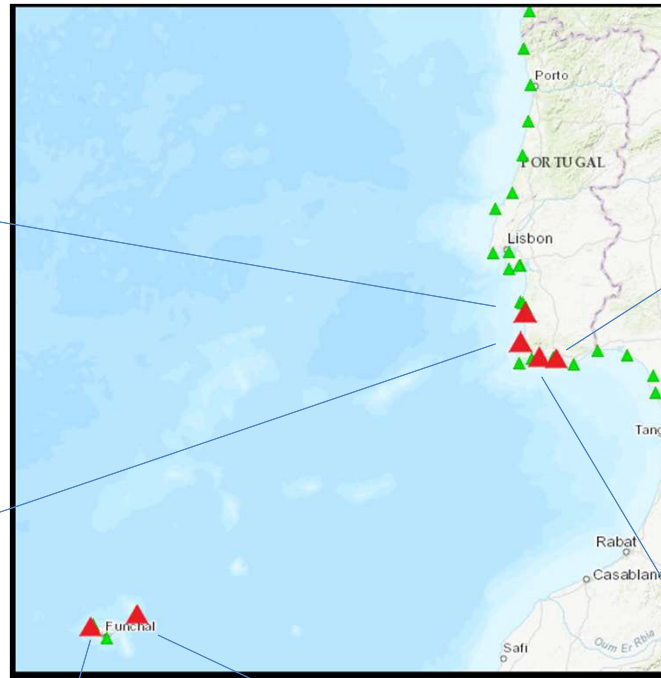


Sources:

- CENALT, seiscomp/MPLS (SHAUM stations)
- IH, webservice/Internet (Instituto Hidrográfico)
- JRC, webservice/Internet
- EMSO-PT/UBI/IPMA, webservice/Internet
- DGT sites, webservice/Internet (Direção geral do Território)
- IGN seiscomp/Internet (Puertos del Estado stations)

— Instituto Hidrográfico
— Direção Geral do Território
— JRC (ipma & ign support)

— Puertos Del Estado (via IOC & IGN)
— CNRST (via CNRST & JRC)
— IOC

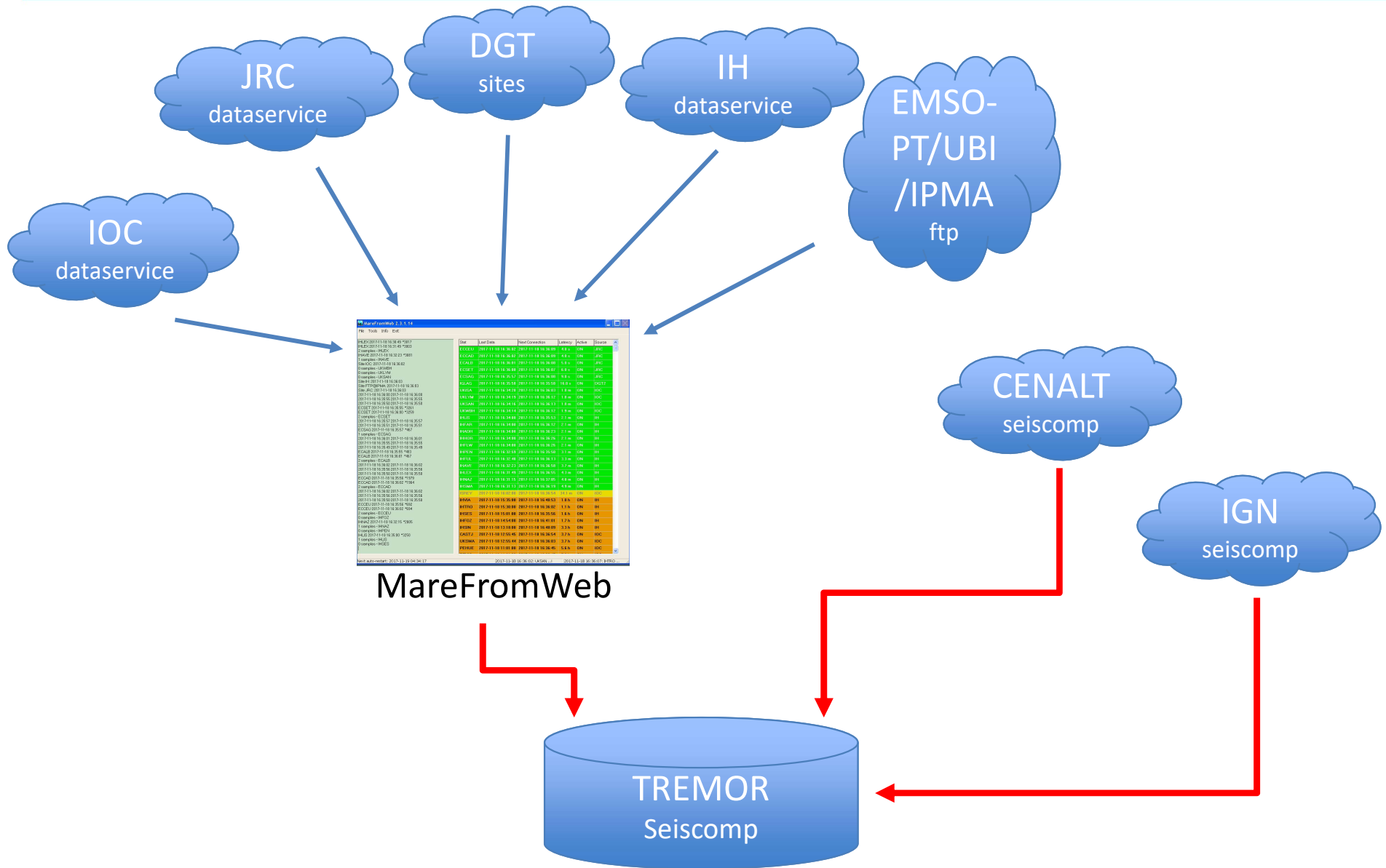


GNSS
Tide-Gauge
Meteo

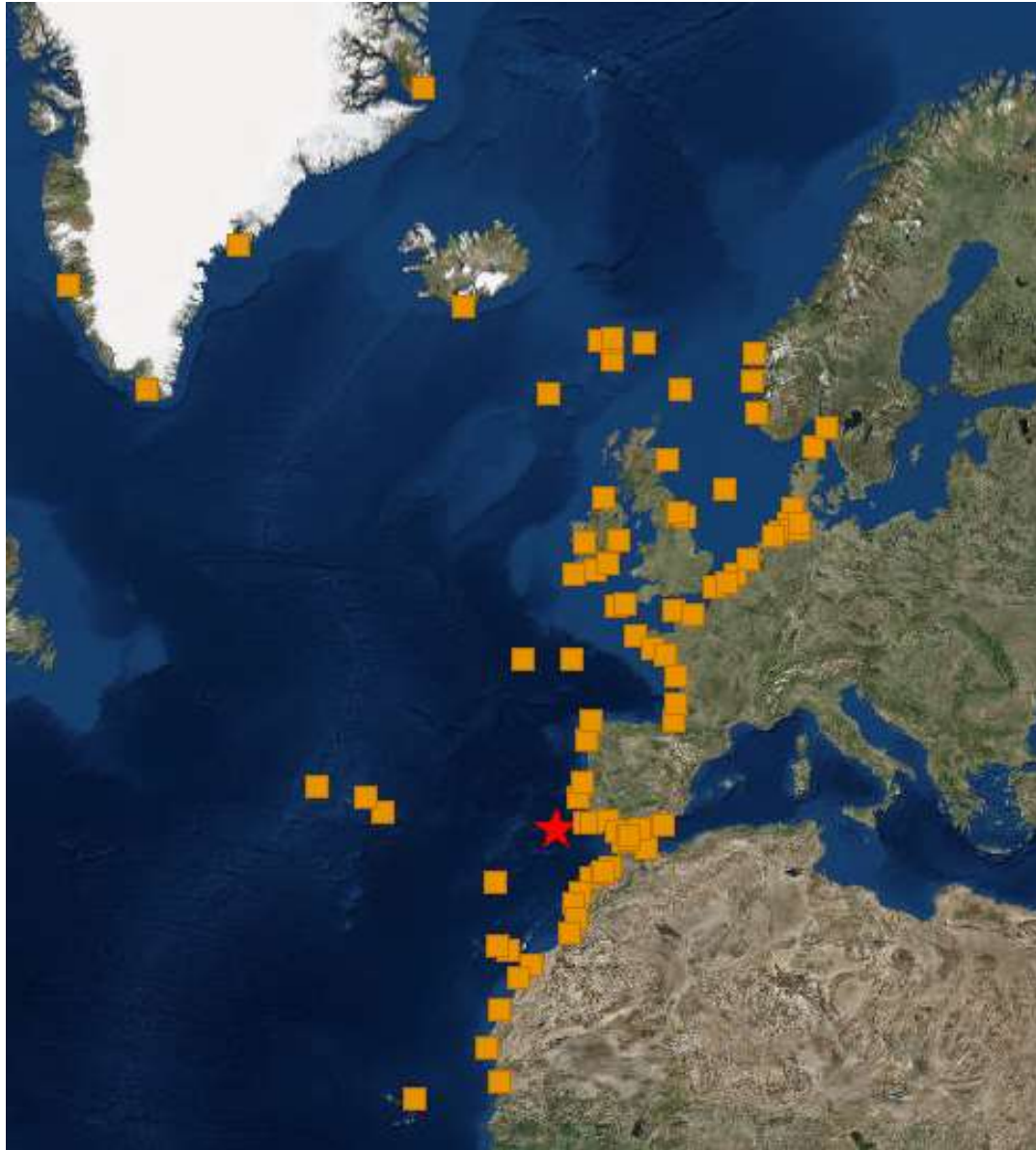
- Atmospheric Pressure
- Temperature
- Humidity
- Wind

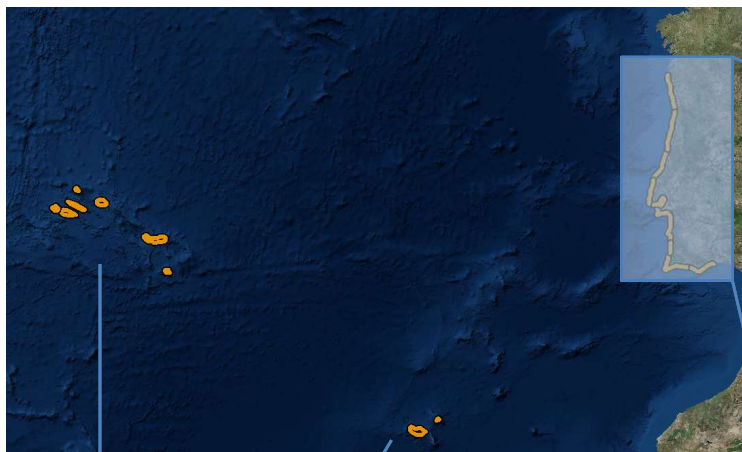
- Solar power
- Mobile Internet
- Local buffer

University of Beira Interior
Instituto Português do Mar e Atmosfera



Decision Matrix for the NE Atlantic						
Depth (km)	Epicentre Location	Earthquake Magnitude (Mw)	Tsunami Potential	Type of tsunami message		
				Local	Regional	Ocean-wide
<100Km	Offshore or close to the coast (<=40Km inland)	≥5.5 and <6.5	Weak potential for a destructive local Tsunami	Advisory	Information	Information
	Offshore or close to the coast (<=100km inland)	≥6.5 and <7.0	Potential for a destructive local Tsunami	Advisory	Information	Information
		≥7.0 and <7.5	Potential for a destructive local Tsunami	Watch	Advisory	Information
		≥7.5 and <7.9	Potential for a destructive regional tsunami	Watch	Watch	Advisory
		≥7.9	Potential for a destructive ocean-wide tsunami	Watch	Watch	Watch
≥100Km	Offshore or inland (<=100Km inland)	≥5.5	No tsunami potential	Information	Information	Information





Islands

10-11. Madeira & Porto Santo
12-20. Azores islands

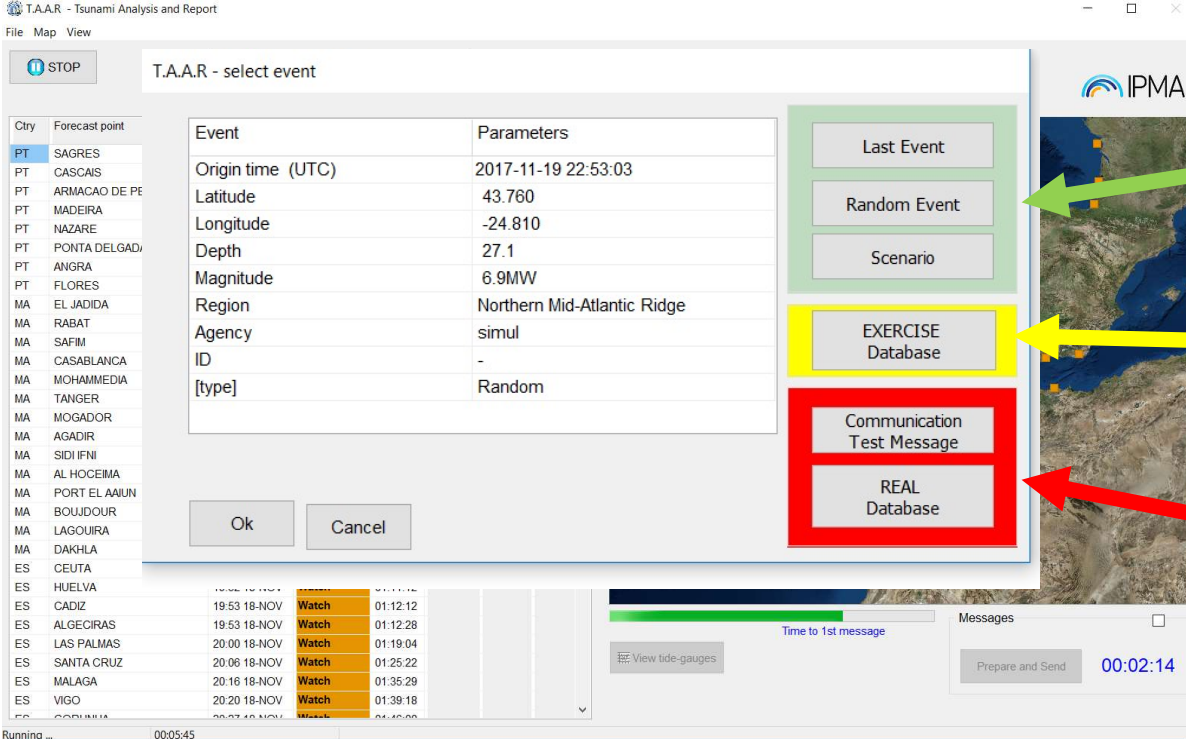


Mainland

1. Viana-Braga-Porto
2. Aveiro-Coimbra
3. Leiria
4. Lisboa Atlântico
5. Estuário Tejo
6. Setúbal
7. Beja
8. Faro Barlavento
9. Faro Sotavento

Islands

10-11. Madeira & Porto Santo
12-20. Azores islands



T.A.A.R. - select event

Event	Parameters
Origin time (UTC)	2017-11-19 22:53:03
Latitude	43.760
Longitude	-24.810
Depth	27.1
Magnitude	6.9MW
Region	Northern Mid-Atlantic Ridge
Agency	simul
ID	-
[type]	Random

Ok Cancel

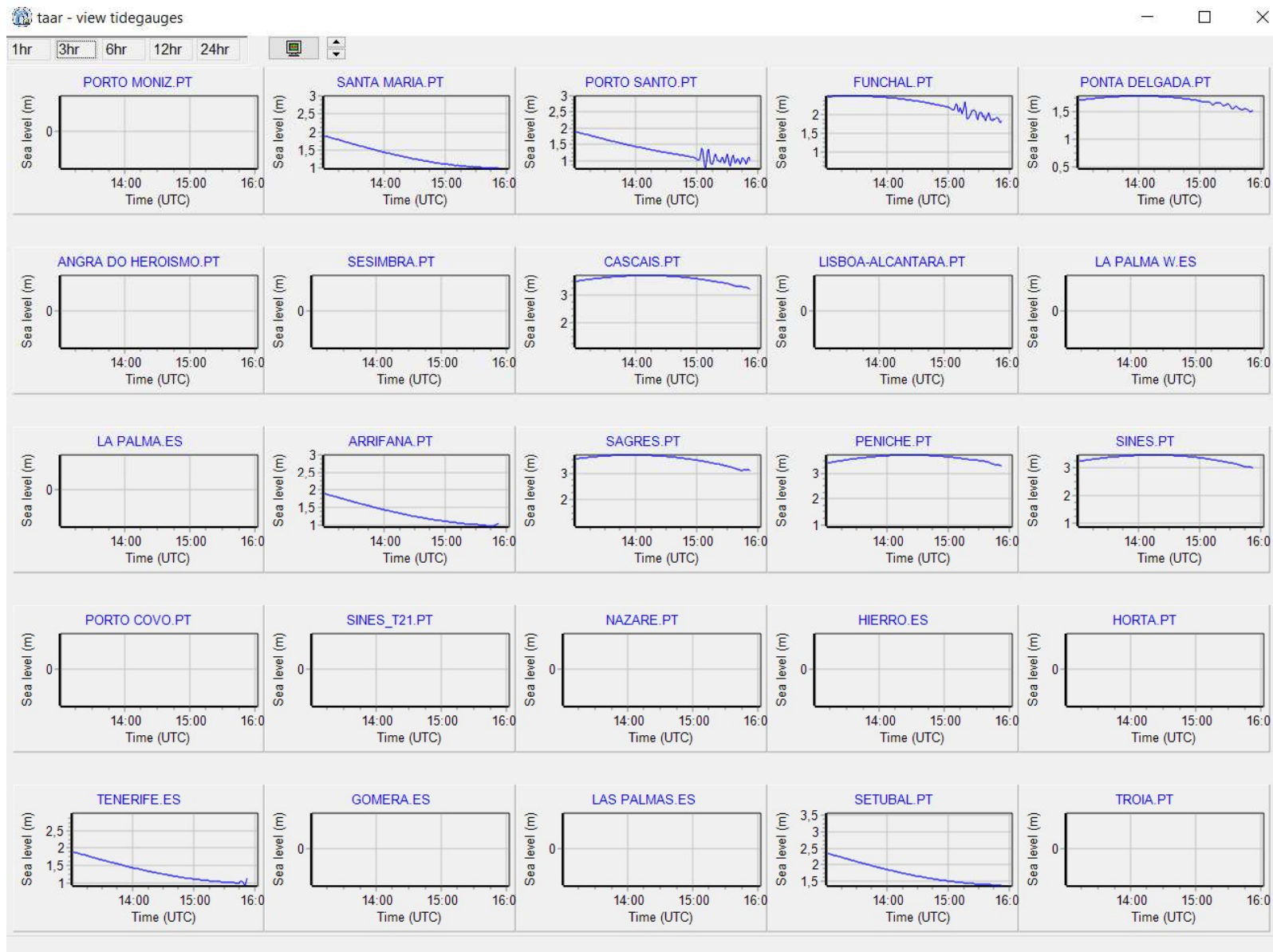
Ctry	Forecast point	Time to 1st message	Watch	Messages
PT	SAGRES	19:53 18-NOV	Watch	01:12:12
PT	CASCAIS	19:53 18-NOV	Watch	01:12:28
PT	ARMACAO DE PE	20:00 18-NOV	Watch	01:19:04
PT	MADERA	20:06 18-NOV	Watch	01:25:22
PT	NAZARE	20:16 18-NOV	Watch	01:35:29
PT	PONTA DELGADU	20:20 18-NOV	Watch	01:39:18
PT	ANGRA			
PT	FLORES			
MA	EL JADIDA			
MA	RABAT			
MA	SAFIM			
MA	CASABLANCA			
MA	MOHAMMEDIA			
MA	TANGER			
MA	MOGADOR			
MA	AGADIR			
MA	SIDI IFNI			
MA	AL HOCEIMA			
MA	PORT EL AAJUN			
MA	BOUJOUR			
MA	LAGOUIRA			
MA	DAKHLA			
ES	CEUTA			
ES	HUELVA			
ES	CADIZ			
ES	ALGECIRAS			
ES	LAS PALMAS			
ES	SANTA CRUZ			
ES	MALAGA			
ES	VIGO			
ES	COVILHAS			

Running ... 00:05:45

Testing purposes
(include random full scenarios)

Exercise Mode
(Neamwave21, others)

Real events and
Communication tests



T.A.A.R. Tsunami messages - Edition & Dissemination

Area of alert

Portugal NEAM regional

Event type

Exercise_Event

DUMMY TEST

FIRST Message SUPPLEMENT END Tsunami Watch Tsunami Watch CANCELL

EXERCÍCIO EXERCÍCIO EXERCÍCIO

Assunto: Mensagem de TSUNAMI #001
Emitido em: 18-11-2017 18:33 TUC
Autor: IPMA/PT.NTWC

NÍVEL DE ALERTA PARA PORTUGAL:

*** WATCH (laranja)
Altura de onda máxima superior a 0,5m e/ou run-up superior a 1m

PARAMETROS SISMICOS PRELIMINARES

Hora de Origem: 18-11-2017 16:50 TUC
Epicentro : 36.01 Norte 10.57 Oeste
Profundidade : 33 KM
Localização : Gorringe
Magnitude : 8.0

PREVISÃO DOS TEMPOS CHEGADA E NÍVEIS DE ALERTA:

Sector----- Hora/Data(TUC)- Alerta

Faro (Barlavento)-----17:12 18-11-2017 WATCH (laranja)
Setubal-----17:20 18-11-2017 WATCH (laranja)

*EXERCICIO*TSUNAMI MSG;IPMA/PT.NTWC;WATCH-Alerta Laranja;18-11-2017;MAG8,0;;36,01N;10,57W;33KM;*EXERCICIO*

Channels

E-MAIL SMS FAX ftpserver.ipma.pt

GTS broadcast ftpserver.ipma.pt

Recipients

<INTERNO>

EMAIL
FAX

SMS

T.A.A.R. Tsunami messages - Edition & Dissemination

Area of alert

Portugal NEAM regional

Event type

Exercise_Event

DUMMY TEST

FIRST Message SUPPLEMENT END Tsunami Watch Tsunami Watch CANCELLATION

DUMMY TEST

COMMUNICATION Message

WENT40 LPMG 181833
TSUNAMI EXERCISE MESSAGE NUMBER 001
NEAM IPMA CANDIDATE TSUNAMI SERVICE PROVIDER
ISSUED AT 1833Z 18 NOV 2017

... TSUNAMI WATCH ...
THIS ALERT APPLIES TO BELGIUM ... CAPE VERDE ... DENMARK ... FRANCE ... GERMANY ... ICELAND ... IRELAND ... MAURITANIA ... MOROCCO ... NETHERLANDS ... NORWAY ... PORTUGAL ... SPAIN ... SWEDEN ... UNITED KINGDOM

... TSUNAMI INFORMATION ...
THIS INFORMATION APPLIES TO RUSSIAN FEDERATION ... POLAND ... LITHUANIA ... ESTONIA ... FINLAND ... ALGERIA ... ALBANIA ... BULGARIA ... CROATIA ... CYPRUS ... EGYPT ... GEORGIA ... GREECE ... ISRAEL ... ITALY ... LEBANON ... LIBYA ... MALTA ... MONACO ... ROMANIA ... SLOVENIA ... SWEDEN ... SYRIA ... TUNISIA ... TURKEY ... UKRAINE ... UNESCO ... ERCC

THIS MESSAGE IS ISSUED AS ADVICE TO GOVERNMENT AGENCIES. ONLY NATIONAL AND LOCAL GOVERNMENT AGENCIES HAVE THE AUTHORITY TO MAKE DECISIONS REGARDING THE OFFICIAL STATE OF ALERT IN THEIR AREA AND ANY ACTIONS TO BE TAKEN IN RESPONSE

AN EARTHQUAKE HAS OCCURRED WITH THESE PRELIMINARY PARAMETERS
ORIGIN TIME - 1650Z 18 NOV 2017

*TEST*TSUNAMI EXERCISE MSG;NEAMTWS-IPMA;WATCH:BE CV DK FR DE IS IE MR MA NL NO PT ES SE GB;1650Z 18NOV2017;EQ Mag8.0;36.01N;10.57W;33KM;*TEST*

GTS
EMAIL
FAX

SMS

Channels

E-MAIL SMS FAX ftpserver.ipma.pt

GTS broadcast ftpserver.ipma.pt

Recipients

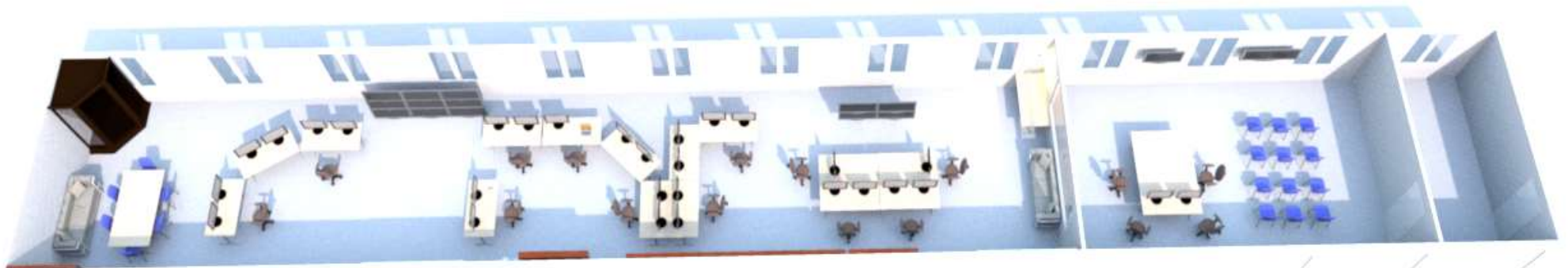
<INTERNO>

Arm sender

Send message

notepad

Exit



Aeronautic Meteo



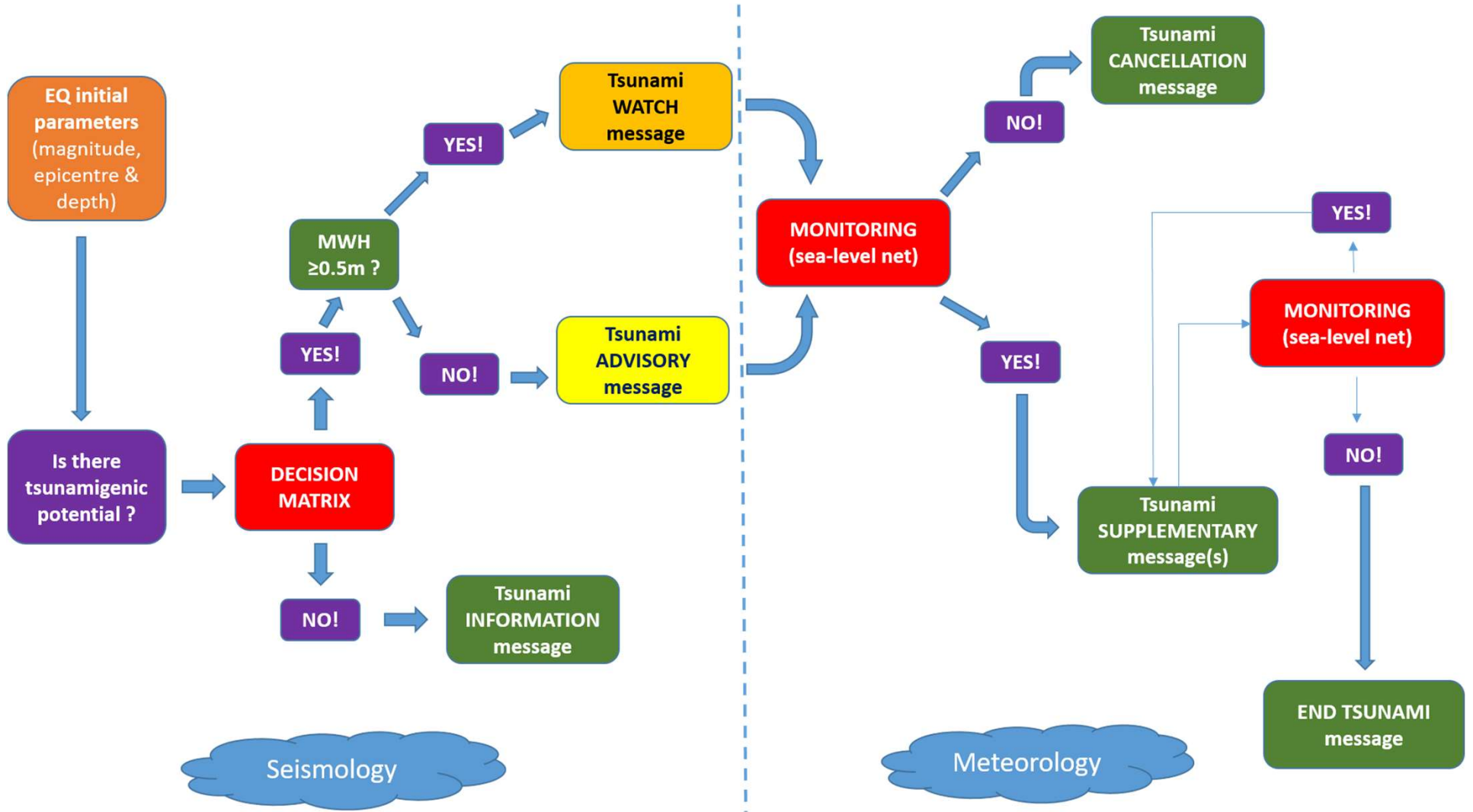
Meteorology



Seismology

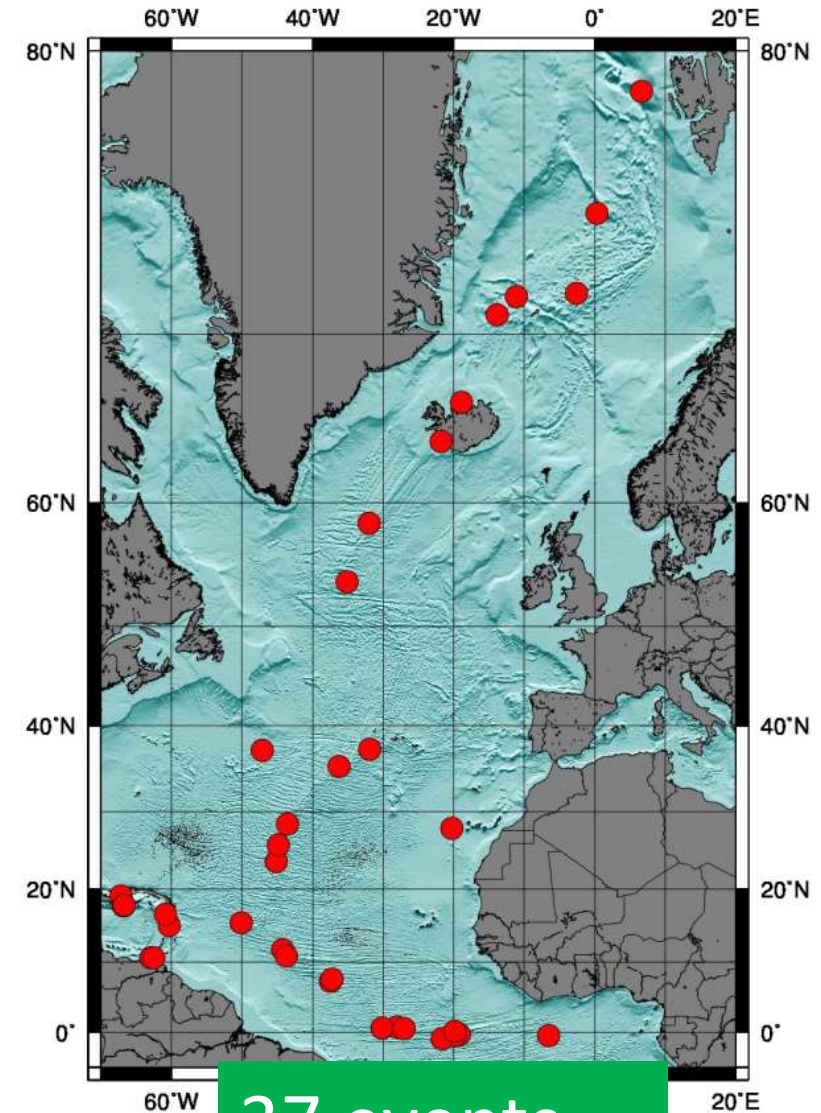


Tsunamis



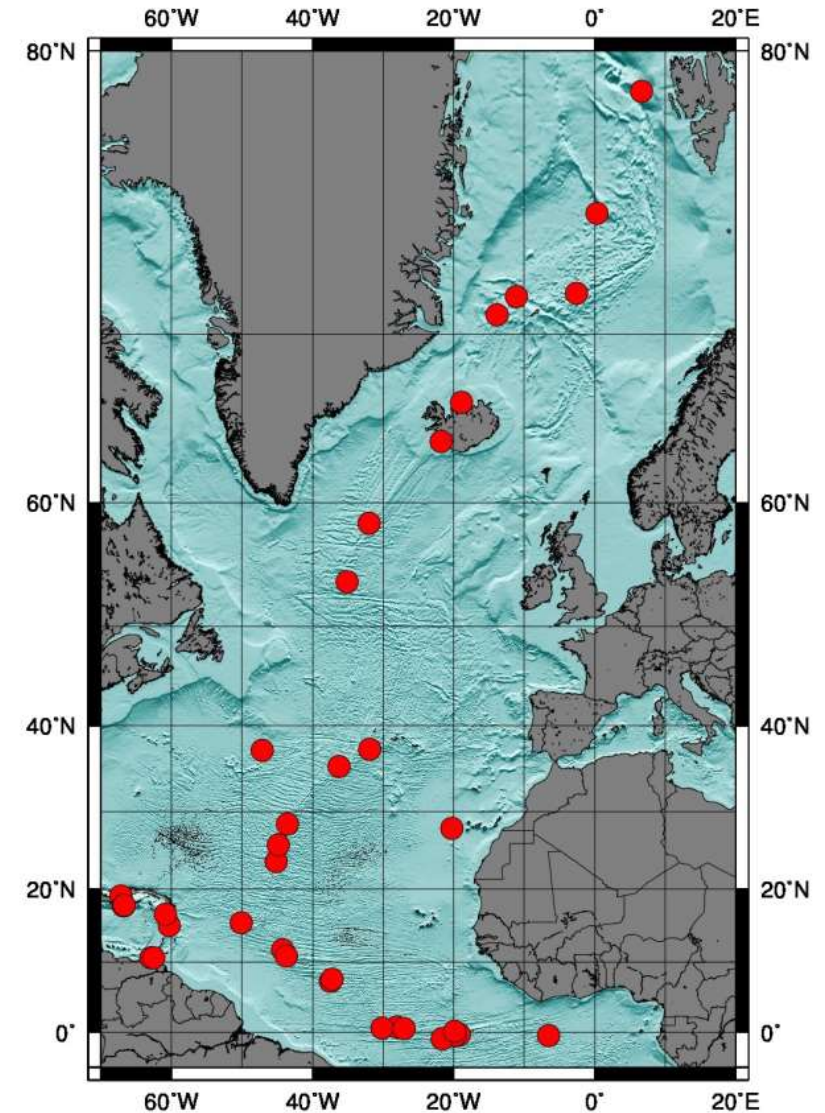
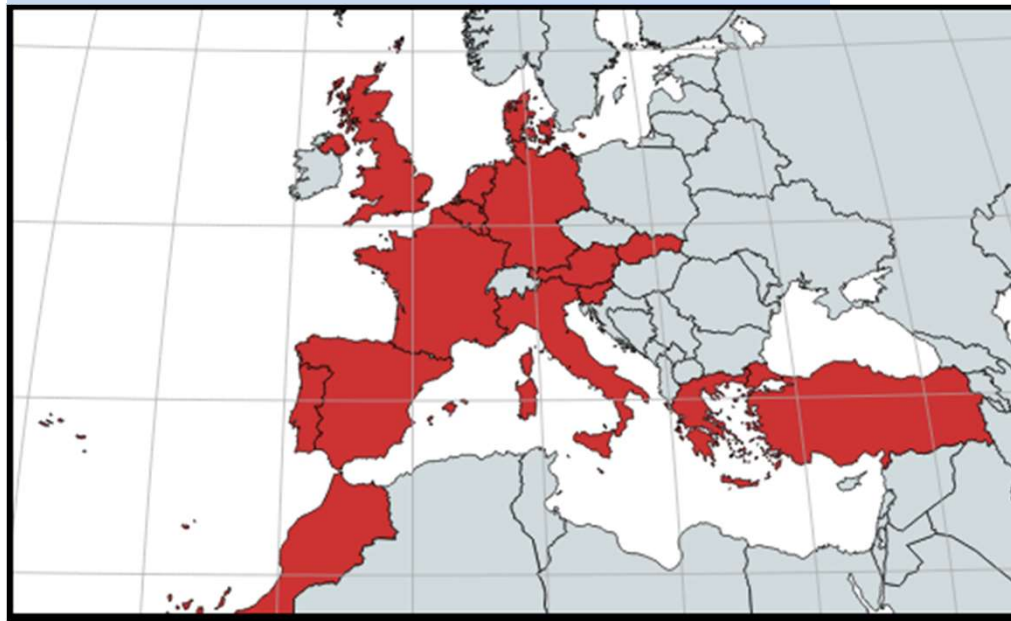
- Operation started on **january 2018**
- **Accreditation on 2019**
- 37 Tsunami messages issued:

Date	Latitude	Longitude	Depth	Mag	Region	Max Alert Level
18-04-2018	00.45S	06.51W	10km	5.7Mw	South Atlantic Ocean	Information
23-07-2018	00.35S	19.19W	10km	5.6Mw	Central Mid-Atlantic Ridge	Information
07-08-2018	75.09N	10.31E	10km	5.7Mw	Svalbard Region	Information
22-08-2018	10.58N	62.93W	95km	5.6Mw	Near Coast of Venezuela	Information
28-09-2018	15.03N	60.33W	10km	5.8Mw	Leeward Islands	Information
07-10-2018	07.24N	37.43W	10km	5.7Mw	Central Mid-Atlantic Ridge	Information
16-10-2018	00.78N	28.12W	10km	5.5Mw	Central Mid-Atlantic Ridge	Information
09-11-2018	71.74N	11.09W	10km	6.8Mw	Jan Mayen Islands Region	Information
11-11-2018	15.46N	50.12W	10km	6.2Mw	North Atlantic Ocean	Information
14-02-2019	35.45N	36.27W	10km	5.7Mw	Northern Mid-Atlantic Ridge	Information
10-03-2019	58.53N	31.96W	10km	5.7Mw	Reykjanes Ridge	Information
02-09-2019	23.64N	45.16W	10km	5.8Mw	Northern Mid-Atlantic Ridge	Information
24-09-2019	19.07N	67.18W	10km	6.0Mw	Mona Passage	Information
26-09-2019	27.92N	20.21W	10km	5.8Mw	Canary Islands, Spain Region	Information
06-01-2020	17.76N	66.73W	10km	5.6Mw	Puerto Rico Region	Information
07-01-2020	17.76N	66.84W	10km	6.3Mw	Puerto Rico Region	Information
11-01-2020	17.83N	66.73W	10km	5.8Mw	Puerto Rico Region	Information
08-03-2020	37.28N	47.13W	10km	5.7Mw	North Atlantic Ocean	Information
30-05-2020	25.83N	44.87W	10km	5.7Mw	North Atlantic Ocean	Information
21-06-2020	66.41N	18.88W	10km	5.8Mw	Iceland Region	Information
30-08-2020	00.56N	30.17W	10km	6.4Mw	Central Mid-Atlantic Ridge	Information
07-09-2020	07.53N	37.25W	10km	6.4Mw	Central Mid-Atlantic Ridge	Information
18-09-2020	00.49N	27.02W	10km	6.6Mw	Central Mid-Atlantic Ridge	Information
30-10-2020	71.89N	02.60W	10km	5.6Mw	Jan Mayen Islands Region	Information
26-03-2021	16.59N	60.84W	10km	5.7Mw	Leeward Islands	Information
24-02-2021	64.07N	21.75W	10km	5.6Mw	Iceland Region	Information
26-06-2021	11.74N	44.23W	10km	5.6Mw	Northern Mid-Atlantic Ridge	Information
10-01-2022	28.49N	43.58W	10km	5.5Mw	Northern Mid-Atlantic Ridge	Information
08-02-2022	0.50S	19.82W	10km	5.9Mw	Jan Mayen Islands Region	Information
14-02-2022	70.90N	13.87W	10km	5.9Mw	Jan Mayen Islands Region	Information
22-03-2022	10.79N	43.72W	10km	6.3Mw	Northern Mid-Atlantic Ridge	Information
14-07-2022	10.55N	62.53W	86km	5.5Mw	Near Coast of Venezuela	Information
18-07-2022	78.96N	6.68E	10km	5.5Mw	Svalbard Region	Information
04-09-2022	0.94S	21.60W	10km	6.1Mw	Central Mid-Atlantic Ridge	Information
29.09.2022	53.87N	35.13W	10km	5.6Mw	Reykjanes Ridge	Information
09-10-2022	0.1N	19.84W	10km	5.5Mw	Central Mid-Atlantic Ridge	Information
28-11-2022	37.41N	31.92W	10km	5.7Mw	Azores Islands Region	Information



Subscribers:

Portugal	UK
Spain	Turkey
Morocco	Greece
Denmark	Italy
France	
Germany	IOC, ERCC and JRC





SESIMBRA



SÂB | 5 NOV

CAMINHADA
**PELA ROTA do
TSUNAMI**

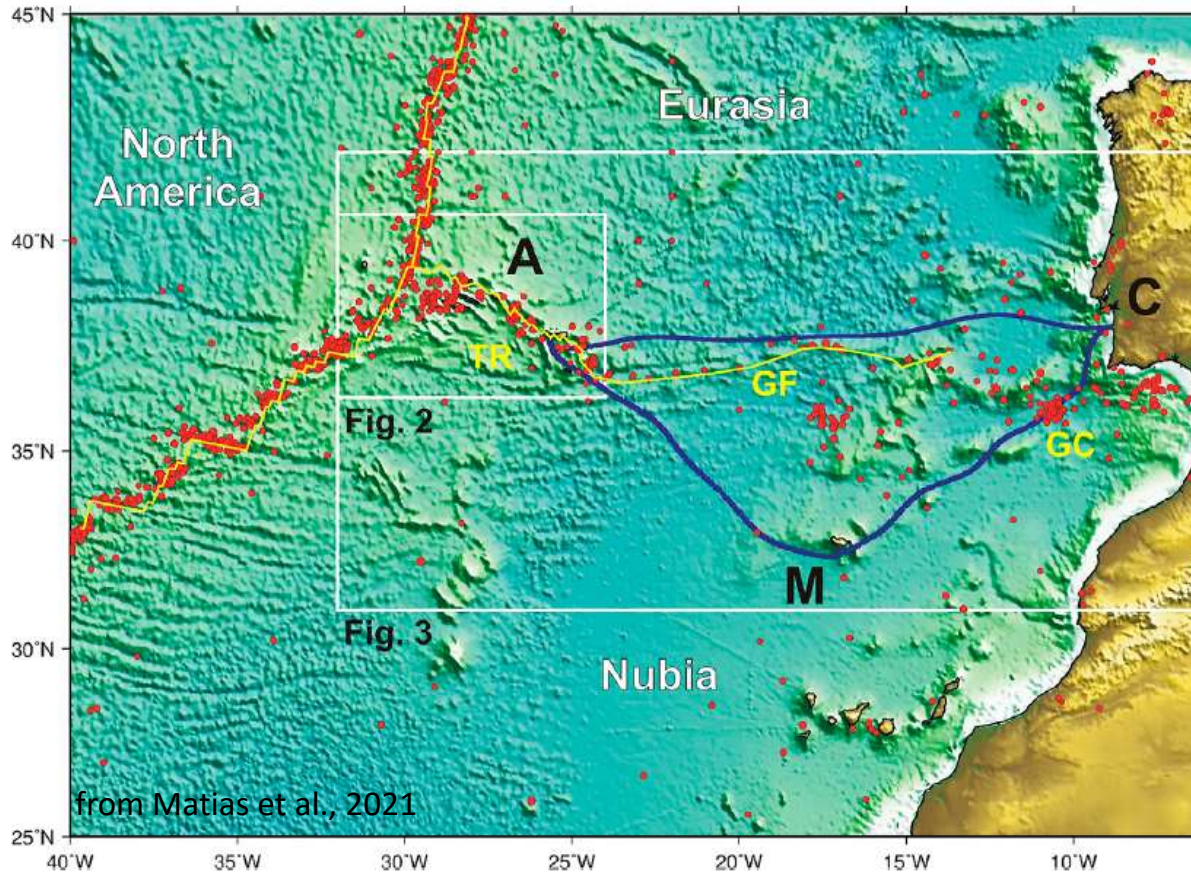


Secretary of state of Civil Protection
Mayor
ANEPC, IPMA, UNDRR



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New Submarine Cable Ring connecting PT Mainland-Azores-Madeira – opportunity for a **SMART system (SMART CAM)**



- **December 2019**
 - Working group nominated by the Government recommended the implementation of “...Seismic and Environmental Detection”
- **September 2020**
 - Government published the decision of Renew the CAM ring including “Seismic and Environment Detection”
- **October 2021**
 - Project included in the general budget of the state for 2022
 - **SMART** functionalities included
- **September 2022**
 - Public company, IP TELECOM, formally designated to implement the project
- **November 2022**
 - Resolution of the Council of Ministers (nr. 104/2022, 2nov)
 - **Public tender in preparation**

Thank you!