Let's talk about:

Challenges of the climate change and biodiversity loss in the area of North Adriatic

Water management, disaster prevention and mitigation measures

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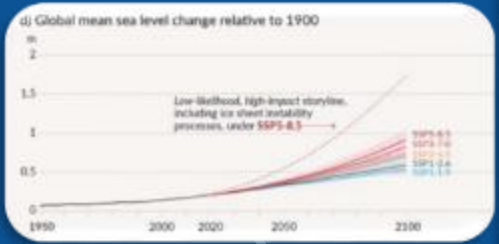
University of Basilicata

CGIAM - Center of Integrated Geomorphology for the Mediterranean Area (Italy)

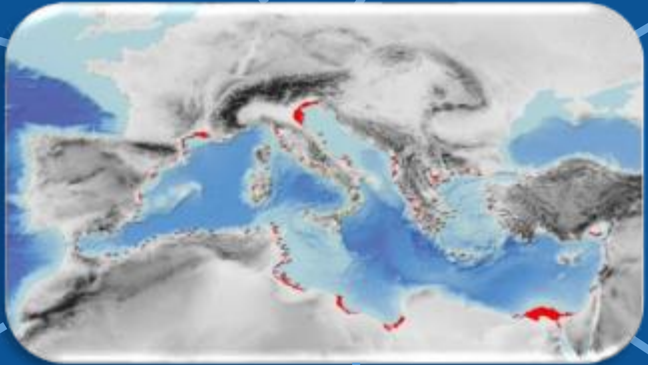
Why SAVEMEDCOASTS?
Sea level rise is a global threat
Prevention and Preparedness is needed – “Early” Warning on a multi-decade scale

Sea Level Rise projections



Sea level rise

Coastal retreat



Tsunami amplification

Land subsidence

Rising people’s awarness

Storm surge amplification

SAVEMEDCOASTS - Partners

INGV

ISTITUTO NAZIONALE DI GEOFISICA E VULCANOLOGIA (INGV)

CENTRO DI GEOMORFOLOGIA INTEGRATA PER L'AREA DEL MEDITERRANEO (CGIAM)

FONDAZIONE CENTRO EURO- MEDITERRANEO SUI CAMBIAMENTI CLIMATICI (FONDAZIONE CMCC)

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CENTRO TECNOLOGICO PER LE TELECOMUNICAZIONI DELLA CATALOGNA (CTTC)

COMUNE DI VENEZIA (COMUNE DI VENEZIA)

FONDAZIONE AMBIENTE RICERCA BASILICATA (FARBAS)

ISOTECH LTD (ISOTECH)

Funded by
European Union
Humanitarian Aid
and Civil Protection

SAVEMEDCOASTS

SAVEMEDCOASTS
Context & main objectives

- ✓ **SAVEMEDCOASTS-2** is aimed at integrating climate change scenarios into disaster risk assessment and disaster risk management of the most exposed river deltas and lagoons of the Mediterranean Region.

- ✓ **T**o increase the availability and use of scientific knowledge on disaster, as explicitly stated in the new **Union Civil Protection Mechanism**, by developing 1) multi-hazard approach for risk assessment, and 2) macro-regional risk assessment integrating climate change scenarios including cascading impacts.

The project capitalizes DG-ECHO Projects

- **SAVEMEDCOASTS** (DGECHO - www.savemedcoasts.eu), in particular the innovative multi-hazard approach and applied disaster risk assessment methods into disaster risk management policy in the Mediterranean Region, to raise the awareness and preparedness of coastal communities on climate change risks.
- **KnowRisk** (DGECHO - https://knowriskproject.com/the-project/) on the dissemination and education actions on seismic risk;
- **Tsumaps** (DGECHO - http://www.tsumaps-neam.eu/), for the tsunami hazard in the Mediterranean region.

SAVEMEDCOASTS data and products

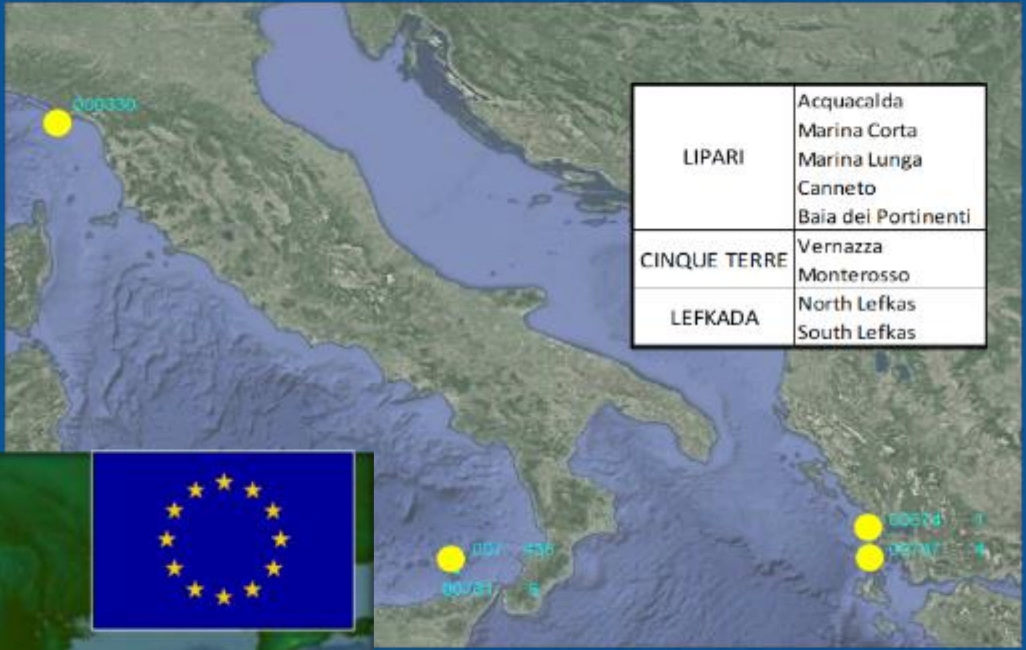
Data

- IPCC AR5 (AR6) – RCP 2.6 and 8.5 SLR projections for 2100
- Geodetic data (GPS, tide gauges and InSar)
- High resolution topography (Lidar, UAV) and bathymetry (regional, local)
- Climate, environmental, social and economic indexes

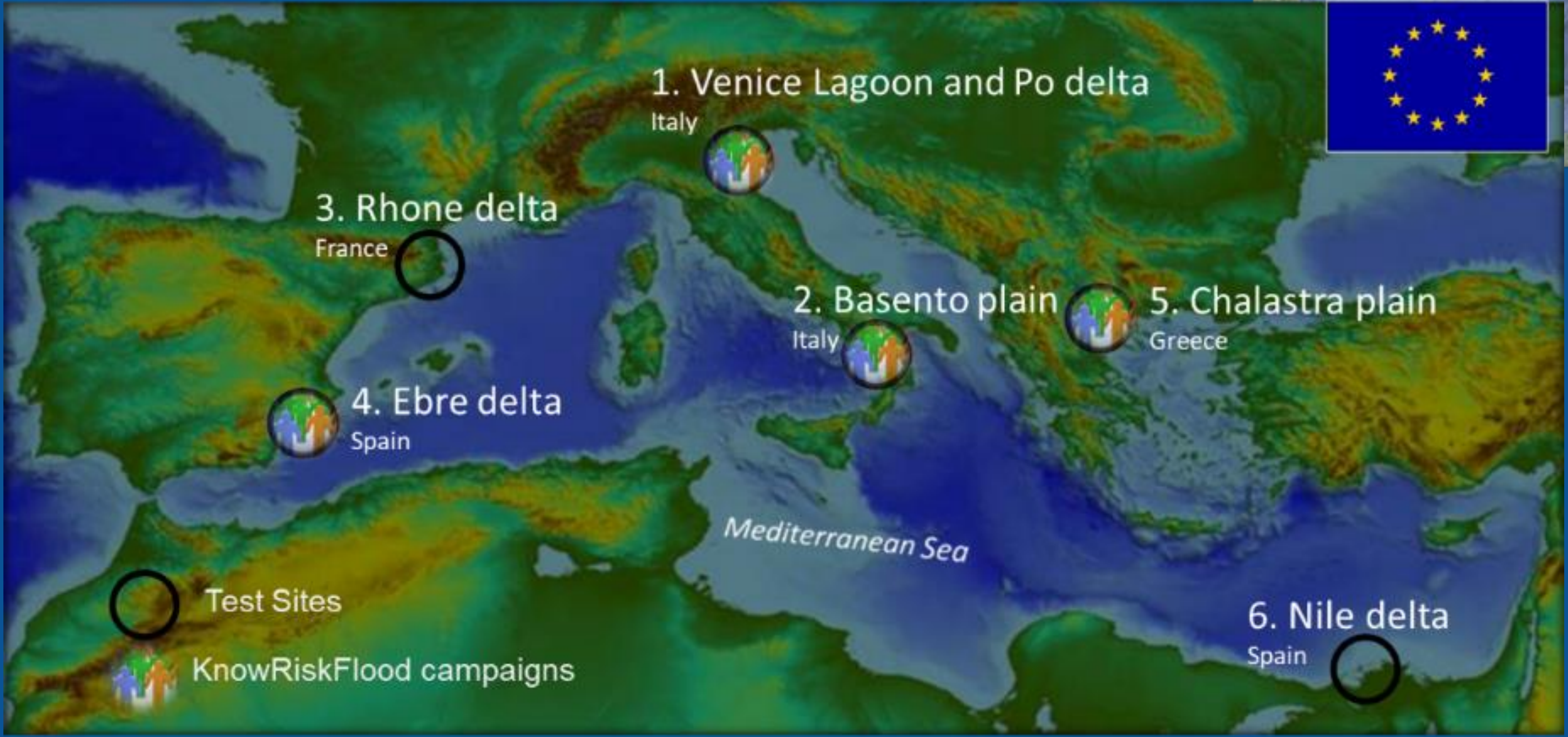
Products

- Rates of Vertical Land Movements and sea level trend (from GPS, tide gauges and InSar)
- RSLR projections for 2100 re-assessed for the Med region in targeted zones
- Multitemporal maps of flooding scenarios (up to 2100) in targeted zones
- Multitemporal maps of flooding scenarios for storm surges in RSLR conditions (up to 2100) in targeted zones
- WebGIS (mapping)
- Socio-economic and stakeholder analysis, exposure, risk assessment and cascade effects in targeted zones; RSLR Surveys
- Education by KnowFloodRisk campaigns (Ebre, Venice, Thessaloniki, Basento)
- Communication & dissemination (Website, Facebook, Twitter, YouTube, Flickr and Instagram)

SAVEMEDCOASTS
Test sites

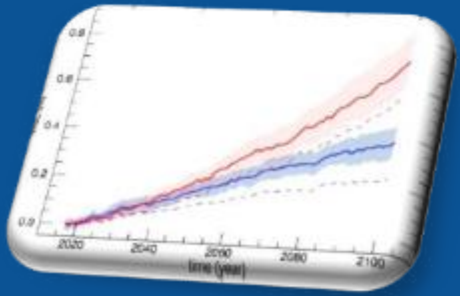


LIPARI	Acquacalda Marina Corta Marina Lunga Canneto Baia dei Portinenti
CINQUE TERRE	Vernazza Monterosso
LEFKADA	North Lefkas South Lefkas

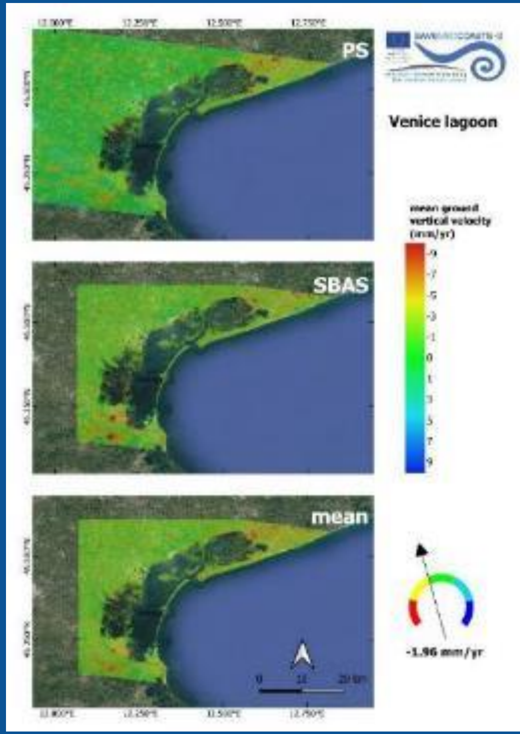


SAVEMEDCOASTS workflow

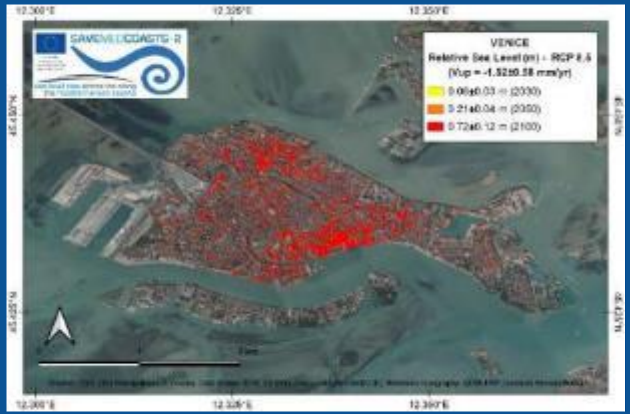
2. Vertical land motion from GNSS & InSAR data analysis

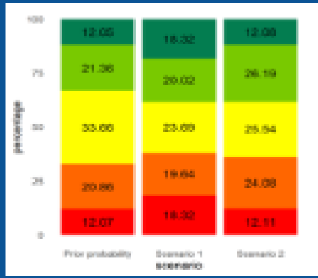


3. Realization of relative sea-level rise projections for 2100 in RCP2.6, RCP8.5 scenarios



4. high resolution topography & multitemporal flooding maps also in storm surge conditions

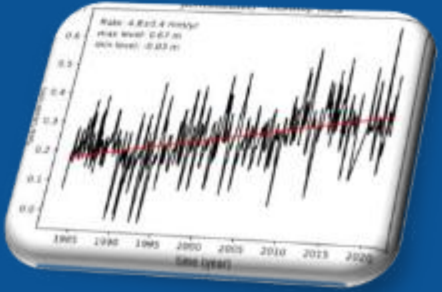




5. Multi risk analysis

6. Raise awarness, knowledge transfer and dissemination

1. SL trend from tide gauge data



Combined coastal flooding scenarios

Overview

The activity deals with the assessment of the flooding scenarios in target areas resulting from the combined effects of the different driving forces, coupling expeditive methodologies and modelling.

What we have done

The main products are the following:

1. the maps of potential land inundation scenarios for each study area, based on the RSLR projections estimated for 2030, 2050 and 2100 epochs;
2. the assessment and mapping of storm surge scenarios in target areas through expeditive methodologies and modelling to define possible combined inundation scenarios.

The analysis takes into account the combination of:

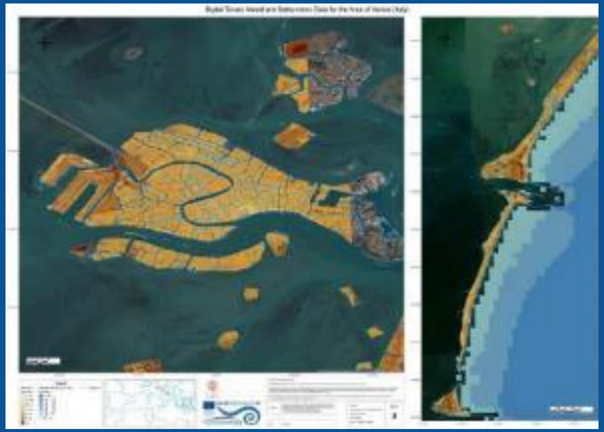
a) regional SLR extracted from the Special Report Ocean and Cryosphere in a Changing climate;
b) rates of land subsidence estimated by InSAR and GNSS analysis assuming they will continue at the same rates up to 2100 epoch;
c) amplitude of astronomical tide and
d) storm-surge (SS) referred to different return times (RT) for 2021, 2030, 2050 and 2100 epochs.

Lidar analysis, mapping and UAV surveys

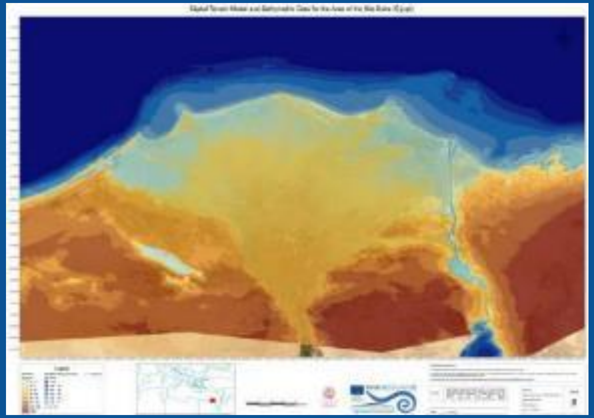
Ebre delta (SP)

Rhone delta (FR)

Basento coast (IT)



Venice Lagoon (IT)



Nile delta (EG)

Chalastra delta (GR)
UAV surveys

High resolution DEMs from available
Lidar data (national agencies)

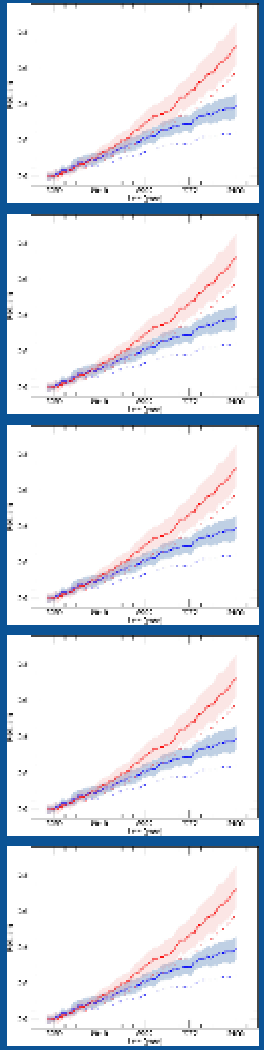
Mapping RSLR scenarios

The Ebro delta. Areas of interest (AOIs) considered.

The Ebro delta. RSLR projections in the 5 AOIs for 2030, 2050 and 2100 epochs.

			RSLR (m)					
			2030		2050		2100	
id	Area of Interest (AOI)	Vup (mm/yr)	RCP 2.6	RCP 8.5	RCP 2.6	RCP 8.5	RCP 2.6	RCP 8.5
1	left Ebro	-0.94±1.09	0.07±0.03	0.08±0.03	0.17±0.03	0.22±0.04	0.38±0.07	0.76±0.14
2	right Ebro	-1.11±1.87	0.07±0.03	0.08±0.03	0.17±0.04	0.23±0.05	0.39±0.07	0.78±0.14
3	Natural Park of Ebro Delta	-0.47±1.55	0.06±0.03	0.07±0.03	0.15±0.03	0.21±0.04	0.34±0.07	0.72±0.14
4	l'Ampolla	0.27±0.6	0.05±0.03	0.06±0.03	0.13±0.03	0.18±0.04	0.28±0.07	0.66±0.14
5	Sant Carles de la Ràpita	-0.06±0.92	0.05±0.03	0.06±0.03	0.14±0.03	0.20±0.04	0.30±0.07	0.69±0.14

Land subsidence from GNSS and InSAR data analysis (WP2)

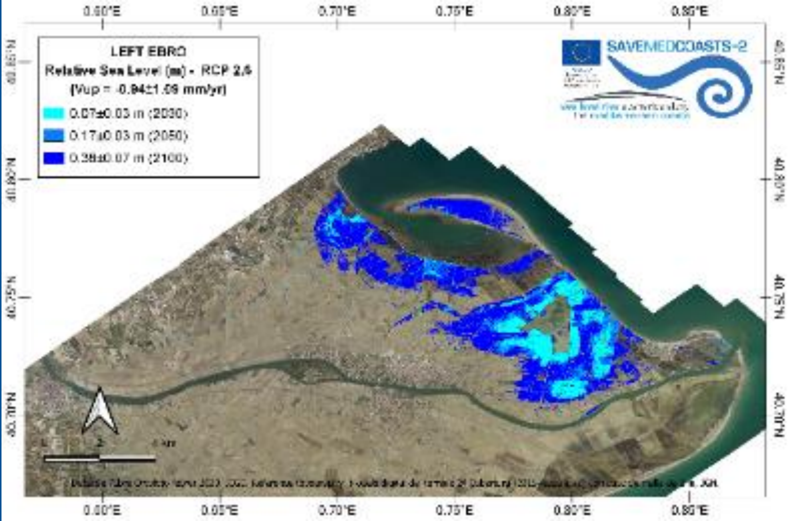


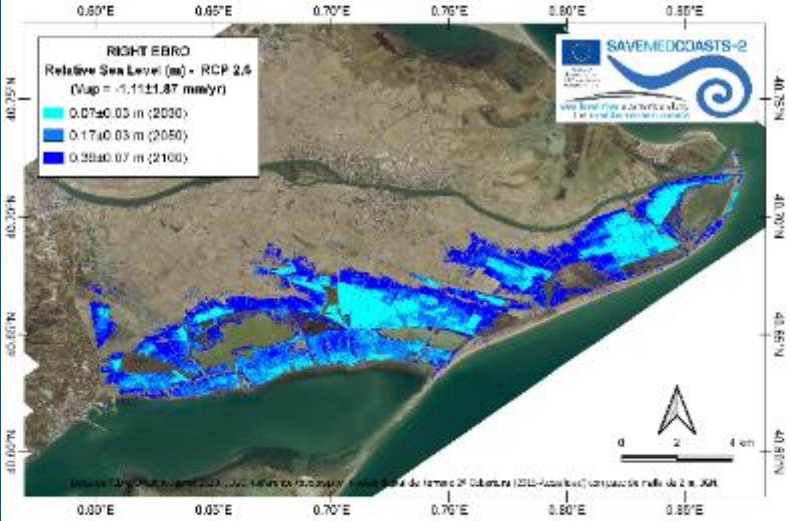
SLR projections (WP2)

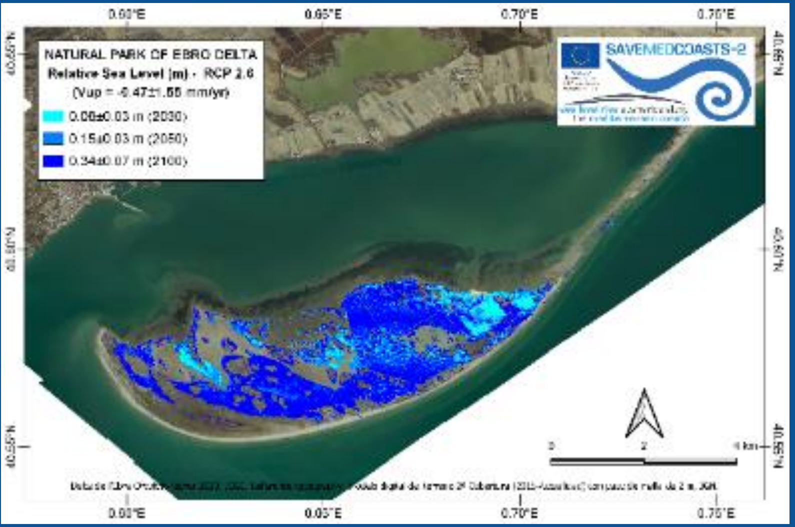
- Each study area has been subdivided into AOIs.
- For each AOI, the **mean ground vertical velocity (Vup)** and the resulting **RSLR values for RCP 2.6 and RCP 8.5 scenarios at 2030, 2050 and 2100**, were evaluated.
- Finally, each of the six flooding scenarios per AOI has been mapped grouped by RCP (2 maps/AOI).

Mapping RSLR scenarios

RCP 2.6

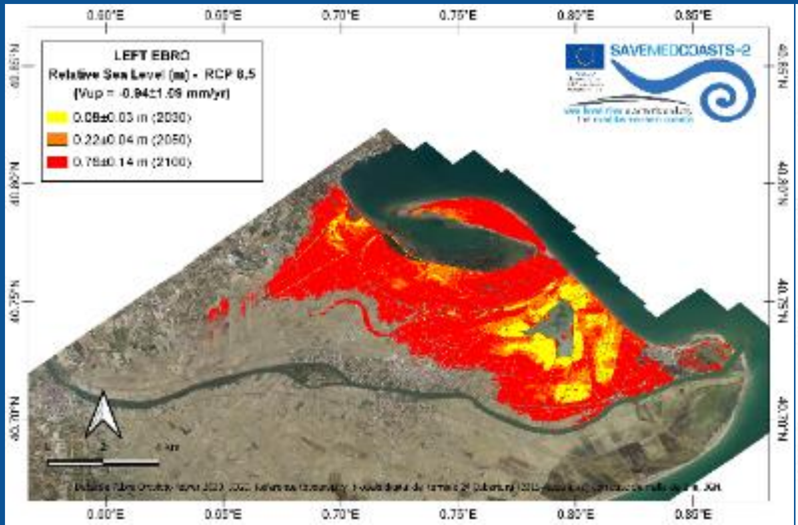


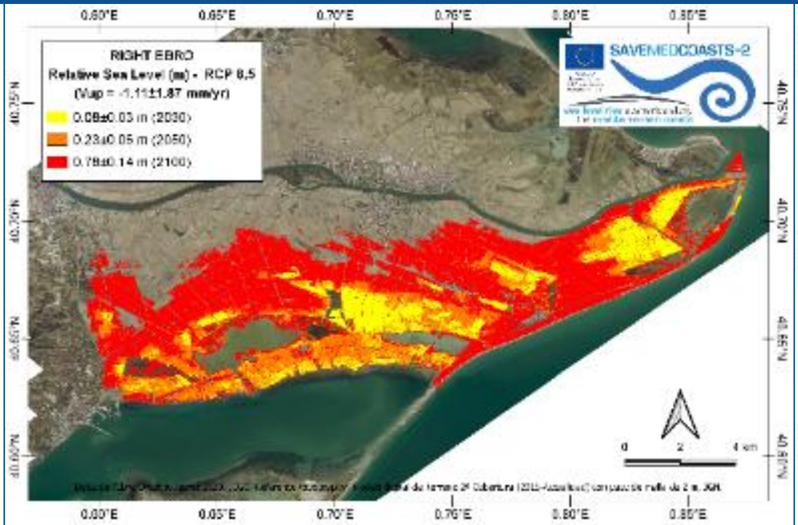


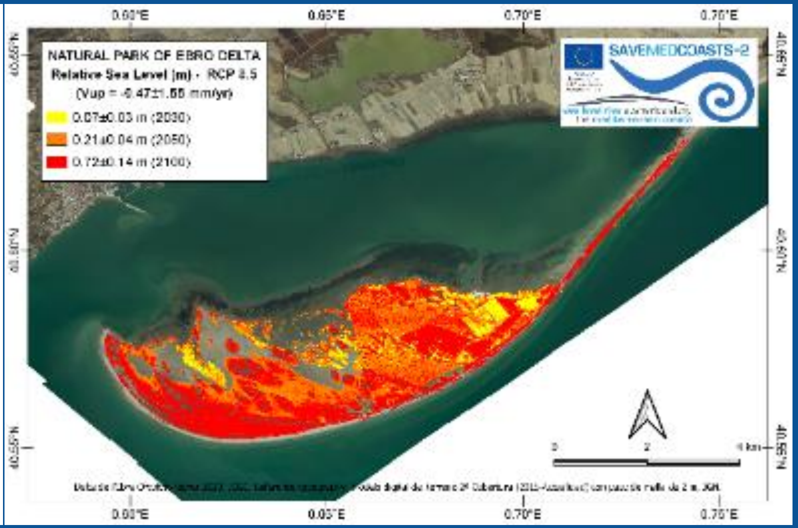


AOI1 | AOI2 | AOI3

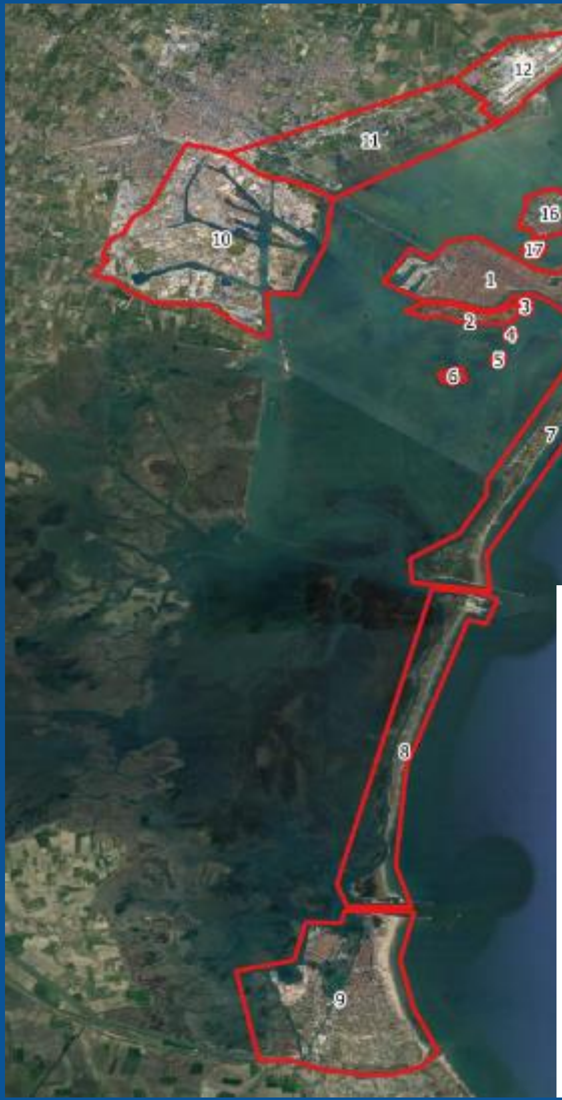
RCP 8.5







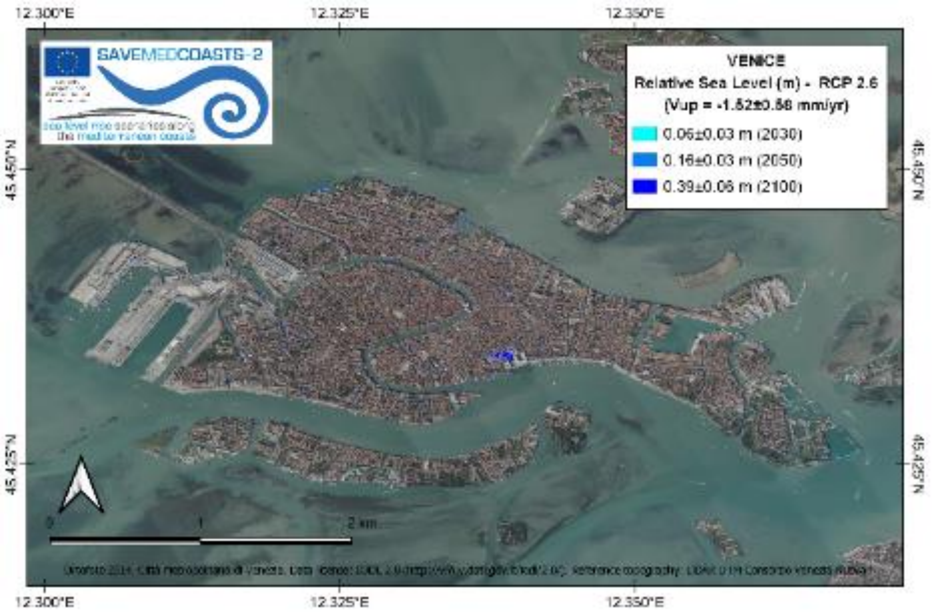
The Venice lagoon



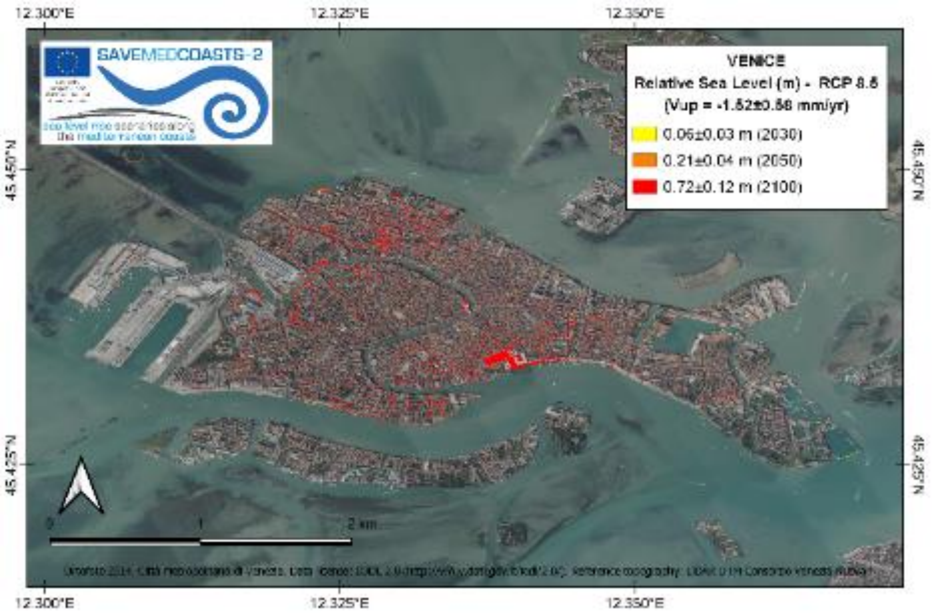
Id	Area of Interest (AOI)	Vup (mm/yr)	RSLR (m) 2030 RCP 2.6	RSLR (m) 2030 RCP 8.5	RSLR (m) 2050 RCP 2.6	RSLR (m) 2050 RCP 8.5	RSLR (m) 2100 RCP 2.6	RSLR (m) 2100 RCP 8.5
1	Venice	-1.52±0.58	0.06±0.03	0.06±0.03	0.16±0.03	0.21±0.04	0.39±0.06	0.72±0.12
2	Giudecca	-1.65±0.46	0.06±0.04	0.06±0.03	0.16±0.03	0.21±0.04	0.40±0.06	0.72±0.12
3	San Giorgio Maggiore	-0.81±0.56	0.05±0.04	0.05±0.03	0.14±0.03	0.18±0.04	0.33±0.06	0.67±0.12
4	La Grazia	-3.61±0.29	0.09±0.04	0.09±0.02	0.23±0.02	0.27±0.04	0.57±0.06	0.90±0.12
5	San Clemente	-7.93±0.15	0.15±0.04	0.14±0.02	0.37±0.02	0.42±0.04	0.92±0.06	1.26±0.12
6	Sacca Sessola	-2.61±0.65	0.08±0.04	0.07±0.03	0.19±0.03	0.24±0.04	0.48±0.06	0.81±0.12
7	Lido	-2.15±0.79	0.07±0.04	0.07±0.03	0.18±0.03	0.23±0.04	0.44±0.06	0.78±0.12
8	Pellestrina	-1.55±0.89	0.06±0.04	0.06±0.03	0.16±0.03	0.21±0.04	0.39±0.06	0.73±0.12
9	Chioggia	-1.95±1.2	0.07±0.04	0.06±0.03	0.17±0.03	0.22±0.04	0.43±0.06	0.76±0.12
10	Porto Marghera	-2.18±1.11	0.07±0.04	0.07±0.03	0.18±0.03	0.23±0.04	0.45±0.06	0.78±0.12
11	Campalto	-1.63±0.75	0.06±0.04	0.06±0.03	0.16±0.03	0.21±0.04	0.40±0.06	0.73±0.12
12	Tessera & Marco Polo Airp.	-1.97±0.87	0.07±0.04	0.06±0.03	0.17±0.03	0.22±0.04	0.43±0.06	0.76±0.13
13	Mazzorbetto	-1.78±0.28	0.07±0.04	0.06±0.02	0.17±0.02	0.21±0.04	0.41±0.06	0.75±0.12
14	Mazzorbo	-1.26±0.33	0.06±0.04	0.06±0.02	0.15±0.02	0.20±0.04	0.37±0.06	0.70±0.12
15	Burano	-1.59±0.27	0.06±0.04	0.06±0.02	0.16±0.02	0.21±0.04	0.40±0.06	0.73±0.12
16	Murano	-1.78±0.3	0.07±0.04	0.06±0.02	0.17±0.02	0.21±0.04	0.41±0.06	0.75±0.12
17	San Michele	-2.14±0.48	0.07±0.04	0.07±0.03	0.18±0.03	0.23±0.04	0.44±0.06	0.78±0.12
18	La Certosa	-1±0.62	0.06±0.04	0.05±0.03	0.14±0.03	0.19±0.04	0.35±0.06	0.68±0.12
19	Le Vignole	-0.28±0.8	0.05±0.04	0.04±0.03	0.12±0.03	0.16±0.04	0.29±0.06	0.62±0.12
20	Sant'Erasmo	-2.54±1.21	0.08±0.04	0.07±0.03	0.19±0.03	0.24±0.04	0.48±0.06	0.81±0.12
21	Cavallino-Treporti	-2.79±1.03	0.08±0.04	0.07±0.03	0.20±0.03	0.25±0.04	0.50±0.06	0.83±0.12

The Venice lagoon. Areas of interest considered (in figure) and corresponding values of Vup and RSLR projections for 2030, 2050 and 2100 epochs (in table).

RCP 2.6



RCP 8.5



Assessing and mapping storm surge scenarios

- The expeditive methodology for coastal flooding risk assessment implemented in the previous SAVEMEDCOASTS project considered the storm-surge component as a static uplift of the sea level due to the maximum runup occurring during the considered extreme events. However, this approach was not applicable in SAVEMEDCOASTS-2, due to the relatively flat morphology of the investigated coastal areas, with the exception of the waterfront of the Venice lagoon.
- Alternatively, an hydrodynamic modelling for the assessment of the storm-surge propagation was implemented in **XBeach** for each study area. The **1-D model for wave propagation along a defined transect** was adopted for the assessment of the maximum storm runup, to take into account the evaluation of the inundation area, under the combined boundary condition imposed for each RCP, RT and reference epoch (2021, 2030, 2050 and 2100).
- For each transect, **the RSLR value was evaluated locally** considering the mean ground vertical velocity (Vup) along the transect as the mean subsidence rate inside a 200 m buffer of the transect itself, and then the calculation of the RSLR values relative to different IPCC scenarios (RCP 2.6 and RCP 8.5) for each transect considering such subsidence rate.

No overtopping → max(RSLR + τ_{max})

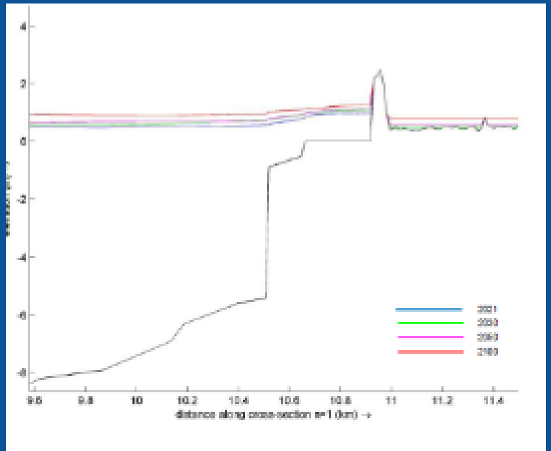


Figure 71 – The Ebro delta: transect 1 output for RCP 2.6 and storm surge RT = 1 yr

Overtopping → max (overtopping)

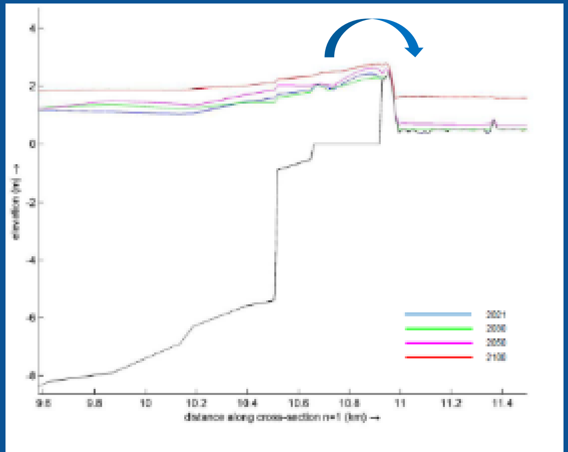


Figure 74 – The Ebro delta: transect 1 output for RCP 8.5 and storm surge RT = 100 yr

Ebro delta (overtopping at 2021)

No overtopping

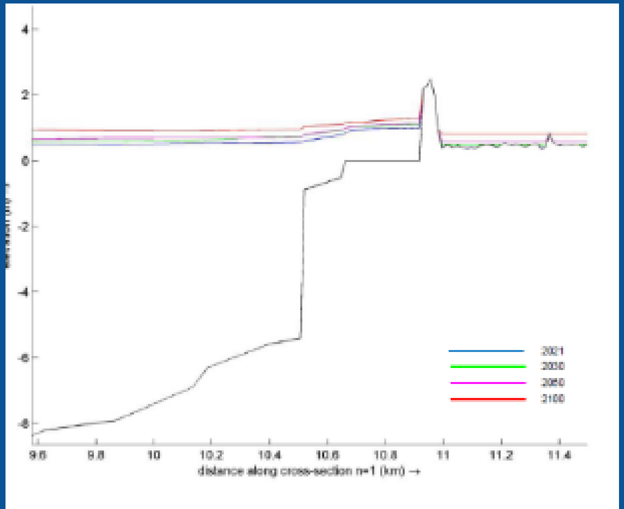


Figure 71 – The Ebro delta: transect 1 output for RCP 2.6 and storm surge RT = 1 yr

Overtopping

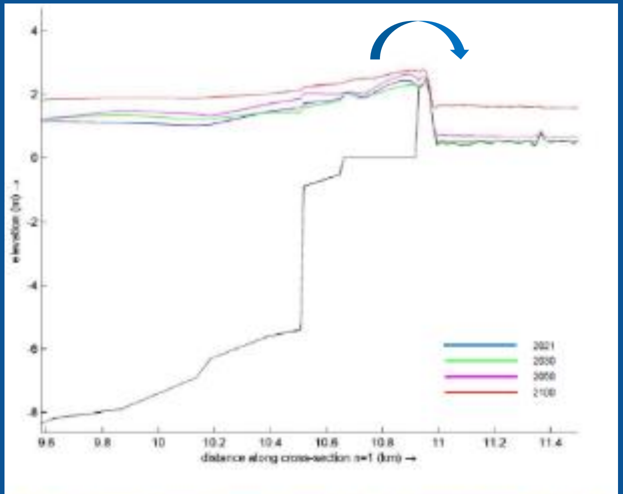
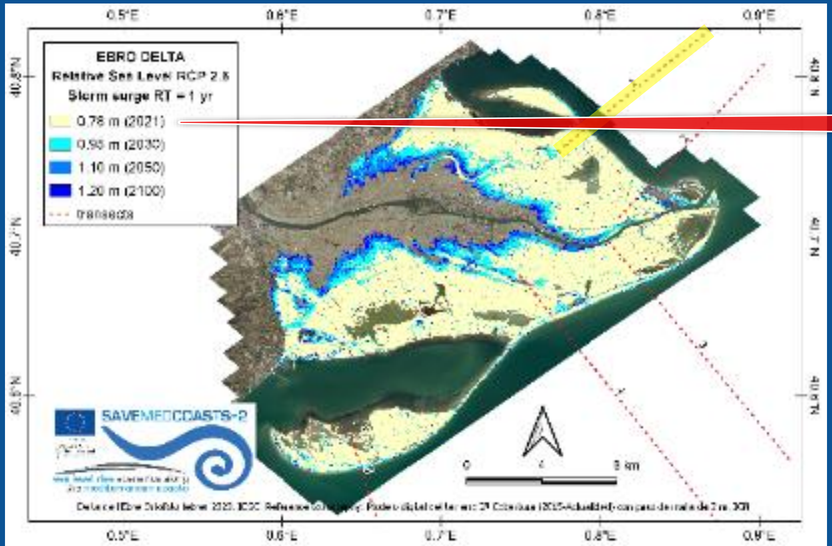


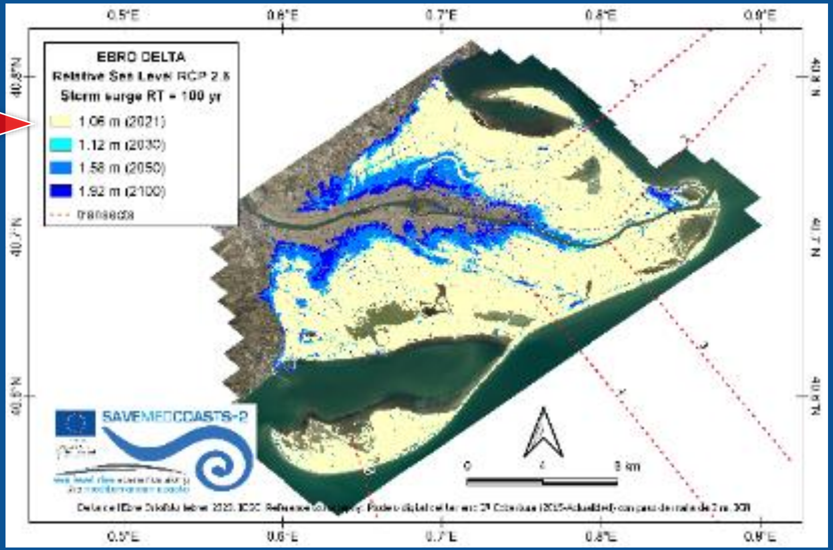
Figure 74 – The Ebro delta: transect 1 output for RCP 8.5 and storm surge RT = 100 yr

RT = 1 yr

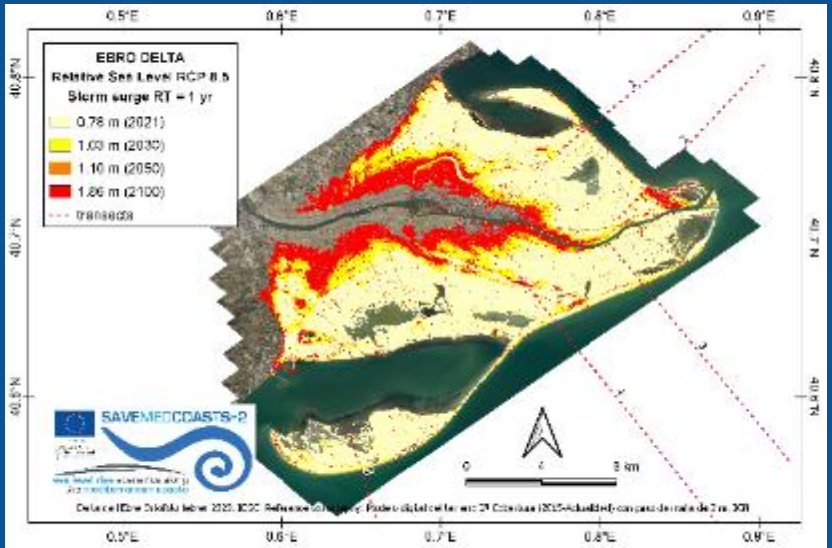
RT = 100 yrs

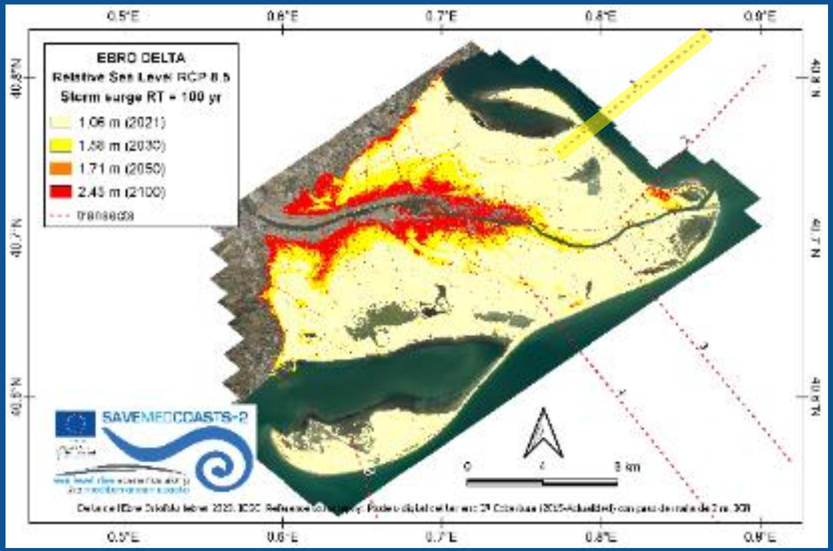
RCP 2.6



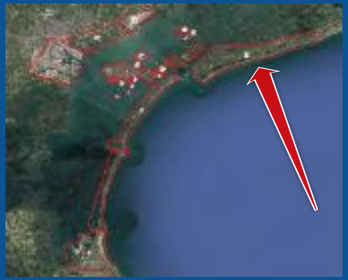


RCP 8.5



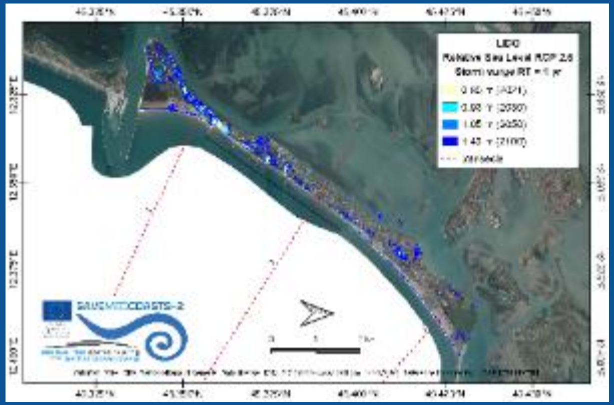
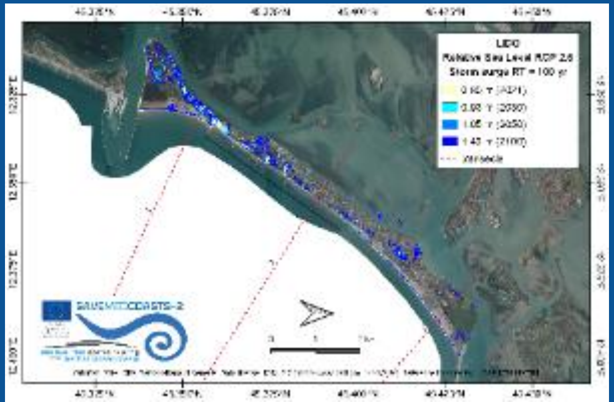
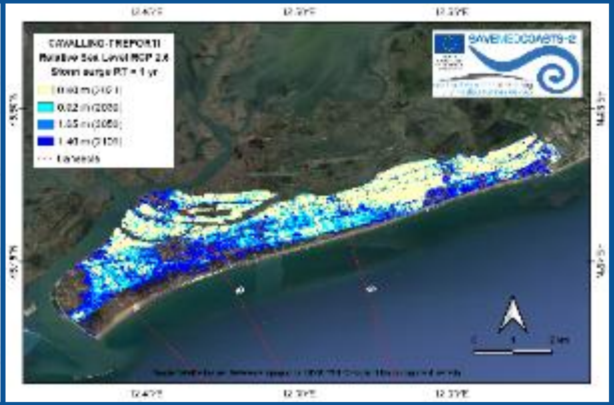
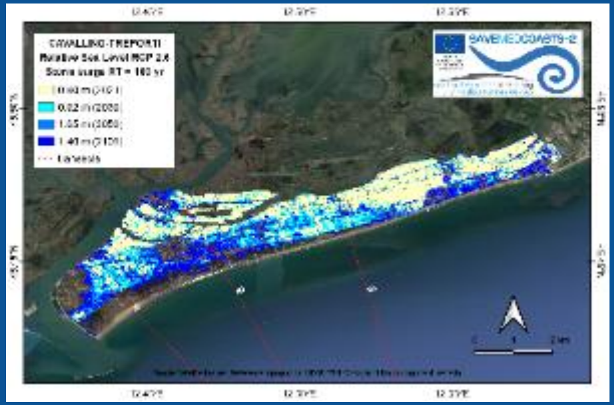
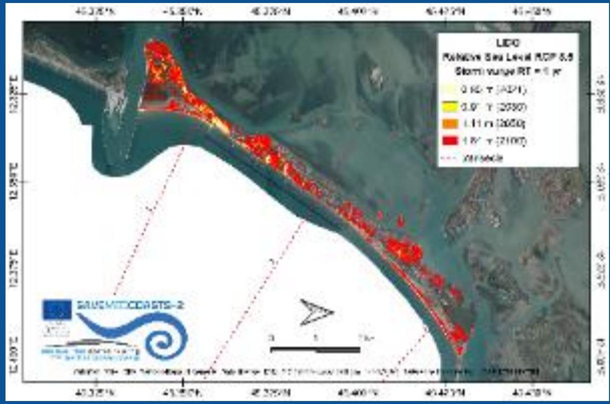
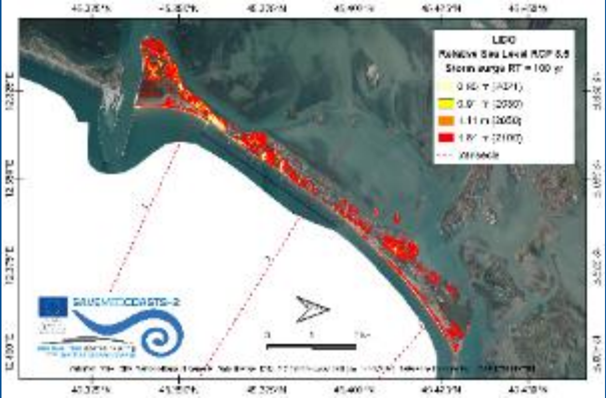
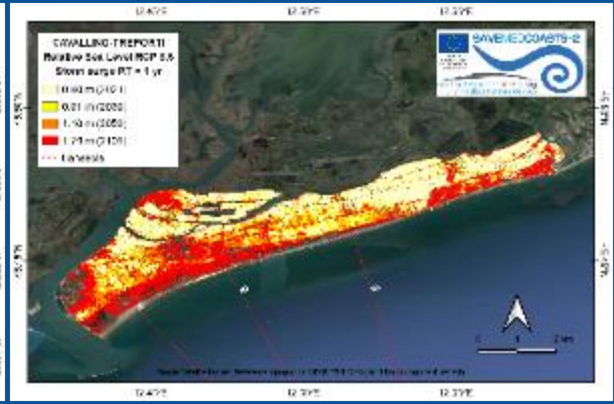
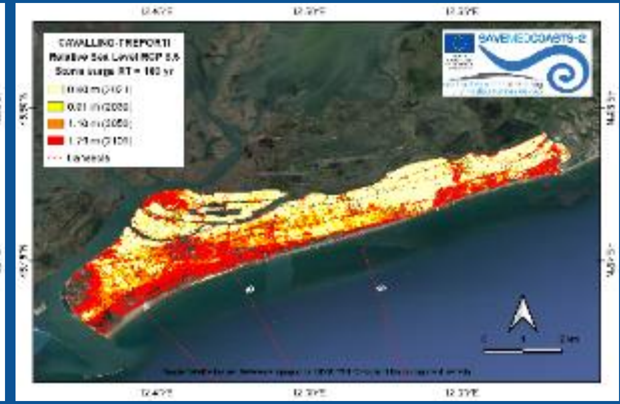


Venice lagoon



Lido
(no overtopping)

Cavallino-Treporti
(no overtopping)

	RT = 1 yr	RT = 100 yrs	RT = 1 yr	RT = 100 yrs
RCP 2.6				
RCP 8.5				

Venice - Piazza San Marco

HWL 150 cm above mean sea level = **70**% of flooded area

HWL 270 cm above mean sea level = 100% of flooded area

Lidar data by CORILA

(mean land subsidence of the lagoon = 3.3±0.85 mm/yr from GNNS data

Metaponto (overtopping at 2050)

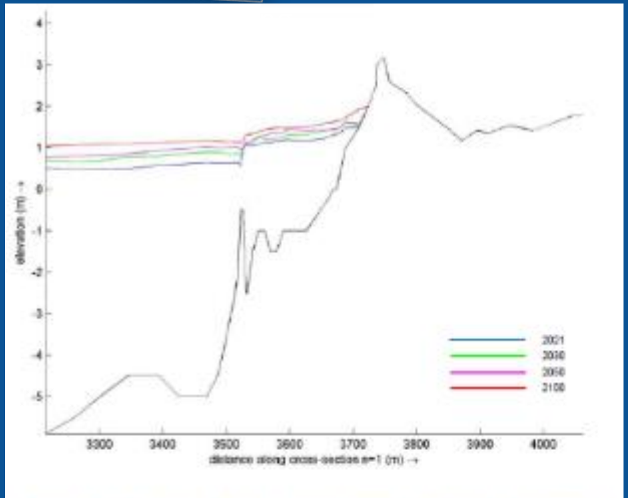


Figure 162 – Metaponto: transect 3 output for RCP 2.6 and storm surge RT = 1 yr

Overtopping

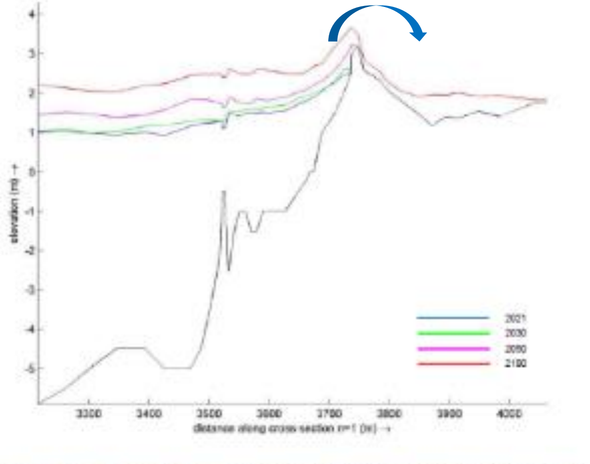
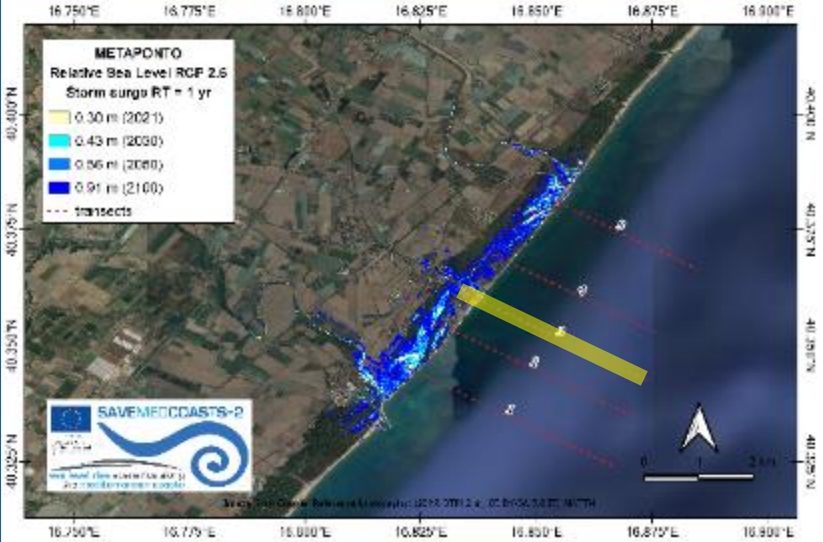


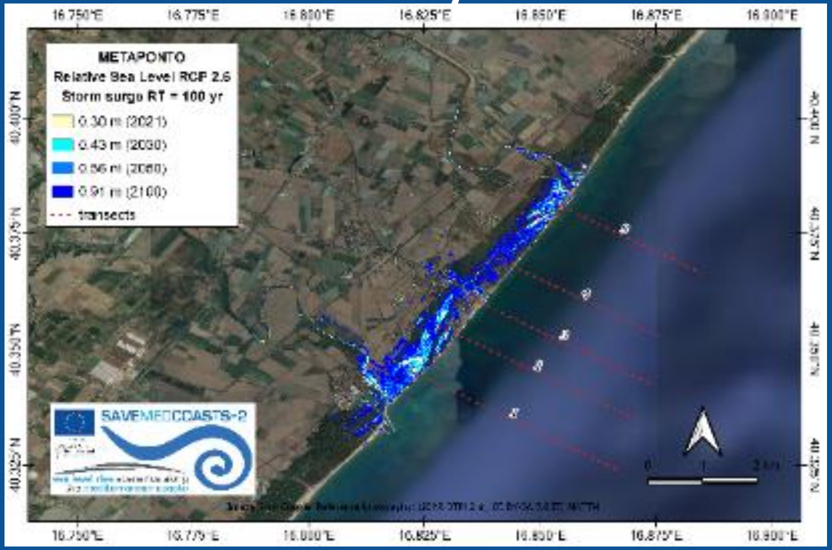
Figure 165 – Metaponto: transect 3 output for RCP 8.5 and storm surge RT = 100 yr

RT = 1 yr

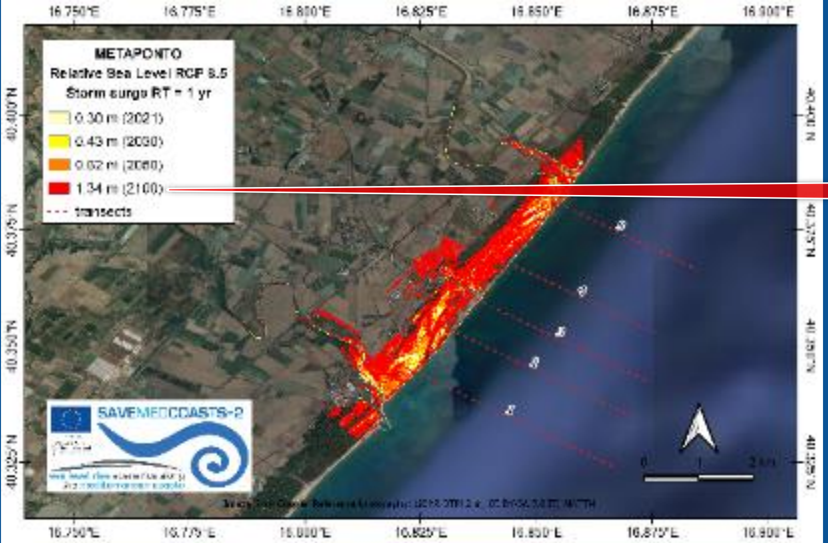
RT = 100 yrs

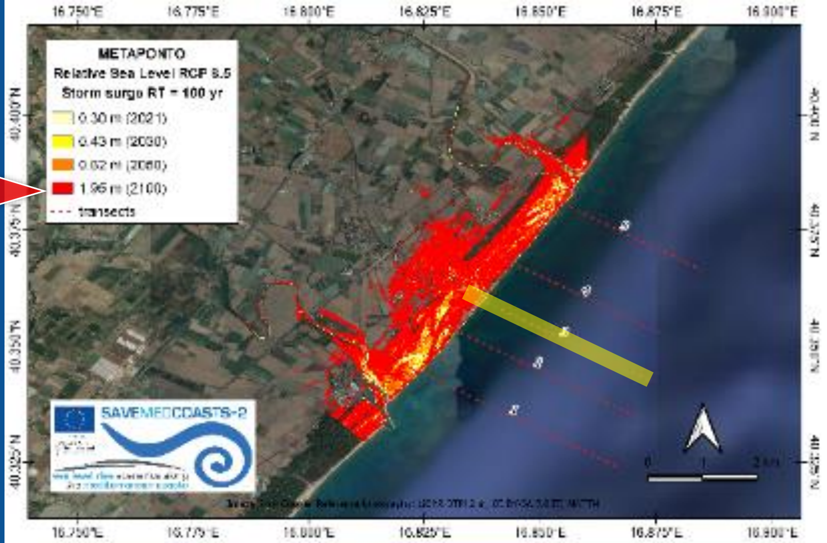
RCP 2.6





RCP 8.5





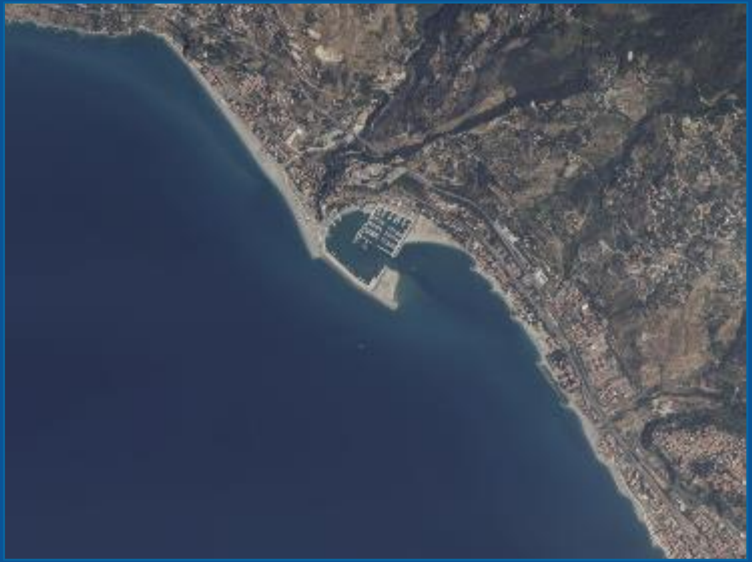
PP2 - Azione 7 -

Responsabili scientifici: prof. Francesco Aristodemo (UNICAL), prof. Pasquale Filianoti (UNIRC) e prof. Michele Greco (UNIBAS).

TECH4YOU

Studio meteomarino

Sito pilota:
Cetraro (CS)



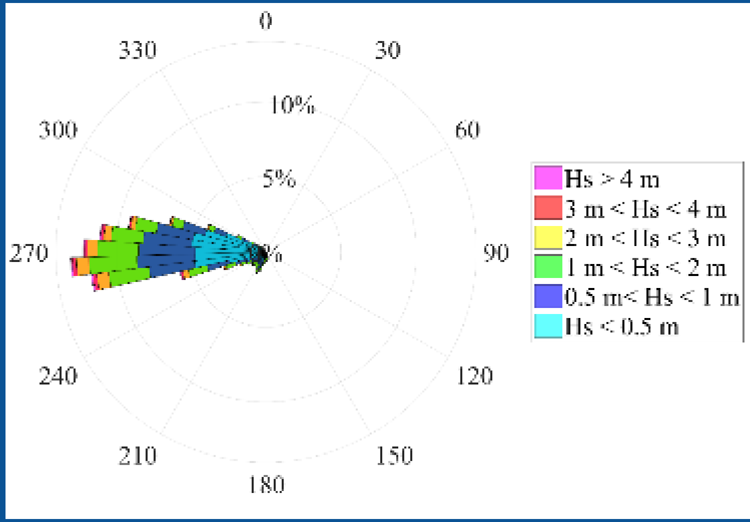


Diagramma polare

- Dati MeteOcean (serie storica dal 1979 al 2017)
- Clima meteomarino al largo
    - Diagrammi polari
    - Correlazioni altezze-periodi
    - Mareggiate (Hs soglia=3.5 m)
    - Onde di progetto (T=1, 50 e 100 anni)

	Settore 250° - 280° N			Settore 280° - 310° N		
T (anni)	Hs (m)	Tm (s)	Tp (s)	Hs (m)	Tm (s)	Tp (s)
1	6.45	10.03	11.77	5.62	9.59	11.27
50	9.23	11.25	13.19	9.51	11.36	13.32
100	9.72	11.44	13.41	10.20	11.62	13.62

Onde di progetto

PP2 - Azione 7

Responsabili scientifici: prof. Francesco Aristodemo (UNICAL), prof. Pasquale Filianoti (UNIRC) e prof. Michele Greco (UNIBAS).

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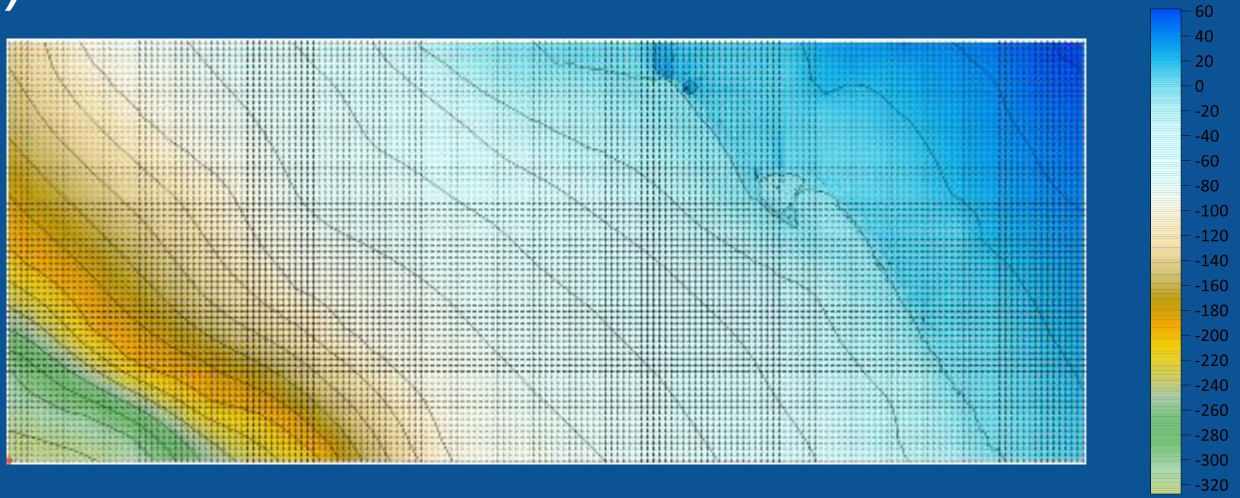
SWAN (Simulating WAves Nearshore)

- Carta nautica
- Carta topo-batimetrica (0.5 m)

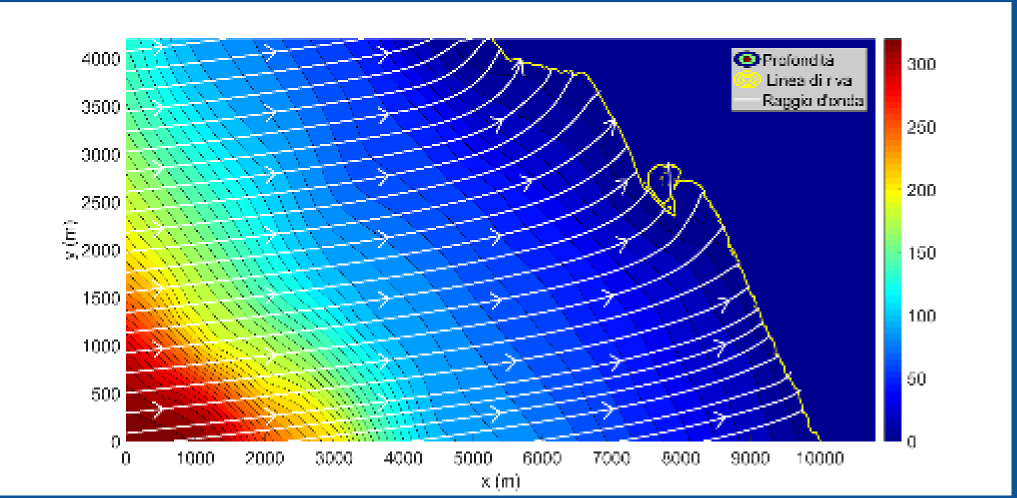
Griglia strutturata (281x721) $\Delta x = \Delta y = 15m$



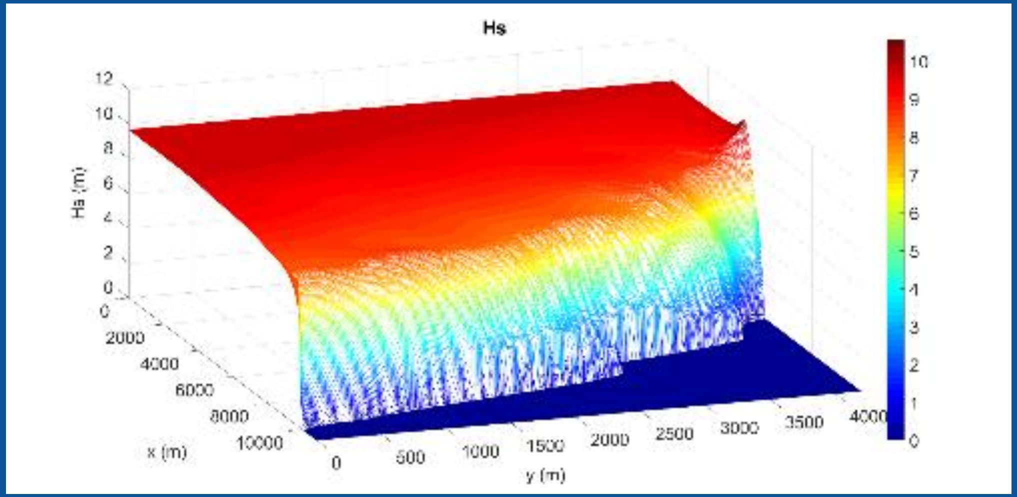
SWAN Simulating WAves Nearshore

Onde di progett
direzionali con
T=100 anni

Hs=9.72 m
Tp=13.4 s
Dir=265°N



Profondità del fondale e raggi d'onda



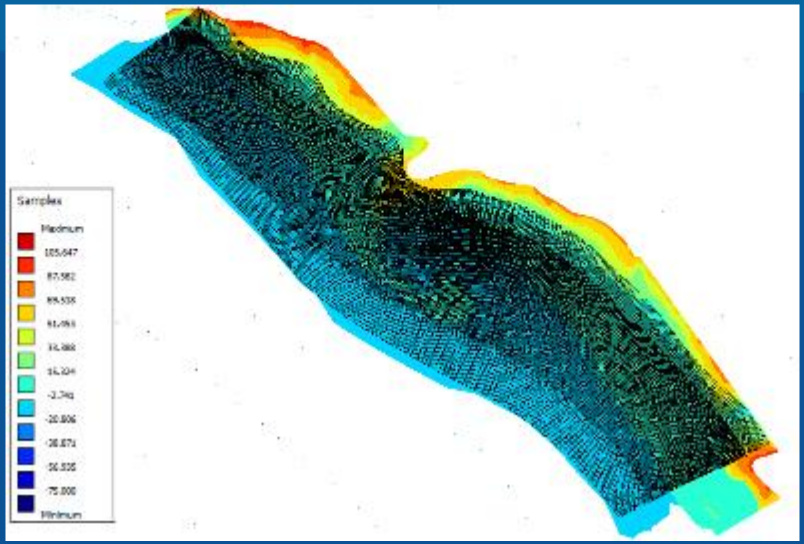
Distribuzione tridimensionale dell'altezza d'onda significativa

PP2 - Azione 7

Responsabili scientifici: prof. Francesco Aristodemo (UNICAL), prof. Pasquale Filianoti (UNIRC) e prof. Michele Greco (UNIBAS).

XBeach

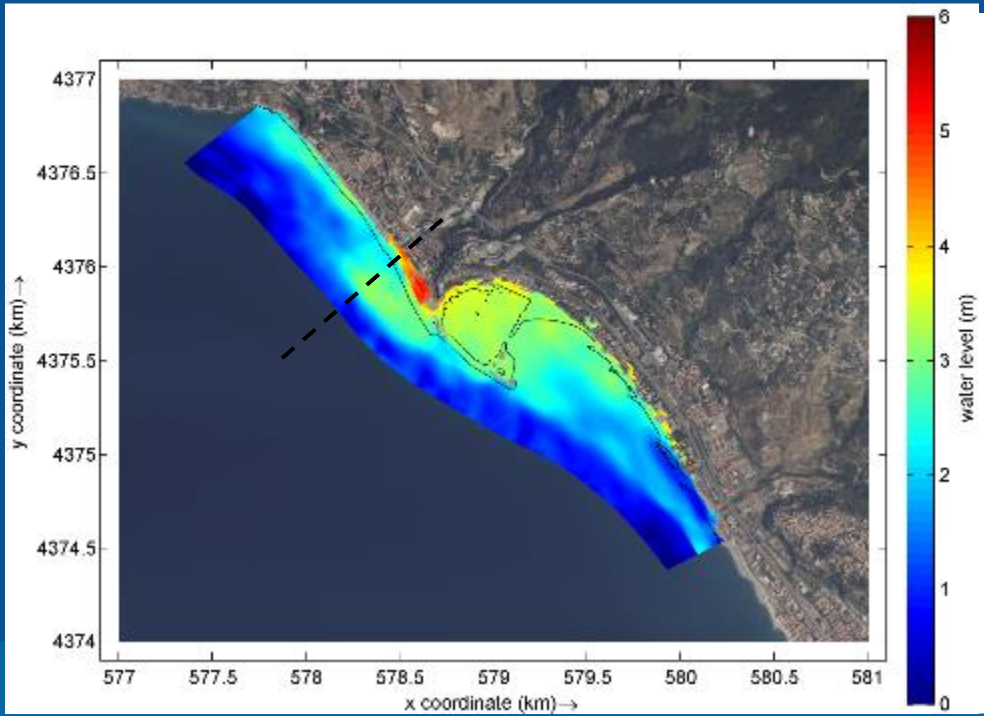
- Carta nautica
- Carta topo-batimetrica (0.5 m)
- Rilievi Lidar sulla spiaggia emersa (2 m)

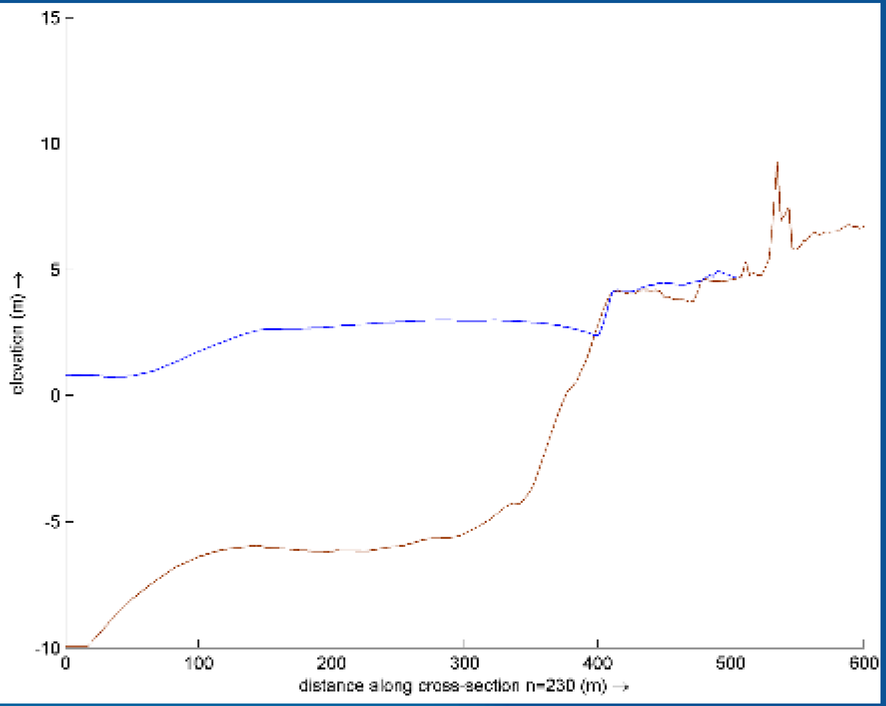


Griglia strutturata curvilinea (189x361)

Dati di input:
Hs=6,58 m
Tp=11.3 s
Dir=237.15°N

(scenario climatico RCP8.5)





PP2 - Azione 7

Responsabili scientifici: prof. Francesco Aristodemo (UNICAL),
prof. Pasquale Filianoti (UNIRC) e prof. Michele Greco (UNIBAS).

TECH4YOU

XBeach

XBeach output

Spatial distribution of Maximum

coastal

Dati di input:
Hs=6,58 m
Tp=11.3 s
Dir=237.15°N

(climatic scenarios RCP8.5)

Preliminary cascading effects

Overview

The task is addressed to provide a preliminary assessment of cascading effects induced on infrastructures, human activities, coastal protected areas, etc. in the study areas due to the flooding scenarios evaluated in Task T4.1.

What we have done

The approach adopted to achieve this goal is a **"flood-damage model like"**, overlapping the flooding scenarios (flooded areas) with human settlements (buildings, transportation networks, drainage channels, valuable crops, etc.) and environment ecosystems (land use/land cover, protected areas, etc.) and evaluating the measure of such interferences in terms of percentage indicators of damage/integrity with regard to the particular component taken into account.

The main products of this task are the following:

1. the maps of damage indicators for each study area, based on the flooding scenarios estimated by Task 4.1 for 2021, 2030, 2050 and 2100 epochs;
2. time series, stage-damage curves and charts on the weight of indicators.

Preliminary cascading effects

Damage Indicators (DI)

	Accom	Buildings	Drainage Network	Irrigation Areas	Protected Areas	Road network	Rice fields
Metaponto plain	X	X	X	X	X	X	
Venice lagoon (Lido + Cavallino Treporti)		X		X	X	X	
Ebro delta					X	X	X
Rhone delta					X	X	X
Chalastra plain					X	X	X

$$DI\ (\%) = A_{damaged} / A_{ref} \qquad (1)$$

where: $A_{damaged}$ is the damaged area of the element considered (e.g., buildings)

A_{ref} is the reference area, i.e. the domain of interest within which the indicators have been defined and then calculated.

or

$$DI\ (\%) = L_{damaged} / L_{ref} \qquad (2)$$

where: $L_{damaged}$ = damaged length of the element considered (e.g., roads)

L_{ref} is the reference length, i.e. the total length of the element considered falling into the domain of interest within which the indicators have been defined and then calculated.

The percentage defined per each damage indicator represents the ratio between the flooded element and the total value of the element falling into the reference area.

Note: The pilot area of Metaponto Plain presents the highest number of damage indicators to be included in the analysis due to the very features of the area which is urbanized in the back-dune of the coastal zone with touristic accommodations, agricultural areas, surface and sub-services infrastructures like roads and drainage networks, beyond the protected areas.

Metaponto

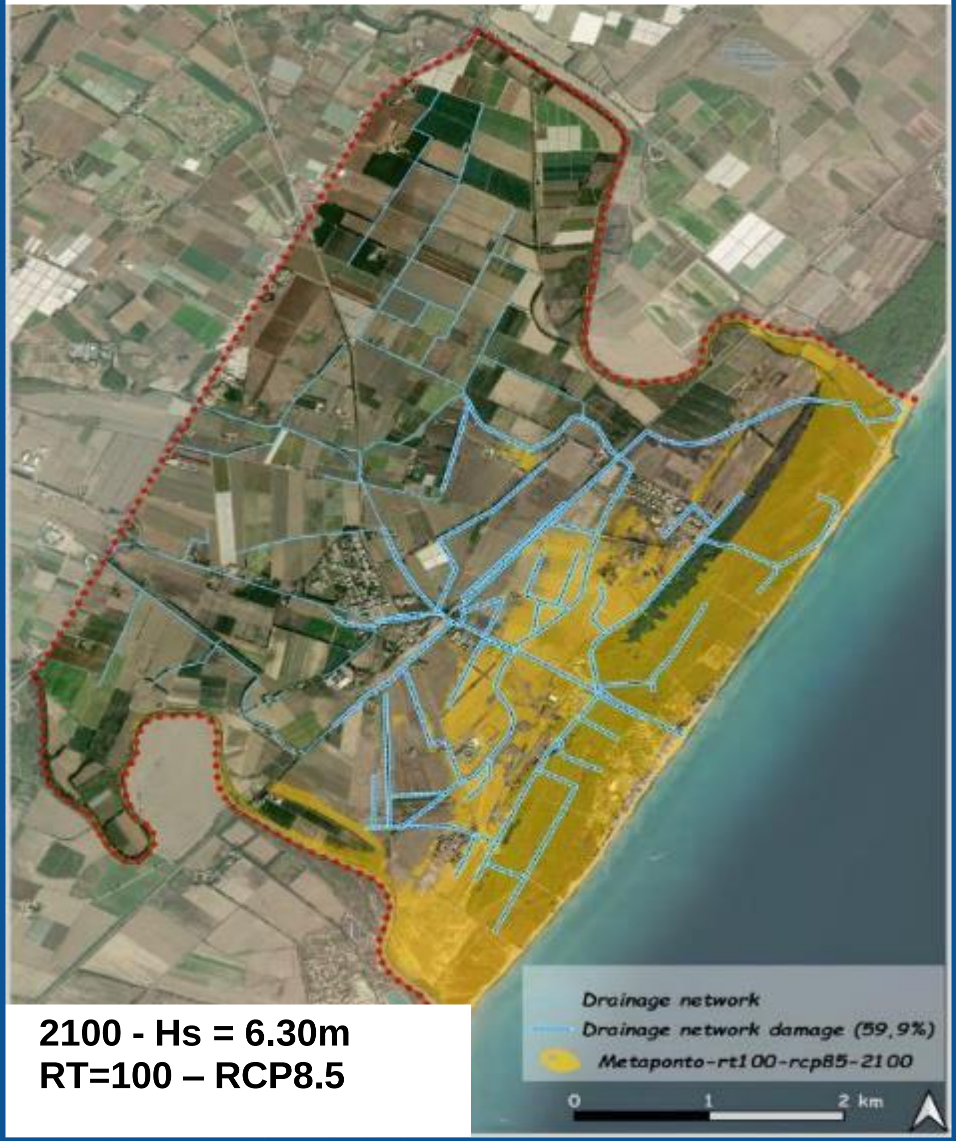
Scenarios	Accom. (%)	Building (%)	Drainage Network (%)	Irrigation Area (%)	Protected Area (%)	Road network (%)
RCP2.6-2030	0.00	0.00	19.90	<0.01	1.30	0.00
RCP2.6-2050	0.00	0.00	22.70	<0.01	2.90	0.00
RCP2.6-2100	0.00	0.60	27.10	<0.01	12.80	3.40
RCP8.5-2030	0.00	0.00	17.80	<0.01	1.10	0.00
RCP8.5-2050	0.03	0.05	22.70	<0.01	4.00	1.10
RCP8.5-2100	26.00	11.30	37.30	<0.01	44.40	12.10
RT001-2021	0.00	0.30	22.30	<0.01	4.70	1.50
RT001-RCP2.6-2030	0.00	0.30	24.80	<0.01	9.30	3.70
RT001-RCP2.6-2050	0.00	0.90	29.10	<0.01	16.30	5.30
RT001-RCP2.6-2100	28.50	11.00	29.10	0.01	43.60	11.70
RT001-RCP8.5-2030	0.00	0.70	24.80	<0.01	9.30	3.50
RT001-RCP8.5-2050	2.10	1.50	29.30	<0.01	20.20	4.70
RT001-RCP8.5-2100	60.60	30.90	50.00	0.21	70.00	21.40
RT100-2021	0.00	0.30	22.50	<0.01	4.70	1.50
RT100-RCP2.6-2030	0.00	0.30	24.80	<0.01	9.30	3.70
RT100-RCP2.6-2050	0.00	0.90	29.10	<0.01	9.30	5.30
RT100-RCP2.6-2100	29.60	11.00	38.40	0.01	43.60	11.70
RT100-RCP8.5-2030	0.00	0.70	24.80	<0,01	9.30	3.50
RT100-RCP8.5-2050	2.10	1.50	29.30	<0.01	20.20	4.70
RT100-RCP8.5-2100	76.70	44.80	59.90	4.10	81.00	30.60

Table 2 – List of the interference indicators for Metaponto plain

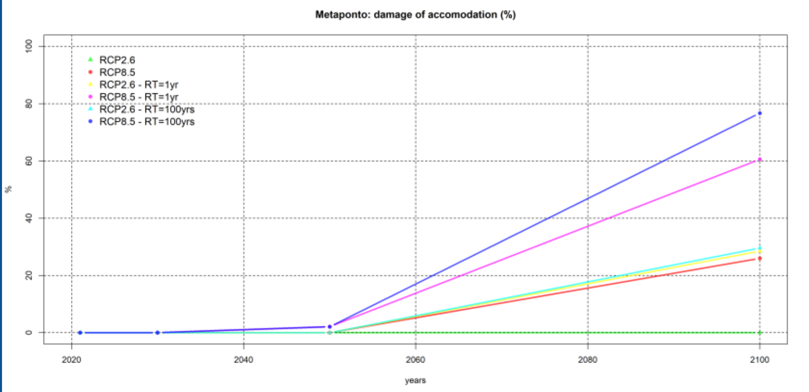
CASCADING EFFECTS - BASENTO COAST

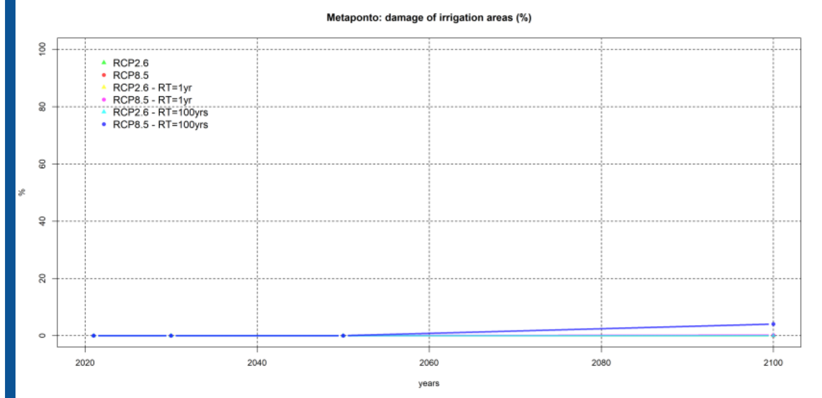
DRAINAGE NETWORK IN RSLR CONDITION

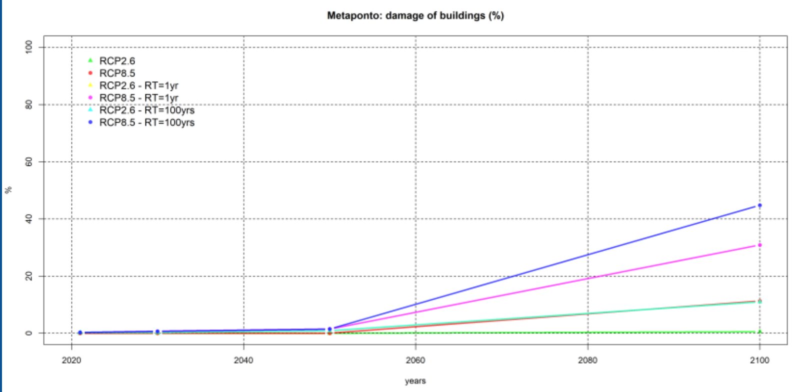
DRAINAGE NETWORK IN RSLR AND EXTREME STORM-SURGE CONDITION

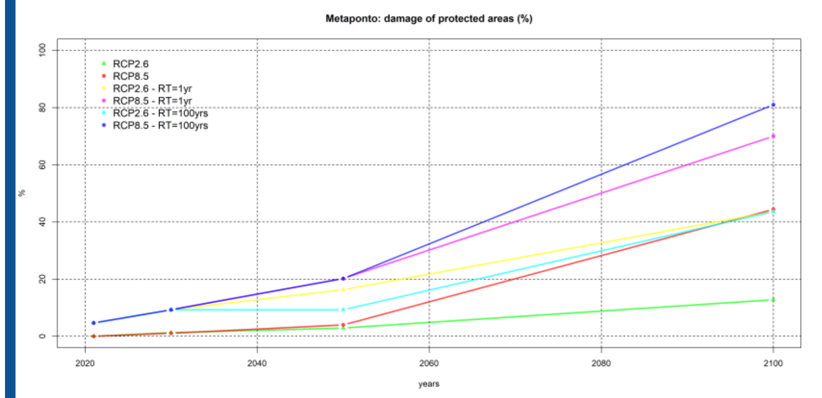


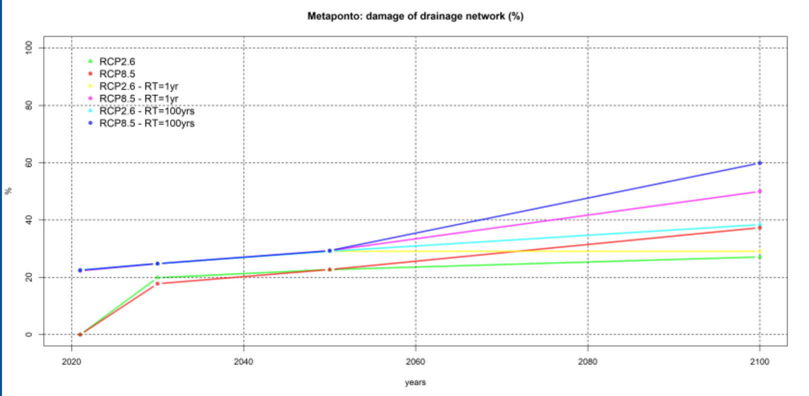
Metaponto

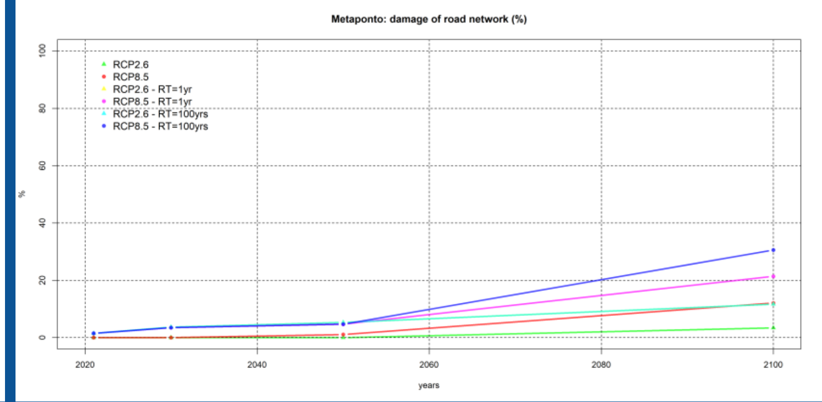

Metaponto: damage of accomodation (%)
RCP2.6
RCP8.5
RCP2.6 - RT=1yr
RCP8.5 - RT=1yr
RCP2.6 - RT=100yrs
RCP8.5 - RT=100yrs
%
0
20
40
60
80
100
2020
2040
2060
2080
2100
years

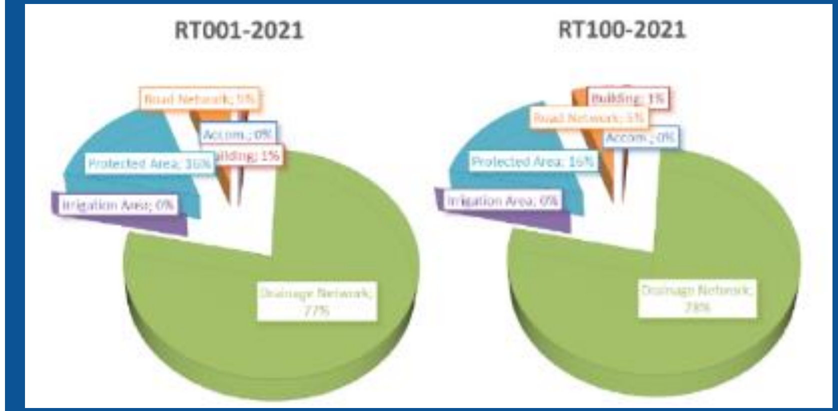

Metaponto: damage of irrigation areas (%)
RCP2.6
RCP8.5
RCP2.6 - RT=1yr
RCP8.5 - RT=1yr
RCP2.6 - RT=100yrs
RCP8.5 - RT=100yrs
%
0
20
40
60
80
100
2020
2040
2060
2080
2100
years

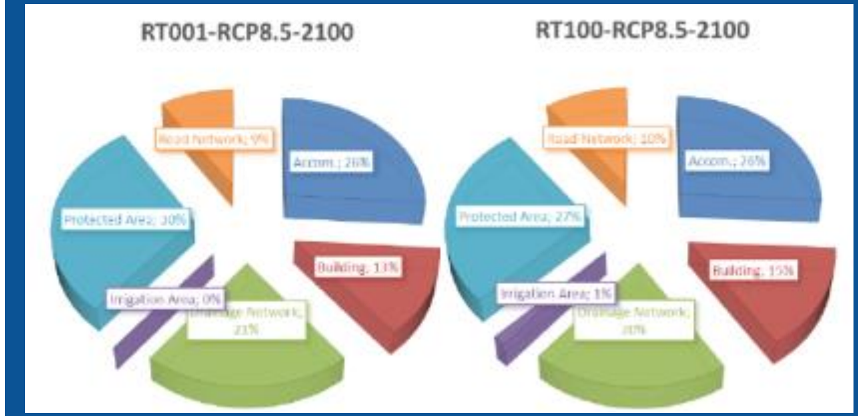

Metaponto: damage of buildings (%)
RCP2.6
RCP8.5
RCP2.6 - RT=1yr
RCP8.5 - RT=1yr
RCP2.6 - RT=100yrs
RCP8.5 - RT=100yrs
%
0
20
40
60
80
100
2020
2040
2060
2080
2100
years


Metaponto: damage of protected areas (%)
RCP2.6
RCP8.5
RCP2.6 - RT=1yr
RCP8.5 - RT=1yr
RCP2.6 - RT=100yrs
RCP8.5 - RT=100yrs
%
0
20
40
60
80
100
2020
2040
2060
2080
2100
years


Metaponto: damage of drainage network (%)
RCP2.6
RCP8.5
RCP2.6 - RT=1yr
RCP8.5 - RT=1yr
RCP2.6 - RT=100yrs
RCP8.5 - RT=100yrs
%
0
20
40
60
80
100
2020
2040
2060
2080
2100
years

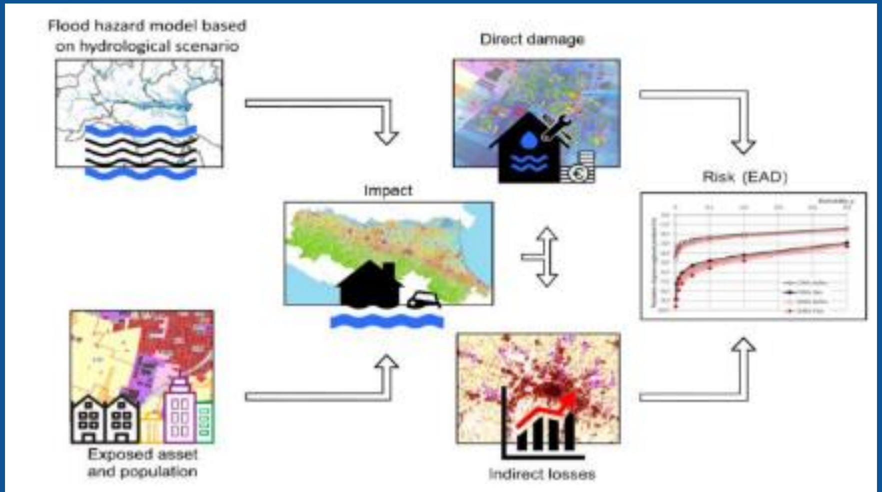

Metaponto: damage of road network (%)
RCP2.6
RCP8.5
RCP2.6 - RT=1yr
RCP8.5 - RT=1yr
RCP2.6 - RT=100yrs
RCP8.5 - RT=100yrs
%
0
20
40
60
80
100
2020
2040
2060
2080
2100
years


RT001-2021
Road Network; 5%
Accom.; 0%
Irrigation Area; 0%
RT100-2021
Building; 1%
Accom.; 0%
Protected Area; 16%
Irrigation Area; 0%


RT001-RCP8.5-2100
Road Network; 9%
Accom.; 26%
Protected Area; 30%
Building; 11%
Irrigation Area; 0%
RT100-RCP8.5-2100
Road Network; 10%
Accom.; 26%
Protected Area; 27%
Building; 15%
Irrigation Area; 1%

Multi risk analysis and socio-economic assessment risk framework

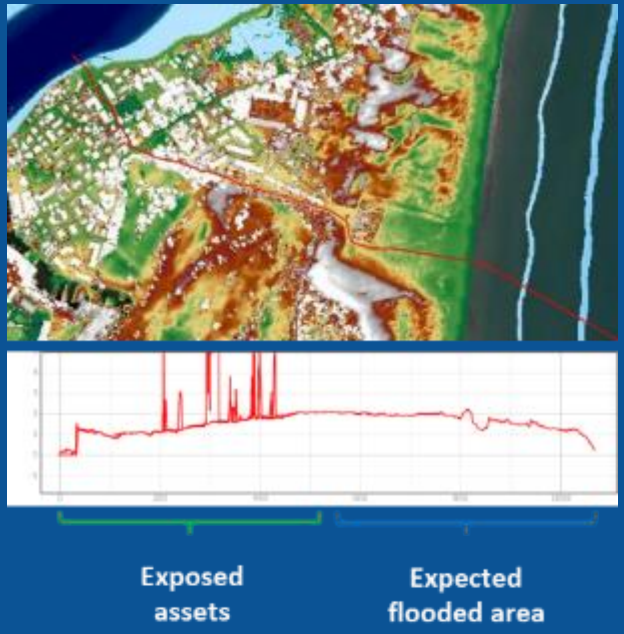
- Development of methodologies for the assessment of risks induced by multiple climate-related hazards in coastal flood-prone areas.
- Evaluation of environmental and socio-economic impacts due to specific types of climate-events and scenarios.



Lido (Granviale)

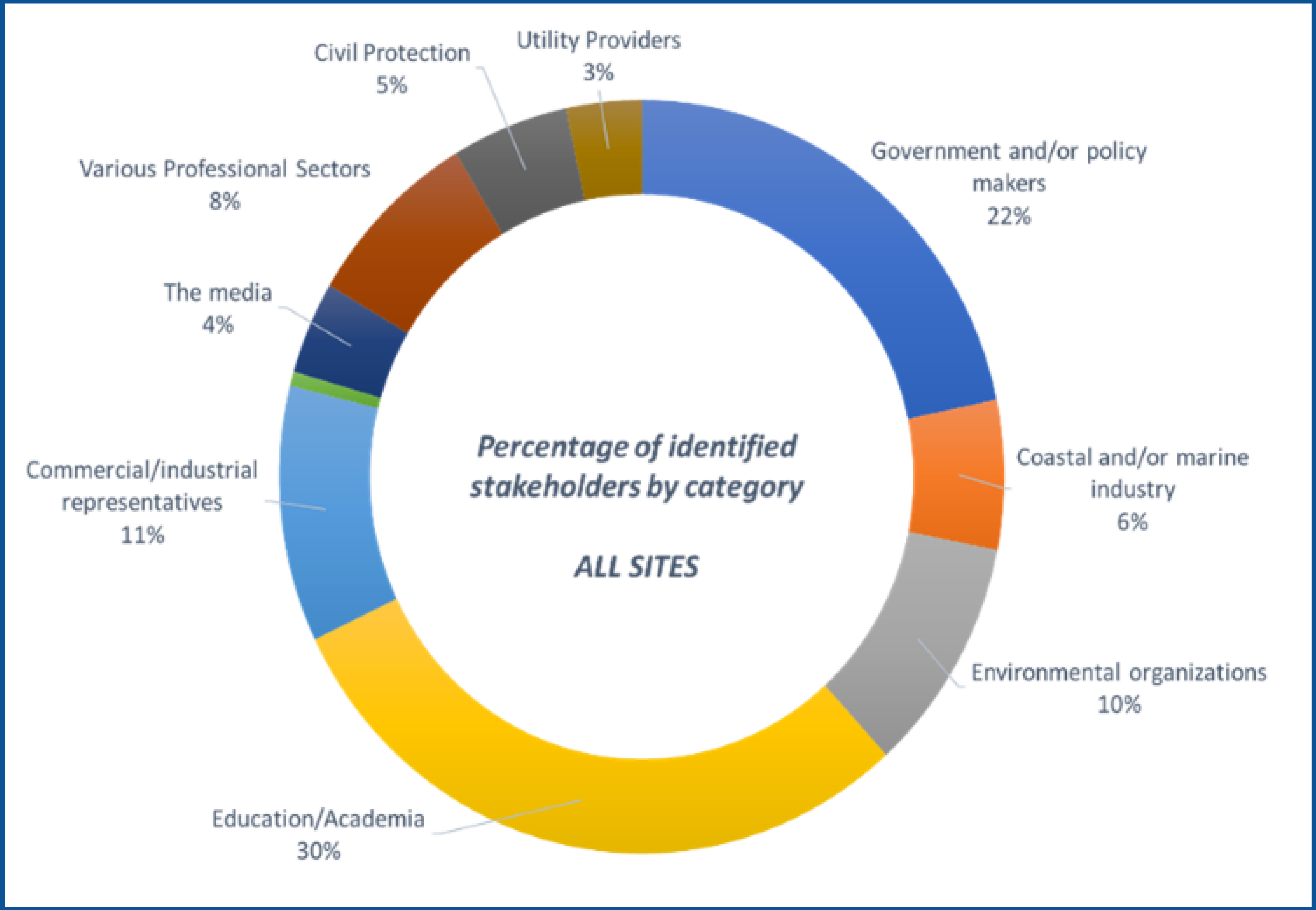
Malamocco

Alberoni



Knowledge transfer
Stakeholder Mapping

Category	Number of stakeholders identified
Government and/or Policy Makers	71
Coastal and/or Marine Industry	21
Environmental Organisations	33
Education/Academia/Research	97
Commercial/Industrial Representatives	36
Insurance Sector	2
The Media	13
Various Professional Sectors	26
Civil Protection	17
Utility Providers	11
Total	**327**



Knowledge transfer: analysis of stakeholder perceptions on sea level rise

Aim: Gain a better understanding of the perceptions of stakeholders in each of the targeted sites with regards to causes, impacts and mitigation/adaptation measures for sea level rise.

How: Questionnaires & Face-to-face Interviews.

Site	Institutions	Teachers	Students
Basento	32	23	111
Chalastra	20	20	44
Ebro	63	17	158
Venice	145	31	132
Cyprus			76
TOTAL	**260**	**91**	**521**

A total of 872 respondents to the questionnaires

Site	No. Stakeholders Interviewed
Chalastra (GR)	4
Venice (IT)	7
Basento (IT)	7
Ebro (ES)	6
Total	**24**

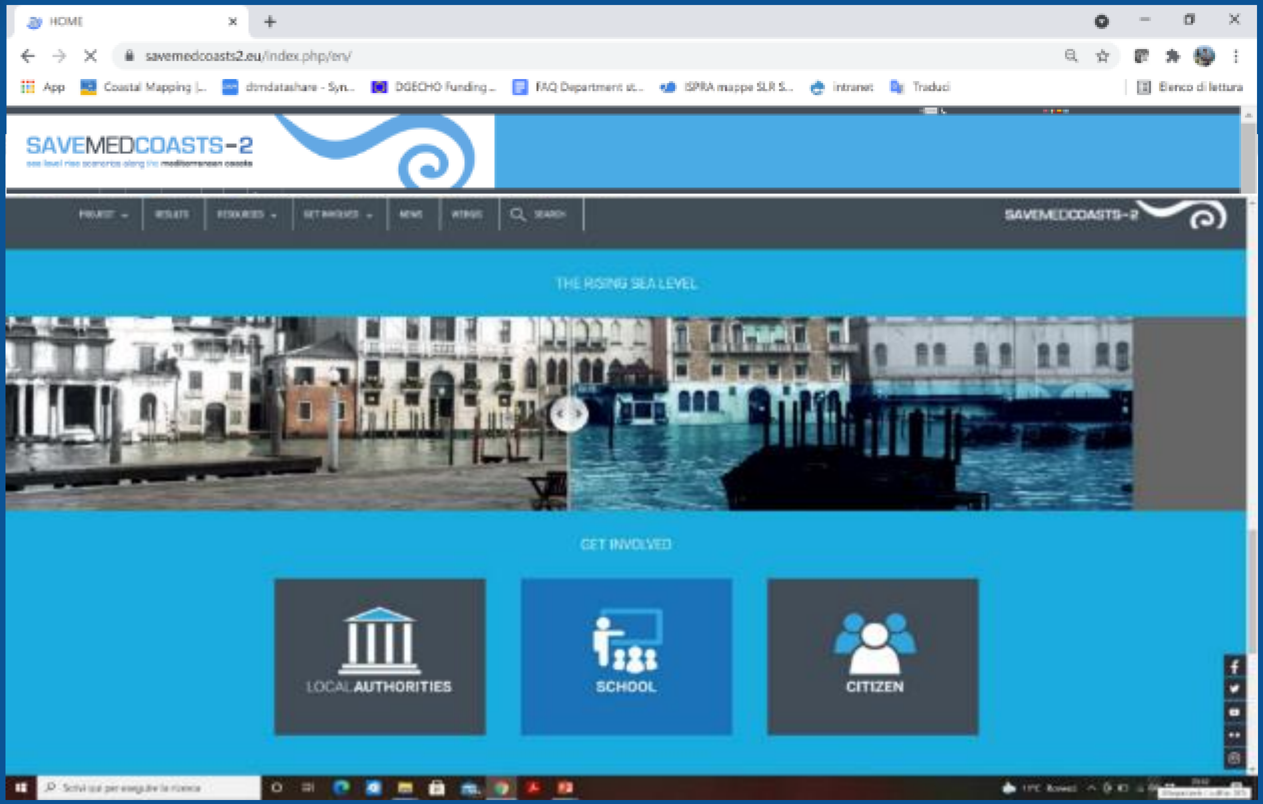
(Virtual) Face-to-face Interviews

Partecipatory workshops

Identification of gaps and needs of risk data end-users, decision-makers, and other key stakeholders & Development of Policy Tools for SLR mitigation.

www.savemedcoasts2.eu

Dissemination



social networks

Workshops, meetings conferences, etc.

webGIS: a decision support tool for coastal spatial planning

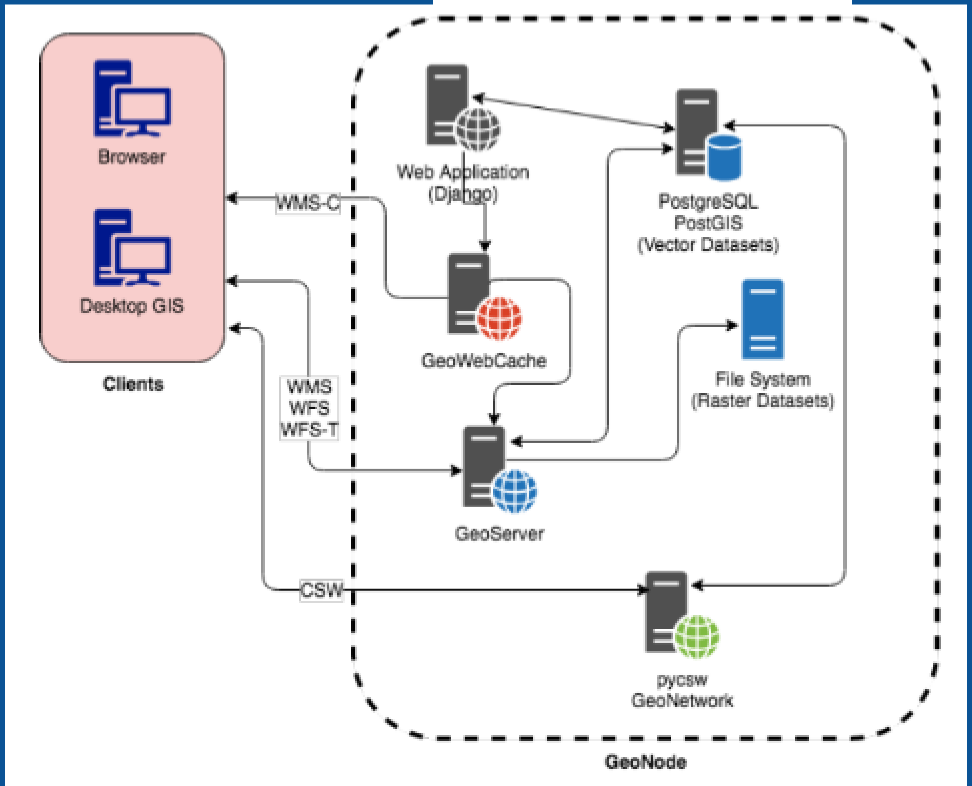
One of the main outputs of SAVEMEDCOASTS-2 project is the **webGIS**, a collaborative web platform aimed at storing and contributing to disseminate the results of the project.

A first experimental version of the webGIS was launched during the SAVEMEDCOASTS project, so it is publicly accessible online since October 2017 through the following URL: **http://webgis.savemedcoasts.eu**.

The webGIS has been redesigned and further enriched with new data and features during the SAVEMEDCOASTS-2 project. It will be available (at least) until June 2025.

GeoNode

GeoNode



Architecture of GeoNode

Corti, P.; Bartoli, F.; Fabiani, A.; Giovando, C.; Kralidis, T.; Tzotsos, A. (2019). GeoNode: An Open Source Framework to Build Spatial Data Infrastructures. DOI: 10.7287/peerj.preprints.27534v1

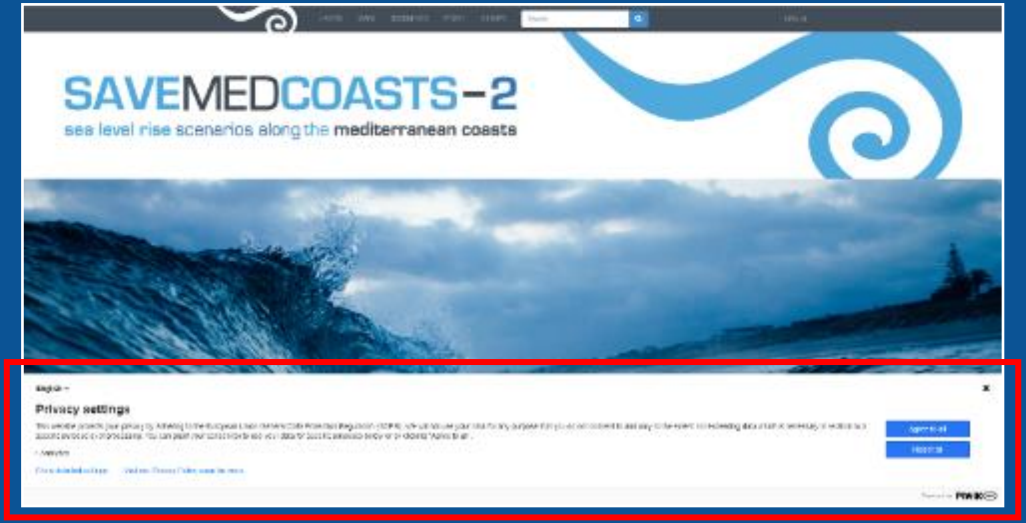
"GeoNode is an open source framework designed to build geospatial content management systems (GeoCMS) and spatial data infrastructure (SDI) nodes. Its development was initiated by the Global Facility for Disaster Reduction and Recovery (GFDRR) in 2009 and adopted by a large number of organizations in the following years. Using an open source stack based on mature and robust frameworks and software like Django, OpenLayers, PostGIS, GeoServer and pycsw, an organization can build on top of GeoNode its SDI or geospatial open data portal. GeoNode provides a large number of user friendly capabilities, broad interoperability using Open Geospatial Consortium (OGC) standards, and a powerful authentication/authorization mechanism. Supported by a vast, diverse and global open source community, GeoNode is an official project of the Open Source Geospatial Foundation (OSGeo)."

Main activities

Improving an online mapping platform to share information on flooding scenarios

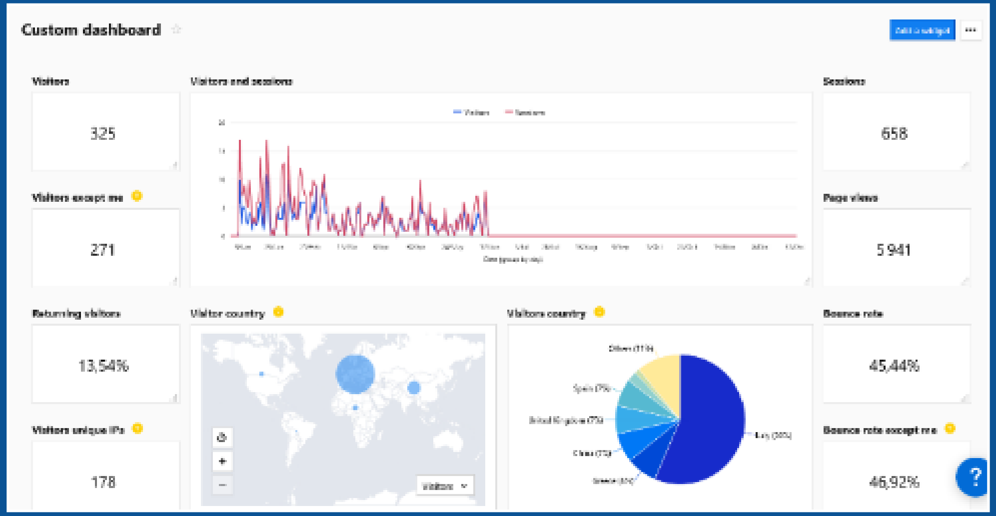
- restyling the webGIS homepage and layout in good agreement with the styles (color of the navigation bar, logo, banner, font, etc.) of the project website;
- enhancing and fine tuning the deployment environment, monitoring the server performance and detecting potential vulnerabilities and bugs;
- testing and enabling specific features of GeoNode (e.g. user registration and site wide announcements) in order to improve the site navigation and optimize the user experience;
- adding an analytics tool with user data protection, a Cookie Consent Manager in compliance with GDPR, and then a Privacy & Cookies Policy page;
- adding a Disclaimer page;
- last but not least, developing and integrating new web mapping applications ("apps") in order to visualize and analyze the flooding scenarios and their cascaded effects interactively.

Main activities

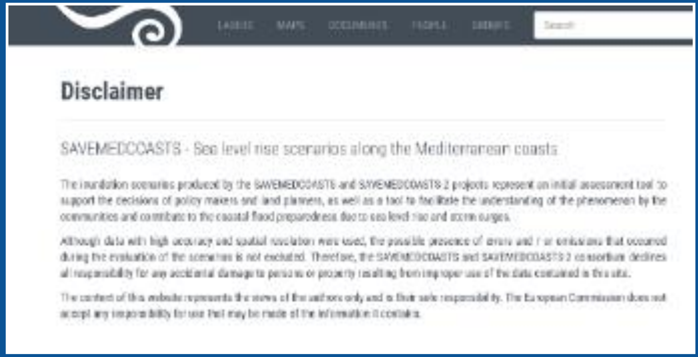


Cookie Consent Manager

Privacy and Cookies Policy

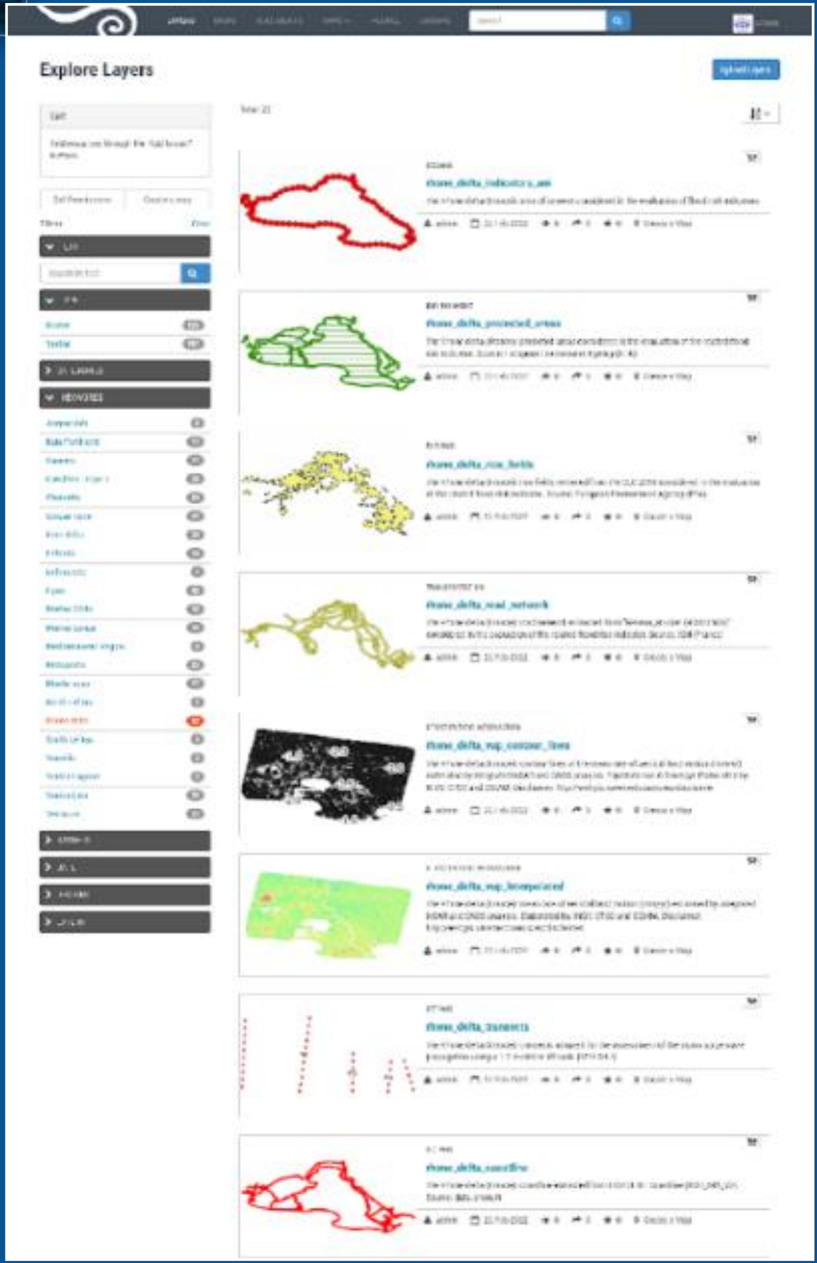


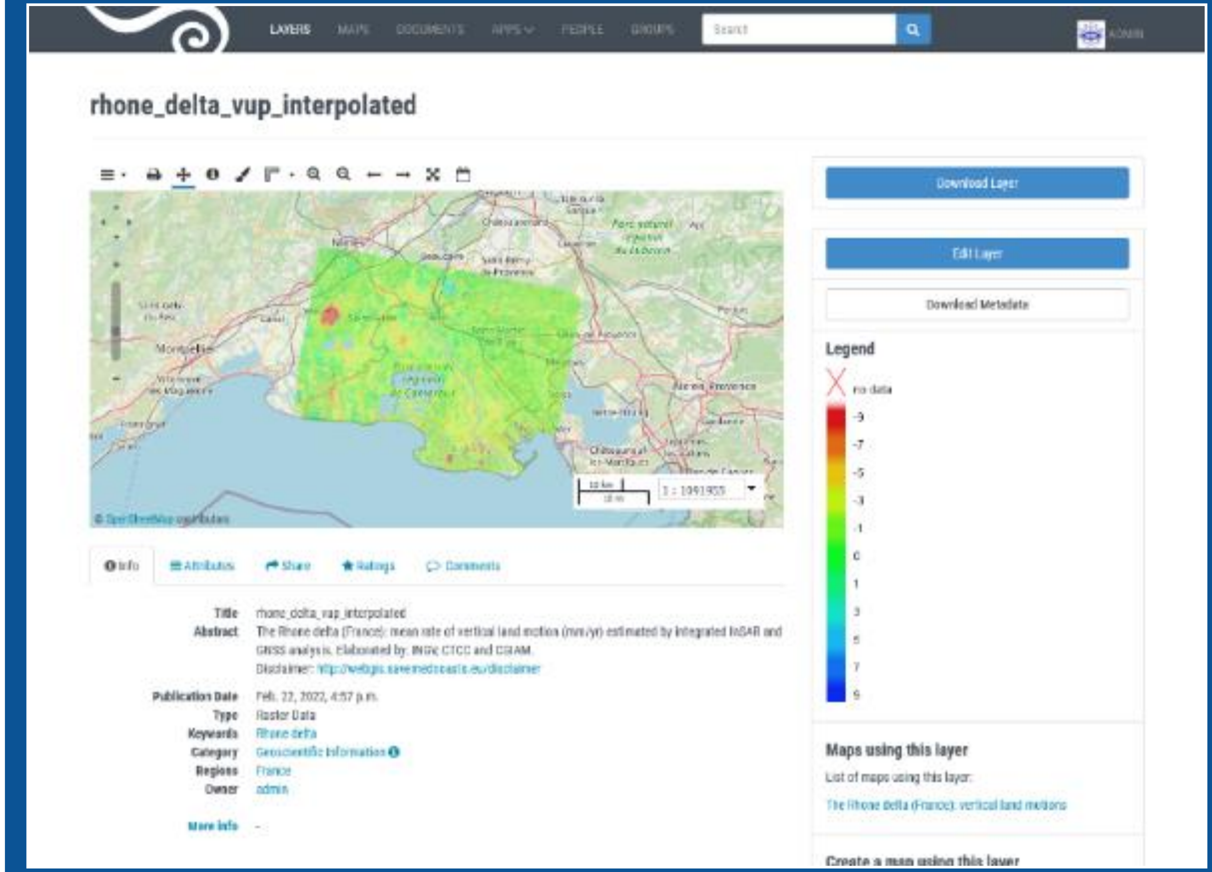
Analytics tool with user data protection



Disclaimer

Layers


Explore Layers


LAYERS
MAPS
DOCUMENTS
APPS
PEOPLE
GROUPS
Search
ADMIN
rhone_delta_vup_interpolated
Download Layer
Edit Layer
Download Metadata
Legend
no data
-9
-7
-5
-3
-1
0
1
3
5
7
9
Info
Attributes
Share
Ratings
Comments
Title rhone_delta_vup_interpolated
Abstract The Rhone delta (France): mean rate of vertical land motion (mm/yr) estimated by integrated InSAR and GNSS analysis. Elaborated by: INGV, CTCC and CGIAM.
Disclaimer: http://webgis.savemedcoasts.eu/disclaimer
Publication Date Feb. 22, 2022, 4:57 p.m.
Type Raster Data
Keywords Rhone delta
Category Geoscientific Information
Regions France
Owner admin
More info
Maps using this layer
List of maps using this layer:
The Rhone delta (France): vertical land motions
Create a map using this layer
Montpellier
Nîmes
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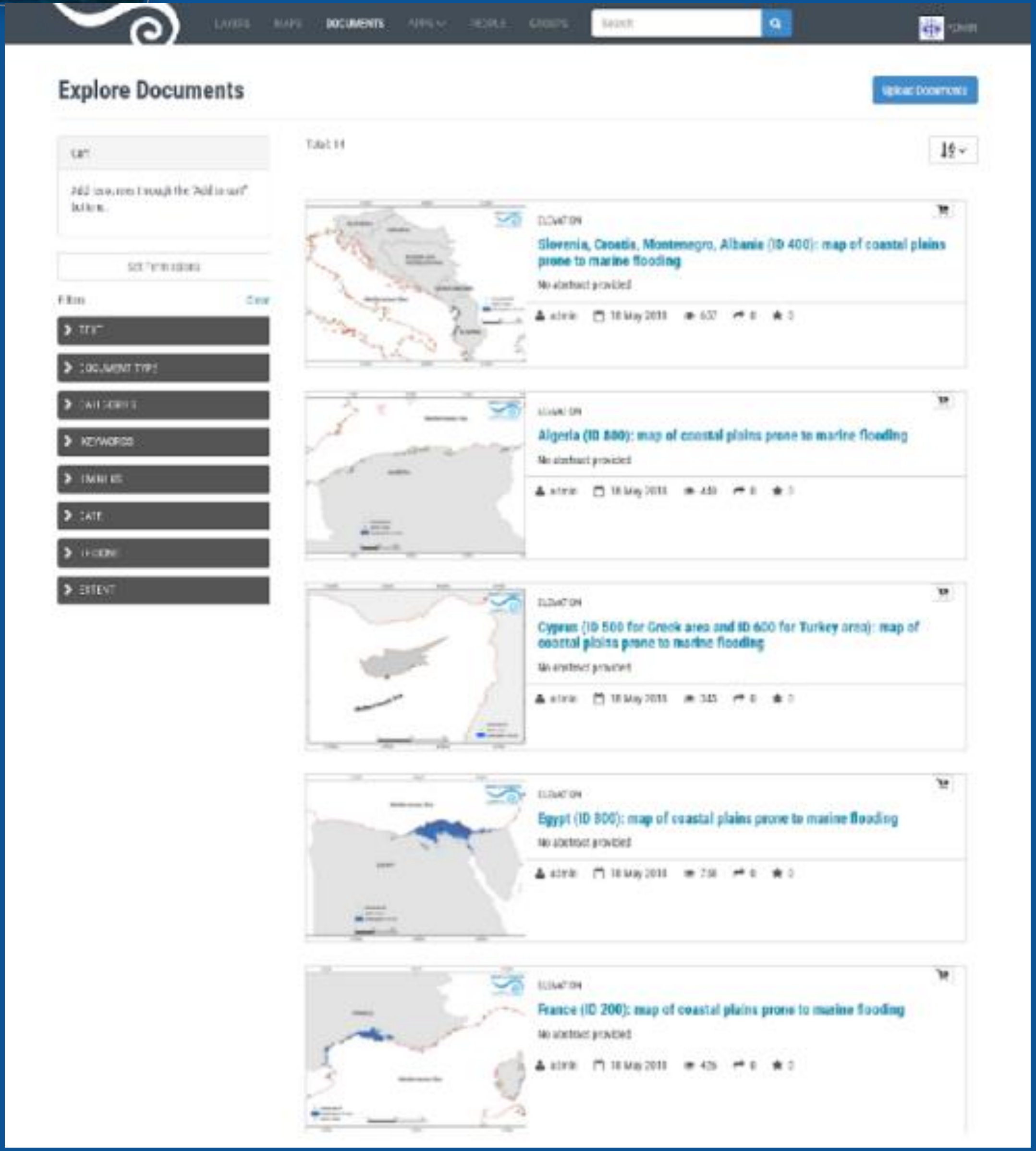
BLUE ECONOMY FORUM

Documents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Slovenia, Croatia, Montenegro, Albania (ID 400): map of coastal plains prone to marine flooding
No abstract provided
Algeria (ID 800): map of coastal plains prone to marine flooding
No abstract provided
Cyprus (ID 500 for Greek area and ID 600 for Turkey area): map of coastal plains prone to marine flooding
No abstract provided
Egypt (ID 900): map of coastal plains prone to marine flooding
No abstract provided
France (ID 200): map of coastal plains prone to marine flooding
No abstract provided


Italy (ID 300): map of coastal plains prone to marine flooding
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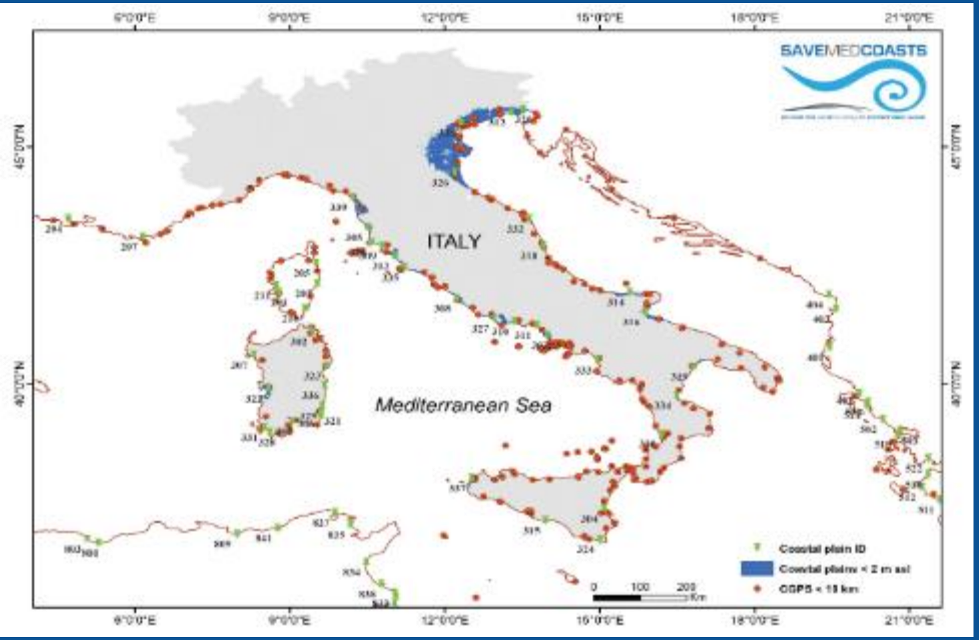
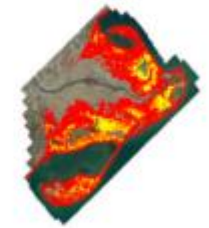

SAVEMEDCOASTS
ITALY
Mediterranean Sea
6°0'0"E
9°0'0"E
12°0'0"E
15°0'0"E
18°0'0"E
21°0'0"E
45°0'0"N
40°0'0"N
Coastal plain ID
Coastal plains < 2 m asl
OGPS < 15 km
0
100
200
Km

Maps



OCEANS

The Ebro delta (Spain): RSLR flooding scenarios

The Ebro delta (Spain): potential inundation scenarios at 2030, 2050 and 2100 due to the relative sea level rise (RCP2.6 or RCP8.5). [WP4 Task 4.1] Disclaimer: http://webgis.savemedcoasts.eu/disclaimer

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The Ebro delta (Spain): flood risk indicators

The Ebro delta (Spain): map containing the main layers considered in the assessment of flood risk indicators [WP4 Task 4.2]

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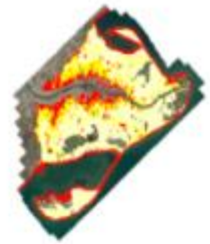

OCEANS

The Ebro delta (Spain): RSLR+HAT+SS flooding scenarios

The Ebro delta (Spain): potential inundation scenarios at 2021, 2030, 2050 and 2100 due to the combination of sea level rise (RCP2.6 or RCP8.5), vertical land movements (subsidence or uplift), highest astronomical tide and storm surges (ordinary or extreme conditions). [WP4 Task 4.1] Disclaimer: ht...

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GEOSCIENTIFIC INFORMATION

The Ebro delta (Spain): vertical land motions

The Ebro delta (Spain): vertical land motions by integrated InSAR and GNSS analysis. [WP2 D2.4] Disclaimer: http://webgis.savemedcoasts.eu/disclaimer

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The Venice Lagoon (Italy): RSLR flooding scenarios

The Venice Lagoon (Italy): potential inundation scenarios at 2030, 2050 and 2100 due to the relative sea level rise (RCP2.6 or RCP8.5). [WP4 Task 4.1] Disclaimer: http://webgis.savemedcoasts.eu/disclaimer

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Venice Lido and Cavallino Treporti (Italy): flood risk indicators

Venice Lido and Cavallino Treporti (Italy): map containing the main layers considered in the assessment of flood risk indicators [WP4 Task 4.2] Disclaimer: http://webgis.savemedcoasts.eu/disclaimer

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The Venice Lagoon (Italy): vertical land motions

The Venice Lagoon (Italy): vertical land motions by integrated InSAR and GNSS analysis. [WP2 D2.4] Disclaimer: http://webgis.savemedcoasts.eu/disclaimer

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Venice Lido (Italy): RSLR flooding scenarios

Venice Lido (Italy): potential inundation scenarios at 2030, 2050 and 2100 due to the relative sea level rise (RCP2.6 or RCP8.5). [WP4 Task 4.1] Disclaimer: http://webgis.savemedcoasts.eu/disclaimer

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Venice Lido (Italy): RSLR+HAT+SS flooding scenarios

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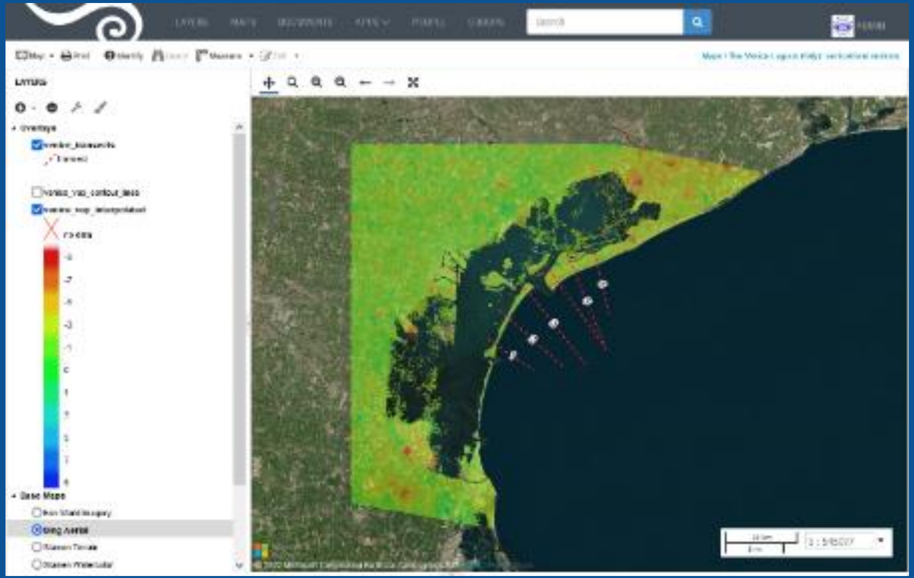
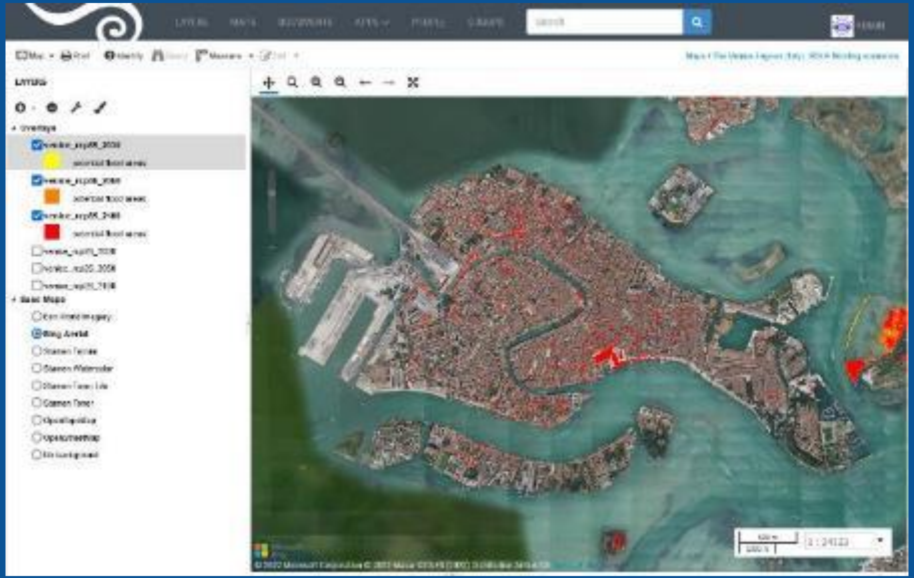
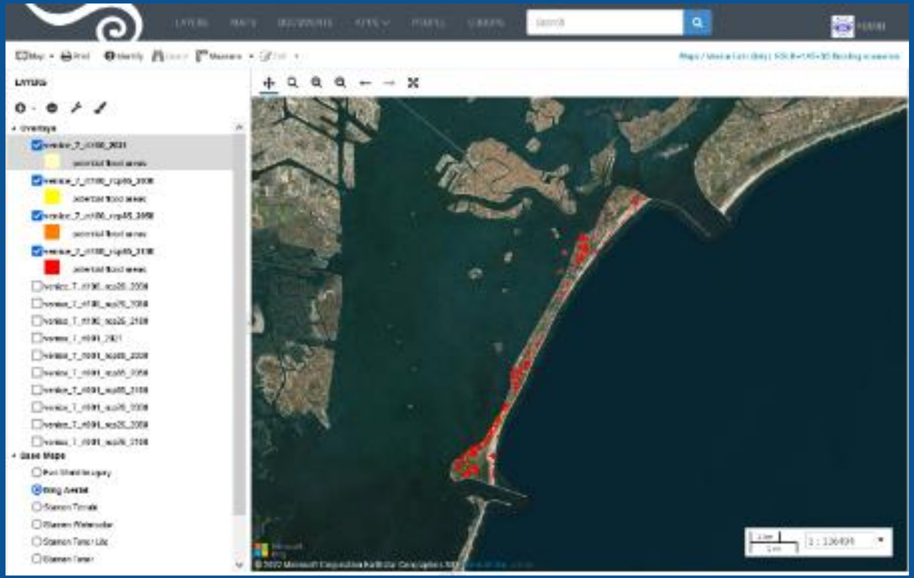
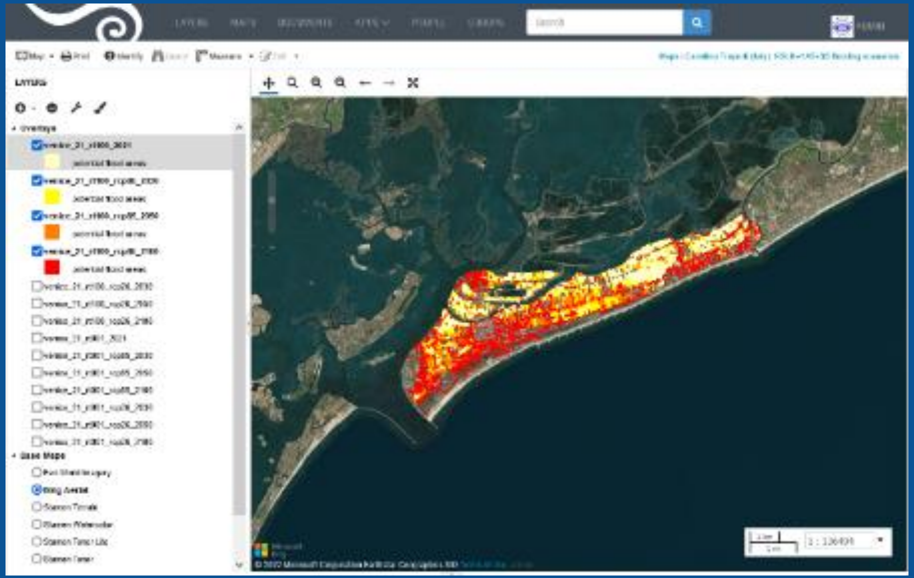
Maps on Venice Lagoon (Italy)

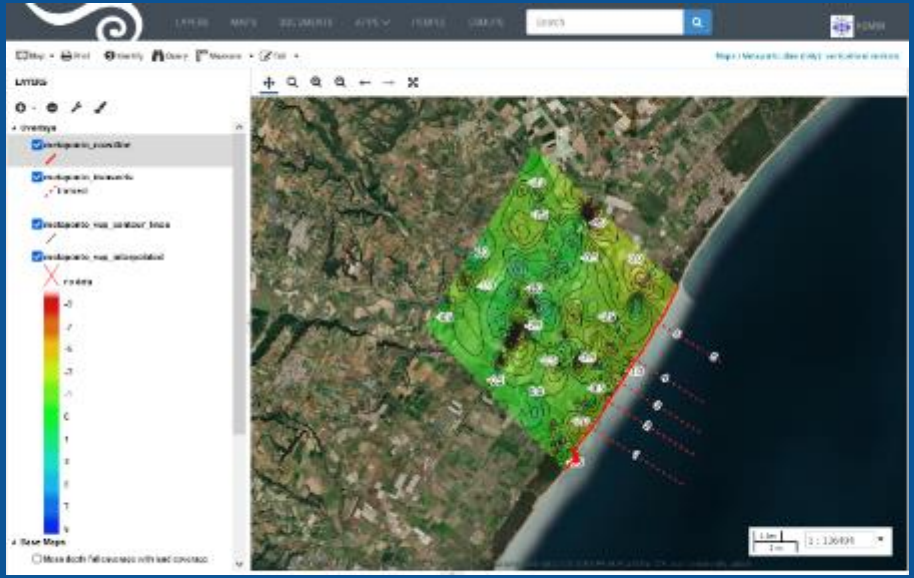


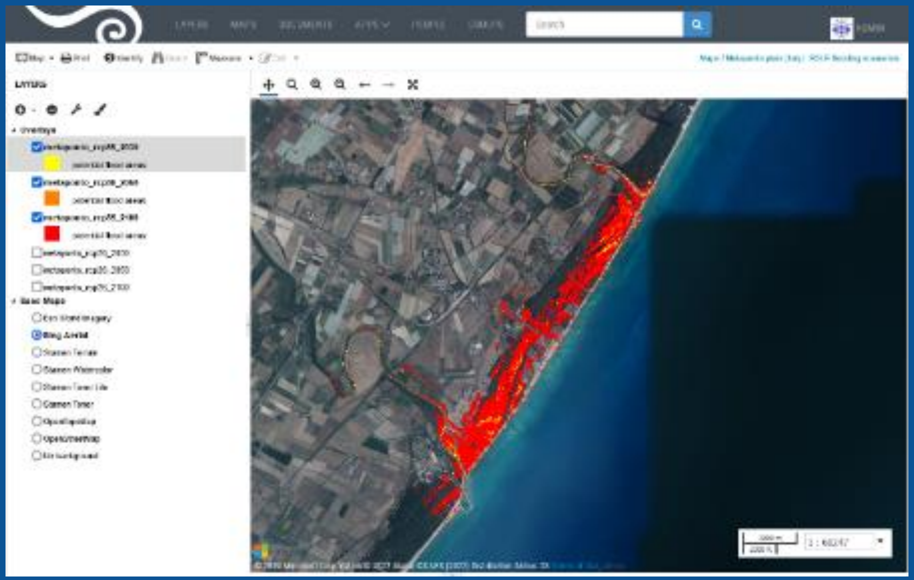


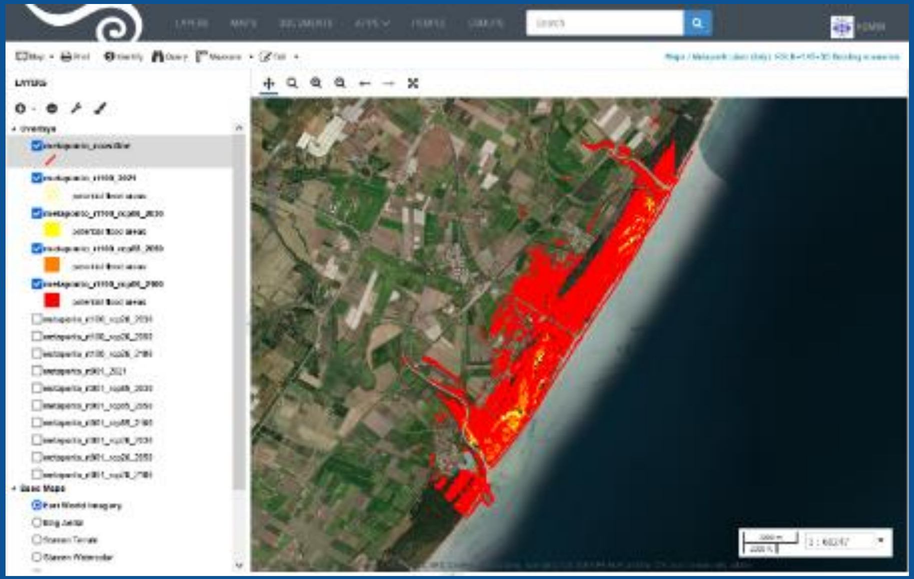


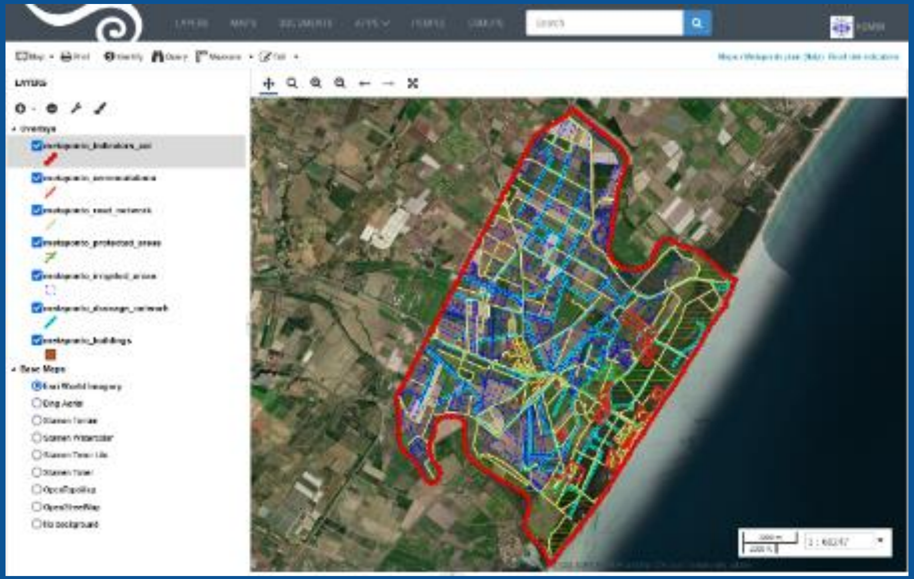


Maps on Metaponto (Italy)

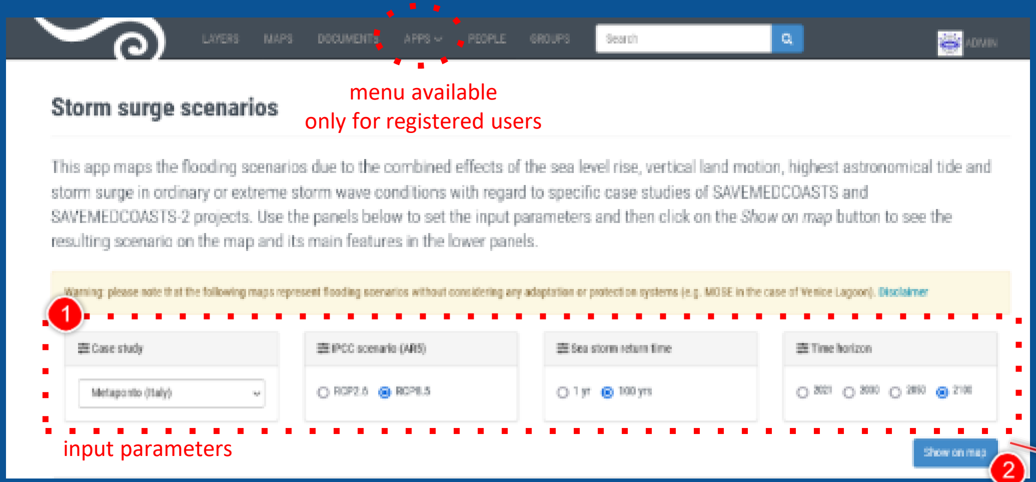


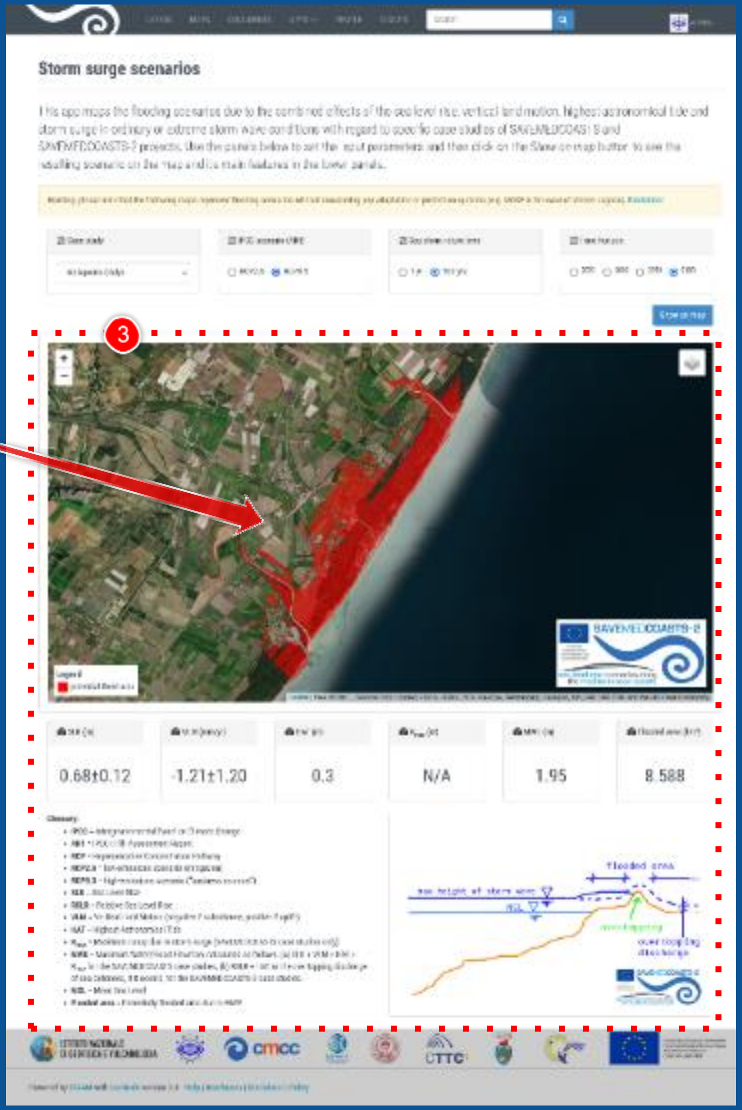




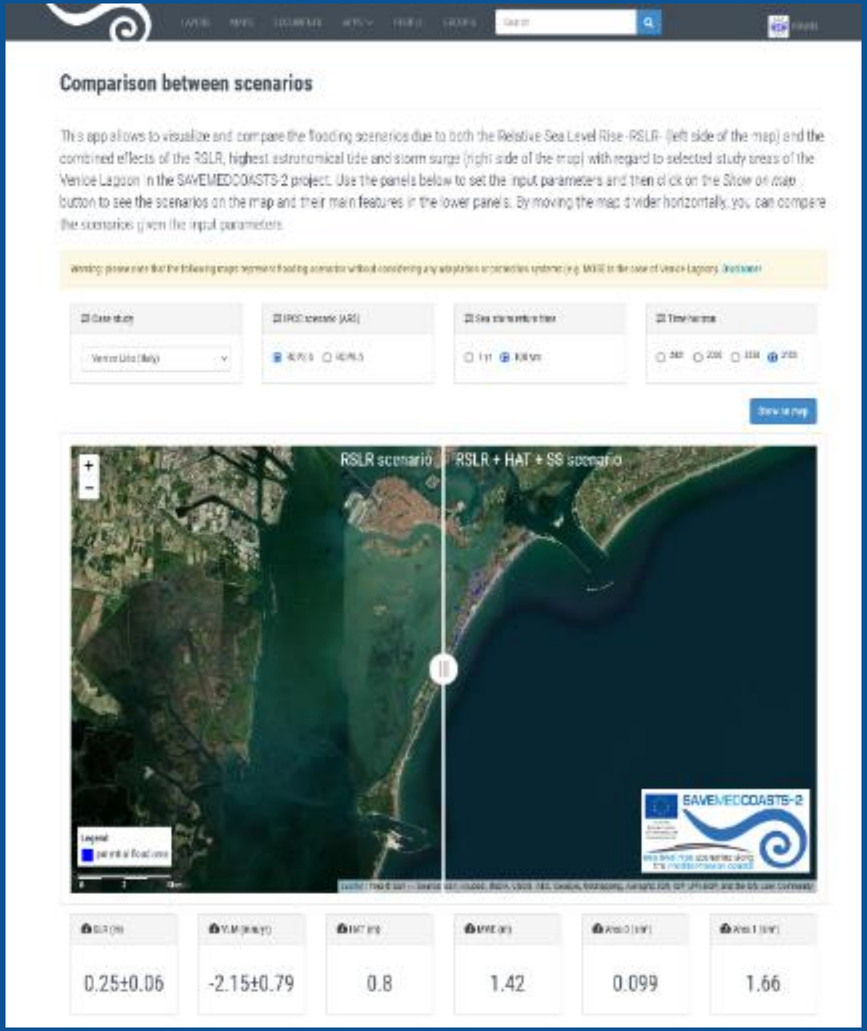


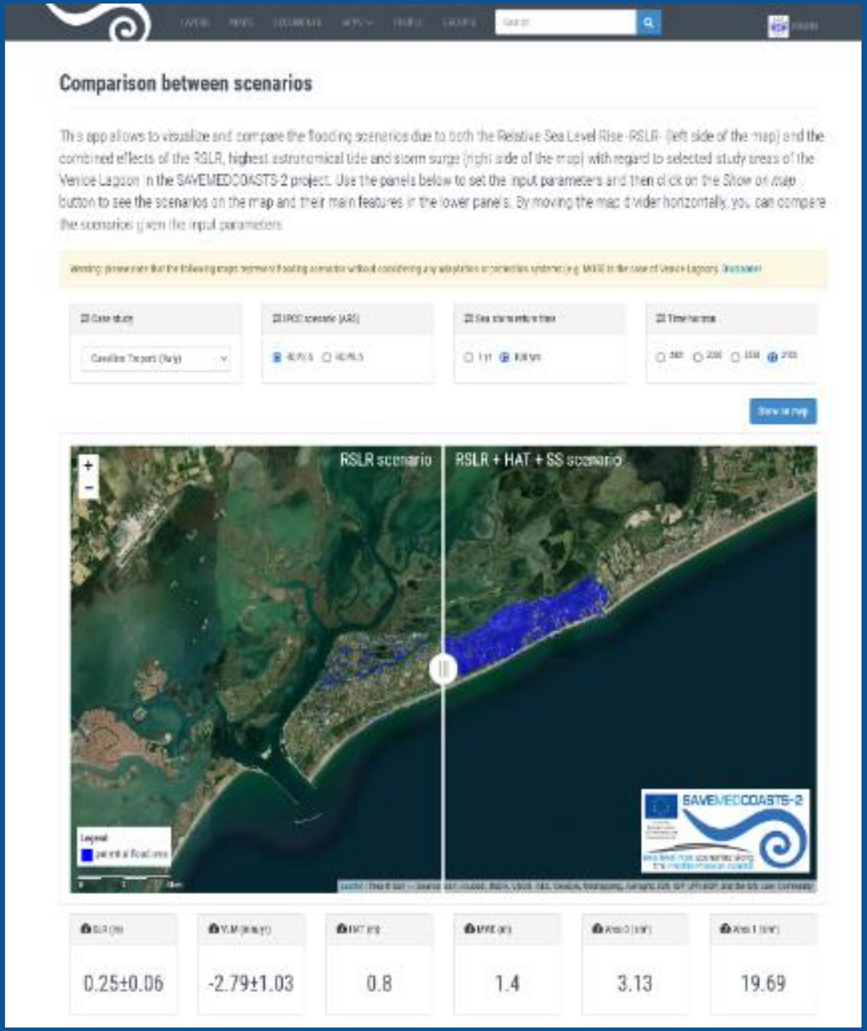
App 1: Storm surge scenarios





App 2: Comparison between scenarios





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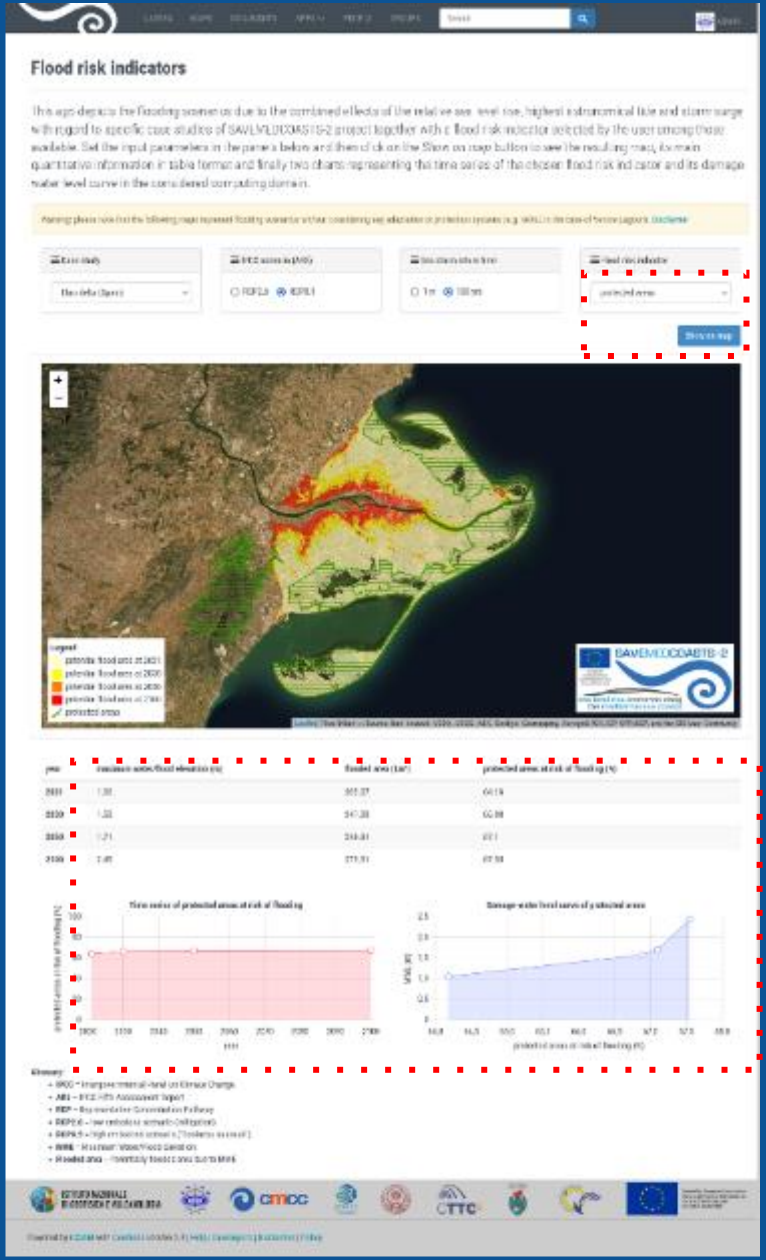
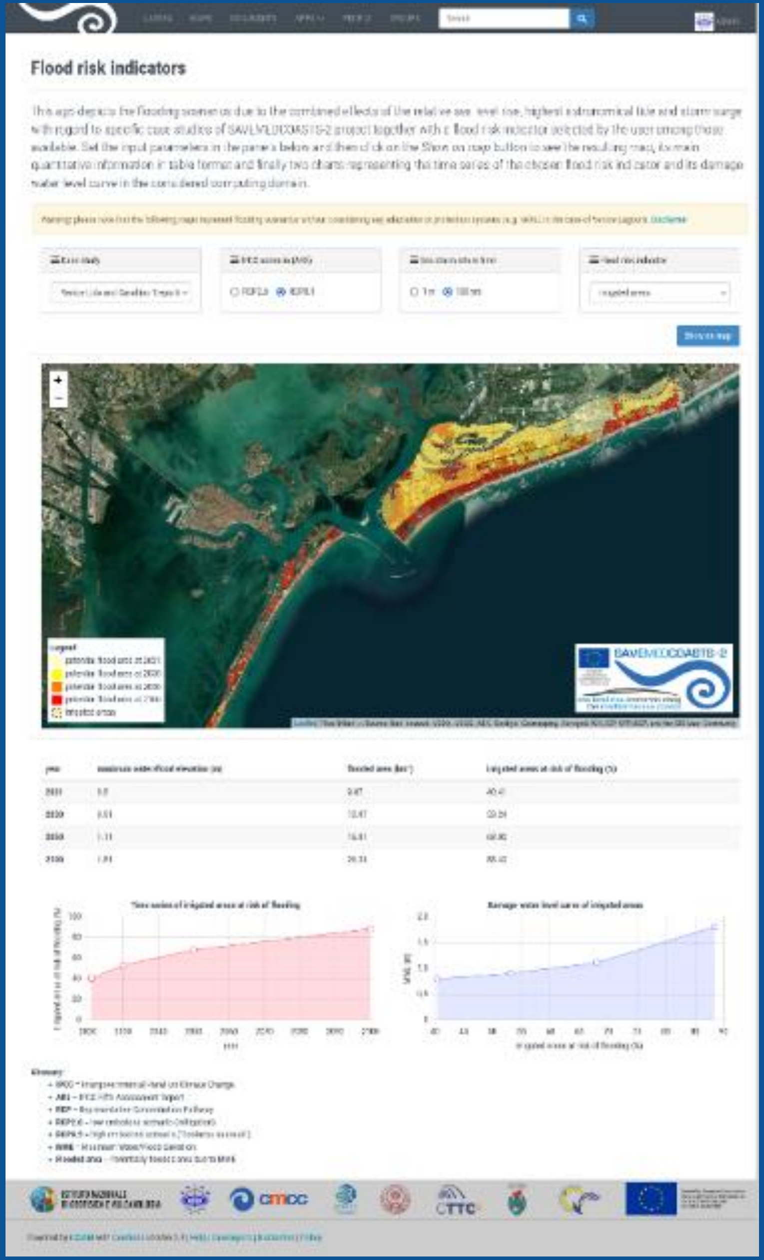
App 3: Flood risk indicators

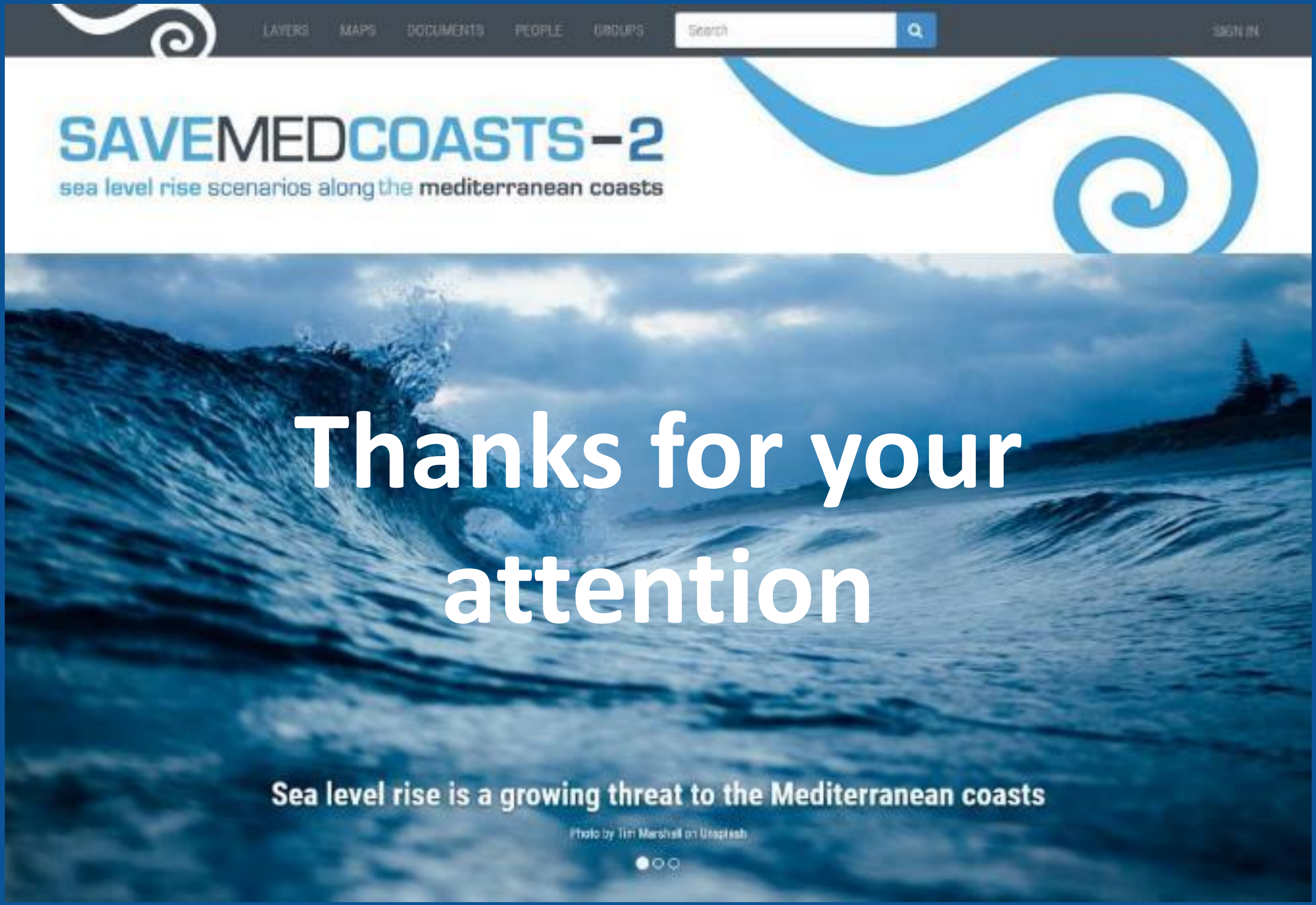




The SAVEMEDCOASTS-2 webGIS: The Online Platform for Relative Sea Level Rise and Storm Surge Scenarios up to 2100 for the Mediterranean Coasts — 2023
A Falciano, M Anzidei, M Greco, ML Trivigno, A Vecchio, C Georgiadis, ...
Journal of Marine Science and Engineering 11 (11), 2071

Relative Sea-Level Rise Projections and Flooding Scenarios for 2150 CE for the Island of Ustica (Southern Tyrrhenian Sea, Italy) — 2023
M Anzidei, D Trippanera, A Bosman, FF Martin, F Doumaz, A Vecchio, ...
Journal of Marine Science and Engineering 11 (10), 2013

Relative sea-level rise scenarios for 2100 in the Venice lagoon by integrated geodetic data, high-resolution topography and climate projections. New insights from the ... — 2021
M Anzidei, M Crosetto, J Navarro, C Tolomei, P Patias, C Georgiadis, ...
EGU General Assembly Conference Abstracts, EGU22-5138



Thanks for your attention

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a.falciano@cgiam.org