
SDS-WAS

7. SDS-WAS

Description

SDS-WAS provides a set of services related to the mineral dust forecast. It collects numerical model outputs and observational data from a wide set of worldwide partners plus internally developed. A wide set of post-processed analysis and statistics are generated, and results in form of plots, tables or numerical (binary) data are disseminated to a variety of users (public institutions, researchers, etc). Finally, SDS-WAS also organizes training courses on dust related research, to give capabilities for generated products usages and other kinds of events (seminars, workshops) related to dust research. The aim is to give support to institutional entities (e.g. National Meteorological Agencies) to warn about possible dust events and to foster the study of dust-related phenomena into the academic and research communities. The EOSC infrastructure will give the possibility to increase the volume of data hosted and processed, reach a wider set of end-users, improve the compliance to FAIR principles and robustness of the whole service infrastructure.

Architecture

As shown in figure 23, the service is configured as an High Availability Cluster of two duplicated instances. Each instance, one hosted in the Barcelona Supercomputing Center, and the other in AEMET (Spanish Meteorological Agency), runs in the front-end a Content Management System which delivers all web contents, and where all authenticated users have access to add/remove/modify contents. There are different levels of access (through a classic web log-in) according to roles of each user or group. Currently all products generated are disseminated through the web, maps, plots, calculated statistics and numerical data (models outputs).

Some of these products are pushed to different channels in background (WMO Global Telecommunication System: https://www.wmo.int/pages/prog/www/TEM/GTS/index_en.html and EUMETCAST: https://www.eumetsat.int/eumetcast).

In the backend a local storage hosts all data, received and generated, and a set of libraries and tools for post-processing and data analysis. Currently the service downloads data and produces its outputs (plots, numerical data,) on a daily basis with a set of cron-jobs. In-house models are run separately in two HPC clusters and the front-end accesses one of those outputs by default, and the other if the first one is not available.

On the other hand, the new refactored services is going to have:

- An automatic and independent workflow which will manage the in-house model run in multi-HPC environment
- A single sign-on system provided by the authentication service B2Access, which will be the entry point
- All numerical data products will be available through the THREDDS data server integrated into B2SAFE storage service. The data server is specific to netCDF data format, which is the one used in the SDS-WAS and one of the most popular for atmospheric science data. It exposes public APIs and provides aggregation features to data, independently of how files are physically organized into the file system underneath. It provides one entry point per data set and features, among others, to select dynamically spatial and temporal subsets. The B2Handle service integrated with B2SAFE will manage the Persistent IDentifiers generation and management.

A new interactive application connected directly to the B2SAFE repository which will replace (partially) static plots generated by nightly jobs. This application will, among other things:

- Show comparison view of forecast plots of different models selected dynamically by the user (v0)
- Show compared timeseries of selected model in a selected point (fig_ sdswassdash2)
- Show evaluation plots of model outputs against observations
- Show verification scores tables of models against observations performances (BIAS, RMSE, etc)
- Show other relevant products (probabilistic forecast maps, warning advisory for specific countries, etc)

EOSC Services

SDS-WAS thematic service has selected and it is integrating the following services listed in the EOSC marketplace:

- B2ACCESS will be used as a single sign-on platform to authenticate users into the services.
- B2Handle will be in charge of managing and generation of Persistent IDentifiers for data products delivered.
- B2SAFE runs as a storage service and will expose data products through the integration with a THREDDS (https://www.unidata.ucar.edu/software/tds/) data server.

7. SDS-WAS

Service Endpoint

The current interface of SDS-WAS is the http://sds-was.aemet.es website. All operational services are available through that end-point, such as:

- Forecast plots: https://sds-was.aemet.es/forecast-products/dust-forecasts/forecast-comparison
- Forecast evaluation: https://sds-was.aemet.es/forecast-products/forecast-evaluation/model-evaluation-metrics/model-evaluation-metrics-v3
- Files download: https://sds-was.aemet.es/forecast-products/dust-forecasts/files-download

The whole system is being refactored in collaboration with AEMET and in the framework of EOSC-SYNERGY project. The temporary end-point deployed for new refactored services is: http://dust02.bsc.es (can be down from time to time). It will show the web Content Management System and the interactive dashboard shown in figures 23 and 24.

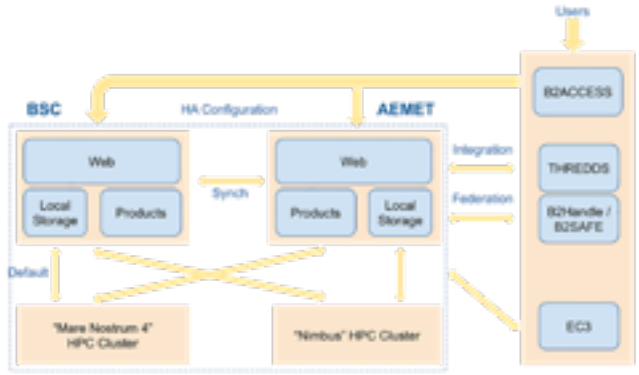

Figure 23 - Architecture of the SDS-WAS thematic service

Figure 24 - New interactive dashboard with models forecasts comparison plots

Figure 25 - New interactive dashboard with models forecasts comparison time series

Demonstration Video

The video follows this structure:

A first introduction to the current operational SDS-WAS service as it runs now, with:

- Models forecasts comparison plots.
- Numerical model data storage and download.
- Forecast evaluation against observations time series.

A second part on the developments for the new service completely refactored with:

- Storage moved to B2SAFE service.
- The THREDDS data server build on top of it to distribute numerical data dynamically aggregated.
- The automatic workflow of the in-house numerical model MONARCH which runs in multi-HPC environment.
- The interactive visualization application built on top of B2SAFE storage service and which provides all services related to plots, going to replace currently delivered as static png generated with nightly jobs.

Click the image to view the video