Challenges in retrieving and using climate services' data for local-scale impact studies: insights from the SCORE project

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Climate services

The demand for tailored climate data and information by the public and diverse specific users (such as stakeholders, decision makers and scientists) is growing worldwide together with the awareness of the challenges posed to the environment and society by climate change. In this context, climate services play a crucial role in developing and disseminating customized climate information and tools to diverse stakeholders based on relevant standards and conventions.

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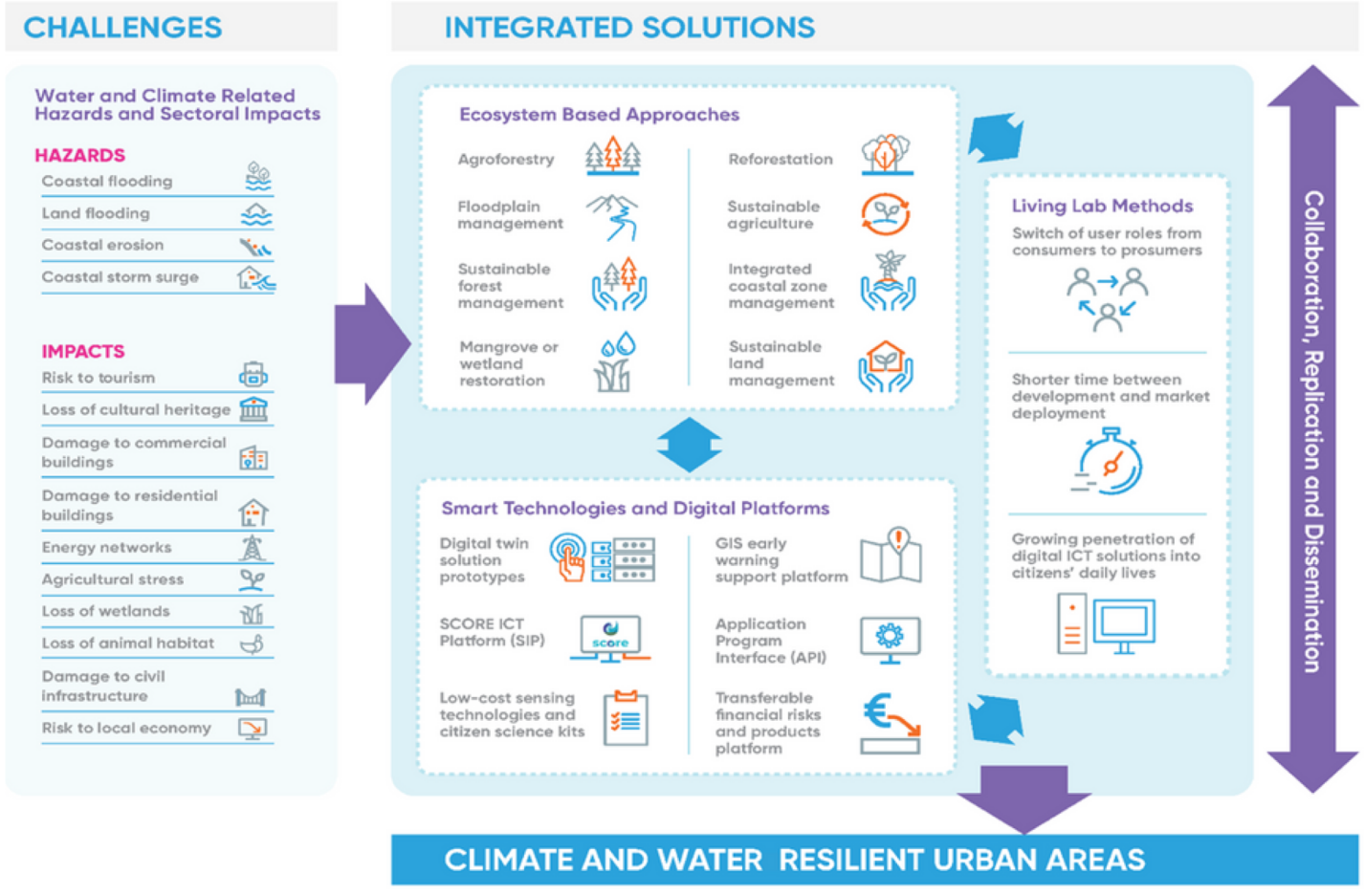
SCORE Project

The overarching concept of SCORE is to develop a framework for the development, deployment, evaluation, and uptake of integrated Ecosystem Based Approaches (EBA) and smart technologies as the optimum route to improving the climate resilience of European coastal cities.

28	12	4	01.07.2021 30.06.2025	10M
partners CONSORTIUM	countries CONSORTIUM	years DURATION	start-end DATE	euros BUDGET



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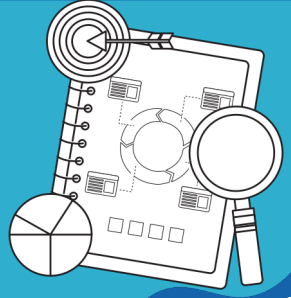
Approach for dataset identification and selection

The identification and selection of fit-for-purpose climate and marine data for the baseline (historical) characterization and projection is based on some key requirements as follows.

- Investigating users and CCLLs needs
- Availability of variables
- Accessibility
- Spatio-temporal coverage
- Spatio-temporal resolution
- Available documentation
- Data and metadata quality
- Standards and conventions



Datasets selected

ERA5 dataset

Atmospheric/Ocean/Land

COPERNICUS C3S

Land/Ocean

CORDEX

Atmospheric

NCEP

Atmospheric/Ocean/Land

EMODnet

Ocean

EMODnet
European Marine Observation and Data Network

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Content of the SCORE climate and marine data' s dataset

Suggestions for SCORE's users...

Historical baseline

- **ERA5 family set,** e.g. (but not limited to)
  - *ERA5 hourly data on a single level from 1979 on*
  - *ERA5-Land*
- **ERA5-related datasets**, e.g. (but not limited to)
  - *Water level change time series for the European coast from 1977 to 2100 derived from climate projections*
  - *Ocean surface wave time series for the European coast from 1976 to 2100 derived from climate projections*
  - *River discharge and related historical data from the European Flood Awareness System (EFAS)*
- ***EMODnet Data Portals***

Eventually, in case of missing variables/data and for specific users need *Climate Forecast System Version 2 –CFSv2.*

Climate projections

- **EURO-CORDEX and Med-CORDEX**

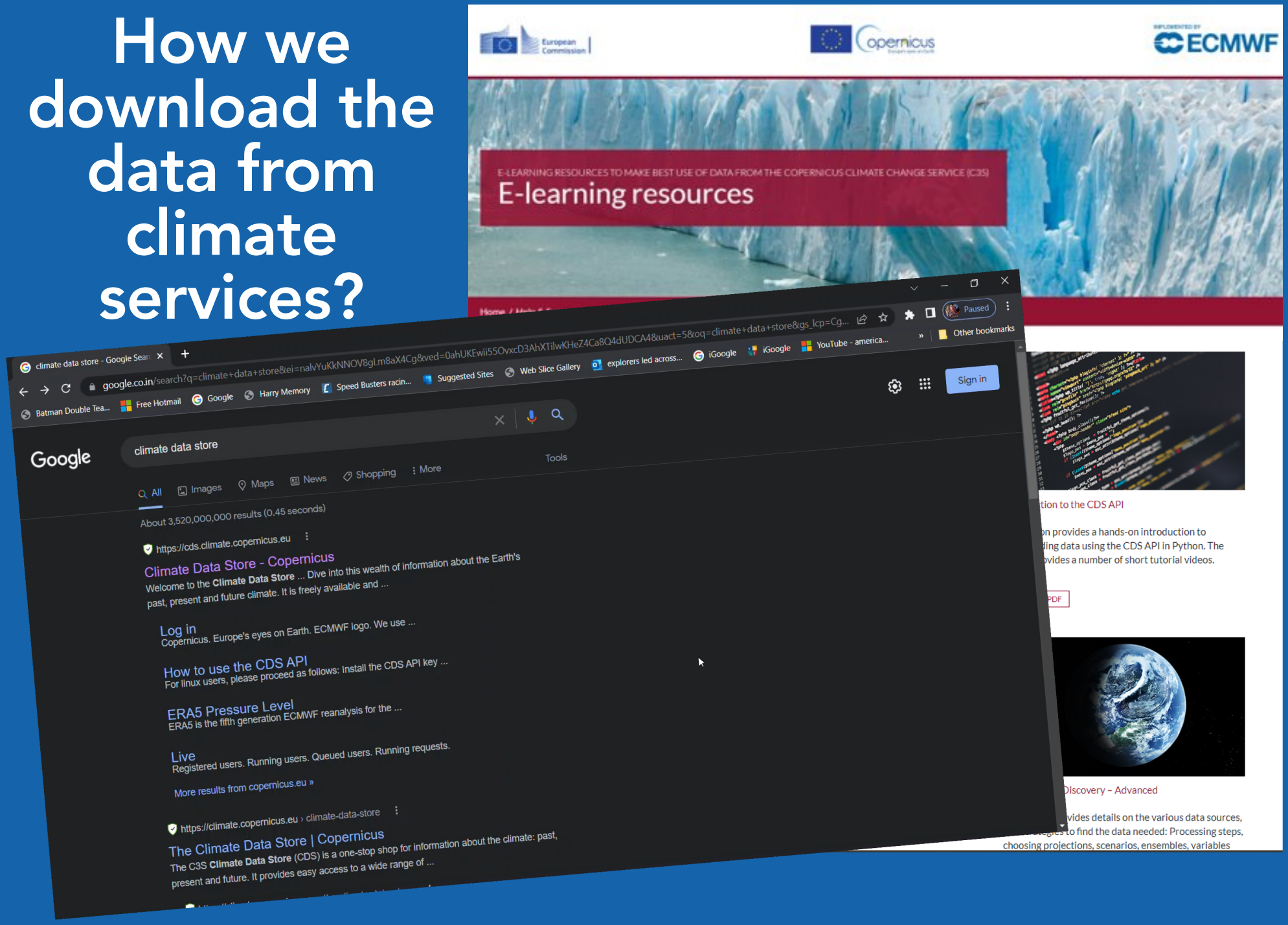
Eventually, in case of missing variables/data and for specific users need CMIP5 and CMIP6

- **ERA5**-related datasets, e.g. (but not limited to)
  - *Water level change time series for the European coast from 1977 to 2100 derived from climate projections*
  - *Ocean surface wave time series for the European coast from 1976 to 2100 derived from climate projections*
  - *Marine biogeochemistry data for the Northwest European Shelf and the Mediterranean Sea from 2006 up to 2100 derived from climate projections*

Content of the SCORE climate and marine data' s dataset

Field	Options	Meaning
No.	Numbers	Order number
Variable domain	Atmosphere Atmosphere/Land Atmosphere/Land/Ocean Ocean Land	Earth system component the variable refers to
Provider	Free text	Name of the Climate Service/Operational Service/Research centre providing the service
Dataset name	Free text	Product name as identified by the data producer
Data type	Gridded/Gridded and catchments/Point data, Others (free text)	Type of object
Main variables	Free text as specified by the provider	Climate variable name
Product type	In-situ observations, Reanalysis, Seasonal Forecast, Scenario, Satellite-derived product, Projections-derived product, Model and observation-derived product, Others (free text)	Type of climate data
Horizontal coverage	Global, Europe, Global land, Global ocean, European coastline, Others (free text)	Spatial domain
Horizontal resolution	Free text as specified by the provider	Geospatial resolution
Vertical resolution	Single level (surface), Multiple levels (plus specifications), Others (free text)	Number of vertical levels
Temporal resolution	Daily, Sub-daily, Monthly, Others (free text)	Information about the discrete resolution of a measurement with respect to time
File format	NetCDF, NetCDF-4, GRIB2, Others (free text)	Standard way to encode information for storage in a file
Source	Link	Direct link to the climate/operational service webpage to download data
Licenses	Link	Terms of use agreement for model output
Conventions	Climate and Forecast (CF) Metadata Convention v1.3, 1.4, 1.6, 1.7 Others (free text)	Name of the conventions for climate and forecast metadata designed to promote the processing and sharing of files

How we download the data from climate services?



Challenges

CLIMATE SERVICES AND CLIMATE CHANGE ADAPTATION

What's the best way to use data from climate services in combination with other information to improve local (urban), national and transnational climate change vulnerability and risk assessments? Adaptation services providing complementary information to climate services for different sectors (e.g., on cost loss-benefits assessments, tools and policies) are crucial.

INTEGRATION BETWEEN DIFFERENT SOURCES OF DATA

Integration between climate services' data, citizen-science low-cost sensors data and local data provided by local environmental agencies, weather services, and consortia is not trivial (i.e., in terms of format and standards requirements)

FRAGMENTATION OF DATA

Regarding marine data specifically, these have been, unfortunately, gathered and stored in fragmented ways across Europe during previous decades, focusing on specific purposes or user needs. The issue has been partially addressed by the Copernicus Marine Service (CMEMS).

COMPUTATIONAL CHALLENGES

The management of massive datasets and the alghoritms involved in climate modeling and downscaling are complex and computationally demanding (finding the best compromise between spatiotemporal resolution and CPU performance)

Conclusions

- Our main purpose was **to showcase the procedures and data samples** for the baseline characterization of the historical period and for the climate projections of interest for SCORE project, **to embrace the involvement of different users** thus not limited to CCLLs, scientists, technical staff and decision makers.
- This work provides **a snapshot of the climate information available today** and thus is not intended to be exhaustive. New tools and updated data will come available and have to be considered in the future.
- The climate services identified for SCORE project's purposes represent **a single point access to a number of diverse climate and marine datasets** across Europe otherwise sparsely accessible and available.
- Climate services **complement capabilities** existing at the national level and provide a comprehensive climate information for a variety of different purposes and studies.

THANKS FOR LISTENING

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