CAMS National Collaboration Programme: NCP Iceland

Atmosphere Monitoring

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WHAT IS CAMS NCP?

- **CAMS National Collaboration Programme** is an initiative of ECMWF (The European Centre for Medium-range Weather Forecasts) endorsed by the European Commission to:
  - enhance collaboration at national level
  - support EU Member States and participating Countries in extracting the maximum benefit from CAMS products and services during the implementation of their mandate
  - support national institutions to improve their uptake and use of CAMS products in support of air quality, pollen and dust monitoring objectives and in further phases, providing support to climate mitigation actions via monitoring and verification of CO_2 and other GHG emissions
  - the CAMS NCP programme runs until 2027 with tangible actions co-designed with national institutes in a thoroughly collaborative spirit

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NCP CAN SELECT FROM:

CAMS products:

- Regional (Europe) products
- Global products (troposphere and stratosphere)
- Supplementary products
- Emissions datasets from inventories
- Emissions datasets based on satellite detection
- CO_2 emissions service element

Modules (activities):

- CAMS products to support regulatory reporting
- Direct use of CAMS products at national level
- CAMS air quality products downscaled at national level
- Exploitation of the CAMS emission data set at national level
- Support monitoring to in-situ network
- Training and knowledge transfer
- Communication about CAMS at national level

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WHY NCP ICELAND?

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Air Quality monitoring stations in Iceland

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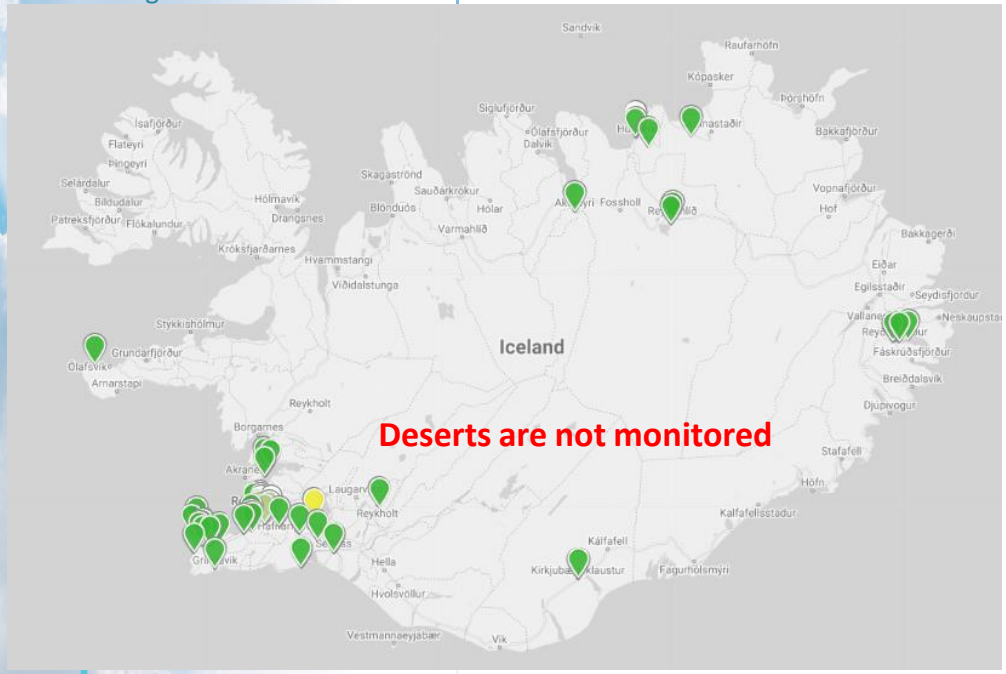
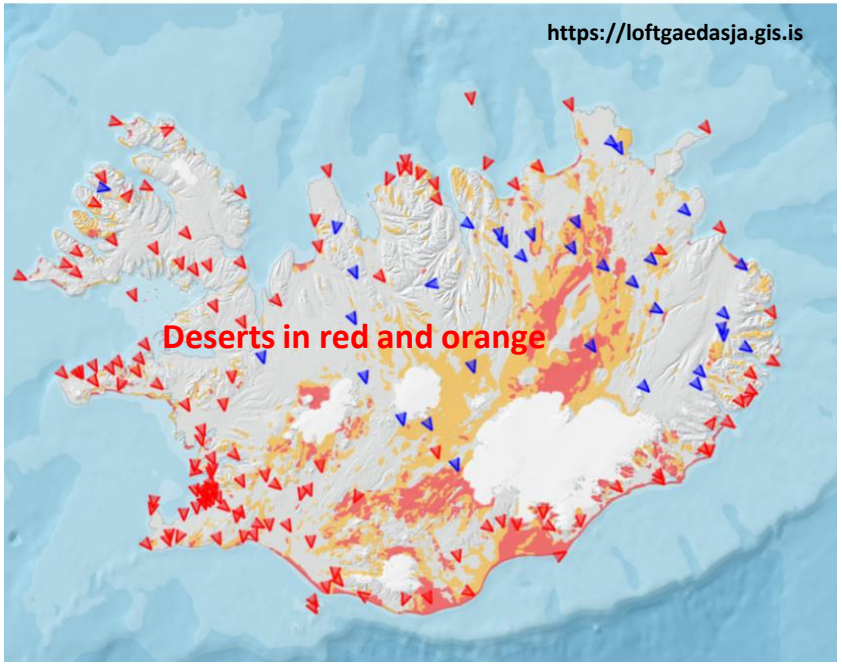


Environmental Agency of Iceland, loftgaedi.is

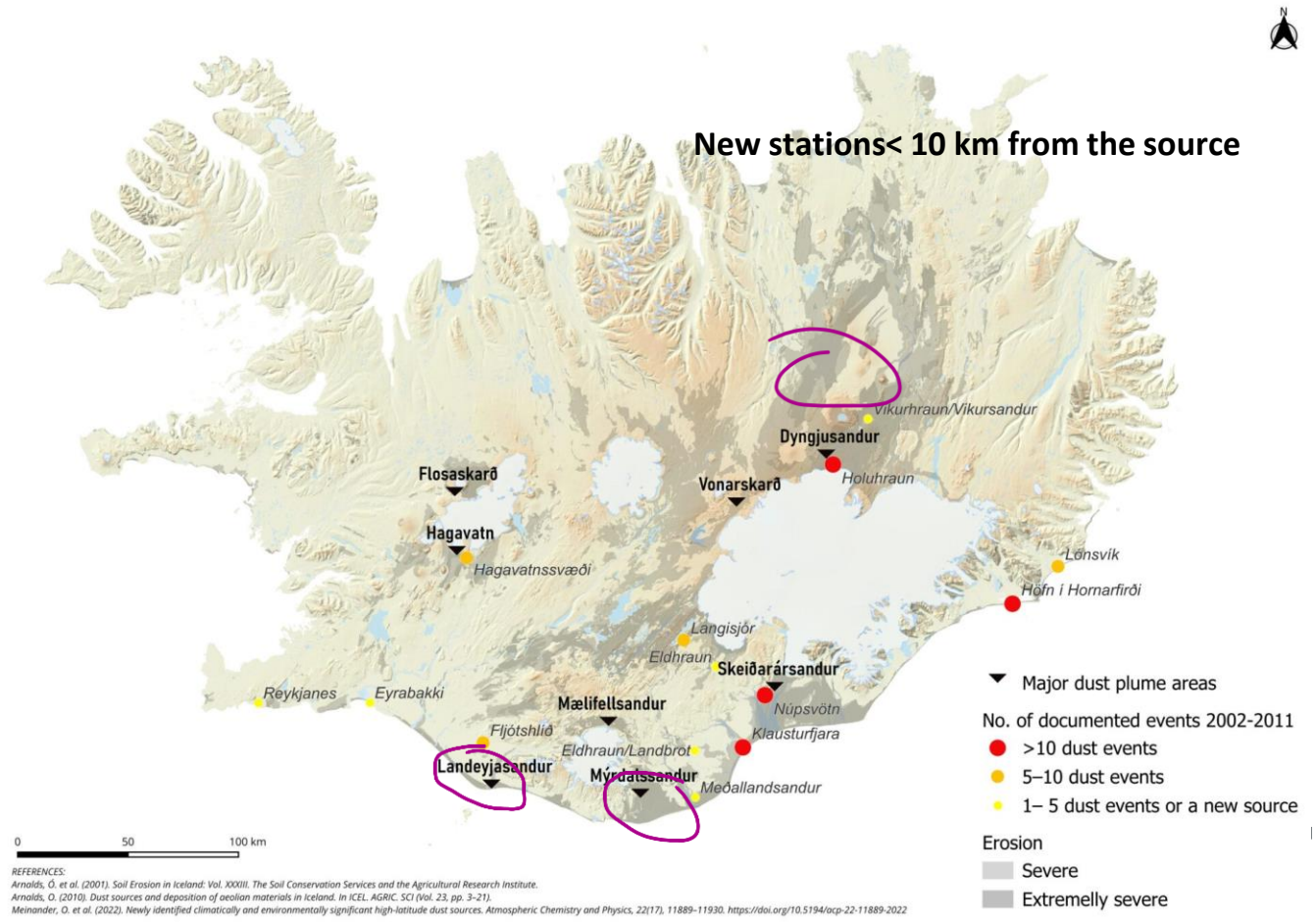
Loftgæðasjá - Rykstormar



CAMS NCP – Iceland, an interactive map in preparation

PM measurements mainly in Reykjavik and Akureyri, far from the deserts
-> Iceland scores as one of the cleanest air country in Europe

Three new monitoring stations established in vicinity of the deserts



- **Data Acquisition:** Gather in-situ data to enhance CAMS dust product evaluation, with an emphasis on High Latitude Dust (HLD) sources.
- **Monitoring Enhancement:** Strengthen the PM mass concentration monitoring network in Iceland, providing a comprehensive overview of air quality.
- **Product Improvement:** Support enhancements to CAMS products, addressing the unique challenges of HLD forecasting regions.

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Key Objectives

Collaboration & Awareness:

- **Stakeholder Collaboration:** Facilitate CAMS-focused meetings with stakeholders in Iceland, fostering a deeper understanding and collaboration in the Arctic region.
- **Public Awareness Campaign:** Utilize CAMS to educate the Icelandic community about PM-related air quality concerns, aligning with the project's vision of elevating public awareness.
- **Effective Communication:** Strategically disseminate project results to optimize the adoption and utilization of CAMS products in the Arctic.

Data & Research Enhancement:

- **Data Acquisition:** Gather in-situ data to enhance CAMS dust product evaluation, with an emphasis on High Latitude Dust (HLD) sources.
- **Monitoring Enhancement:** Strengthen the PM mass concentration monitoring network in Iceland, providing a comprehensive overview of air quality.
- **Product Improvement:** Support enhancements to CAMS products, addressing the unique challenges of HLD forecasting regions.
- **Research Promotion:** Introduce and endorse CAMS tools/products in Iceland, with a future spotlight on monitoring gaseous air pollutants and greenhouse gases.

Modules (activities):

- CAMS products to support regulatory reporting
- Direct use of CAMS products at national level
- CAMS air quality products downscaled at national level
- Exploitation of the CAMS emission data set at national level
- **Support monitoring to in-situ network**
- **Training and knowledge transfer**
- **Communication about CAMS at national level**

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Key Deliverables

Monitoring & Data:

- Monitoring stations network
- PM concentration dataset

Validation & Tools:

- Verification tools setup & demo
- CAMS data validation & assessment

Web Platforms:

- Integrated CAMS & in-situ data web app
- Project website

Training & Reports:

- Training materials & national reports
- Communication reports

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WHERE IS NCP ICELAND NOW?

- ESTABLISHED MONITORING STATION NETWORK
- CAMS User Engagement Workshop as part of the 8th High Latitude Dust Workshop
- CAMS WORKSHOP
- Established website for CAMS NCP Iceland
- Set up first verification tools – in-situ, CAMS and DREAM_Iceland data
- Draft for Integrated CAMS & in-situ data web app

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New dust station network

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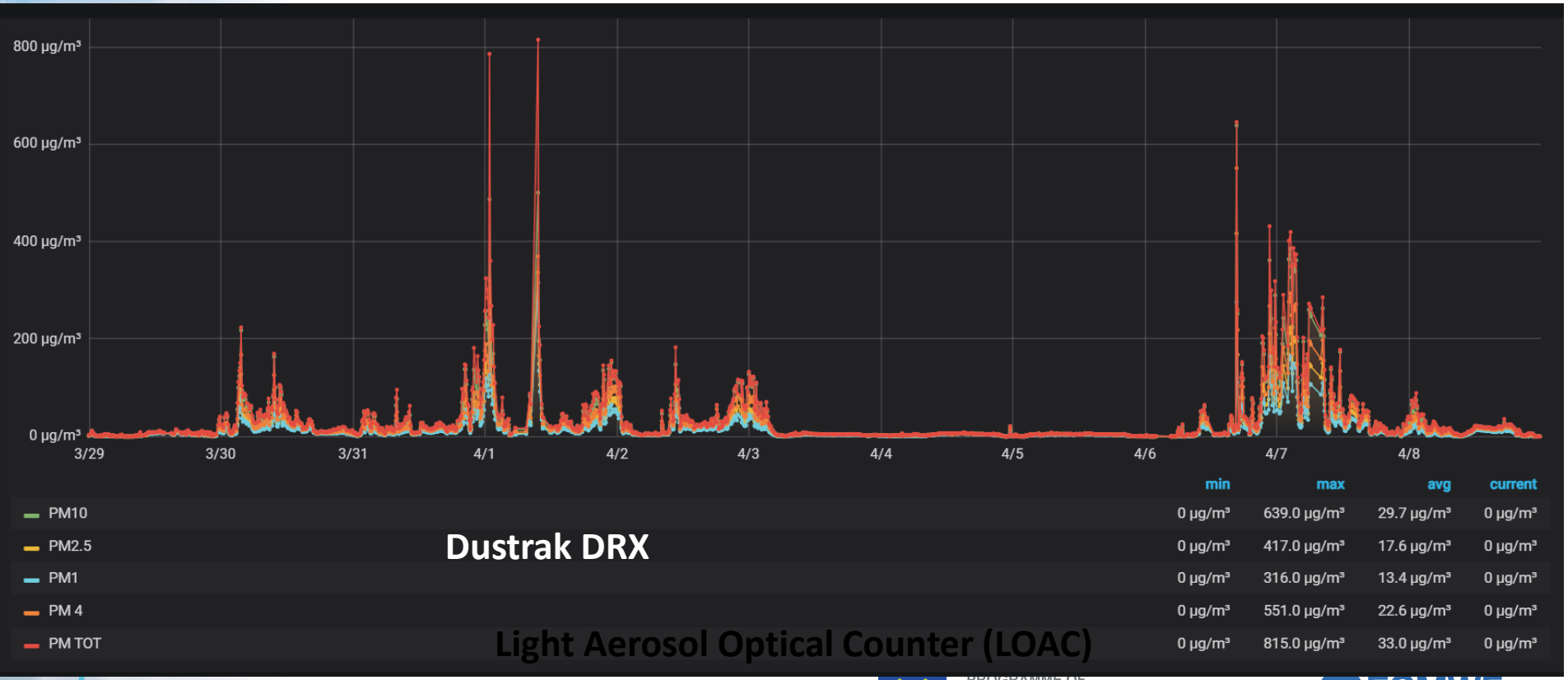
Major dust plume areas

No. of documented events 2002-2011
- >10 dust events
- 5–10 dust events
- 1– 5 dust events or a new source

Erosion
- Severe
- Extremelly severe

REFERENCES:
Arnalds, Ó. et al. (2001). Soil Erosion in Iceland: Vol. XXXIII. The Soil Conservation Services and the Agricultural Research Institute.
Arnalds, O. (2010). Dust sources and deposition of aeolian materials in Iceland. In ICEL. AGRIC. SCI (Vol. 23, pp. 3–21).
Meinander, O. et al. (2022). Newly identified climatically and environmentally significant high-latitude dust sources. Atmospheric Chemistry and Physics, 22(17), 11889–11930. https://doi.org/10.5194/acp-22-11889-2022

Example of data: Early April 2024 data
Mýrar – S Iceland



Dustrak DRX

Light Aerosol Optical Counter (LOAC)

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For preliminary data see here: https://ice-dust.com/copernicus/cams-ncp-iceland/

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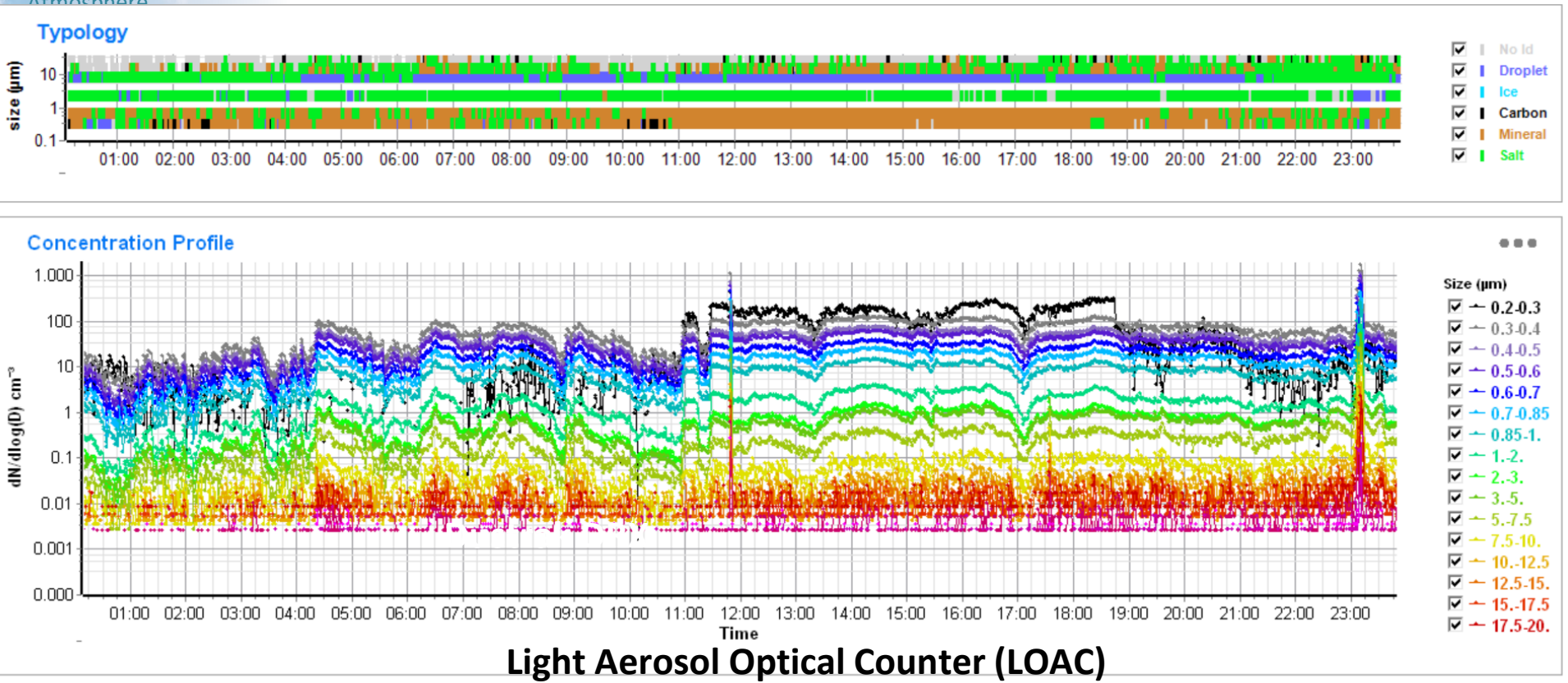

Light Aerosol Optical Counter (LOAC)

Number of raw measurements:8618

WORKSHOPS WITH STAKEHOLDERS

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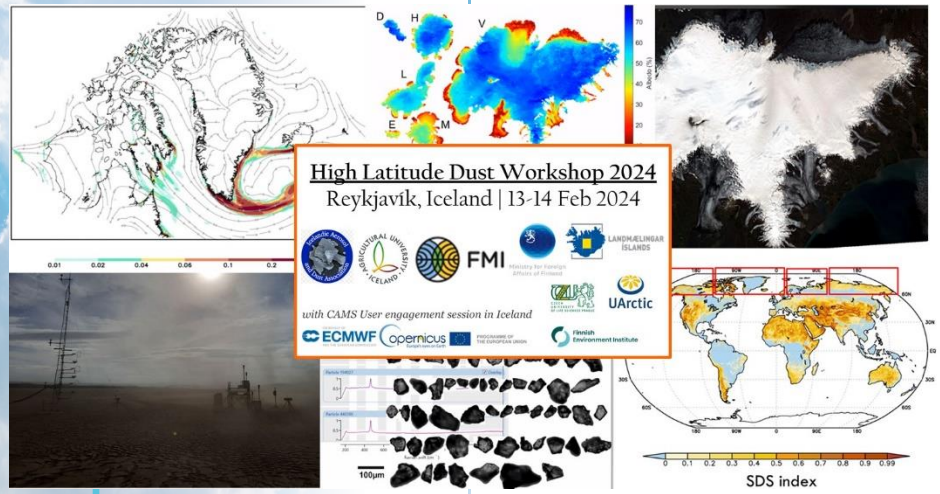

https://atmosphere.copernicus.eu/cams-user-engagement-workshop-user-community-iceland

www.ice-dust.com

www.icedustblog.wordpress.com

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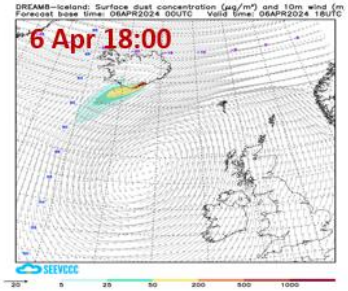
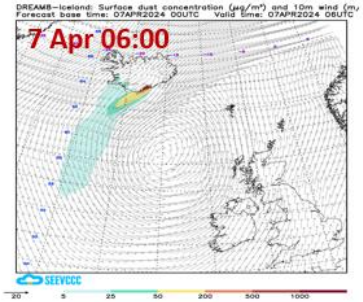
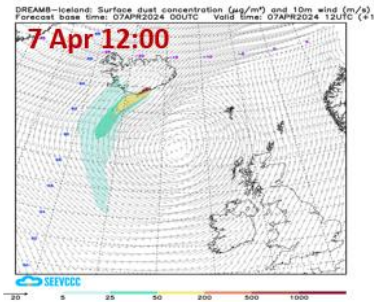
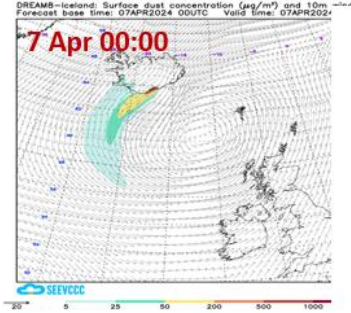
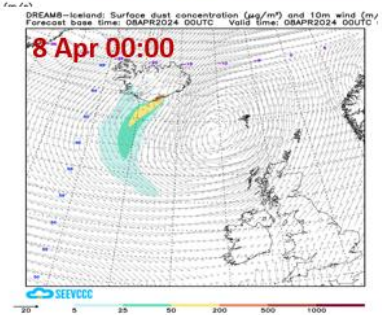
DREAM model for Iceland

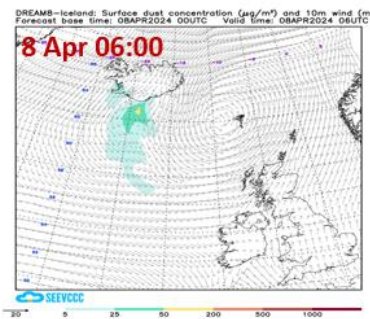


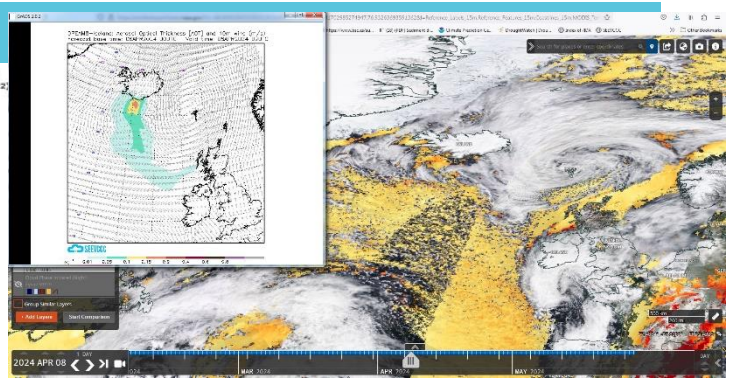






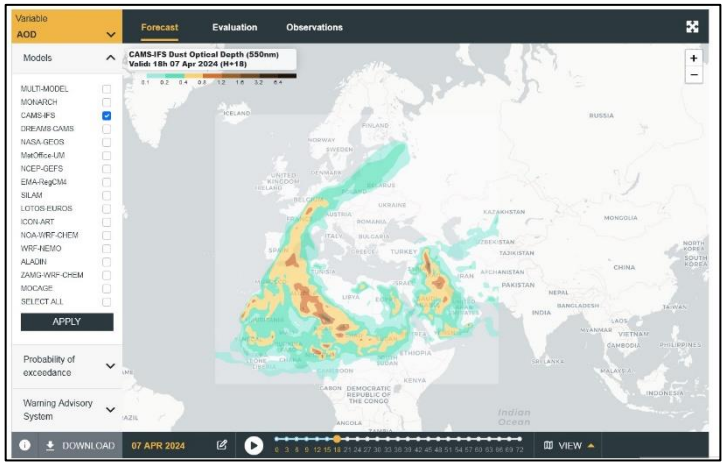






DREAM vs. MODIS

CAMS dust prediction 7 April 18:00



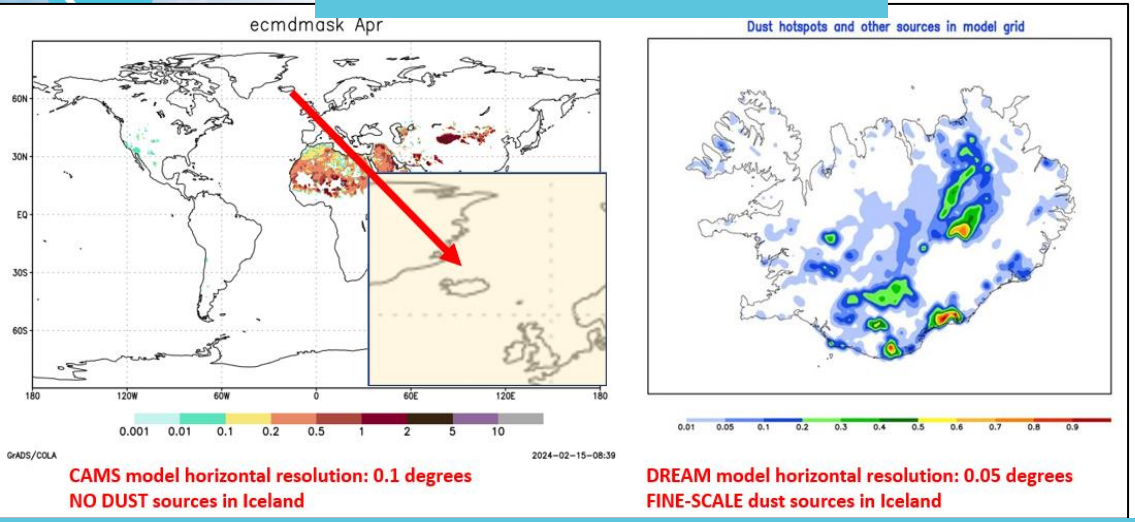
DREAM_Iceland - operational dust forecast model based on the Icelandic dust hot-spot emissivity classes (Cvetkovic et al., 2022))

http://dustforecast.lbhi.is/desktop.html

https://sds-was.aemet.es/forecast-products/dust-forecasts/icelandic-dust-forecast (under WMO SDS WAS)

CAMS vs. DREAM dust prediction complementarity

ECMWF and DREAM dust sources



CAMS model horizontal resolution: 0.1 degrees
NO DUST sources in Iceland

DREAM model horizontal resolution: 0.05 degrees
FINE-SCALE dust sources in Iceland

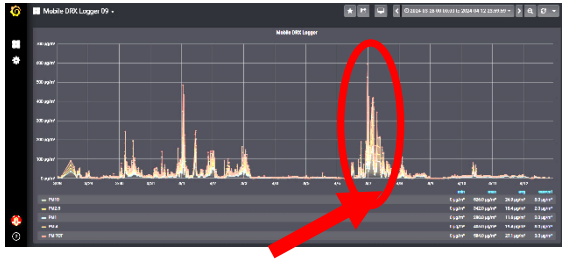
- PM data from the established in situ stations are used for validation and evaluation of CAMS and DREAM model predictions (high agreement: DREAM + PM observations).
- **Challenges**

CAMS AQ predictions do not include dust sources in Iceland. The two modelling systems, CAMS and DREAM to be used in a complementary manner (CAMS: long range transport from non-Icelandic sources, DREAM: Icelandic dust sources + long range transport).

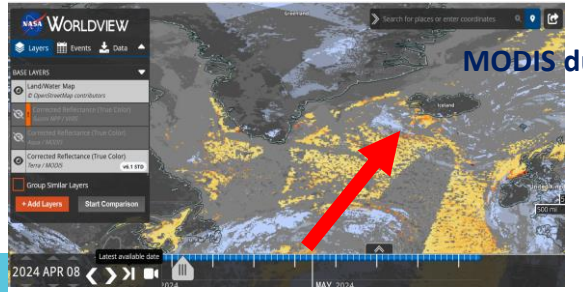
- **Recommendation**

Implement DREAM+SILAM dust forecasts to regional forecasts. The in situ PM2.5 and PM10 will be used to specify ratio between dust and non-dust concentrations using DREAM conc.

7-8 April 2024 extreme dust episode

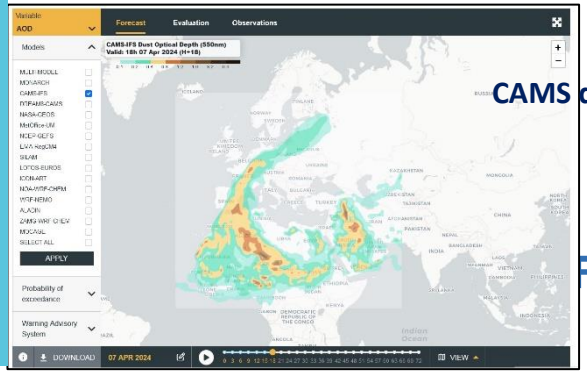


7-8 April 2024



MODIS dust

8 April 2024



CAMS dust

Communication activities to increase CAMS' public awareness in Iceland

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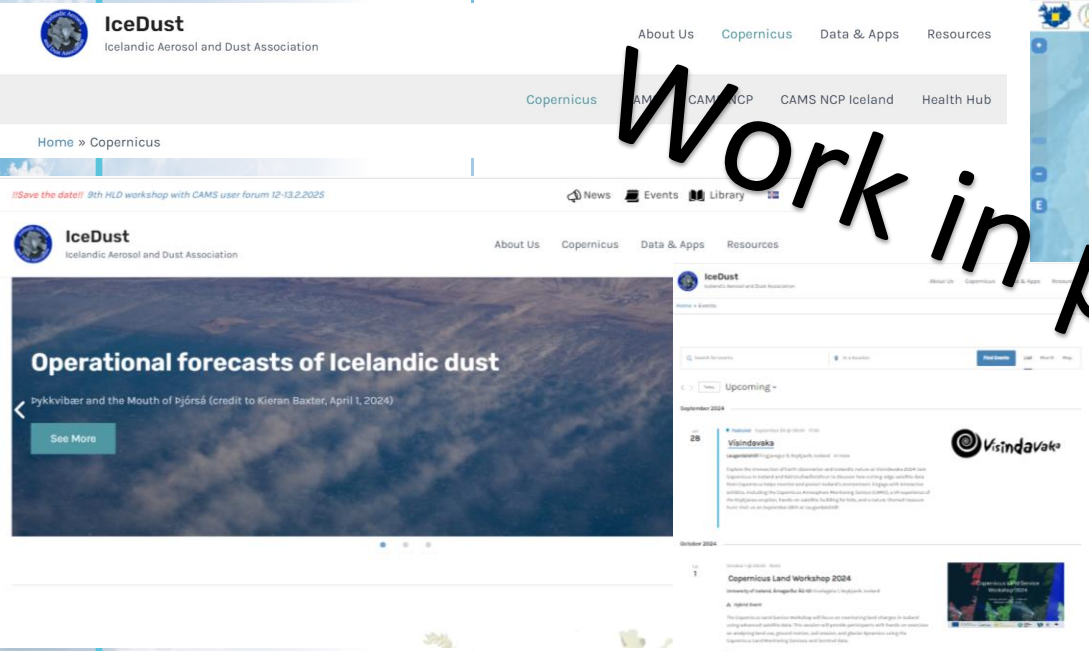
- **CAMS NCP Iceland website**

https://ice-dust.com/copernicus/



https://ice-dust.com/events

- **Interactive map website**

https://loftgaedasja.gis.is/mapview/?application=loftgaedasja

Work in progress

- **Copernicus website for NCP Iceland website**

https://atmosphere.copernicus.eu/iceland

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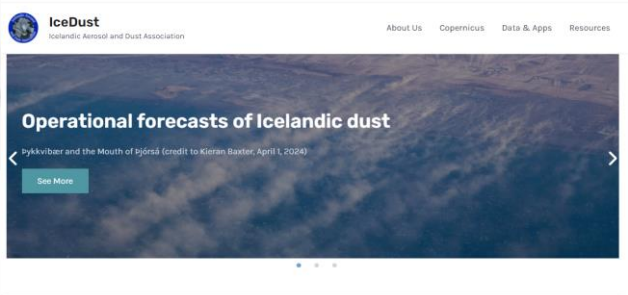
HOW CAN NCP ICELAND HELP YOU?

- WHAT KIND OF DATA AND INFO ON AIR POLLUTION DO YOU NEED?
  Let us know through a dedicated Survey

- USE AND DISSEMINATE THE OUTCOMES OF THE NCP ICELAND:
  - Interactive map website
  - https://loftgaedasja.gis.is/

- FOLLOW US ON THE ICE-DUST WEBSITE:
  - https://ice-dust.com/
  - 9TH HLD Workshop on 12-13.2.2025
  - FB group Dust storms in Iceland



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Thank you for your attention!
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December 2023