GeoNode and multidimensional Data

The I-Storms Project use-case

GeoNode Summit 2019

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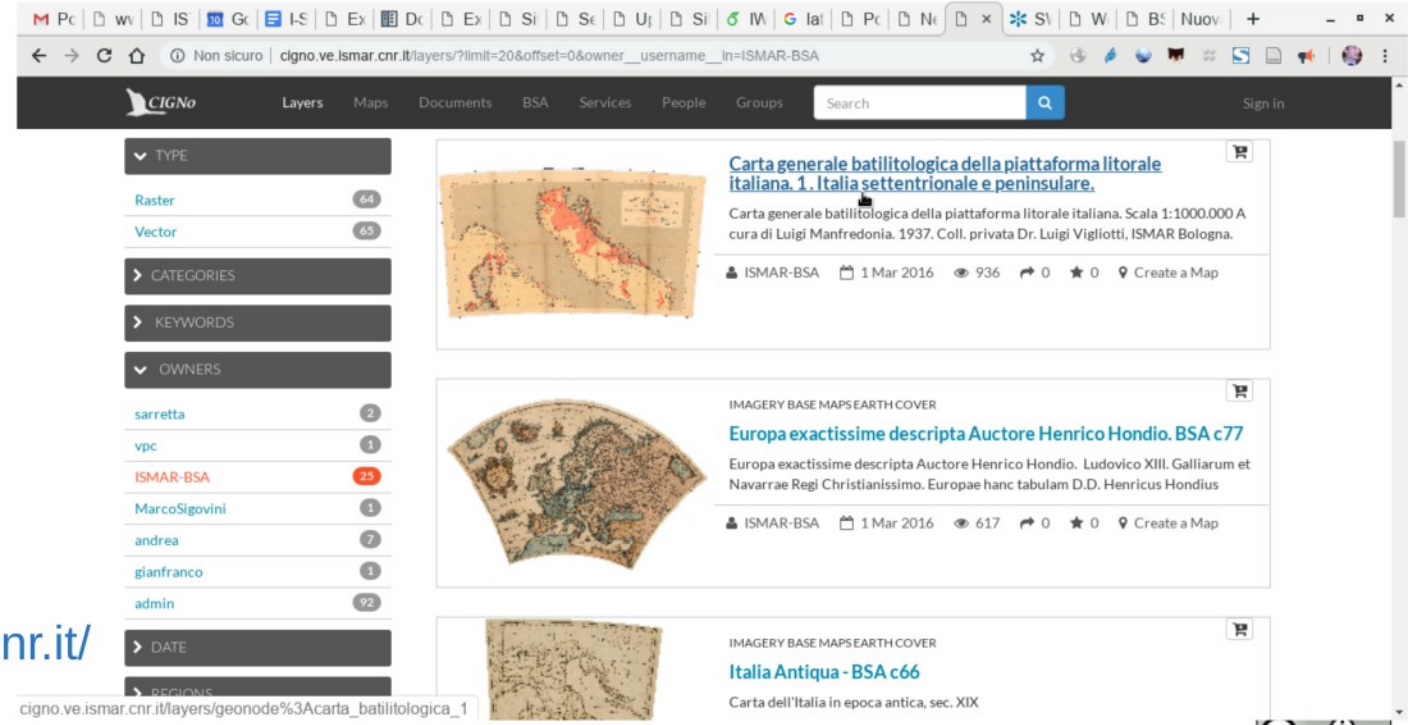
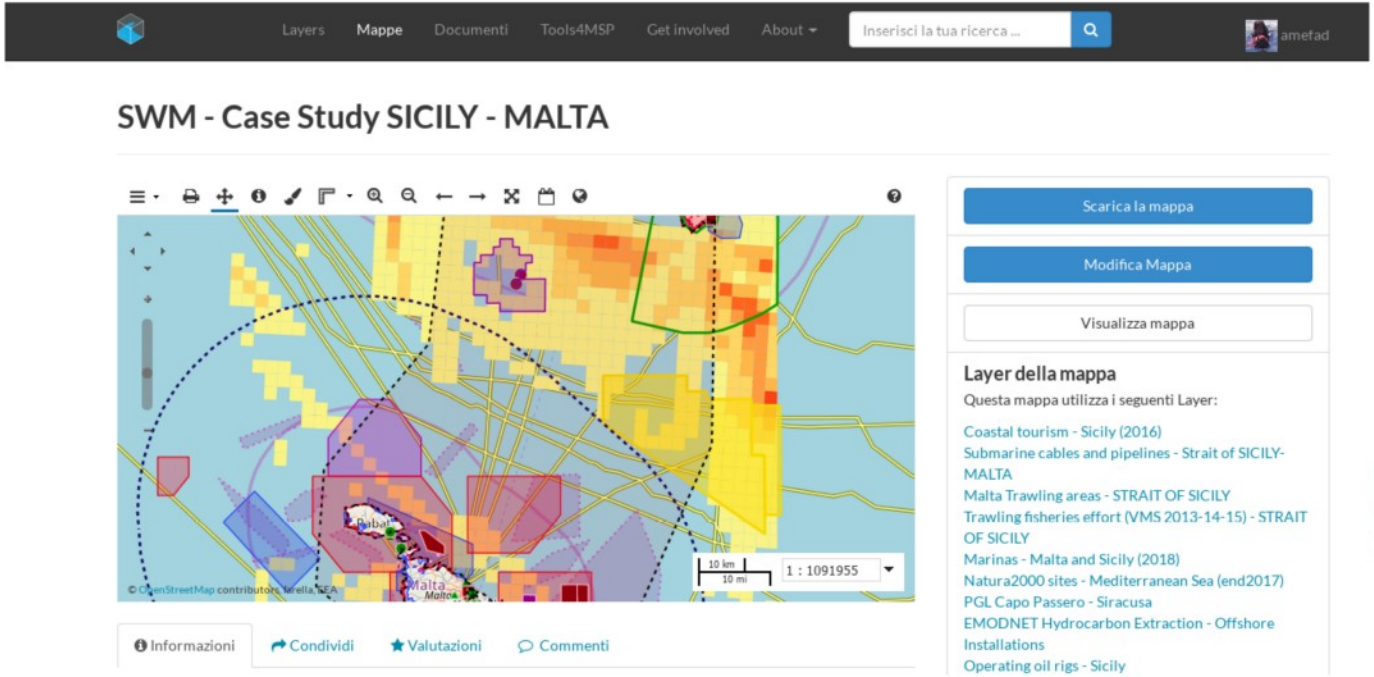
CNR-ISMAR GeoNode instances



http://cigno.ve.ismar.cnr.it/

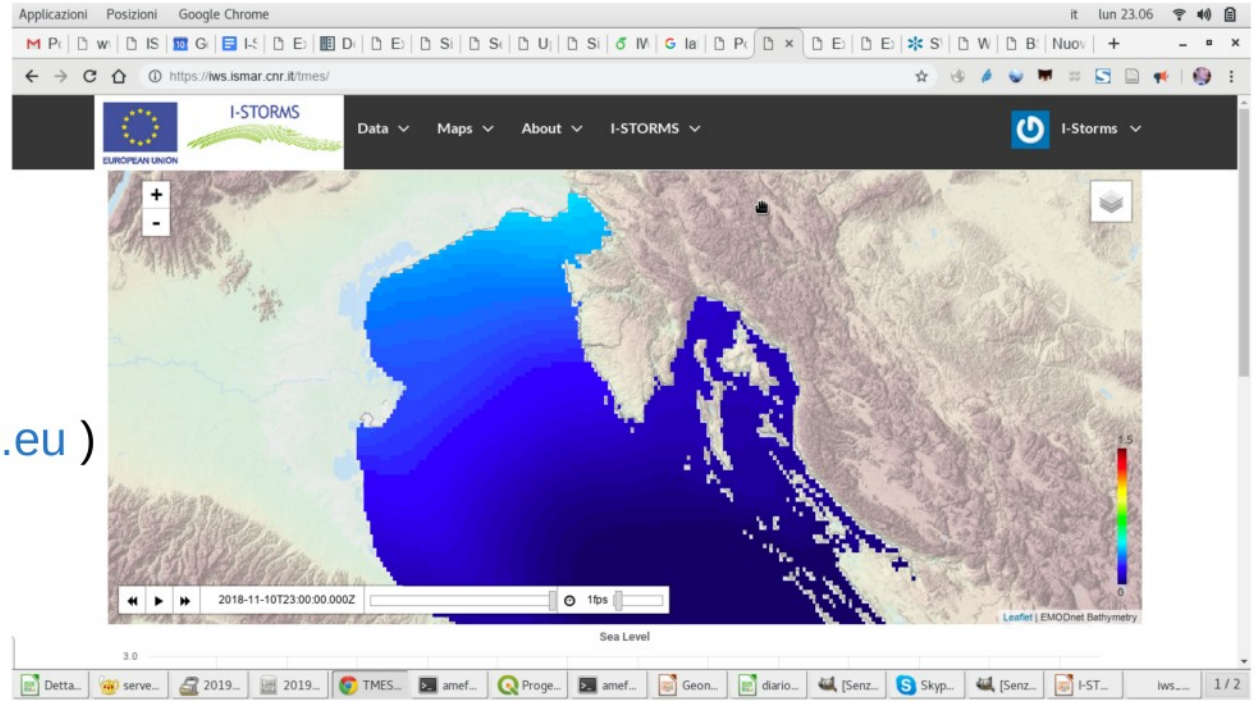
CNR-ISMAR GeoNode instances



http://tool4msp.eu
(formerly AdriPlan)

CNR-ISMAR GeoNode instances

http://iws.ismar.cnr.it
(soon www.seastorms.eu)

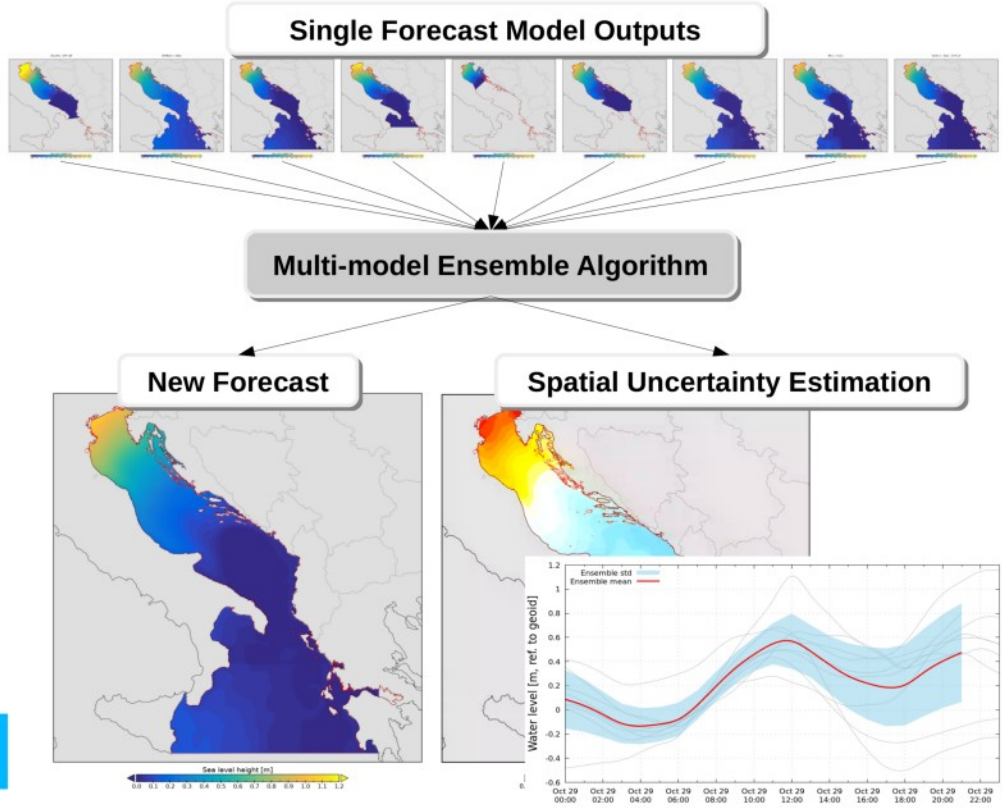


The I-Storms project

- I-STORMS project aims to develop a shared and interoperable system (I-STORMS Web integrated System - IWS) to allow exchange of information about sea storms in the Adriatic-Ionian area.
- The IWS has been designed to specifically store, visualize and share:
  - i) time series measurements of sea level and wave from sensors;
  - ii) outputs from existing oceanographic operational forecast models;
  - iii) localization and description about coastal sea storm events

TMES - Transnational Multi Model Ensamble

- Different Forecasts Model outputs (netCDF or GRIB files) are processed (aligining, normalizing…) and merged to create a single Ensamble forecast (netCDF) for every day.
- The same grid contains the expected values and standard deviation to estimate spatial uncertainty.



Forecast data

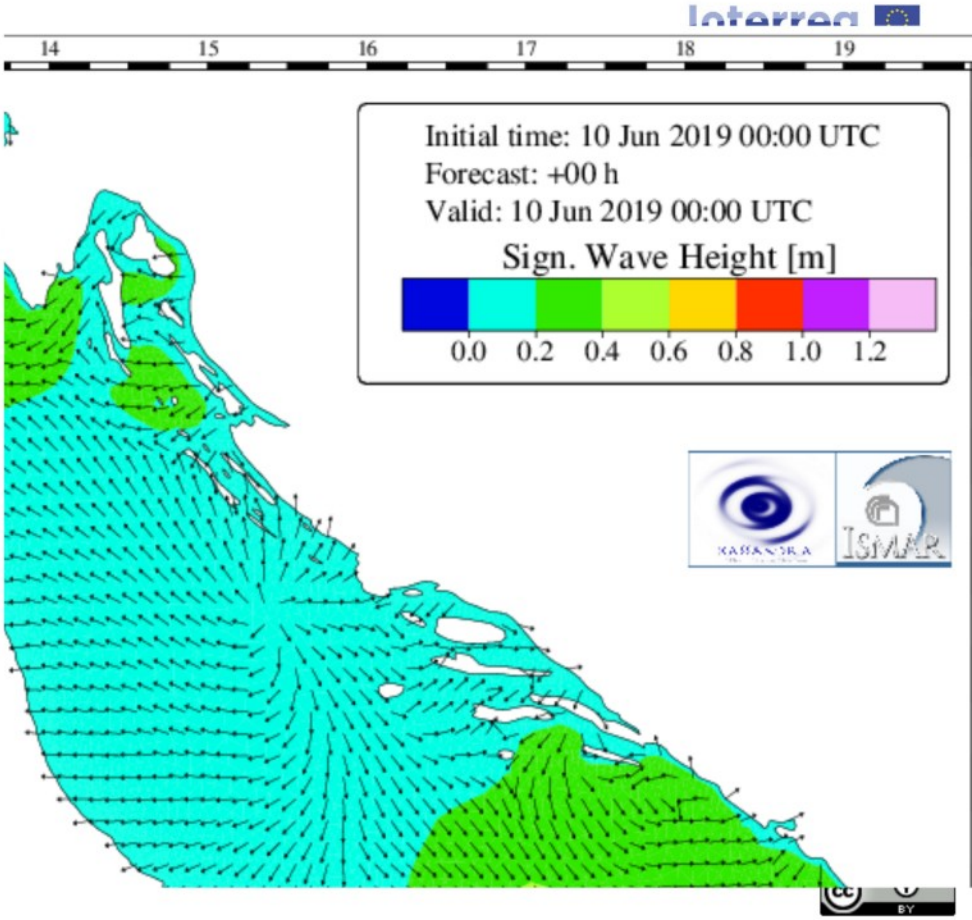
- Forecast model output are provided in specific formats, netcdf grib2
- Multidimensional data: time dimension from 0 to +72h, x,y,z u and v velocity (wind, currents..)
- Can be structured and unstructured (variable resolution
- There are different conventions (usually CF convention…) not properly act as a standard
- For local data different and unusual coordinates and projections (lat and lon can be present as a variables and not as a dimension, rotated grid...)

Forecast data

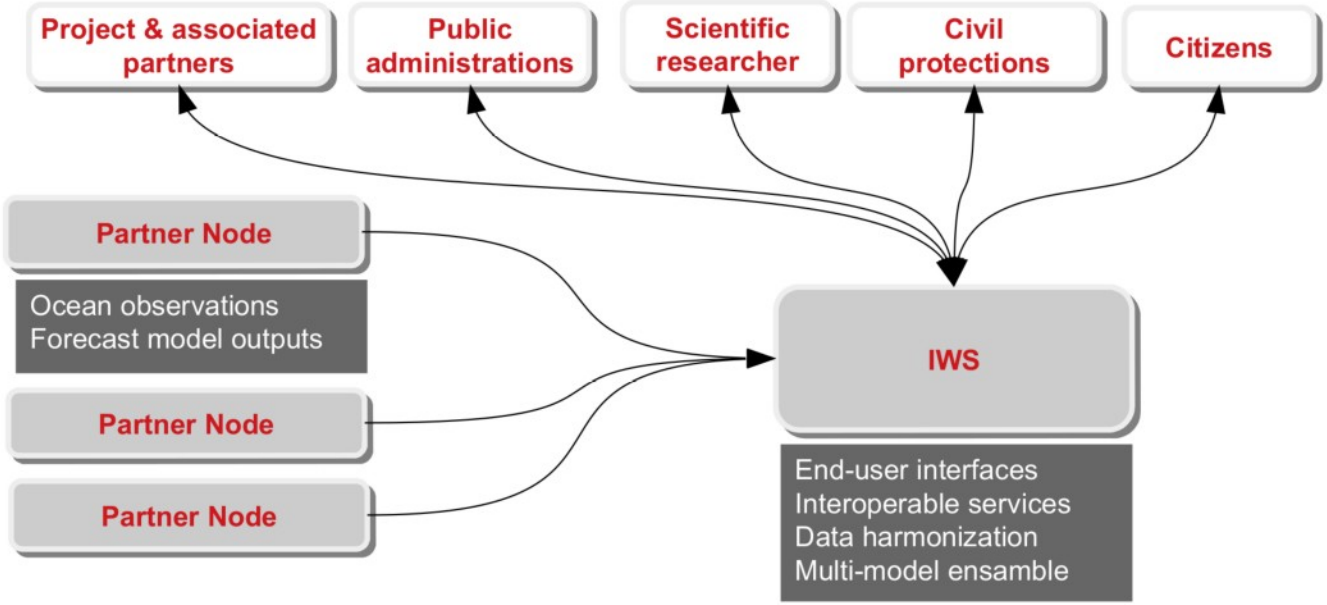
This kind of data is a bit different frm GIS data.

Some files (especially global forecasts) can be opened as a raster with gdal, or geoserver plugin, some not

The viewers often use color ramp and vector field representation (http://kassandra.ve.ismar.cnr.it)



Infrastructure Overview



Technological stack

Why Thredds Data server

- From October 2018 the Rome unit that maintain dissemination services for Copernicus Marine Environment Monitoring service become part of CNR-ISMAR
- The CMEMS viewer is based on Thredds Data Server instance that create catalogs of netCDF and GRIB data and provide interoperable services (WMS, WCS, OpenDap…)
- TDS is a good tool to manage Multidimensional data, even in long time series, and provide to different users only the data they needs.
- TDS is a Tomcat Web App just like geoserver.

Catalog http://nrt.cmems-du.eu/thredds/cmems/v201904/med/catalog.html

Dataset

- OCEANCOLOUR_MED_CHL_L3_NRT_OBSERVATIONS_009_040/
- OCEANCOLOUR_MED_CHL_L4_NRT_OBSERVATIONS_009_041/
- OCEANCOLOUR_MED_OPTICS_L3_NRT_OBSERVATIONS_009_038/
- OCEANCOLOUR_MED_OPTICS_L4_NRT_OBSERVATIONS_009_039/
- SEALEVEL_MED_PHY_L4_NRT_OBSERVATIONS_008_050/
- SST_MED_SST_L3S_NRT_OBSERVATIONS_010_012/
- SST_MED_SST_L4_NRT_OBSERVATIONS_010_004/

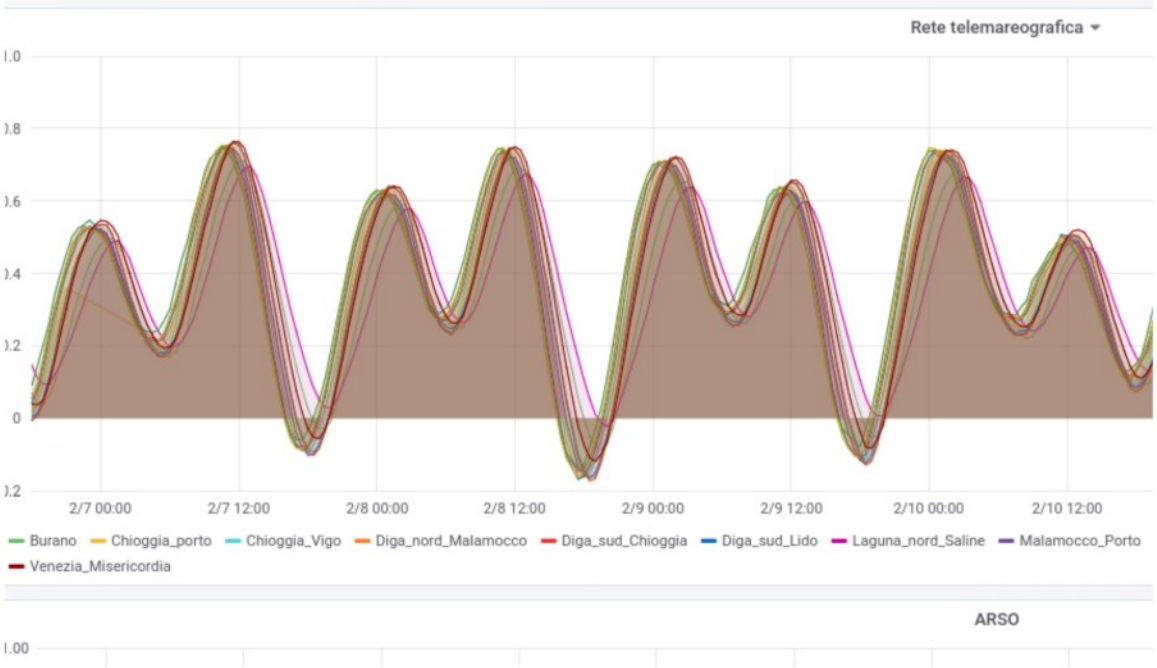
CMEMS DU OBS at see Info
THREDDS Data Server [Version 4.6.8 - 2017-01-06T16:32:27-0700] Documentation

Thredds Data Server features

- THREDDS catalogs (XML) that advertise the datasets and services it makes available.
- The available remote data access protocols include OPeNDAP, OGC WCS, OGC WMS, and HTTP. The ncISO service allows THREDDS catalogs to be translated into ISO metadata records
- TDS also supports several dataset collection servicesand dataset aggregation capabilities. This allows to aggregate a collection of datasets into a single virtual dataset, greatly simplifying user access to that data collection.

https://www.unidata.ucar.edu/software/thredds/current/tds/

Grafana dashboard

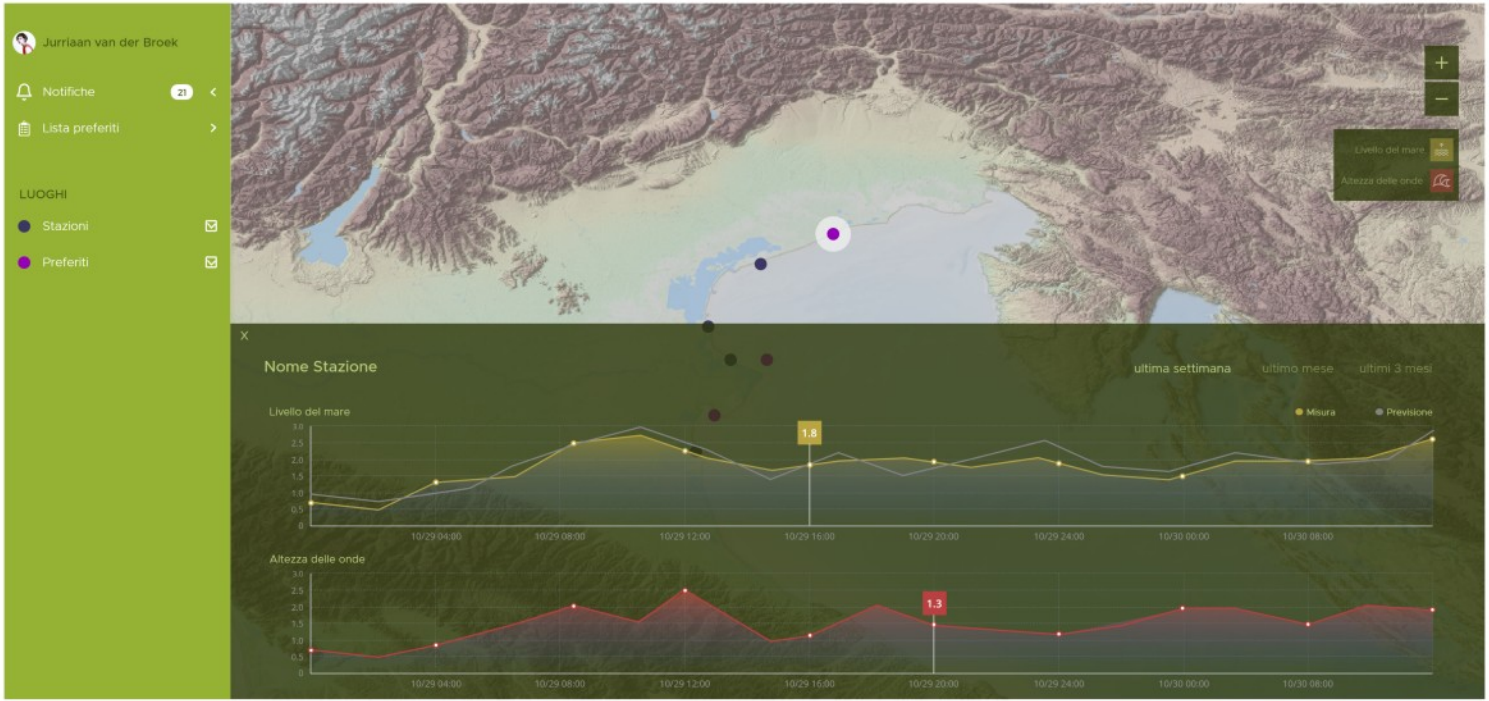


Measurements from sensor network are visualized with Grafana Dashboard using a Postgresql database

Deployment status

- Geonode 2.8 instance was deployed using geonode-project work-flow with customization of CSS and templates;
- an additional django-app ha been created to manage sea storm event atlas: Storm events objects are linked to standard geonode documents;
- the development of a dedicated client and Mobile App named Open-Istorms is ongoing (Alveo & Inkode partners)

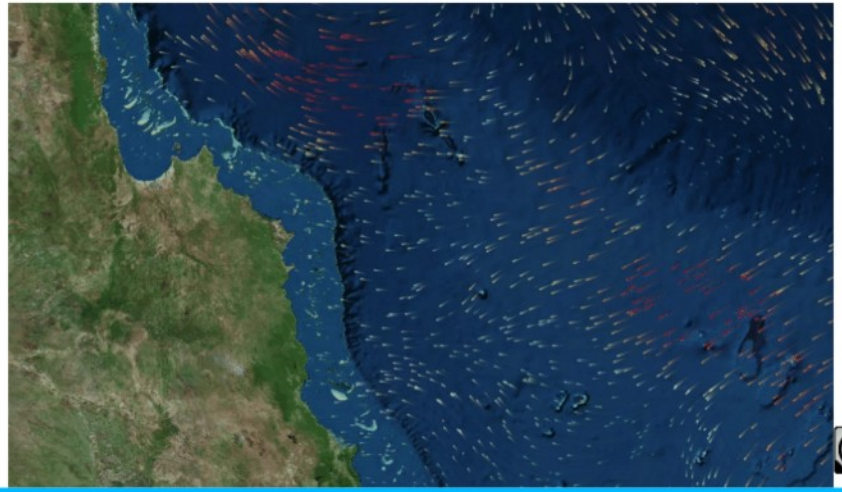
https://github.com/CNR-ISMAR/iws


I STORMS
Profilo
Impostazioni
Cambia
Esci
Jurriaan van der Broek
Notifiche
21
Lista preferiti
LUOGHI
Stazioni
Preferiti
Livello del mare
Altezza delle onde
Nome Stazione
ultima settimana
ultimo mese
ultimi 3 mesi
Livello del mare
Misura
Previsione
1.8
10/29 04:00
10/29 08:00
10/29 12:00
10/29 16:00
10/29 20:00
10/29 24:00
10/30 00:00
10/30 08:00
Altezza delle onde
1.3

Current TMES viewer

- Every day a new TMES file is generated and published by TDS catalog, old TMEs files are cutted to first 24 hours and saved in a subdirectory to be published as aggregation (not yet implemented).

- A custom template with leaflet map shows the daily TMES using Leaflet time dimension (by SOCIB) that generate time slider from TDS WMS url.
- For waves direction we plan to use animated output from Leaflet Velocity (https://danwild.github.io/leaflet-velocity/)



Discussion

- Maybe will be possible use MapStore client to load TDS WMS endpoint,
- Animation is great to visualize velocity field models,
- This kind of multidimensional data are quite important for scientific data, but apart from global data (like ECWMF) every organization seems to have its own work-flow.
- Unstructured data seems to be impossible to visualized as GIS data.

Thank-you for your attention!

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