Air quality basics – Copernicus program

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Basics of air quality

Definitions

Air Pollution

"The atmospheric condition where substances are present in concentrations that are a concern, or even an immediate danger for human health, ecosystems or infrastructure."

Air Pollutants

Substances which, when present in the atmosphere in sufficient concentration, may harm human, animal, plant or microbial health, or damage infrastructure or ecosystems.

Air Quality

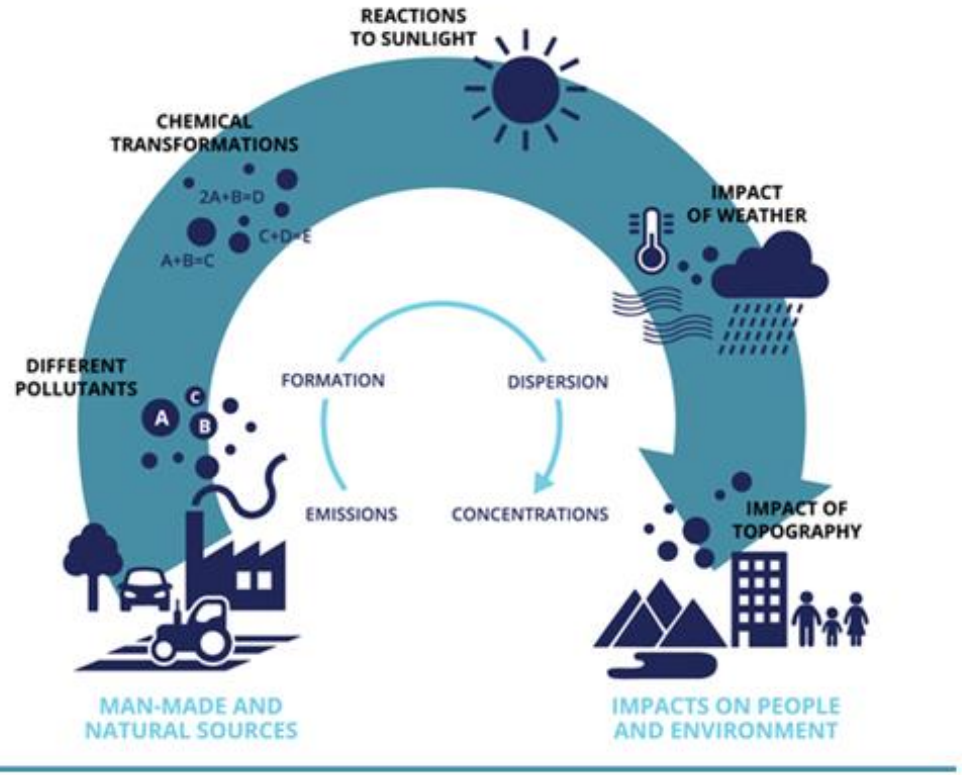
Refers to the degree to which the air is suitable for humans and the environment.

Breathable air is the first requirement for surviving! In terms of **Air Quality**: Survival time differs depending on the type and concentration of the air pollutant and the exposure of the receptor.

Basics of air quality

Cycle and Sources

From emissions to exposure



Source: EEA

Man-made or anthropogenic sources

- Agricultural activities, energy production, waste, coal mining, transportation, fuel combustion (businesses, public buildings, households)

Natural sources

- Volcanoes, dust storms, sea-spray

Basics of air quality

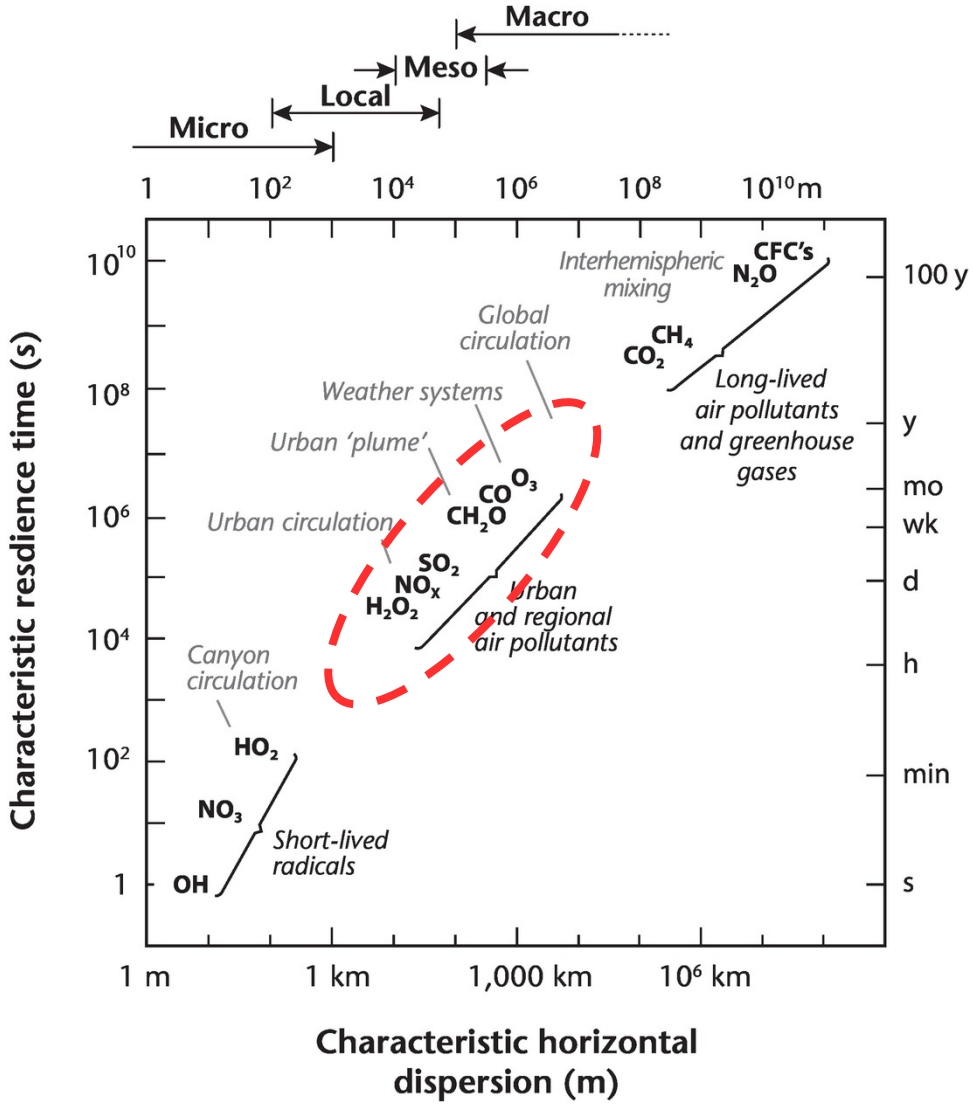
Basic Air Pollutants & Timescales

Carbon Monoxide (CO)

- Emission sources
  - Combustion
- Climate Impacts
  - Contribution to O_3 and CO_2

Nitrogen Oxides (NO_x)

- Emission sources
  - Fuel combustion, Soils
- Climate Impacts
  - Production of O_3, eutrophication, fertilization



Sulphur Dioxide (SO_2)

- Emission sources
  - Volcanoes, combustion (coal, diesel, fuel oil), Industrial processing
- Climate Impacts
  - 'acid rain', particulate matter

Ozone (O_3)

- Emission sources
  - Formation from VOCs and NO_x
- Climate Impacts
  - Reduced primary productivity, changes in radiative budget

Basics of air quality

Basic Air Pollutants & Timescales

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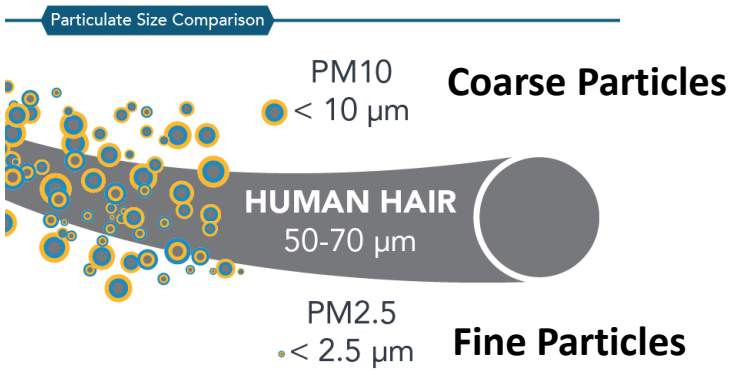
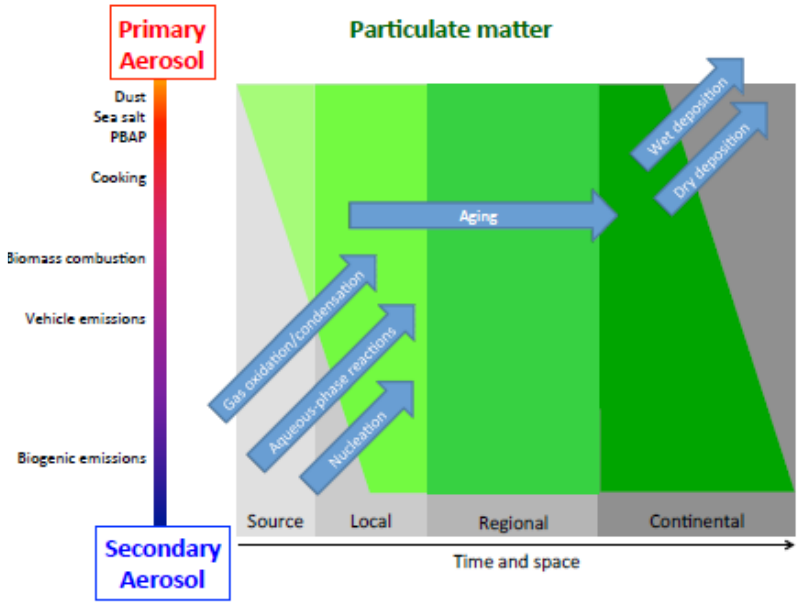
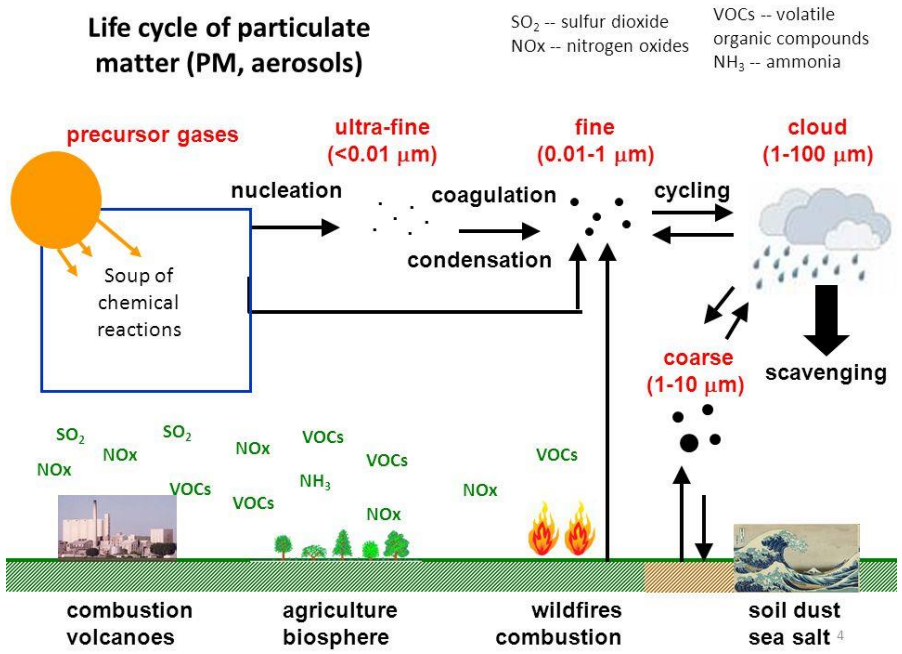


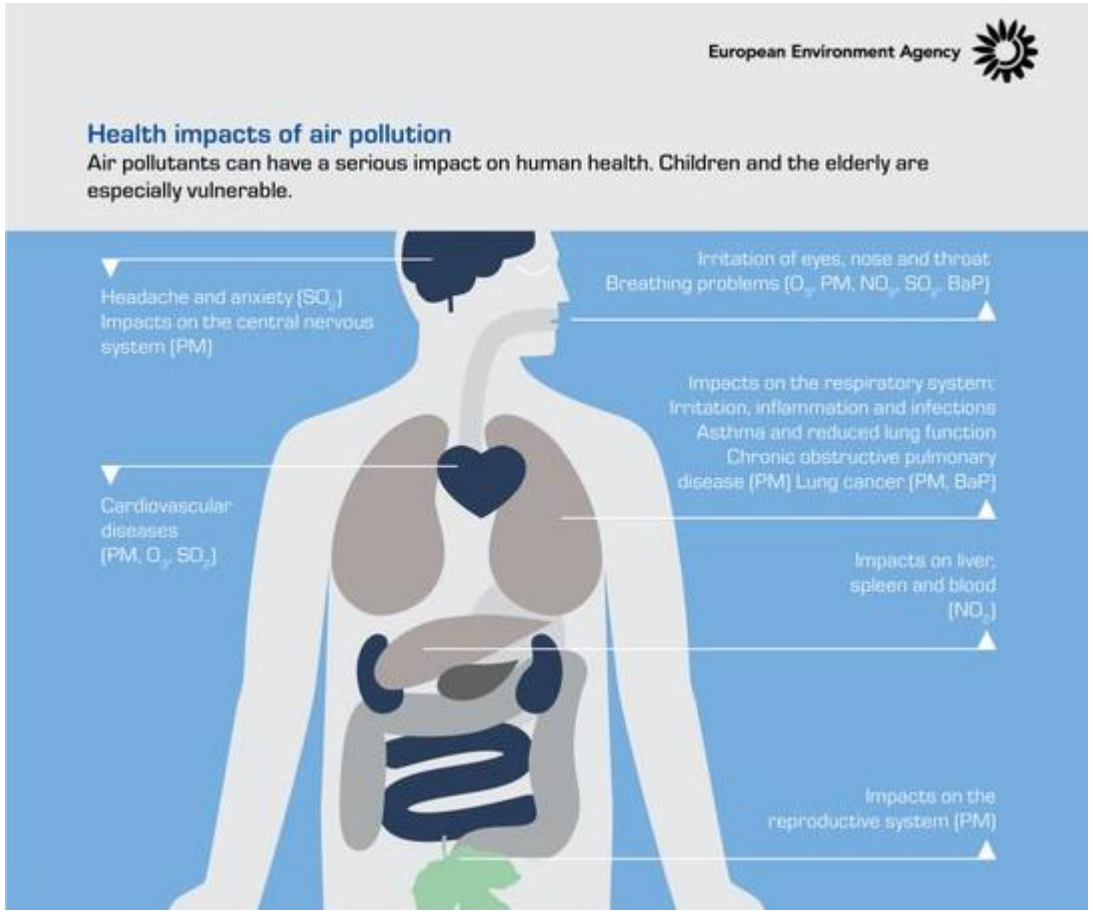
Particulate Matter (PM_x)

- Emission sources
  - Combustion, during mechanical abrasion, formation from condensation of gas-phase species, sea-salt and desert dust.
- Climate Impacts
  - Changes in the radiative transfer in atmosphere, reduction of visibility, variation of albedo

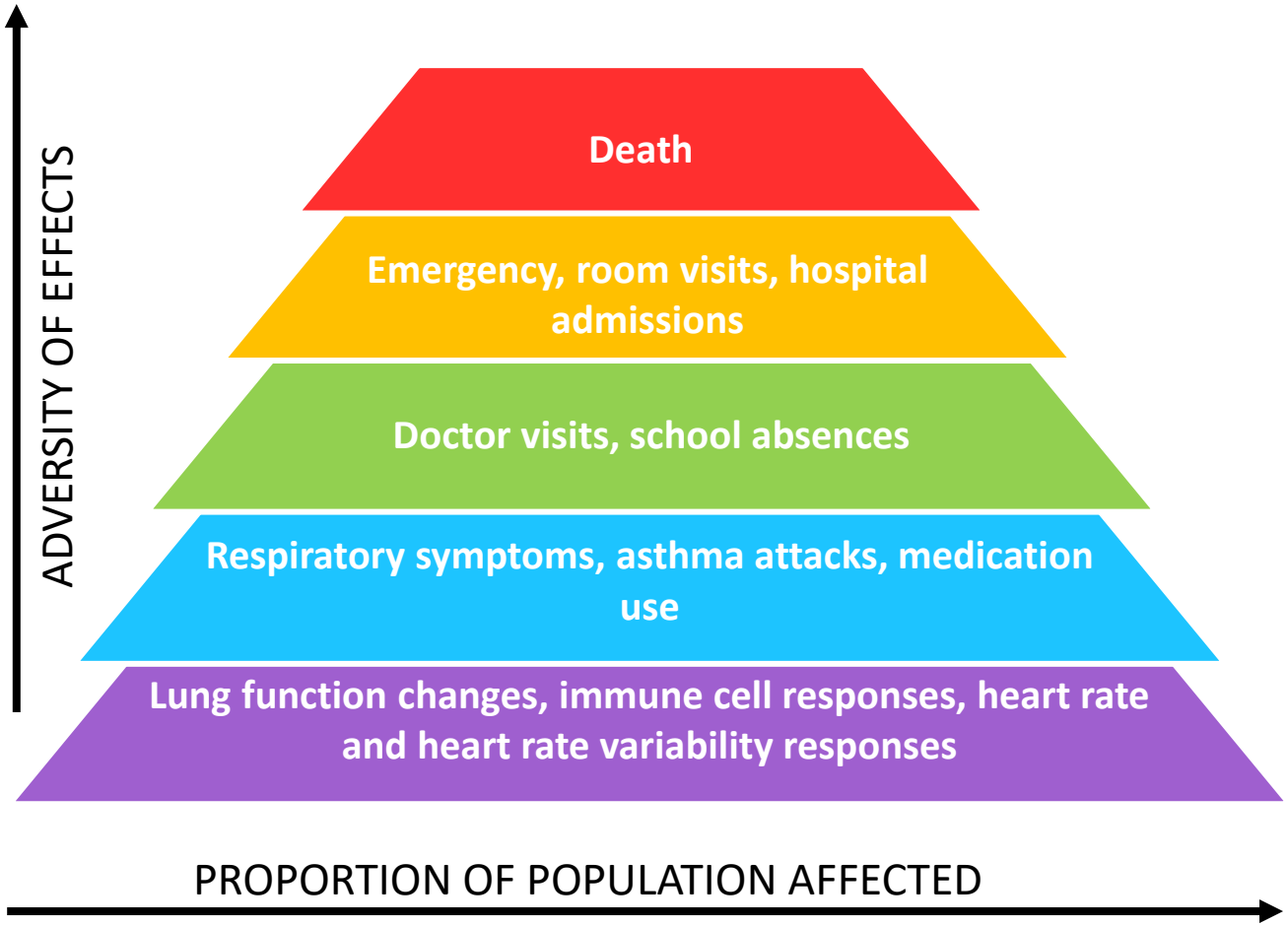




Air Pollution vs. Health



Source: EEA



Copernicus Program

Europe's eyes on Earth

Copernicus is the EU Earth observation program, looking at our planet and its environment to benefit all European citizens.

It offers information services that draw from **satellite Earth Observation and in-situ (non-space) data.**

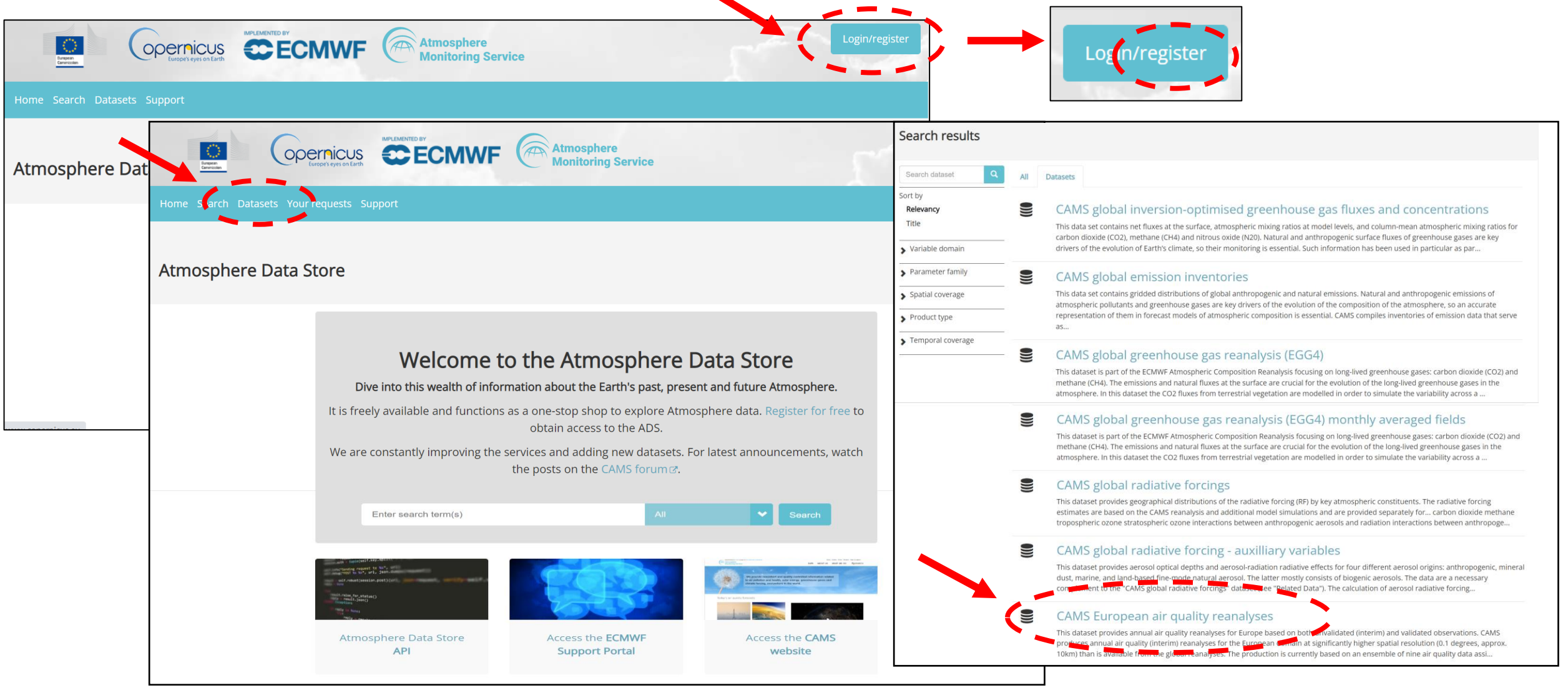
The information services provided are **free** and **openly** accessible to users.

Copernicus Program

Atmosphere Data Store

https://ads.atmosphere.copernicus.eu/#!/home

Create an account and login



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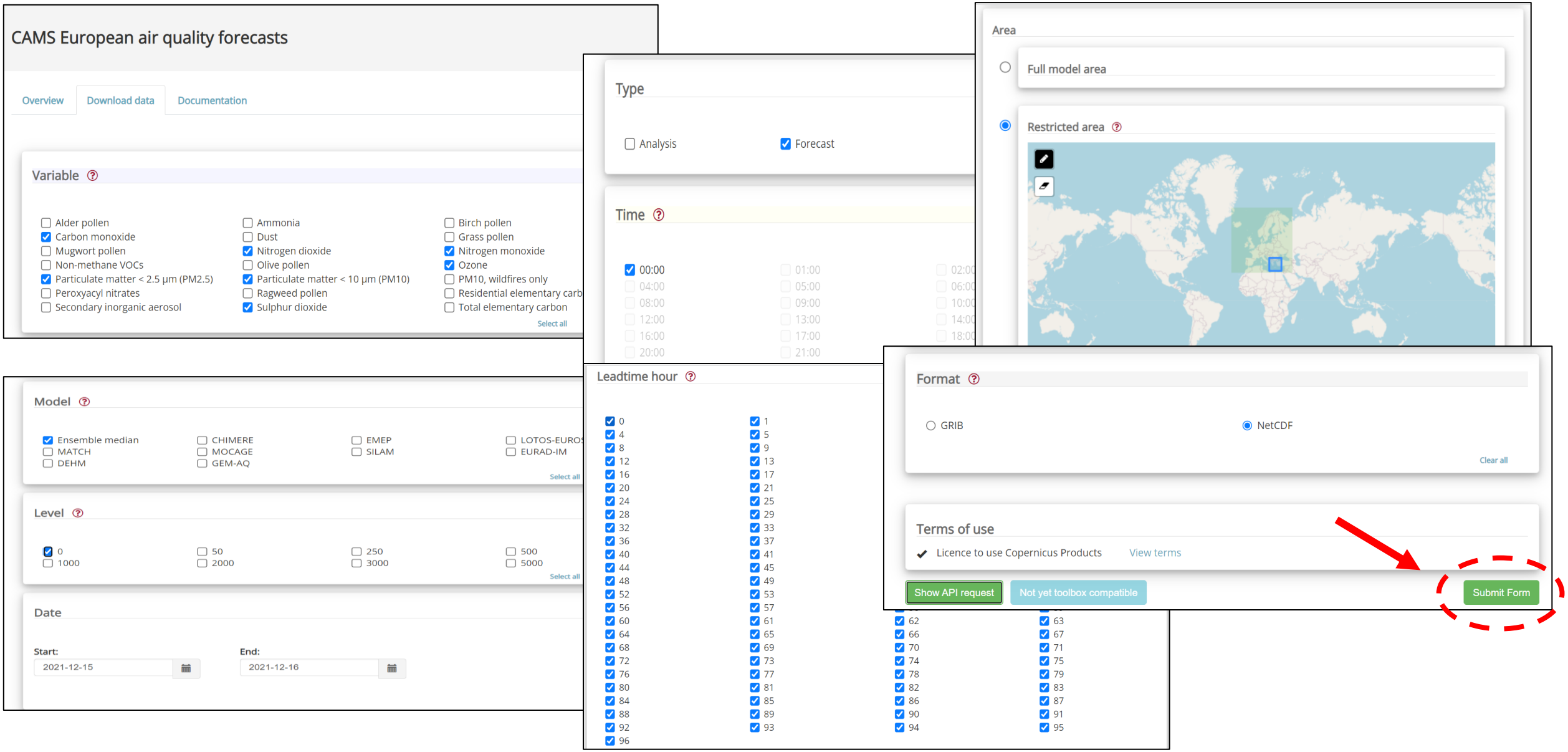
Atmosphere Data Store



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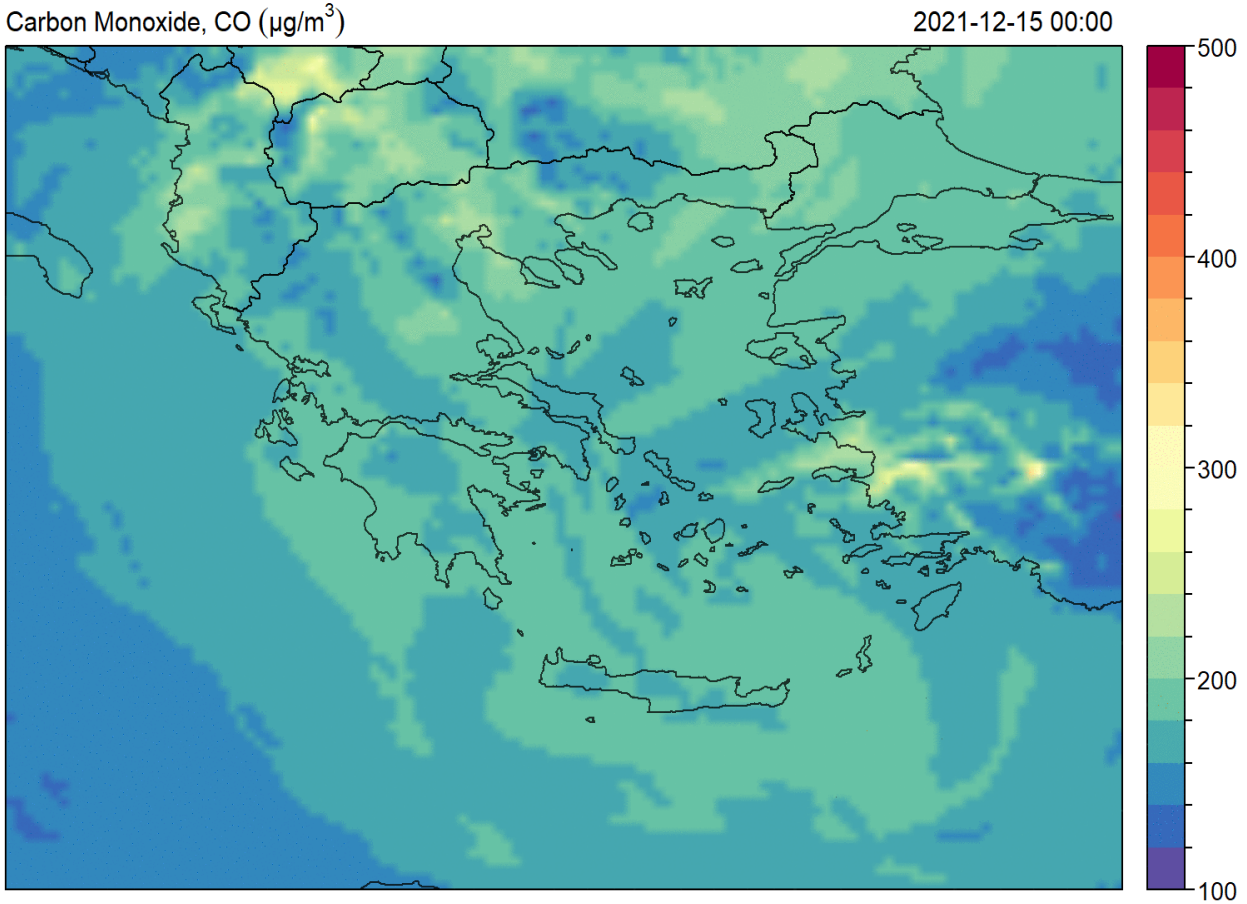
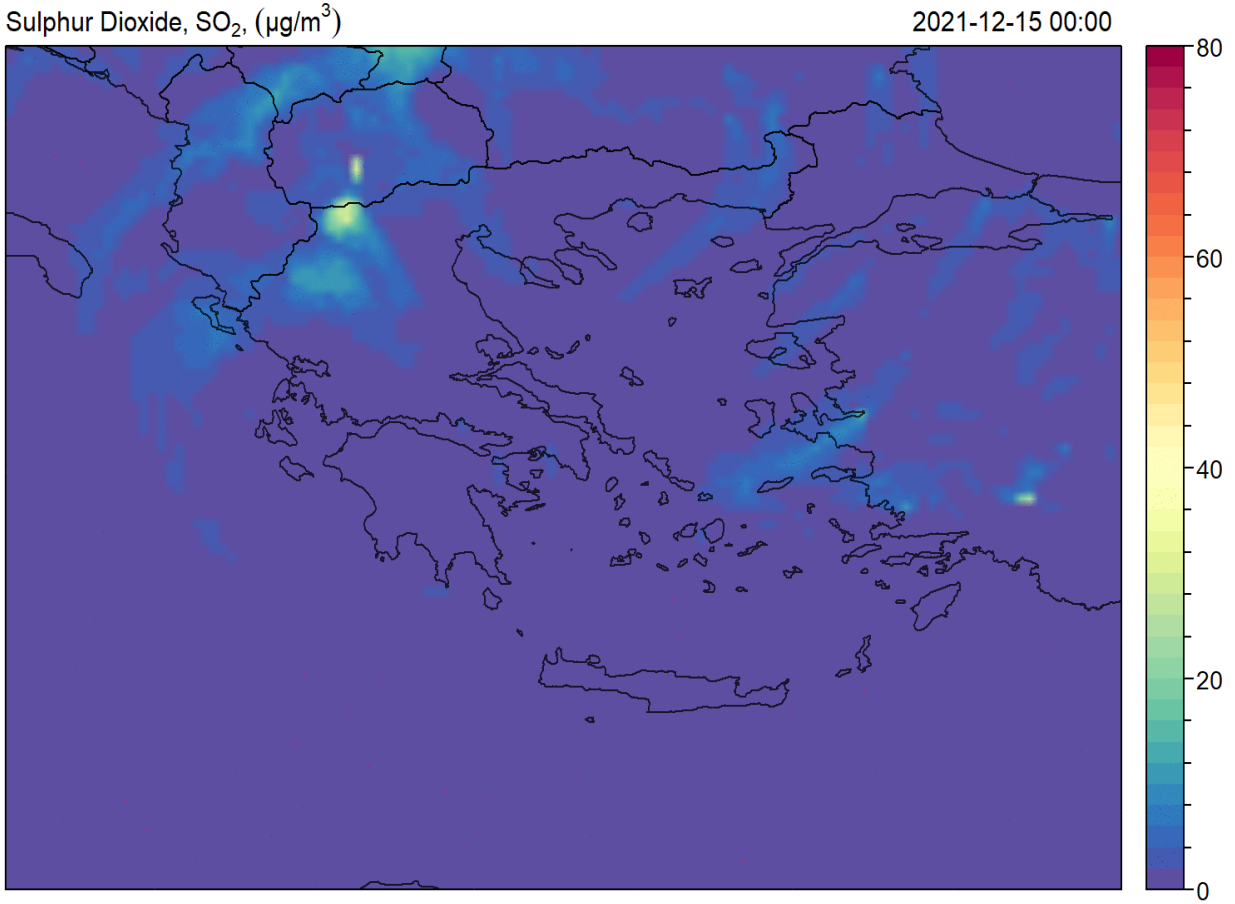
Air Pollutants – Forecasts

Carbon Monoxide (CO)



Sulphur Dioxide (SO_2)



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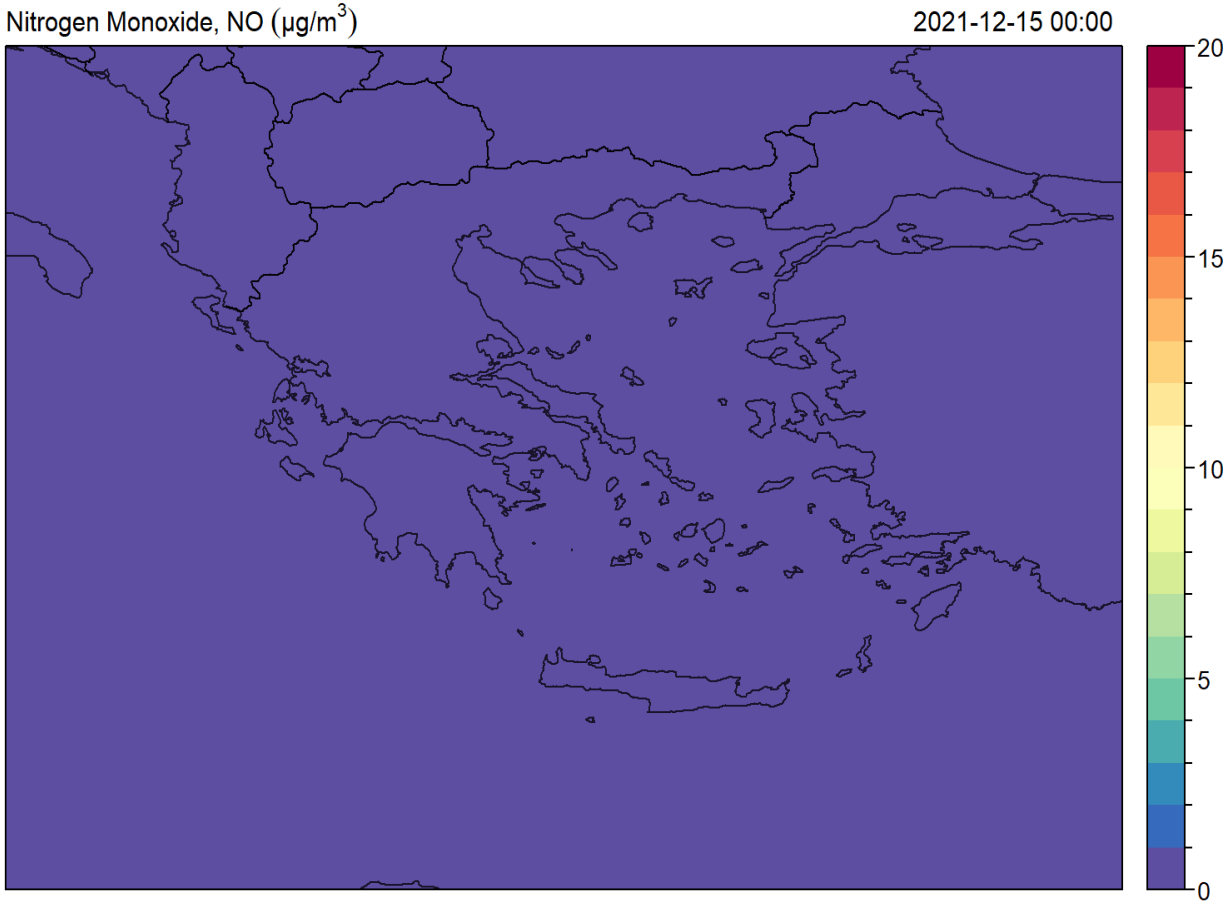
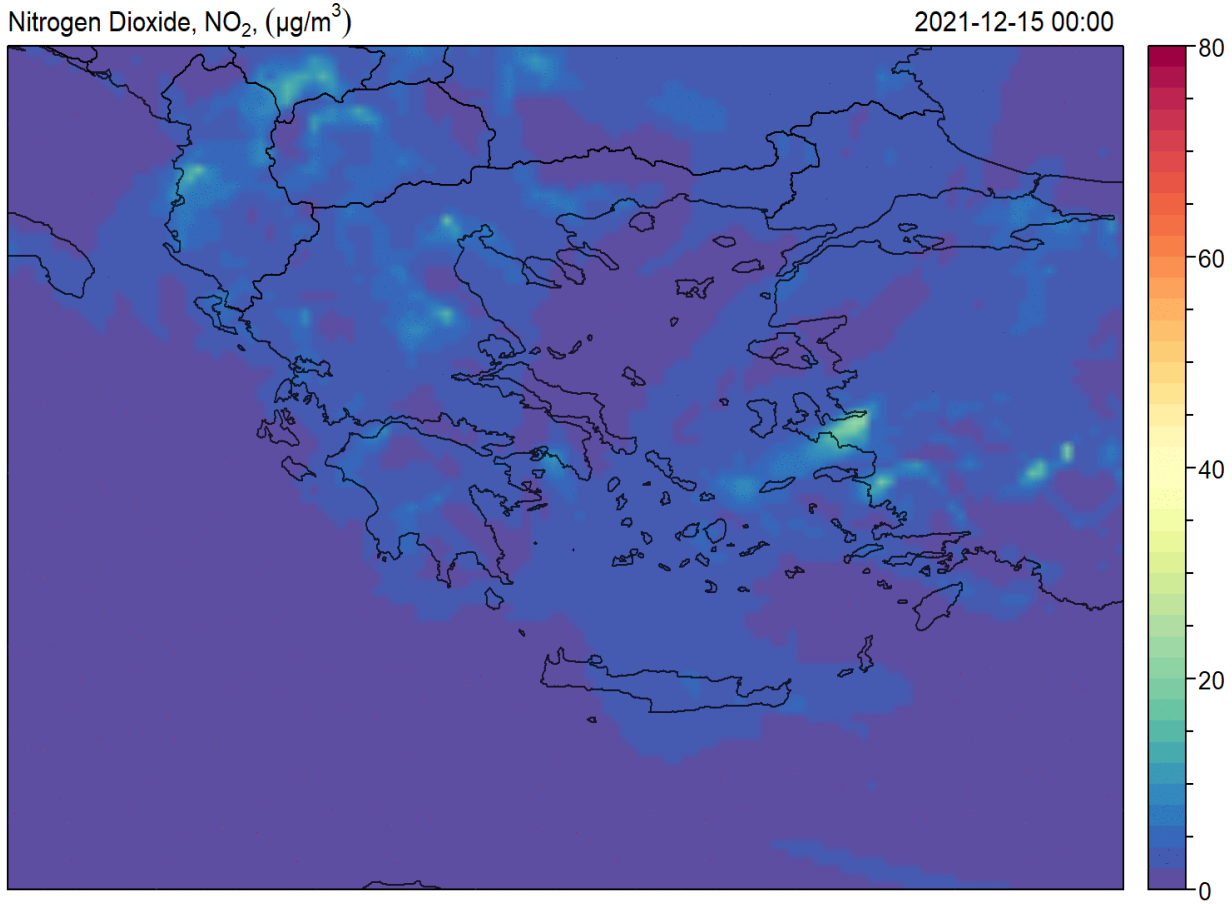
Air Pollutants – Forecasts

Nitrogen Monoxide (NO)



Nitrogen Dioxide (NO_2)



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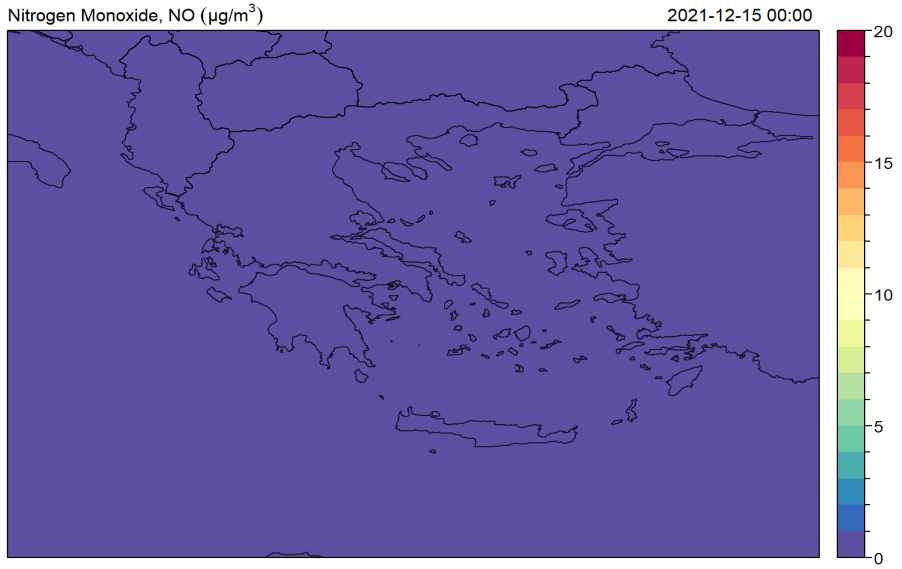
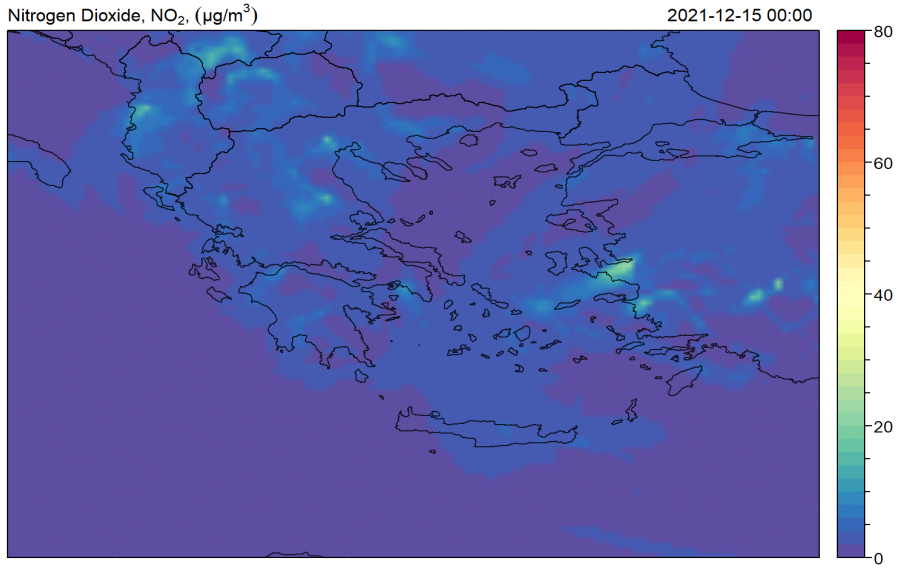
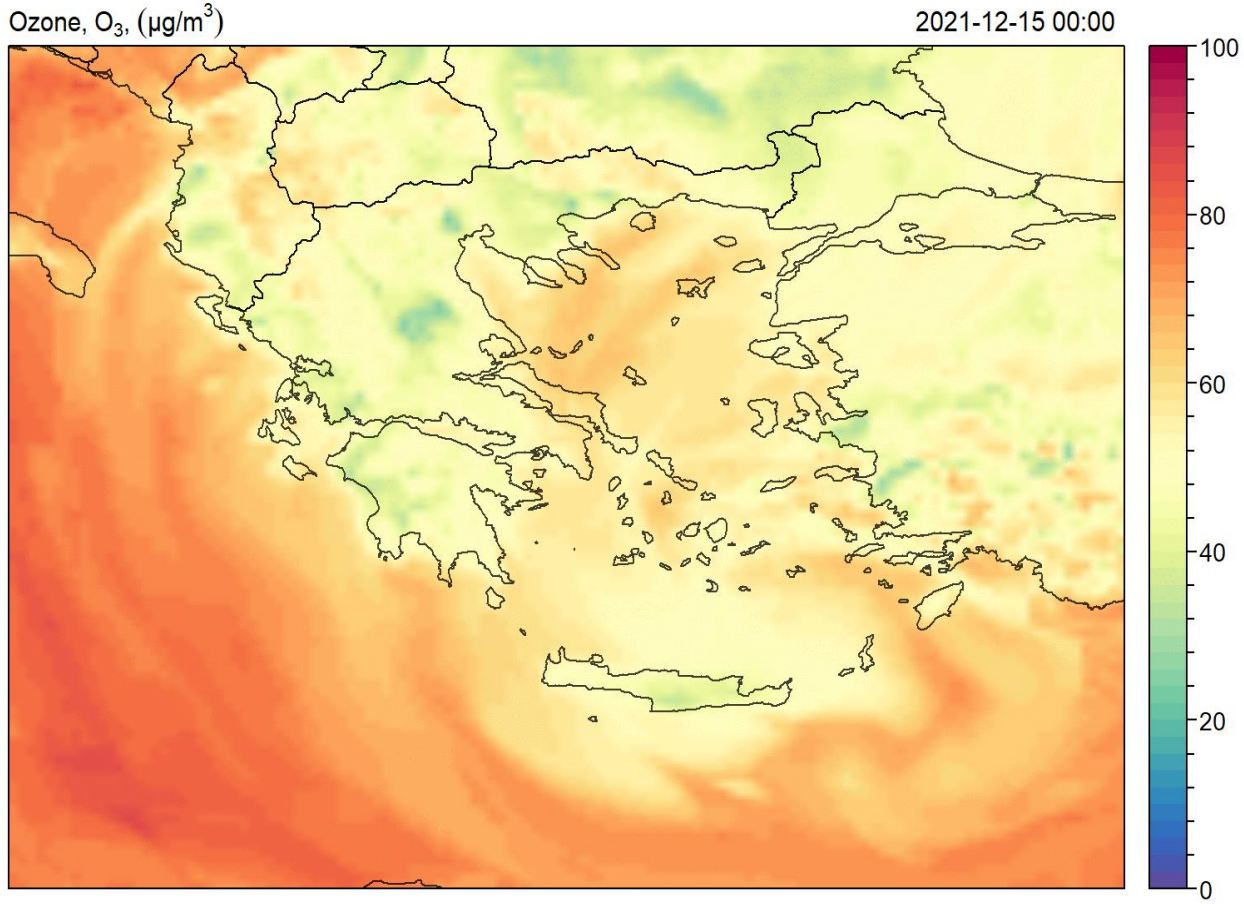
Air Pollutants – Forecasts





Primary Pollutants (Precursors) & Ozone (O_3)



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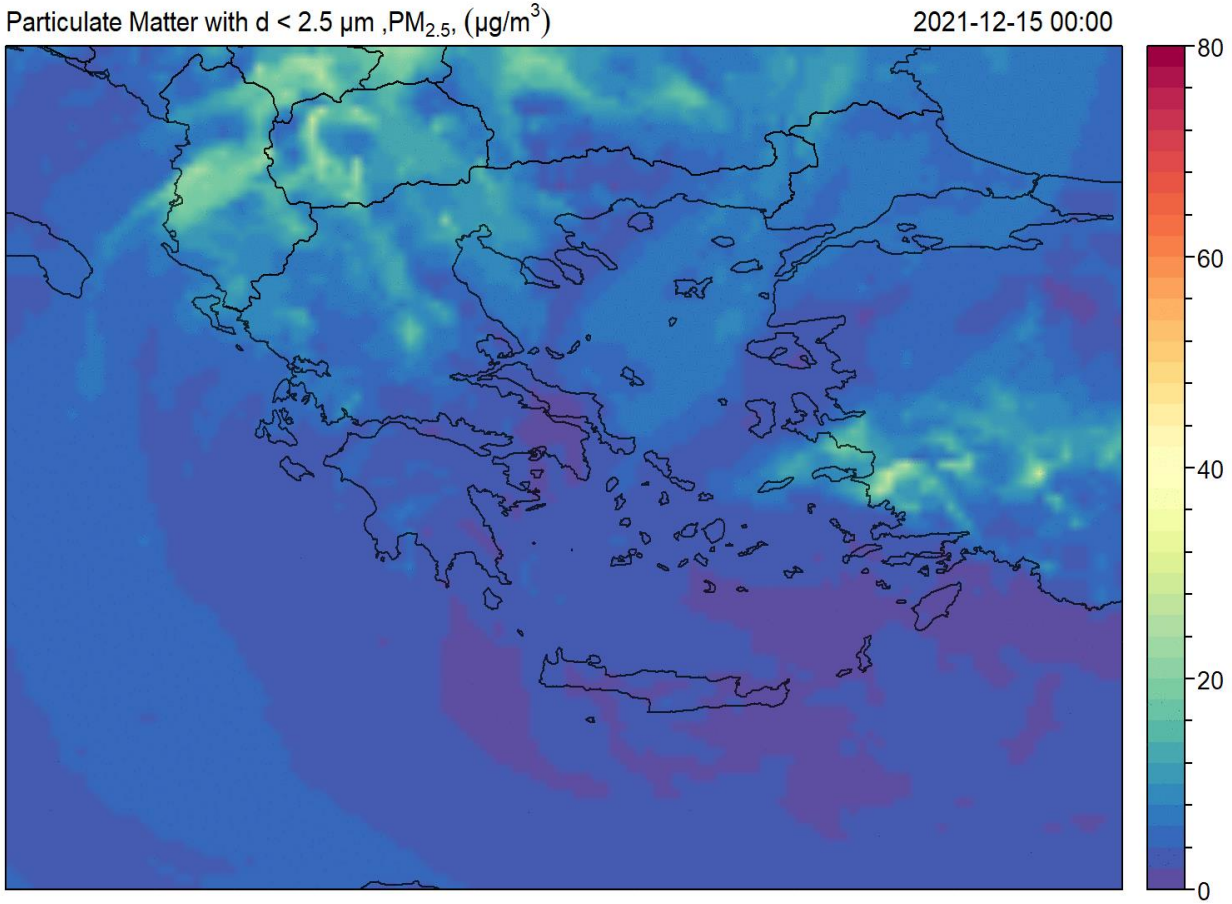
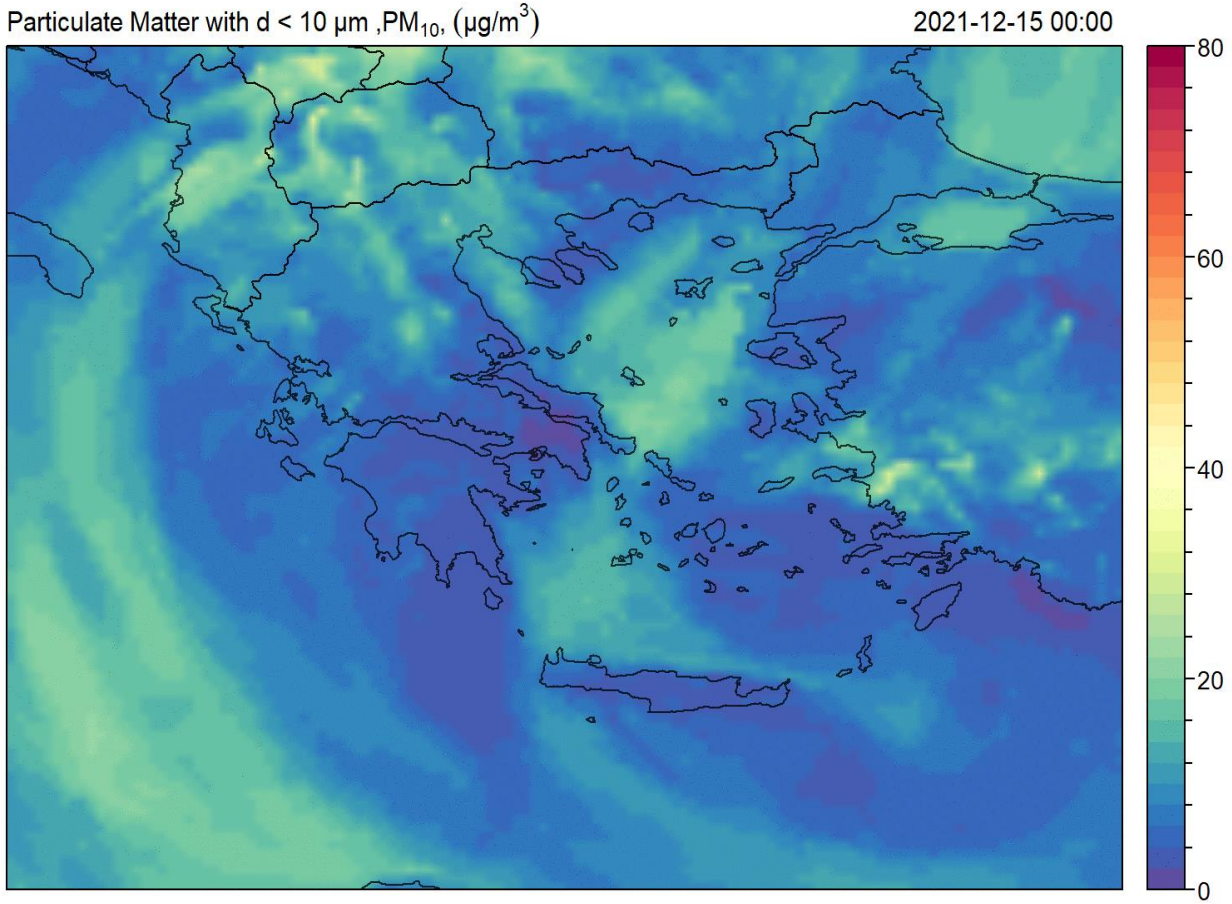
Air Pollutants – Forecasts

Particulate Matter

$PM_{2.5}$



PM_{10}




Workshop on Air quality Monitoring and Management
Friday 17th December

Thank you!