

Keywords:

#service, #data, #users, #forecast, #synergy, #storage, #project, #EOSCinPractice #dust

Supporting data findability, reliability and replicability in Earth, Meteorology and Climate science domains.

An EOSC in Practice Story on daily dust observations and forecasts from Europe, North Africa and the Middle East.

The project involved



The dust observation and forecast services presented in this story are offered within the context of [EOSC-synergy](#), which is a European Horizon 2020 project funded under Grant Agreement no 857647. The goal of the project is to integrate a set of multi-disciplinary thematic services into the EOSC ecosystem. The biggest impact brought by the EOSC-synergy project will be represented by the large increase in the number of resources, services and data repositories offered through EOSC.

The Users

This EOSC in practice story targets three main types of users: (1) **researchers using the uploaded data models** for their own research, (2) **national and international meteorological agencies**, disseminating forecasts to their users, (3) **policymakers**, providing official data to governments and international organisations to support the decision made by the governments.

The Challenge

The challenge addressed was to provide more reliable, findable and replicable data through dust related forecasts and observations to researchers and policy makers. Currently these users struggle to find good data sources, as they need to deal with multiple copies of the same records, records with many missing variables, compliance issues.

The solution

The dust observations and forecasts services are provided by the WMO Barcelona Dust Regional Centre. The centre was created in 2007 by the formal agreement of two Spanish institutions: the [Meteorological State Agency of Spain \(AEMET\)](#) and the [Barcelona Supercomputing Center \(BSC\)](#). The new services EOSC-based are still in their early stages, but the number of users, generic, in research, and public policy fields

"We need to go more in the direction indicated by the World Meteorological Organisation: implement a forecast portal where services like data visualisation, data analysis and data storage are provided."

Francesco Benincasa, Barcelona Dust Regional Centre Engineer @EOSC_synergy

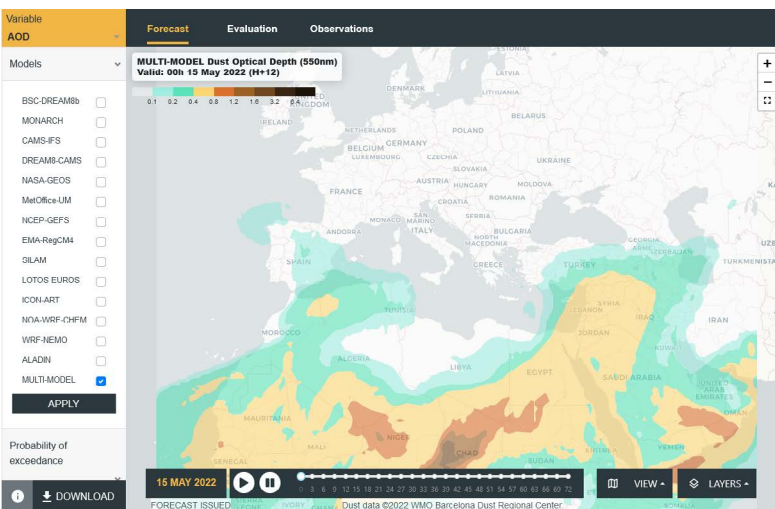


is already increasing. In particular, the WMO Barcelona Dust Regional Centre, through its services, allows to simulate, thanks to numerical models, the forecast of dust and sand storms in Europe, North Africa and Middle East. Some numerical models are run in-house; in addition, outputs of models from institutions like NASA are collected. Currently, 12 data models are made available and more are foreseen in the near future. All these data follow international standards and formats to make them reliable and usable by an international audience. Users can choose between the following products:

- » **Daily Dust Forecast:** this section includes daily forecasts, their comparison with observations, and dust-related observations. Data are displayed through interactive dashboards with three panels: Forecast, Evaluation and Observations. The dashboards allow users to centralize dust information from different sources (satellites, ground-based networks, experimental campaigns, marine ecosystems and models). All the services provided by the WMO Barcelona Dust Regional Centre are using EOSC related infrastructure, in particular B2SAFE and B2HANDLE, provided by EUDAT. To access storage services here, providers need to deliver the Persistent Identifiers (PID) of their data. This allows users to easily find files, web pages and any other resources they need.
- » **Data Download Service:** This service provides almost all models outputs participating in the ensemble with two policies. Public access (2-days delay data) for all registered users and Restricted access (real time data) for partners.
- » **Dust Products Catalogue:** Users can find centralized dust information from different sources (satellites, ground-based networks, experimental campaigns, marine ecosystems and models), that can be filtered by parameters, type of measurement or instrument and region.

Moreover, a climate service dashboard is under development and will be added soon.





The Daily Dust Forecast from Barcelona Dust Regional Centre

Across disciplines

This EOSC in practice story showcases a service that provides data specific to the climate research domain. Nonetheless, connections with health, agriculture, visibility, aviation and transport domains are evident due to the impact dust concentration has on these areas. This could lead to multidisciplinary collaboration.

Future developments

In its future versions, all the Barcelona Dust Regional Centre services will likely be improved with the addition of new visualisation, forecasts and time series tools. Users would be able to use maps, with a time series feature, for producing accurate forecasts. A new functionality will be the implementation of a cross section with the visualisation features capable of considering the impact of the altitude. This additional data will provide new insights to researchers. In the prospective of continuously keeping on improving the services, a feedback system will be implemented.

Sustainability for an EOSC in practice

The Barcelona Dust Regional Centre services do not depend on EOSC financially. Users can access the services for free, they will only need to sign an acknowledgment of data use for research purposes. On the operative side, this service uses the EUDAT infrastructure, in particular B2SAFE and B2HANDLE and the storage capacity, from the current 50 TB, will probably be increased in the future.

Future funding model scenarios

Currently the Barcelona Dust Regional Centre services are funded mainly by the national funding coming from the Spanish national meteorological agency, [AEMET](#). Since 2010 the service contract is renewed every 2-3 years. The products provided by WMO Barcelona Dust Regional Centre are well used in the European research community. Institutions based in UK, Finland and NASA are uploading the data produced by their models on the Barcelona Dust Regional Centre.

Useful material related to this story

- » [Barcelona Dust Regional Center User Guide](#)
- » [WMO SDS-WAS Regional Center for Northern Africa, Middle East and Europe](#)
- » [Global Assessment of Sand and Dust Storms by UNEP](#)
- » [The paper in preprint on dust forecast reanalysis \(climate application\) for the DustClim project](#)

Want to learn more about the other services being developed by **EOSC-synergy**? [Read here](#)

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The service provider

[Barcelona Supercomputing Center \(BSC\)](#) is the national supercomputing centre in Spain, specialised in high performance computing (HPC). The centre, with a total staff of more than 725 R&D experts, is a point of reference for scientific communities that need HPC. Their research fields are: Computer Sciences, Life Sciences, Earth Sciences and Computer Applications in Science and Engineering.

Why do I need EOSC?

The Barcelona Dust Regional Centre services, called Daily Dust Products, bring the following benefits to their users thanks to their presence in the EOSC Portal:

- » unique storage service capacity, with unique features in terms redundancy, federability and Persistent Identifiers generation.
- » additional visibility to the service provided.
- » opportunity to have a direct channel toward EU research audience

The Barcelona Dust Regional Centre services are already available on EOSC Marketplace! Access them [here](#).

The impact on society

The Barcelona Dust Regional Centre services impact on society in different fields. In the health sector, for example, there are studies investigating the relationship between the frequency of dust storms in a given country and the likelihood to experience pandemics and illnesses like meningitis, as well as allergies and diseases of the respiratory system. There are also studies showing how dust in agriculture is used as fertiliser. In addition, dust is the most prominent component of atmospheric aerosols after sea salt. It impacts climate directly by interacting with both solar and terrestrial radiation, thus influencing the global radiation balance. By acting as cloud condensation nuclei, dust also impacts climate indirectly altering cloud microphysical structure and rainfall process. Understanding better all these relationships can open paths to new green sustainable policies.

