



Training event on Atmospheric Composition Data Exploitation.

Sara Basart - sbasart@wmo.int

Day 1. Introduction on Atmospheric Composition data exploitation

IR0000032 – ITINERIS, Italian Integrated Environmental Research Infrastructures System
(D.D. n. 130/2022 - CUP B53C22002150006) Funded by EU - Next Generation EU PNRR-
Mission 4 “Education and Research” - Component 2: “From research to business” - Investment
3.1: “Fund for the realisation of an integrated system of research and innovation infrastructures”



Training event on Atmospheric Composition Data Exploitation, 28-30 January 2025

The WMO Global Atmosphere Watch (GAW) programme

Sara Basart (sbasart@wmo.int)

Scientific Officer

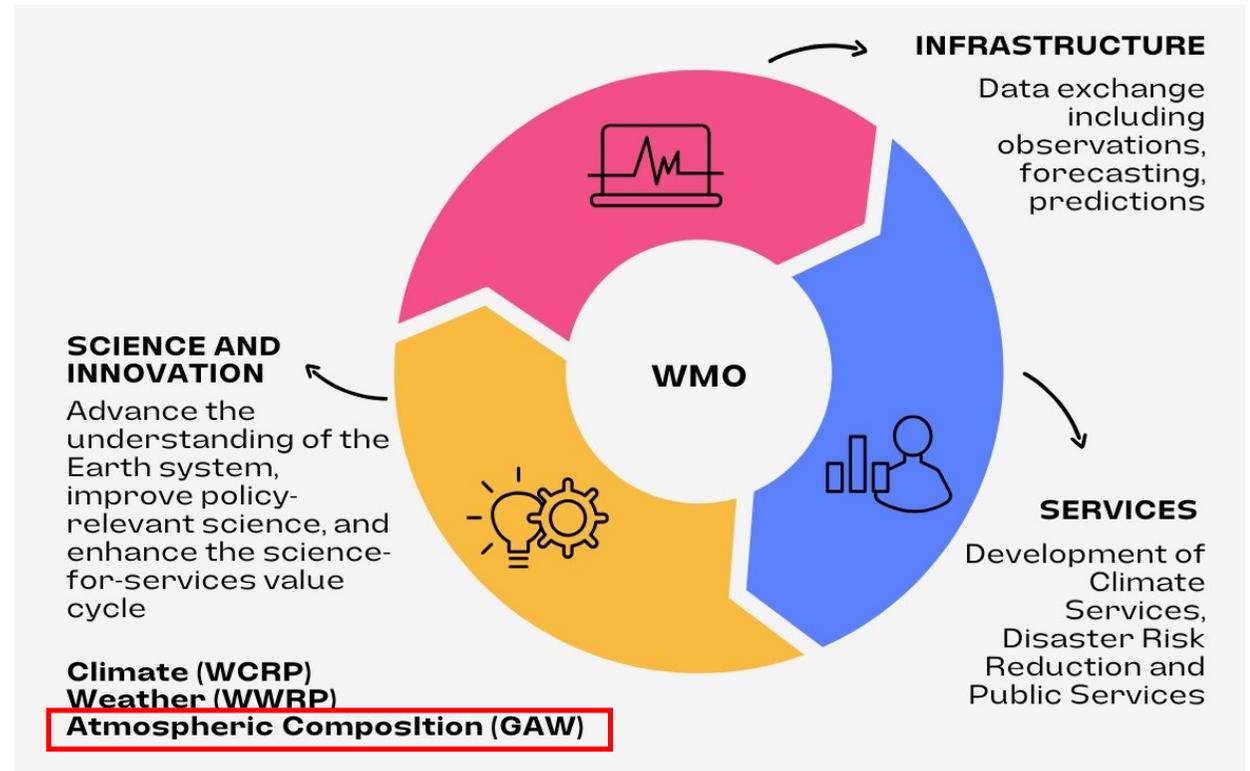
WMO Science and Innovation Department



WORLD
METEOROLOGICAL
ORGANIZATION

World Meteorological Organization (WMO)

- UN specialized agency on weather, climate and water.
- It's supported by 193 Members and the headquarters is in Geneva (Switzerland).
- Coordinates work of > 300,000 national experts from meteorological and hydrological services, academia and private sector.
- Co-Founder and host agency of IPCC.



WMO Research-Operations Departments

The WMO Global Atmosphere Watch (GAW) Programme

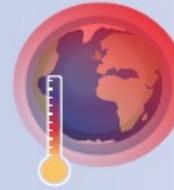


Advance and enhance science, services and infrastructure related to atmospheric composition, and support policies for society through applied research aimed at improving the understanding of the roles of aerosols, reactive gases, stratospheric ozone and greenhouse gases and their interactions in the Earth System



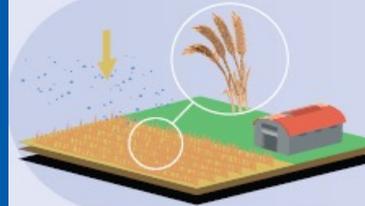
Support to international conventions and SDGs

- The Convention on Long-range transboundary Air pollution (LRTAP)
- The Montreal Protocol and Vienna Convention (*ozone*)
- The UN Framework Convention on Climate Change (UNFCCC)
- Climate and Clean Air Coalition (CCAC)
- The Convention on Biodiversity
- The Group of Experts on the Scientific Aspects of Marine Environmental Protection (GESAMP)
- UN Coalition for Combating Sand and Dust Storms



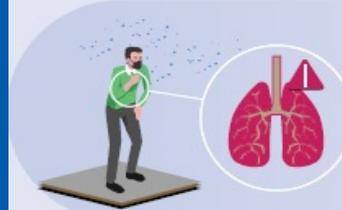
SDG 13:

Air pollution not only contributes to climate change but makes it worse.



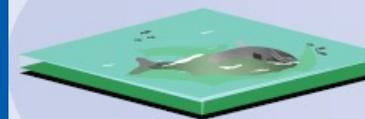
SDG 2:

Air pollutants affect crop growth, putting global food security at risk.



SDG 3:

People exposed to air pollution may experience health issues, such as breathing problems or more serious heart conditions.



SDG 6:

Air pollutants that accumulate in the ocean affect marine biodiversity.



SDG 11:

Urban areas are vulnerable to dangerous levels of air pollution and responsible for up to 70% of greenhouse gas emissions.

The GAW Programme: 4 pillars

Monitoring Infrastructure: provision of atmospheric composition data from GAW stations,

Scientific assessments: advancing scientific understanding through analysis of global data sets,

Science-for-Services Initiatives: engage with user communities for supporting services and policies,

Capacity Building and education: provide training opportunities for all GAW users from all regions



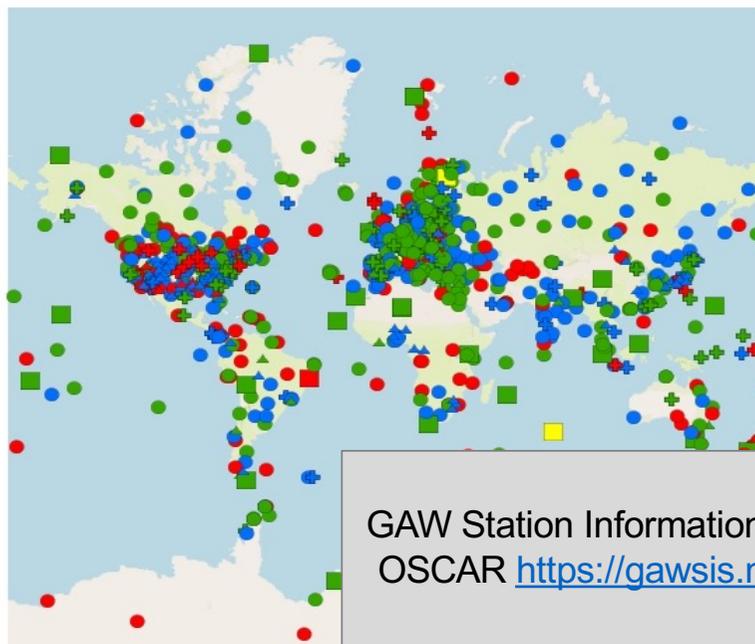
18 GAW groups/teams/initiatives
Experts from more than 100 countries

GAW: Research Infrastructure

*Strengthen the atmospheric composition measurement and data infrastructure and contribute to **understanding trends and variability and extremes.***

Filling gaps:
LCS and satellites,
but also National AQ networks
Integration!

- More than 200 parameters
- Intercomparisons
- Measurement guidelines
- World Data Centers



GAW Station Information System (**GAW SIS**) part of OSCAR <https://gawsis.meteoswiss.ch/GAW SIS/#/>

3,000 Km

mapbox © Mapbox © WMO © OpenStreetMap



Open access with emphasis in QA and QC



Schweizerische Eidgenossenschaft
 Confédération suisse
 Confederazione Svizzera
 Confederaziun svizra
 Swiss Confederation
 Federal Department of Home Affairs FDHA
 Federal Office of Meteorology and Climatology MeteoSwiss

- | | | |
|-----------------------|--------------------|---|
| Global | Operational | ● |
| Regional | Partly operational | ● |
| Contributing networks | Non-reporting | ● |
| Local | Closed | ● |
| Other networks | Planned | ● |
| | Pre-operational | ● |
| | Stand-by | ● |

GAW Scientific assessments

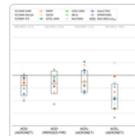
- Publish community assessment reports and high-level scientific papers on the state of the atmosphere and its evolution,
- Provide technical recommendations for monitoring atmospheric composition and modelling
- Contribute to international reports

<https://doi.org/10.5194/acp-21-87-2021>
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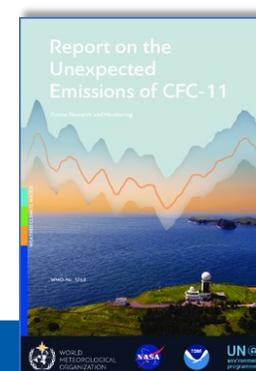
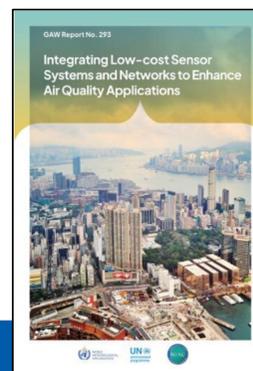
Article Assets Peer review Metrics Related articles

Research article | © ⓘ 06 Jan 2021

AeroCom phase III multi-model evaluation of the aerosol life cycle and optical properties using ground- and space-based remote sensing as well as surface in situ observations



Jonas Glien, Augustin Mortier, Michael Schulz, Elisabeth Andrews, Yves Balkanski, Susanne E. Bauer, Anna M. K. Benedictow, Huisheng Bian, Ramiro Checa-Garcia, Mian Chin, Paul Ginoux, Jan J. Griesfeller, Andreas Heckel, Zak Kipling, Alf Kirkevåg, Harri Kokkola, Paolo Laj, Philippe Le Sager, Marianne Tronstad Lund, Cathrine Lund Myhre, Hitoshi Matsui, Gunnar Myhre, David Neubauer, Twan van Noije, Peter North, Dirk J. L. Olivié, Samuel Rémy, Larisa Sogacheva, Toshihiko Takemura, Kostas Tsigaridis, and Svetlana G. Tsyro

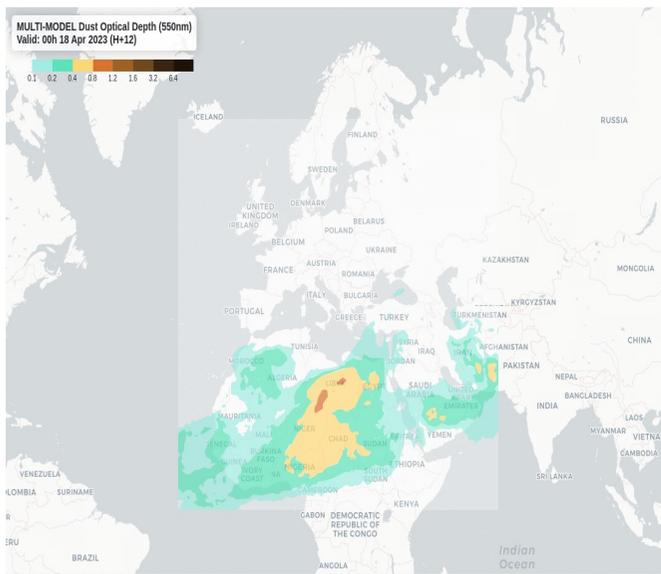




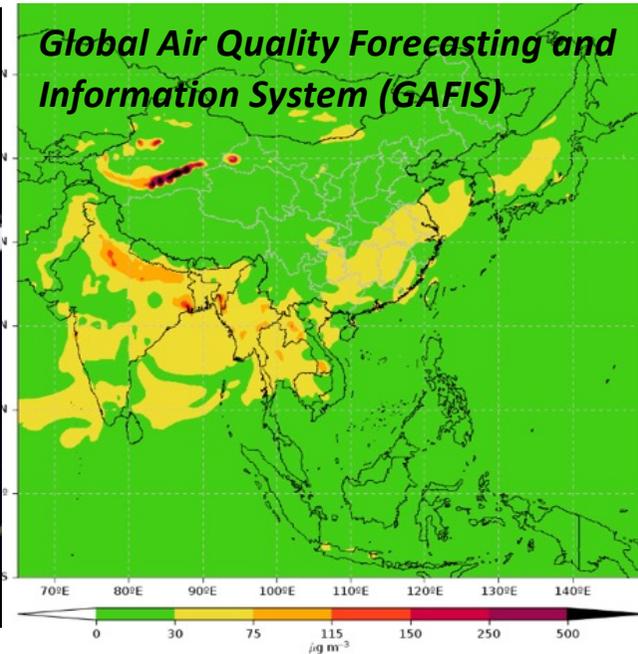
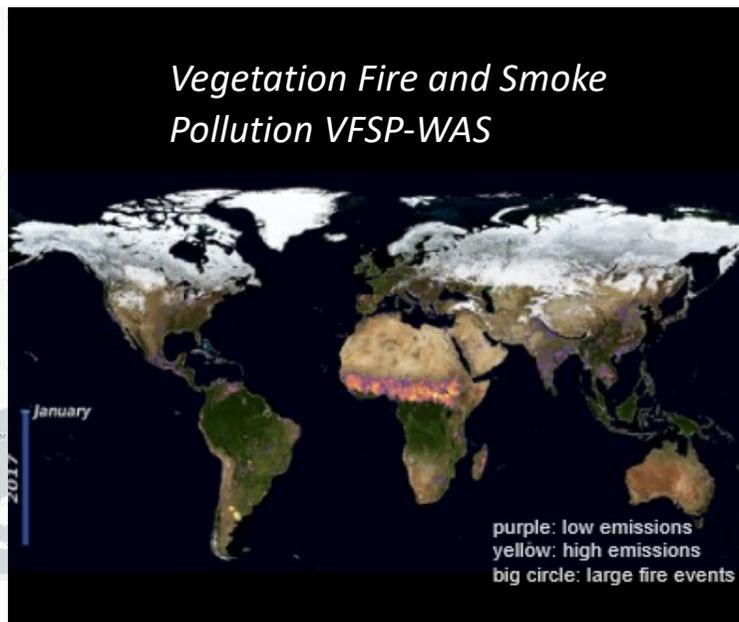
Science for Services

*Advance the application of atmospheric composition information in support of policies and conventions, and expand **societal services** related to air quality, human and ecosystem health, climate change and food production.*

Warnings and Forecasting Services Model intercomparisons



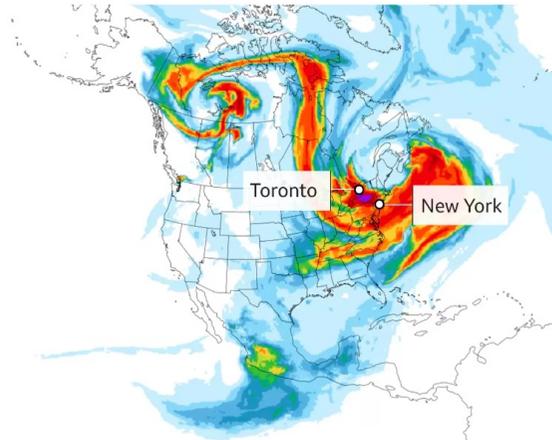
Sand and Dust Storm SDS-WAS



WMO-GAW Warning Advisory and Assessment Systems (SDS-WAS and VFSP-WAS)



The World Meteorological Organization spearheads a Sand and Dust Storm Warning Advisory and Assessment System.



Data from NOAA on Wednesday 7 June 2023

NASA MODIS/Terra, May 6, 2023



International coordination of research for weather and climate

Identification and assessment of SDS and VFSP impacts

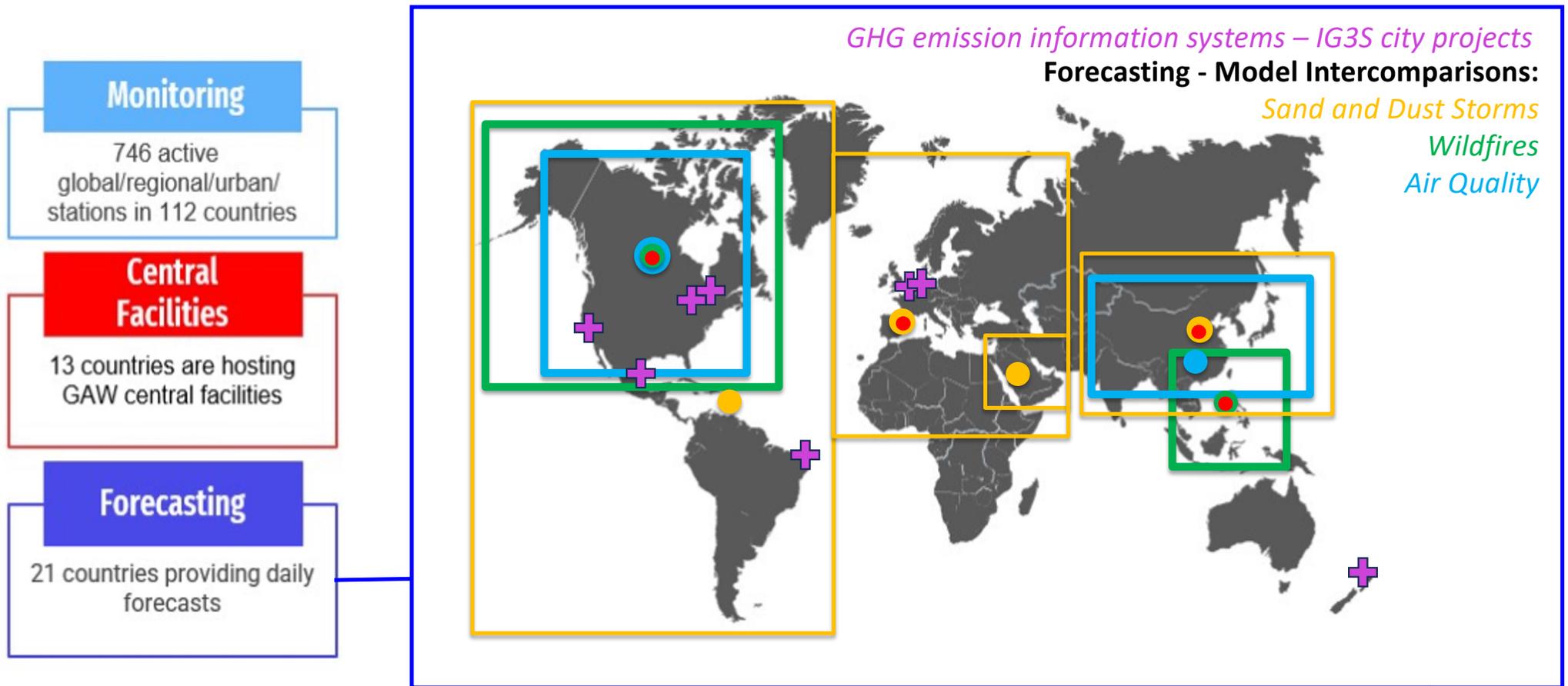
Promoting the use of current available products (observations and monitoring)

Building capacity and facilitate access to the available services

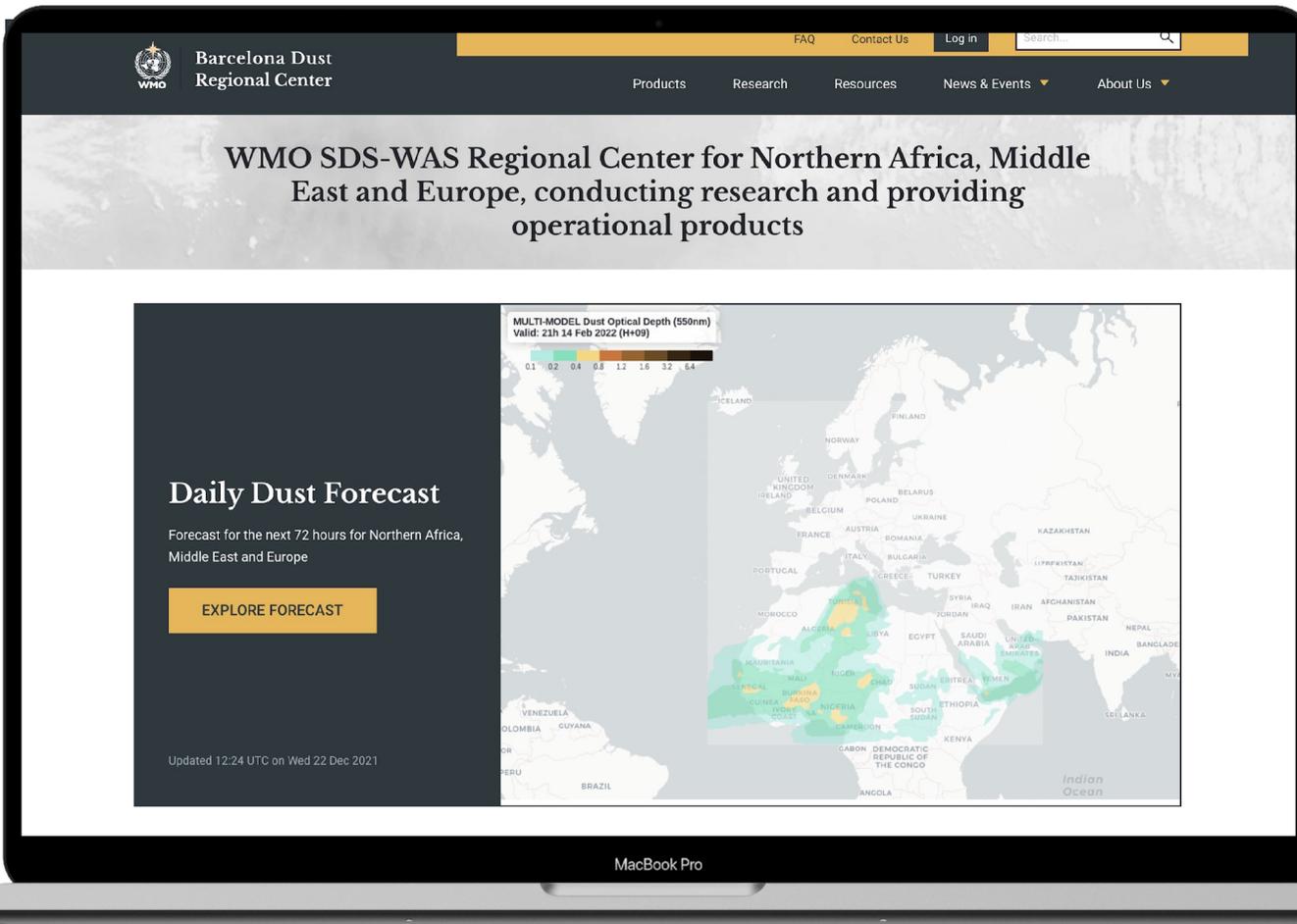
Dissemination and awareness

<https://community.wmo.int/en/activity-areas/gaw/>

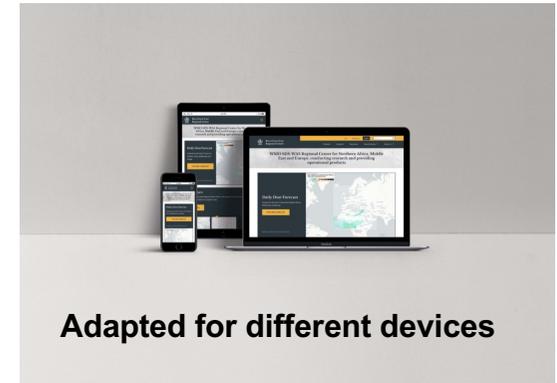
Infrasructure for the provision of Services



WMO INFRASTRUCTURE - WIPPS
Regional Specialized Meteorological Center with activity specialization
ASDF and VFSPF



<https://dust.aemet.es/>
[@Dust_Barcelona](#)





Daily Dust Products

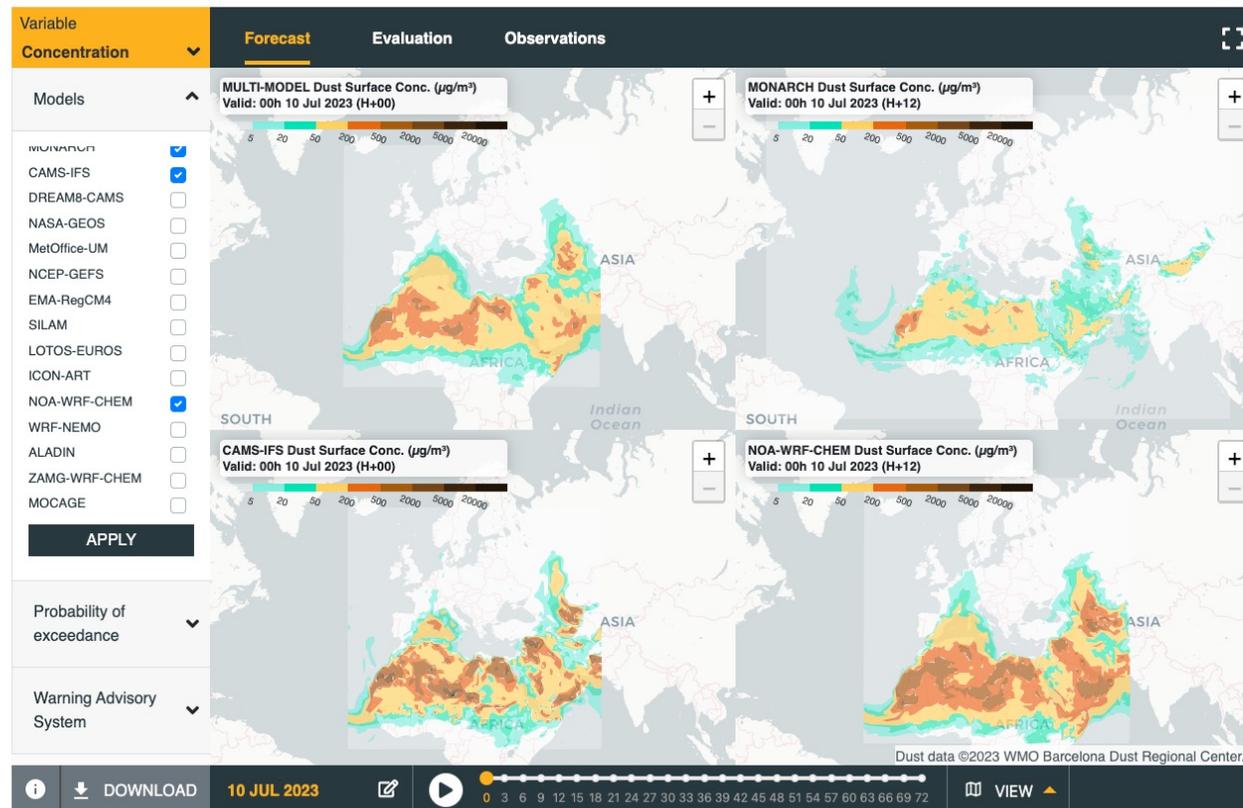
[< BACK TO PRODUCTS](#)

This interactive visualisation tool allows you to access different dust forecasts and dust-related observational products. To find out how to interact with it, please watch the [Video Tutorial](#) or download the [User Guide](#).

Model intercomparisons

1. Promoting best practices and guidelines to be used by the international community

2. Development of probabilistic forecasts

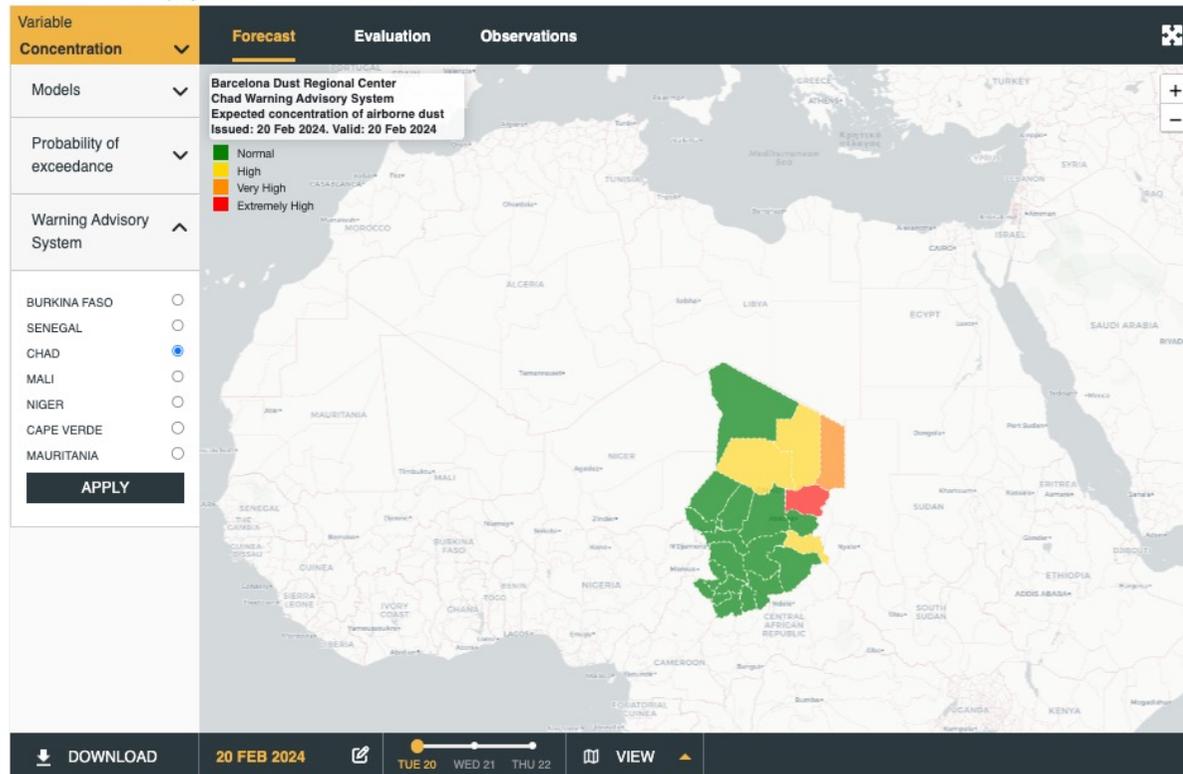




Daily Dust Products

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This interactive visualisation tool allows you to access dust forecasts from different [numerical models](#) and dust-related observational products. To find out how to interact with it, please watch the [Video Tutorial](#) or download the [User Guide](#) and read the [Documentation](#). The Warning Advisory System has been developed thanks to the co-funding support of [FEDER INTERREG MAC](#) program and [WMO-CREWS](#) initiative.





Daily Dust Products

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Variable
RGB

Forecast Evaluation **Observations**

EUMETSAT RGB

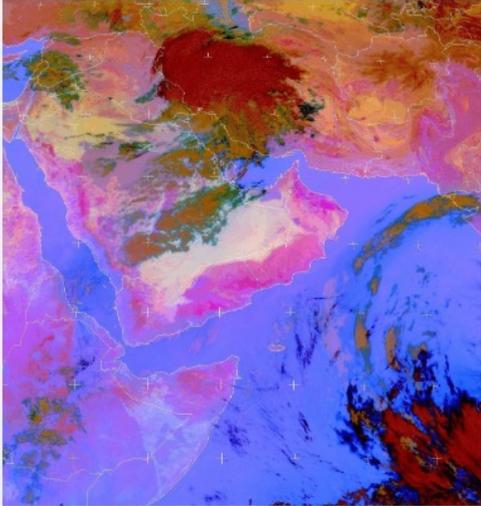
Visibility

EUMETSAT RGB

You can explore key observations that can be used to track dust events. All observations are kindly offered by Partners of the WMO Barcelona Dust Regional Center. RGB is a qualitative satellite product that indicates desert dust in the entire atmospheric column (represented by pink colour).

HEMISPHERIC

MIDDLE EAST



EUMETSAT

Meteosat ICGC Data, 2025-01-27 08:00:00 UTC

DOWNLOAD

27 JAN 2025

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

Capacity Development

- Provision of training to GAW station operators through the Global Atmosphere Watch Training & Education Centre (GAWTEC)
- GAW stations instrument intercomparison and calibration campaigns
- Training on data quality control, data use, modelling tools and quality assurance procedures



Key Messages

- Air pollution plays a significant role in different aspects of weather, climate and atmospheric chemistry and represent a serious hazard for life, health, property, environment and economy.
- Understanding, managing and mitigating air pollution risks (including natural hazards as sand and dust storms and wildfires) and effects requires fundamental and cross-disciplinary knowledge.
- WMO is key to provide information and guidance on how to monitor, model, and mitigate air pollution at global scale.

Promoting latest GAW achievements

WMO Bulletins in 2024

The image displays four WMO bulletins from 2024. The top row features the 'WMO AIR QUALITY AND CLIMATE BULLETIN' (No. 4 - SEPTEMBER 2024) and the 'WMO AIRBORNE DUST BULLETIN' (No. 6 - JULY 2024). The bottom row features the 'WMO OZONE AND UV BULLETIN' (No. 2 - SEPTEMBER 2024) and the 'WMO GREENHOUSE GAS BULLETIN' (No. 30 | 28 October 2024). Each bulletin includes a cover image, title, issue information, and a brief introduction. The Greenhouse Gas Bulletin includes a bar chart showing the growth rate of the global average annual mean atmospheric CO₂ concentration from 1958 to 2023.

Available at: <https://library.wmo.int/>

WMO-GAW Newsletter



Stay up to date on our core and related activities through our Newsletter

Click here to Subscribe to the GAW Newsletter





THANKS!

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Ministero
dell'Università
e della Ricerca

