

MARINE METEOROLOGY FOR MARITIME ACTIVITIES AND PUBLIC SAFETY IN CROATIA

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Outlook

- Duties
- Activities
 - Maritime safety informations (MSI)
 - NAVTEX
 - Observations and measurements
 - R&D and Projects
 - INTESA
 - I-STORMS



Marine meteorology for maritime activities and public safety in Croatia

Duties

Meteorological and Hydrological Service of Croatia (DHMZ), is a **state institution** of Croatia, to provide support to economic development, environment protection, to act towards the preservation of life and material goods from natural hazards and disasters and to mitigate their consequences.

As part of Croatian national obligations and responsibilities as maritime country, **DHMZ is authorized for the national operative marine services, provided by the Marine Meteorological Center in Split.**

DHMZ represents Republic of Croatia at **World Meteorological Organization (WMO)** and **Joint WMO-IOC Technical Commission for Oceanography and Marine Meteorology (JCOMM)**.

DHMZ operates several ranges of **observation networks** (meteorological, climatological, hydrological, marine), at more than 600 observation sites with automated and human operated programs.

DHMZ runs **call centers** dedicated to **meteo, hydrological and marine information services.**

Marine meteorology for maritime activities and public safety in Croatia

Marine meteorological service DHMZ

- Adriatic marine meteo service operates **for 120 years**
- **Since 1947 part of Croatian meteo service**
- Marine meteorological services include activities of atmospheric and sea surface observations and monitoring; numerical analyses and forecasting;
- The specific duties for the marine forecasting and warnings are provided by DHMZ Marine Meteorological Center (Pomorski meteorološki centar- PMC)
- **PMC operates in Split and Rijeka as 24/7 call center** and issues **maritime safety informations** : forecasts and warnings for navigational safety (maritime transport) in line with the international **SOLAS convention**.

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Marine safety informations -MSI

IHO standard on safety information at sea

Define standards and organization of the dissemination of marine messages

NAVTEX messages – disseminated to the ships

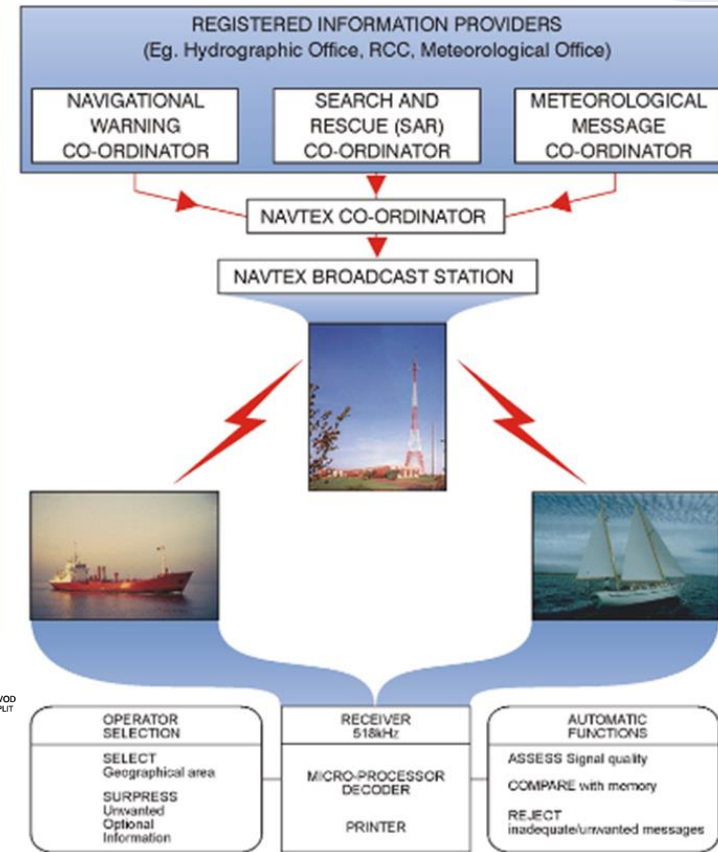
Croatian NAVTEX authorities:

HHI – for organization and navigational warnings

DHMZ- meteorological messages

Plovput – radio broadcast

DHMZ meteo messages for 3 ADRIATIC areas



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Marine safety informations -MSI

NAVTEX meteorological messages

Bulletines for 00 06 12 18 UTC for 24 forecasts

Warnings for phenomenas : **wind, tunderstorms, sea state, fog**

Disseminated by radio in croatian and english languages

QE97 3.11.2020. 6:43:45 518 kHz
030640 UTC NOV 20
SPLIT RADIO

WEATHER BULLETIN FOR ADRIATIC
ISSUED BY THE MARINE METEOROLOGICAL CENTER

1.WARNING:
SCT FOG, MOSTLY IN THE MORNING/OVERNIGHT ON

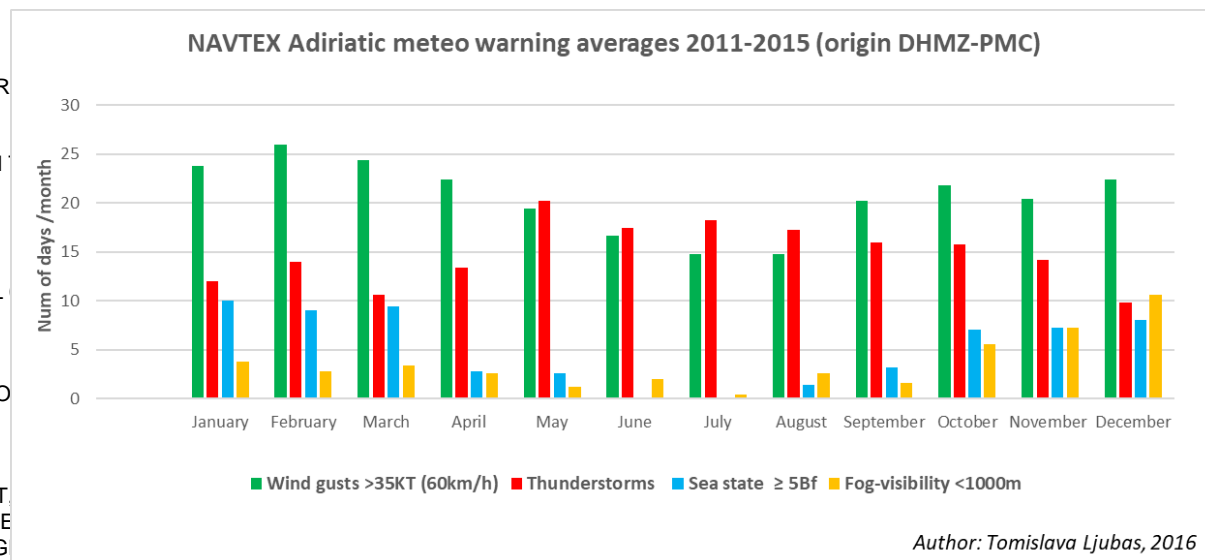
2.SYNOPSIS:
FIELD OF HIGH STNR OVER ADRIATIC.

3.FORECAST FOR THE NEXT 24 HOURS VALID UNTIL

N-ERN ADRIATIC:
MOSTLY NW 4-10 KT/CALM. SEA 1-2. VIS 5-15 KM,
OVERNIGHT/MORNING LOC LESS THAN 1 KM DUE TO
MOD/MOSTLY CLOUDY.

GENT ADRIATIC:
NW 4-12 KT, TOMORROW AS OF NOON LOC TO 16 KT,
ALONG THE COAST IN THE MORNING/OVERNIGHT NE
AS OF NOON LOC 3. VIS 5-15 KM, MORNING/OVERNIG
LIGHT/MOD CLOUDINESS.

S-ERN ADRIATIC:
NW 4-12 KT, TOMORROW AS OF NOON LOC TO 16 KT,
ALONG THE COAST IN THE MORNING/OVERNIGHT NE 4-10 KT. SEA 1-2,
AS OF NOON LOC 3. VIS 5-15 KM, MORNING/OVERNIGHT LOC LESS THAN 1 KM DUE TO FOG



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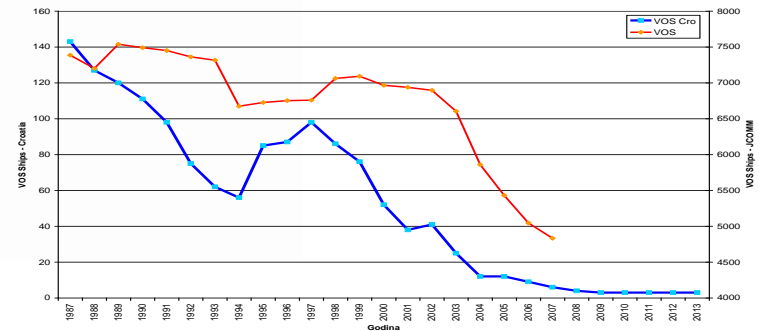
Measurements at Adriatic sea

Croatian VOS observations (Voluntary Observing Ships)

Started at year 1956, **max activities 144 ships**

Number of VOS **national** vs. **JCOMM** for period 1987 -2013
 left axes- max 145; right axes 8000

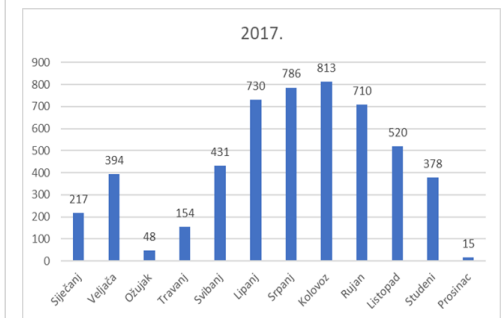
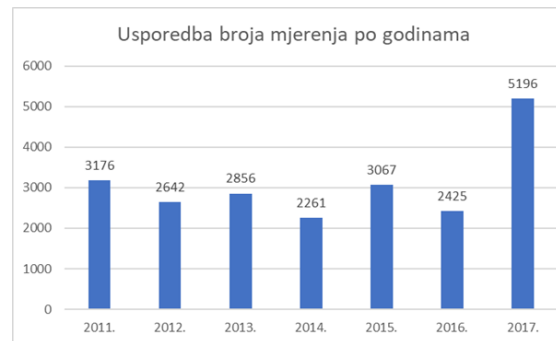
DHMZ archive of VOS data



Last operative:

Dubrovnik ferry 2011-2017

- measurements per year (left)
- measurements in 2017 (right)



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Measurements at Adriatic sea

Croatian VOS observations (Voluntary Observing Ships)

Future automatic systems at VOS

EUCAWS – E-SURFMAR AWS VOS program

- Standardized integrated system with sensors and IRIDIUM satellite dissemination
- TurboWIN+ application for observations
- **1 system to DHMZ (E-SURMAR donation)**
- ready for instalation
- support by Port marine officer service (PMO)
- Croatian coast guard (candidate)



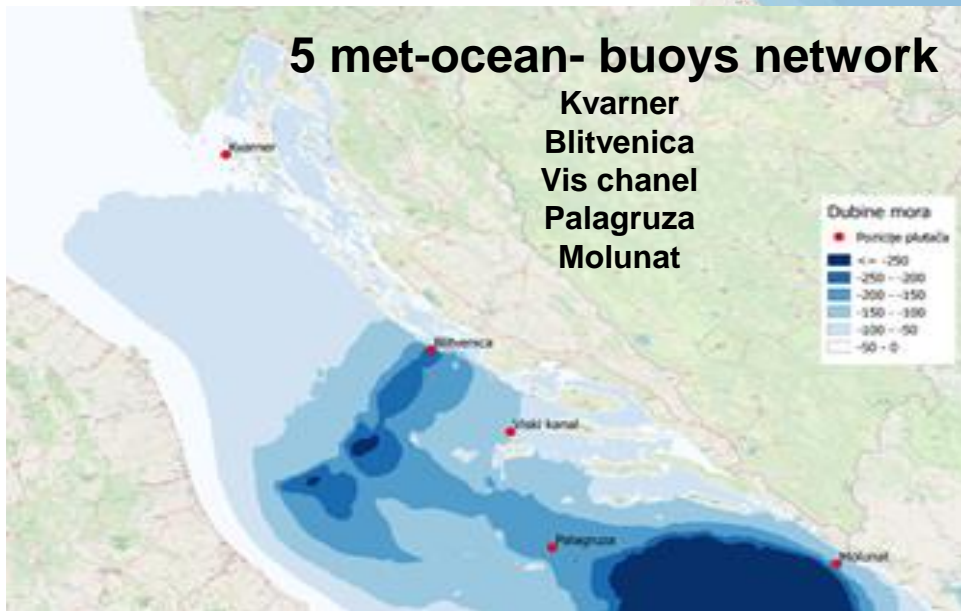
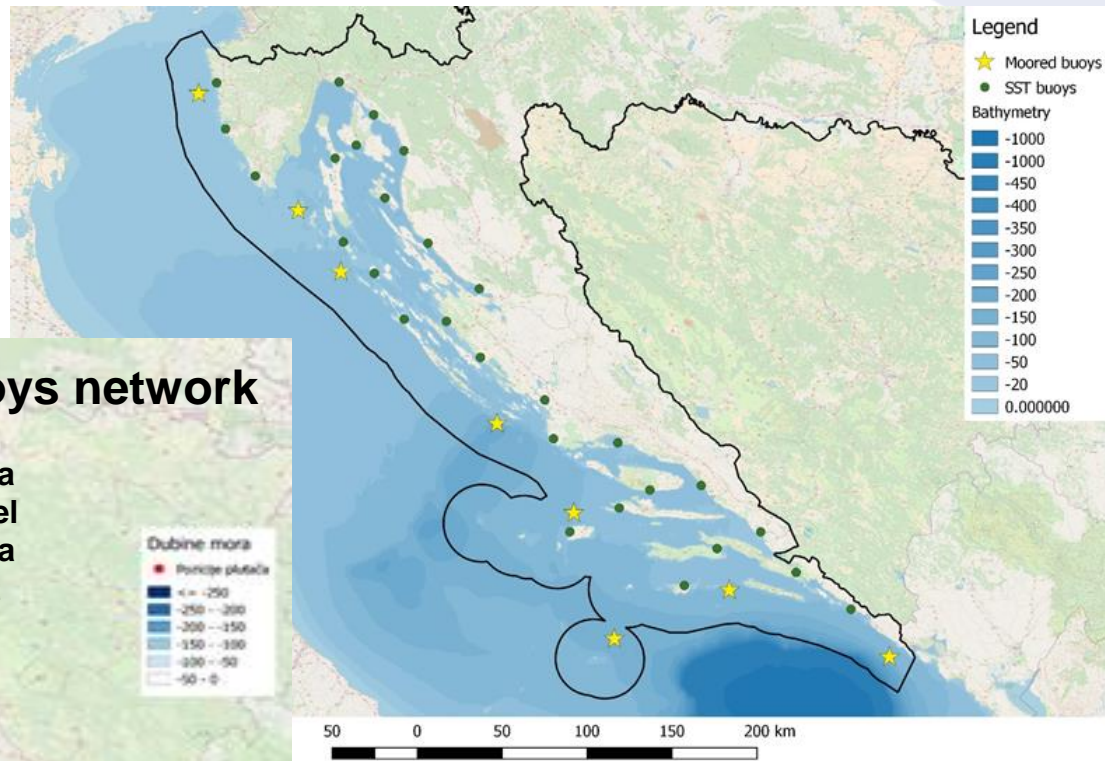
- 1 - EUCAWS postaja
- 2 - Anemometar
- 3 - Barometar
- 4 - Senzor temperature i vlažnosti
- 5 - Prijenosno računalo (TurboWin+)
- 6 - Žiroskop
- 7 - Napajanje (24V DC)
- l - Antene (GPS, Iridium)



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Modernization of measurements at Adriatic project METMONIC

- met-ocean buoys
(licence for 8 buoys)
- SST buoys
(link to AMS network)



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METMONIC meteo-ocean buoys network

Buoy commun.
Iridium, AIS, GSM

Data
aquisition

Power
managment

Navigation safety

Mooring

Meteo dual sensors:

*MSLP, wind, T, RH,
radiation, visibility*

Ocean surface sensors:

*Ts, conductivity, dissolved
oxygen, turbidity, chlorophyll*

Directional surface waves

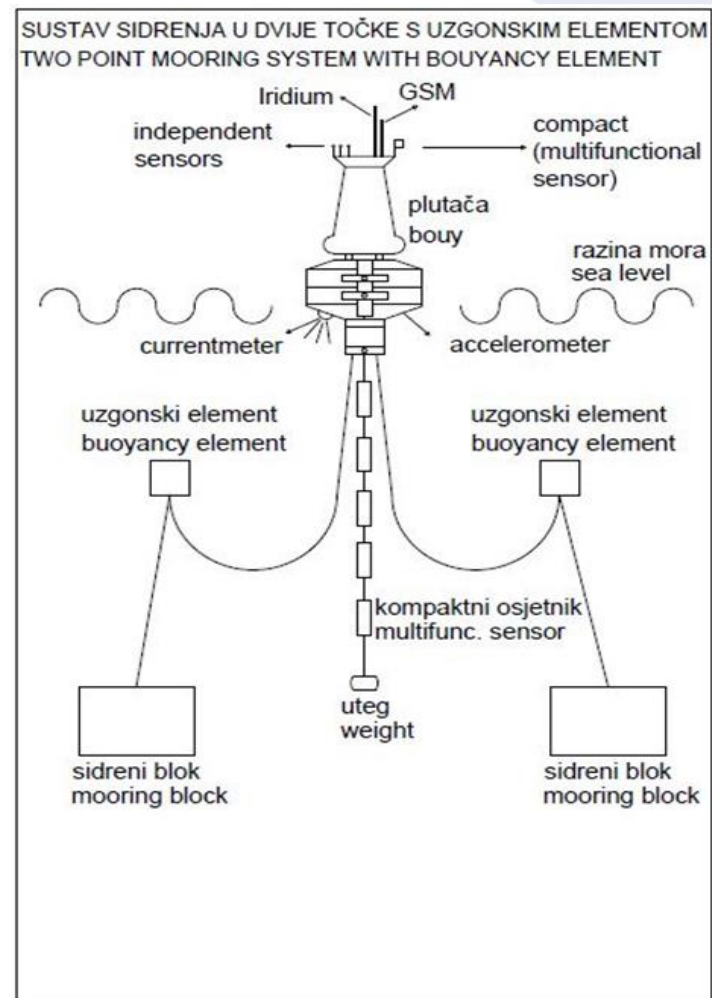
Sea current profile

Ocean subsurface sensors:

*temperature, conductivity and
oxygen*

Sub systems

Sensors



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METMONIC meteo-ocean buoys network

STATUS:

- ✓ **Tender finished** – MOBILIS (FR) buoys (reference UKMO)
- Factory acceptance tests and training
- Bathymetry measurements for 5 positions
- **Deployments:** 5 locations, 200m depths, (spring 2021)
- Test work – 1-3 months
- Real-time dissemination: 1h - 30min

Integration of products at PMC Split

- operative monitoring and remote access:

power supply, sensors, dissemination

- Products monitoring

- Dissemination:

to GTS, to national users (MMPI, geoportal)

- JCOMMOPS observation system



METMONIC Data buoys network

MOBILIS

Kvarner Bitvenica Viški Kanal Palagruža Molunat

| Weather (10 minutes Period) | | | | | | | |
|-----------------------------|------------|----------------|-------------|----------|----------------------|-------------------|-------------------|
| | Wind speed | Wind direction | Temperature | Humidity | Atmospheric pressure | Solar radiation | Visibility |
| Multifunctional sensor | 3.2m/s | 176° | 25°C | 75% | 1009hPa | 1W/m ² | 1W/m ² |
| Independent sensors | 3.2m/s | 176° | 25°C | 75% | 1009hPa | 1W/m ² | 1W/m ² |

| Underwater column measurements (30 minutes Period) | | | | | | | Wave (30 minutes Period) | | |
|--|---------|---------|---------|---------|-----|-----|--------------------------|-----------|--------|
| | 2m | 10m | 25m | 50m | N/A | N/A | Height | Direction | Period |
| Initial depth | 2m | 10m | 25m | 50m | N/A | N/A | | | |
| Depth | 2m | 10m | 25m | 50m | N/A | N/A | | | |
| Temperature | 22°C | 22°C | 22°C | 22°C | N/A | N/A | 0.75m | 32° | 8s |
| Conductivity | 5.5µS/m | 5.5µS/m | 5.5µS/m | 5.5µS/m | N/A | N/A | | | |
| Dissolved Oxygen | 2ppm | 2ppm | 2ppm | 2ppm | N/A | N/A | | | |
| Turbidity | 1.2NTU | 1.2NTU | 1.2NTU | 1.2NTU | N/A | N/A | | | |
| Current direction | | 230° | 230° | 230° | N/A | N/A | | | |
| Current speed | | 1.5m/s | 1.5m/s | 1.5m/s | N/A | N/A | | | |

Status

Battery Position Transmission

Good Good Good

Current time: 19/08/2020 15:57:37
Last data transmission time: 18/08/2020 09:09:55

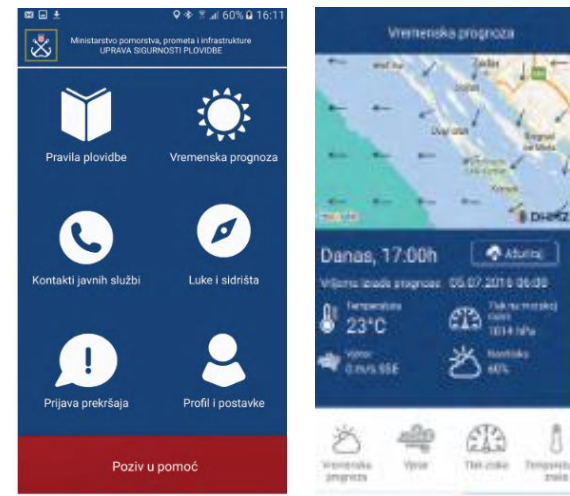
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Products for Ministry of Sea Transport and Infrastructure (MMPI) IT tools

➤ nIS (nautic Information System)

MMPI tool for public, recreational ships
(100.000 licences/year)

- portabe app for mobiles
- DHMZ provides :
 - marine forecasts (4 languages)
 - ALADIN model products



➤ Project INTESA (2019-2023)

integration of DHMZ services in MMPI IT

- CIMIS
- CoastWatch
- CISE (EU integrated platforms for public warnings)

Projekt INTESA – Improving maritime transport efficiency and safety in Adriatic

Duration 2019-2022

CBC ITALY-CROATIA

11 partners:

- ADRIATIC PORTS
(ports of : Rijeka, Split, Ploče)
- Maritime public authorities

Goals:

- list of infrastructure (ports facilities, IT)
- 11 pilot projects on common protocols
- better communication **to the ships**
(dissemination via AIS ATON)
- Link of Italian and Croatian VTS
(Vessel Traffic Systems)
- **CROATIAN VTS: including DHMZ**
measurements and forecasts at MSIs at AIS
ATON messages
- **Ministry of Marine and DHMZ:**
IT integration at the level of data and services

The image features a large blue graphic with a white circle containing the 'Interreg Italy - Croatia INTESA' logo and the European Union flag. To the right, a large blue circle contains the text 'INTESA' and 'IMPROVING MARITIME TRANSPORT EFFICIENCY AND SAFETY IN THE ADRIATIC'. Below this, a map of the Adriatic region shows various ports and cities, with a red dot indicating the location of the project. A small inset image shows a white VTS (Vessel Traffic System) antenna. The text 'included)' is partially visible on the right side of the map.

Integrated Sea Storm Management Strategies I-STORMS

Integrirana strategija upravljanja rizicima plavljenja mora u jadransko-jonskoj regiji

Iniciative -
City of Venecija

2.5 years project
(2018-2020)

Products + 5 years



ADRION
5 states; 9 partners
DHMZ only HR partner

Results:

- list of infrastructure (observations and models)
- map of sea flooding areas
- common platform for storm surge early warnings (IWS) **GEOPORTAL**
 - **TMES** combine the results from existing operational forecasts systems
 - 10 models for sea level height (either storm surge or total water level)
 - 8 models the sea waves
- **ADRION strategy on sea flooding resilience**
- **Public awareness > I-STORMS network**



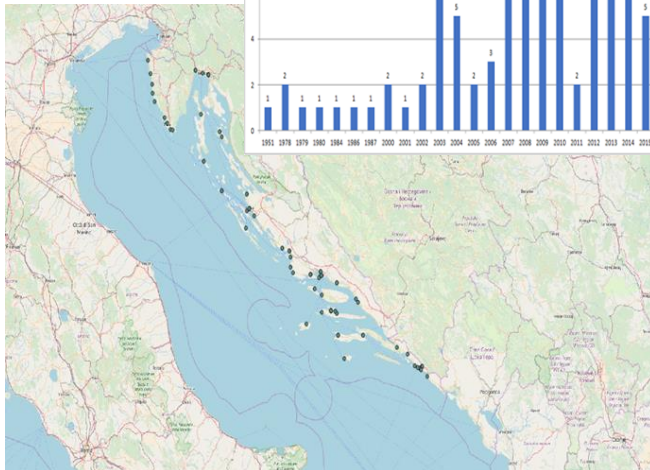
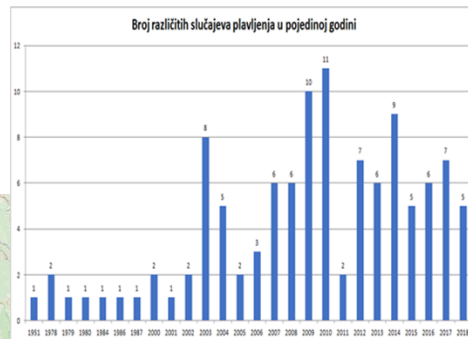
I-STORMS results presented at:

- 1st Meteotsunami; HYMEX conference
- scientific papers; [presentations at 7 MI](#)

RESULTS

Catatalog of sea flooding events

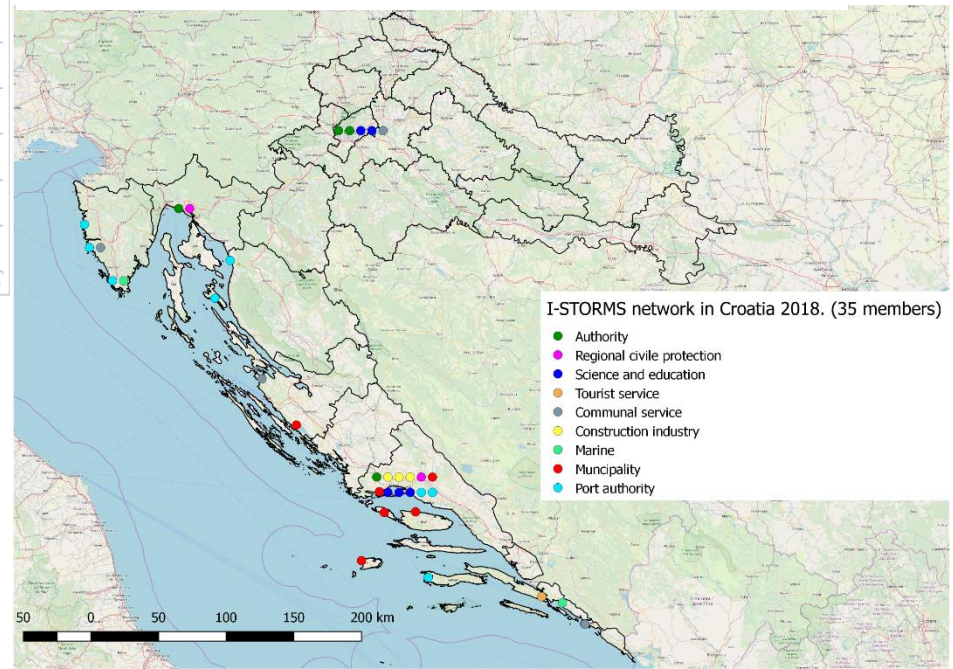
- due to storm surges, waves; meteotsunamies



USERS

I-STORMS NETWORK

- 4 national public authorities,
- 2 regional civil protection authorities
- 3 higher education and research centers
- 15 local public authorities
- 11 SME and interest groups



CROATIA - MARITIME COUNTRY

- Total population 4,44 million / 30.000 seafarers
- Length of coastline 6287 km
- 1246 islands of which 47 populated
- Semi-closed sea basin
- 6 major ports, 98 ports with ship lines, 407 small ports and marines
- Ship lines traffic: 11 mil. passengers, 2.8 mil. vehicles
- Total number of passengers: **12 mil.** maritime transport, ship cruisers, recreational ships
- 539 yachts and 103.945 boats registered
- visit of 100.000 foreign yachts /year for recreational tourism
- **Search & rescue /year: ~800 rescued persons, ~200 rescued vessels**



