Landbúnaðarháskóli Íslands
Agricultural University of Iceland

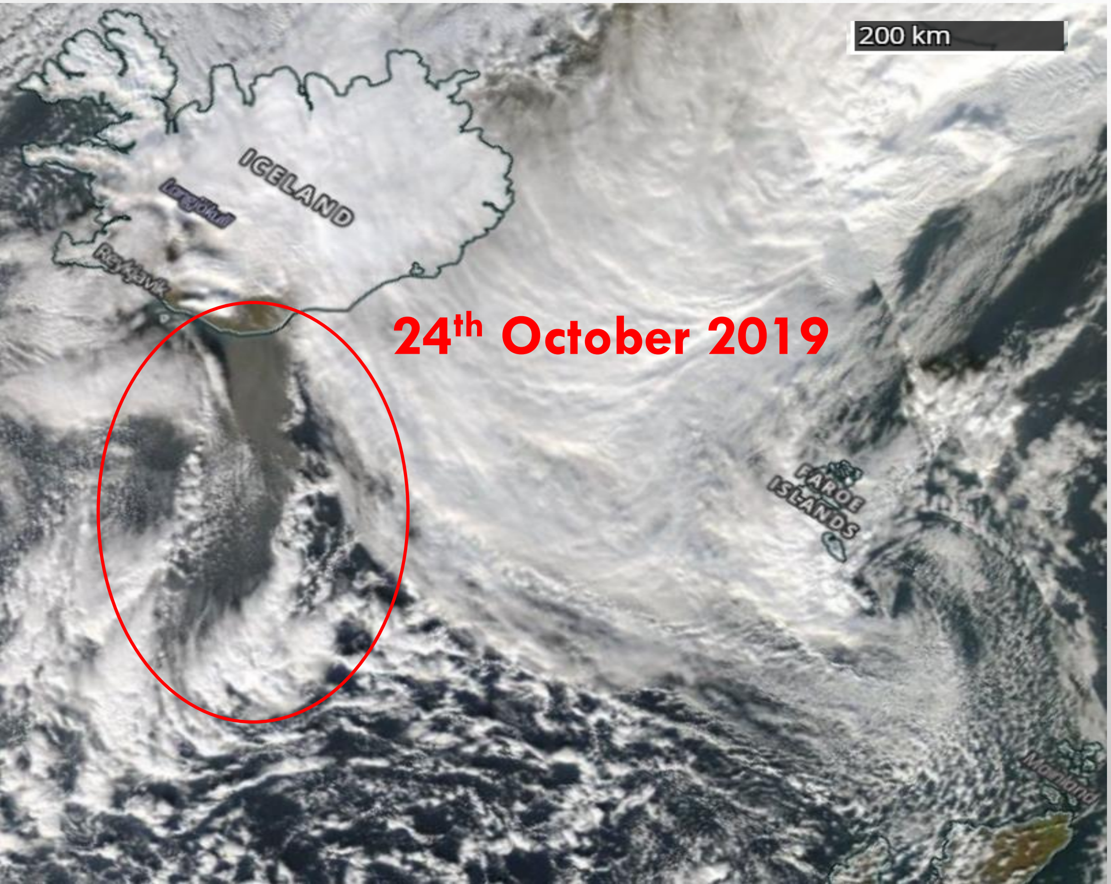
NORTHERN AFRICA-MIDDLE EAST-EUROPE (NA-ME-E) REGIONAL CENTER
WMO Sand and Dust Storm Warning Advisory and Assessment System (SDS-WAS)

Icelandic Aerosol and Dust Association

inDust

CZECH UNIVERSITY OF LIFE SCIENCES PRAGUE

HIGH LATITUDE DUST OBSERVATIONS WITH FOCUS ON ICELAND AND ANTARCTICA



PAVLA DAGSSON-WALDHAUSEROVA

O. ARNALDS, S. NICKOVIC, O. MEINANDER, B. CVETKOVIC, A. VUKOVIC, J-B RENARD, J. KAVAN, B. MORONI, D. DJORDJEVIC, F. THEVENET, D. URUPINA, M. ROMANIAS, A. SANCHES-MARROQUIN, B. MURRAY, J. BROWSE, C. BALDO, Z. SHI, N. BURDOVA, AND MORE

EUMETSAT WORKSHOP:
REMOTE SENSING FOR OCEAN-ATMOSPHERE INTERACTIONS STUDIES AND APPLICATIONS

1-3 DECEMBER 2021

HLD TALK OUTLINE

- **HIGH LATITUDE DUST** SOURCES (HLD) AND THEIR CONTRIBUTION TO GLOBAL DUST BUDGET
- HLD RESEARCH – UPDATE FROM ICELAND AND ANTARCTICA
- SAHARAN DUST IN ICELAND
- ICELANDIC AEROSOL AND DUST ASSOCIATION (ICEDUST)

HIGH LATITUDE DUST AREAS

AGU PUBLICATIONS

Reviews of Geophysics

REVIEW ARTICLE

10.1002/2016RG000518

High-latitude dust in the Earth system

Joanna E. Bullard[1], Matthew Baddock[1], Tom Bradwell[2], John Crusius[3], Eleanor Darlington[1], Diego Gaiero[4], Santiago Gassó[5], Gudrun Gisladottir[6], Richard Hodgkins[1], Robert McCulloch[2], Cheryl McKenna-Neuman[7], Tom Mockford[1], Helena Stewart[2], and Throstur Thorsteinsson[8]

Key Points:

- High-latitude dust sources are located in paraglacial regions ≥50°N and ≥40°S

- THE MAIN SOURCES OF DUST EMISSIONS IN THE NORTHERN (ALASKA, CANADA, GREENLAND, AND ICELAND) AND SOUTHERN (ANTARCTICA, NEW ZEALAND, AND PATAGONIA) HEMISPHERES
- HIGH-LATITUDE SOURCES COVER >500,000 KM^2
- CONTRIBUTION OF 80 – 100 TG YR^{-1} OF DUST TO THE EARTH SYSTEM

(~**5% OF THE GLOBAL DUST BUDGET**)

AGU PUBLICATIONS

eviews of Geophysics

VIEW ARTICLE
002/2016RG000518

Points:
h-latitude dust sources are located
paraglacial regions ≥50°N and ≥40°S

High-latitude dust in the Earth system

Joanna E. Bullard[1], Matthew Baddock[1], Tom Bradwell[2], John Crusius[3], Eleanor Darlington[1], Diego Gaiero[4], Santiago Gassó[5], Gudrun Gisladottir[6], Richard Hodgkins[1], Robert McCulloch[2], Cheryl McKenna-Neuman[7], Tom Mockford[1], Helena Stewart[2], and Throstur Thorsteinsson[8]

HIGH LATITUDE DUST AREAS

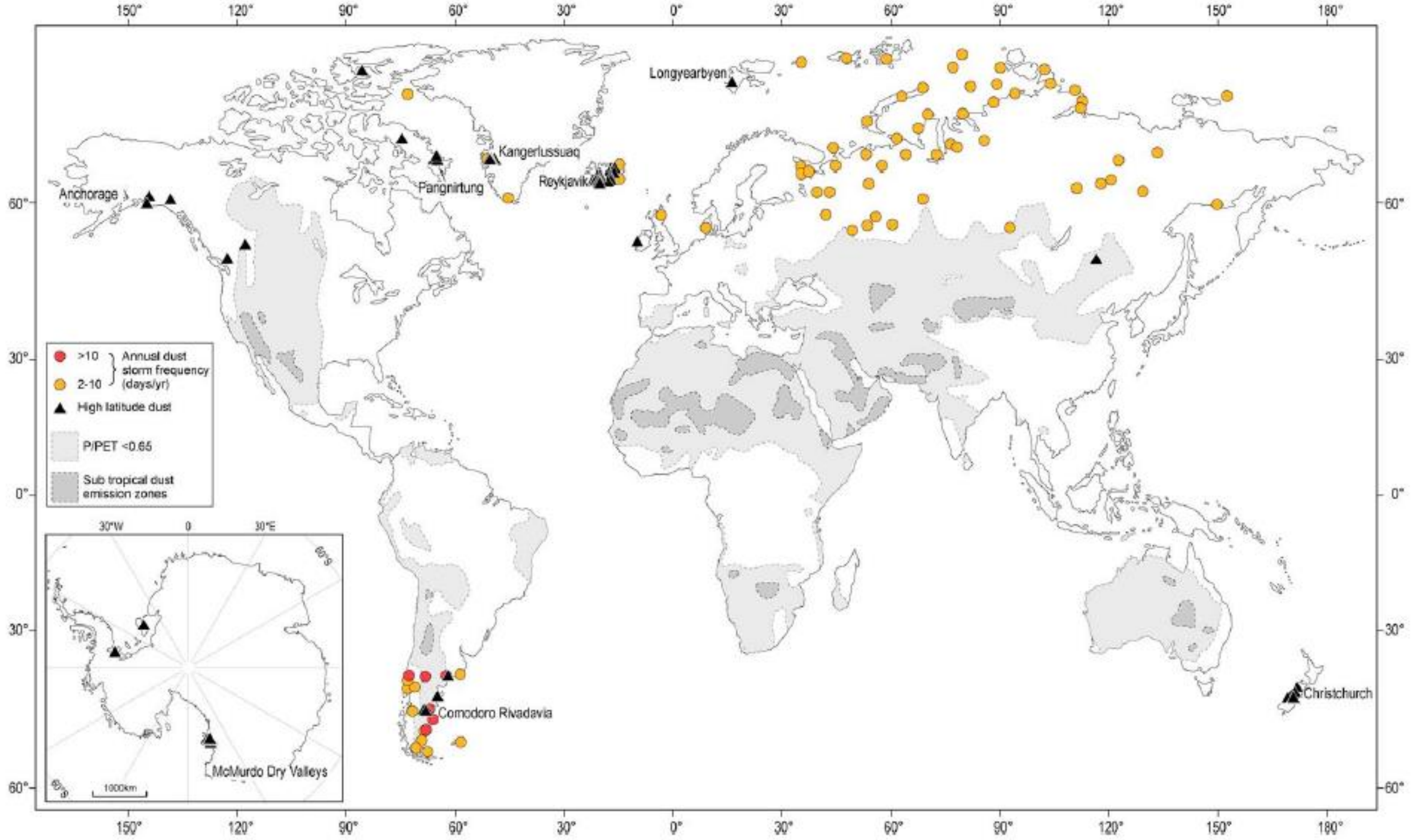
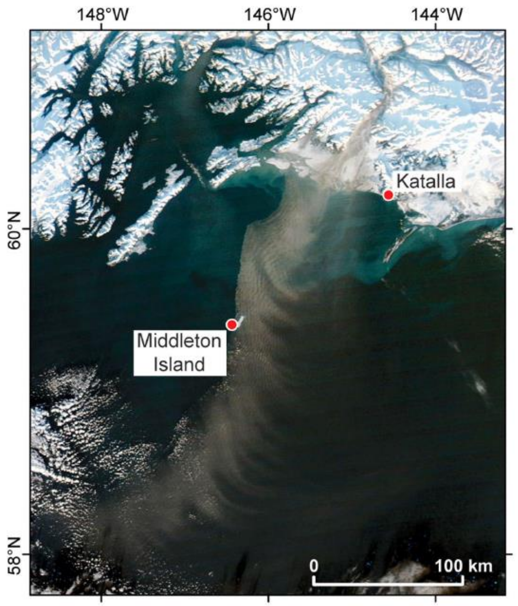
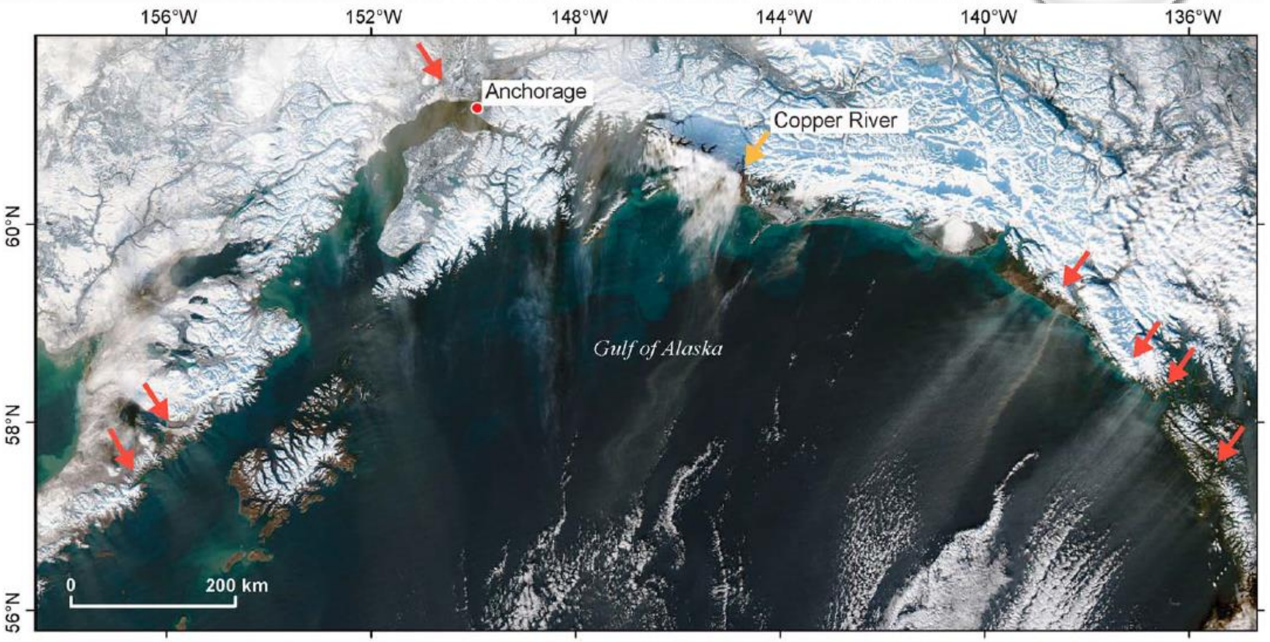


Figure 3. Global observations of high-latitude dust where filled circles indicate dust storm frequency based on visibility data, and black triangles indicate georeferenced published observations of dust storms (see text for details). Areas where the precipitation: potential evapotranspiration ratio <0.65 (aridity index) [*United Nations Environment Programme*, 1997] and subtropical dust emission zones are included for reference.

ALASKA



MODIS Aqua image 4 December 2012 showing a major dust plume originating from the Copper River valley a



MODIS Terra image 26 February 2011 showing multiple dust plumes being transported over the Gulf of Alaska.

PATAGONIA

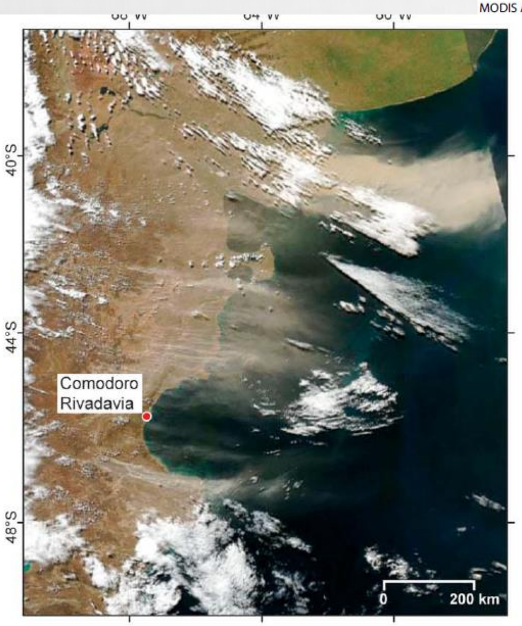
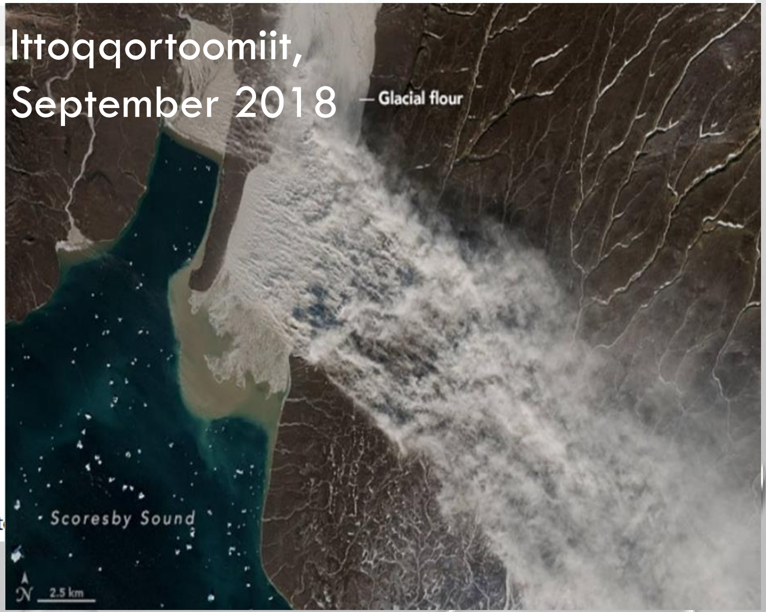


Figure 18. (left) MODIS Aqua image 28 March 2009 showing multiple dust plumes in Patagonia caused by strong westerly winds extending over the south Atlantic. The most dense plume originates from the Colorado and Negro River mouths in the north which were particularly active in 2009 due to combined drought and poor rangeland management. (right) Aerial photograph of dust storm in October 2004 caused by winds gusting to 29 m s^{-1} at San Sebastián Bay, Tierra del Fuego, 800 km south of Comodoro Rivadavia.

). Dust event at Kangerlussuaq, SW Greenland, 1 July 2014. Phot



GREENLAND

Source: *NASA Earth Observatory images by Joshua Stevens, using Landsat data from the U.S. Geological Survey*

SVALBARD

ANTARCTICA 2021

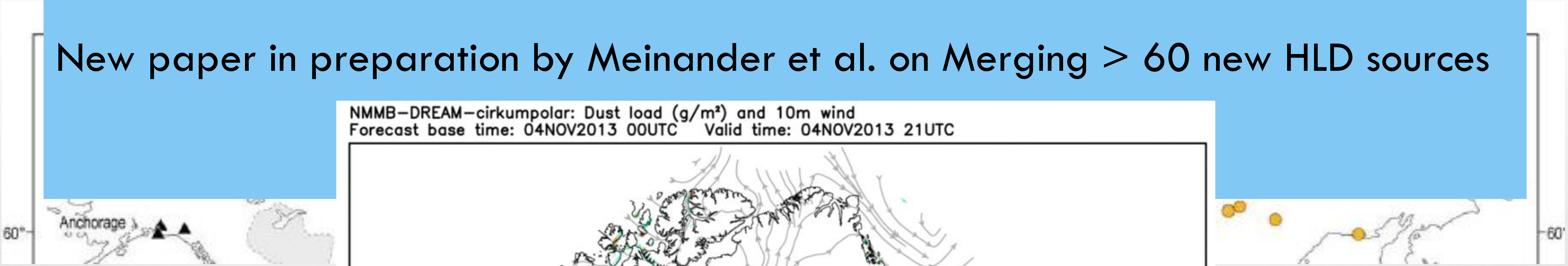
Uplift of fine mineral material in the forefield of the Sven glacier (Petuniabukta) (photo by T. Wawrzyniak).

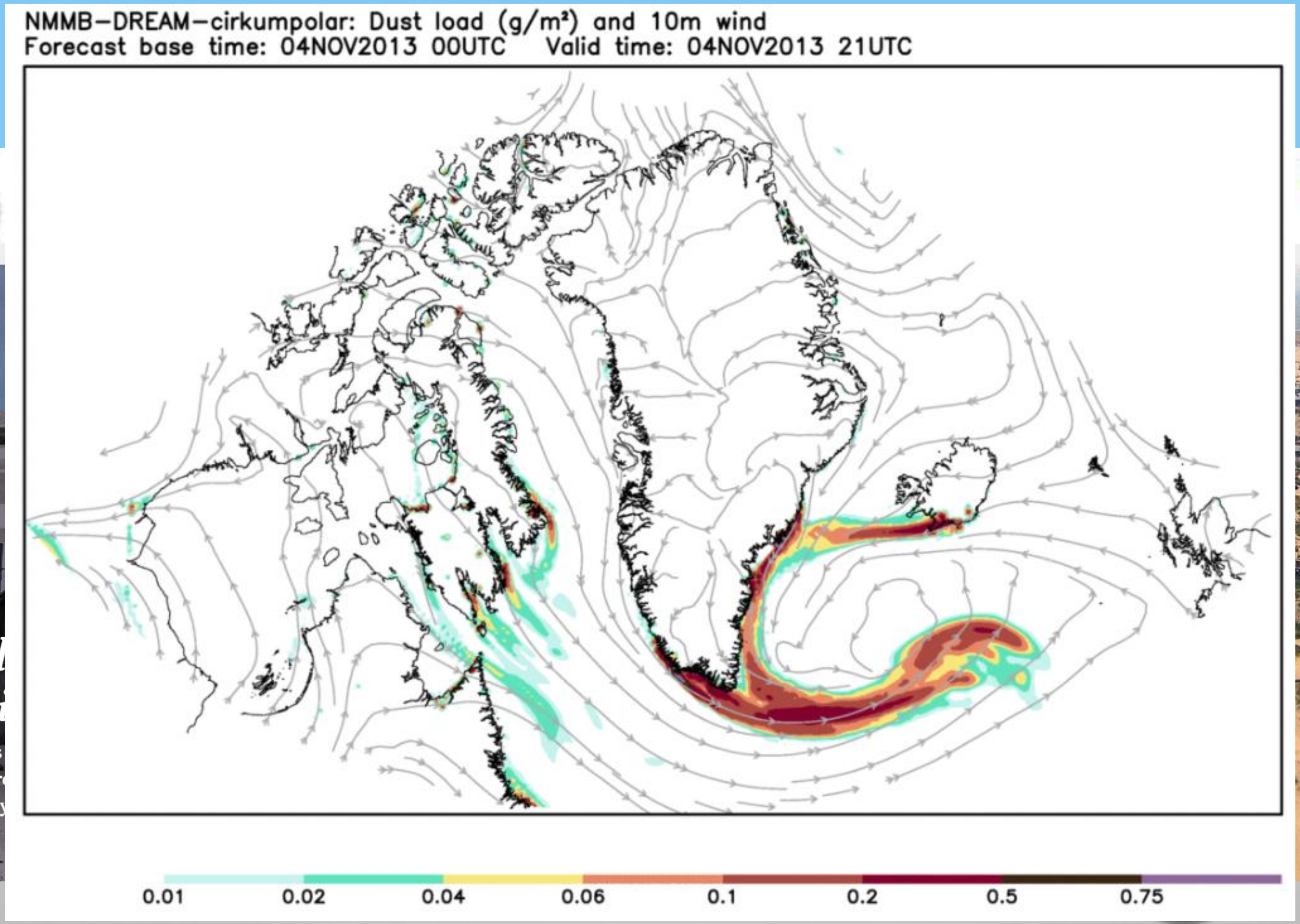
Kavan et al. (2020)

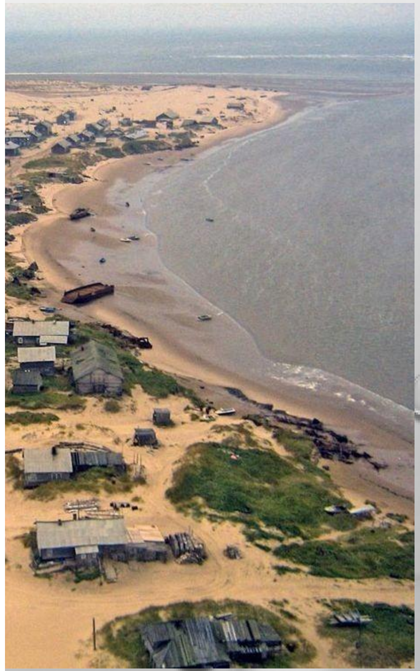
Photo by Kamil Laska

HIGH LATITUDE DUST AREAS – N EUROASIA

New paper in preparation by Meinander et al. on Merging > 60 new HLD sources

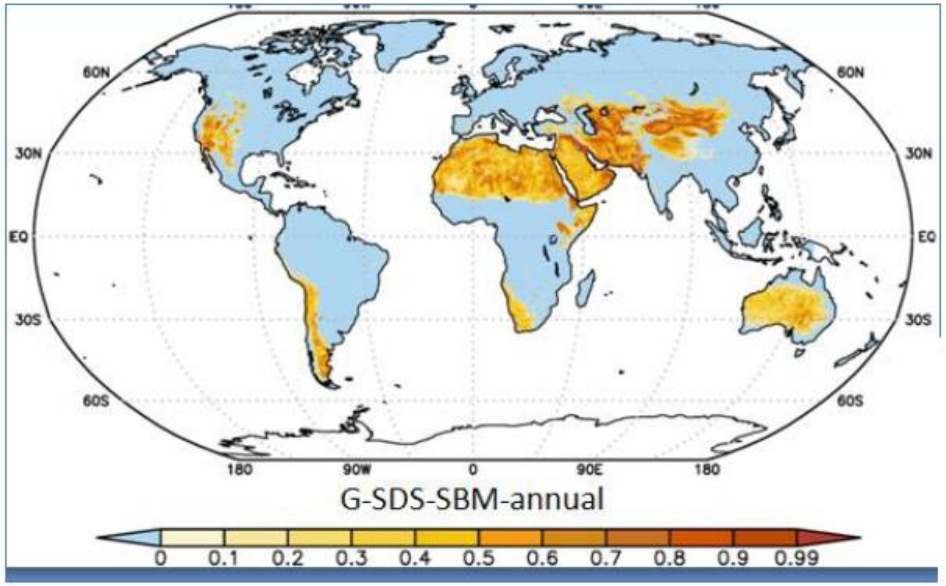






HIGH LATITUDE DUST AREAS

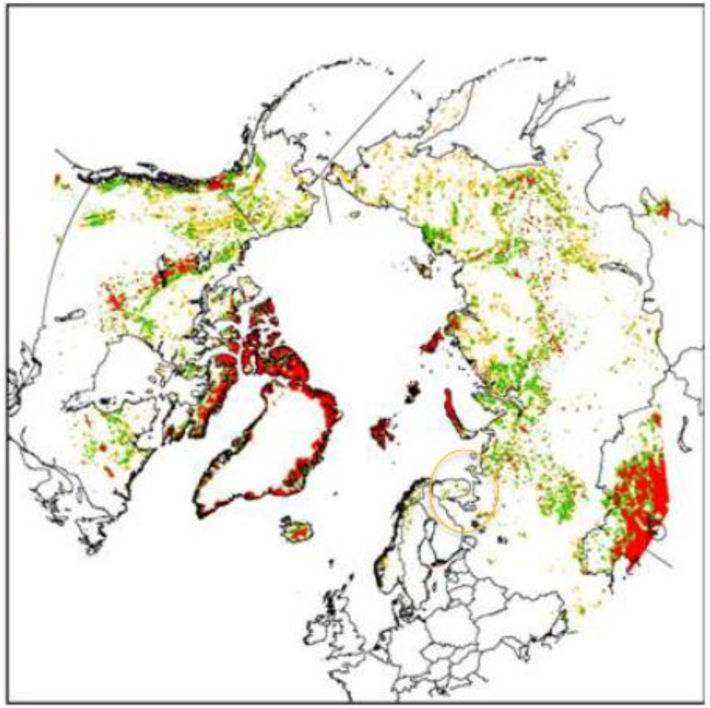
Vukovic, 2019. Sand and Dust Storms Source Base-map



UNCCD 1km global dust mask (Ana Vukovic, 2019)

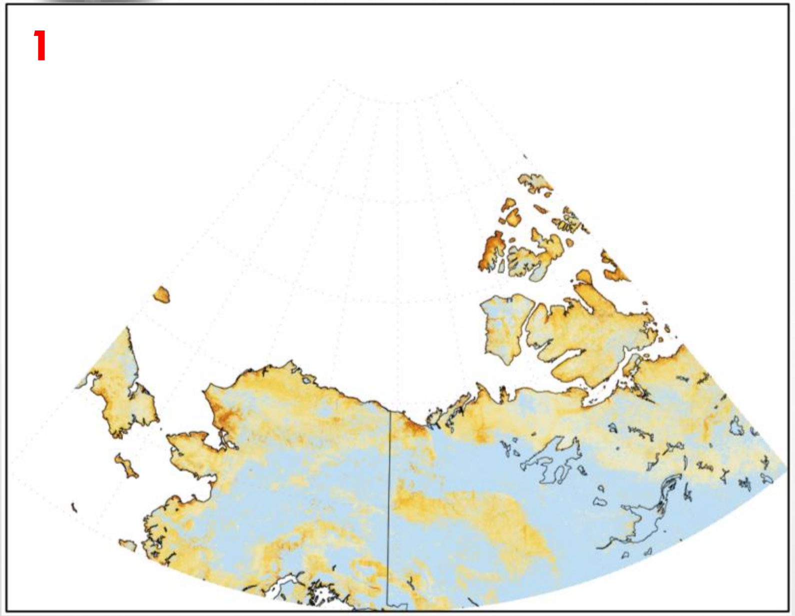
https://maps.unccd.int/sds/

Dust sources in high latitudes



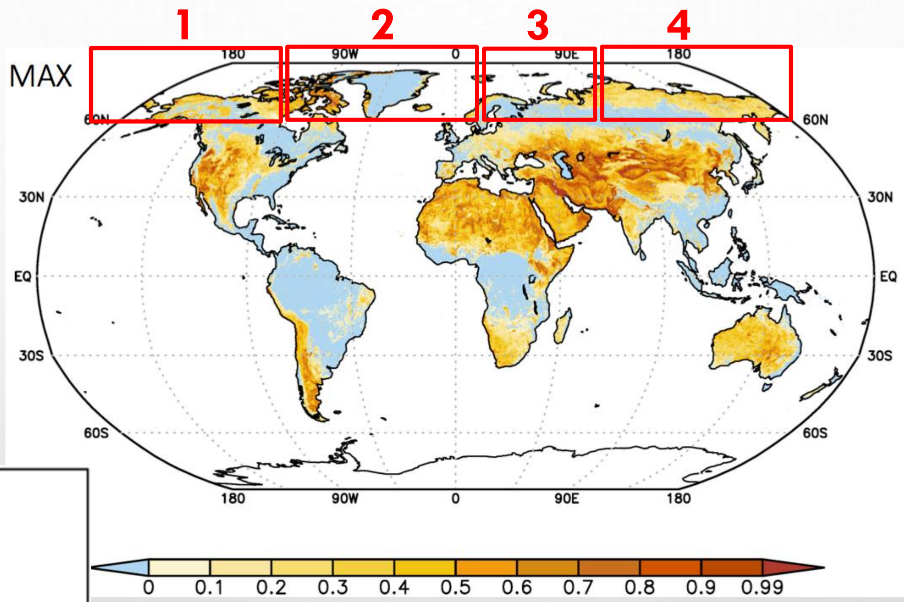
United Nations
Convention to Combat
Desertification

Sand and Dust Storms Source Base-map for the AMAP report 2021

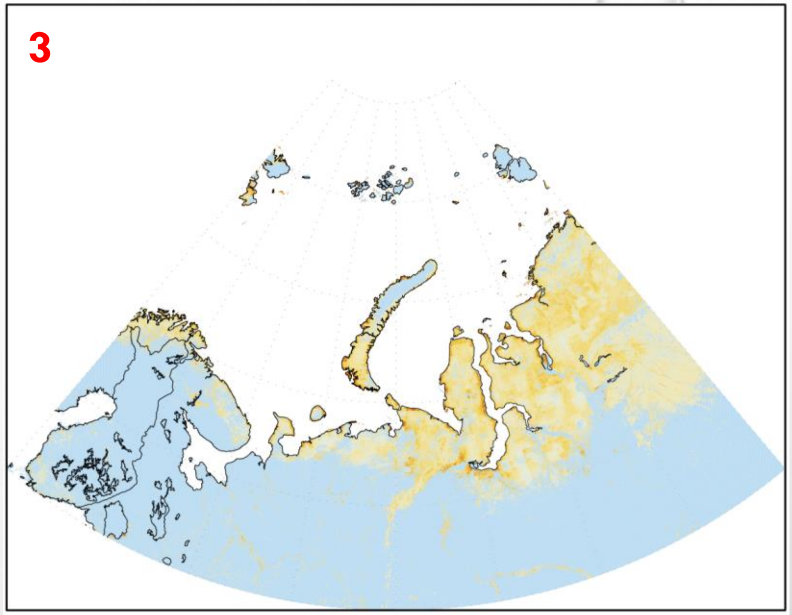


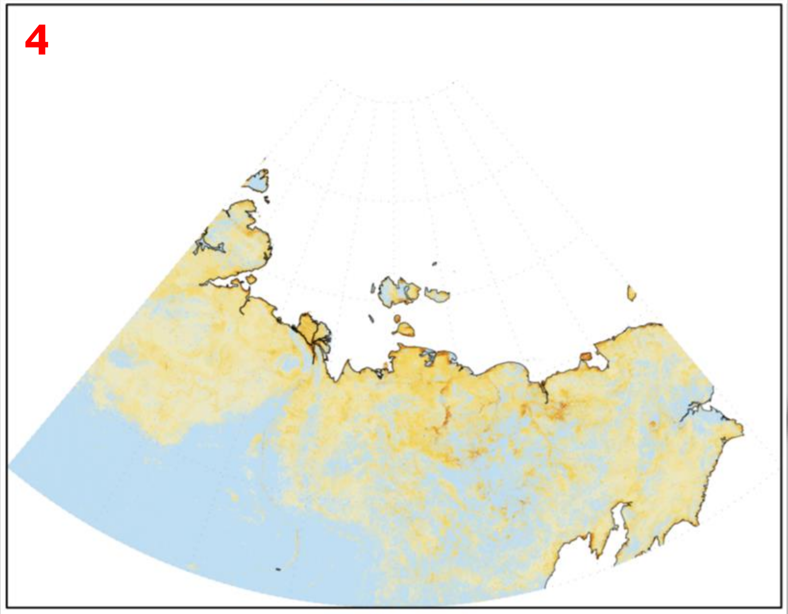
G-SDS-SBM: HIGH-LATITUDE SOURCES

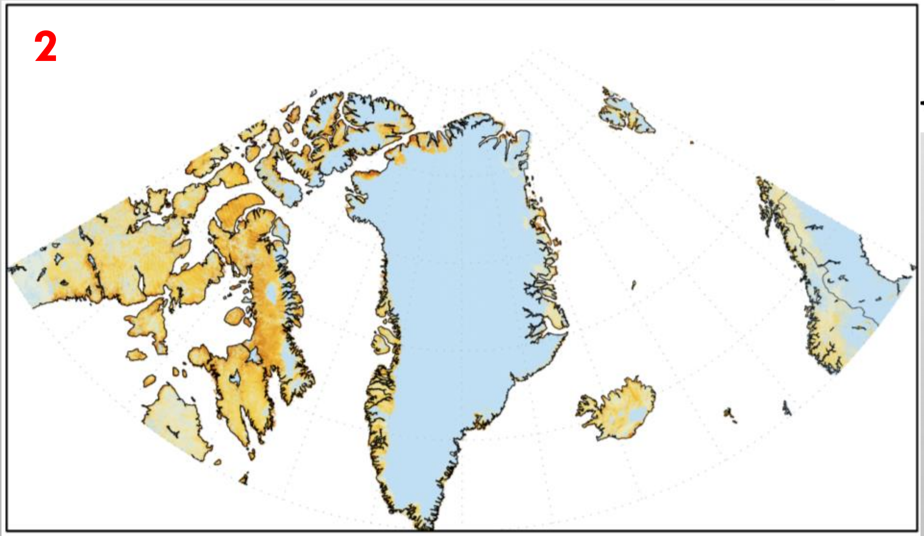
latitude > 60°N



SDS index







-includes seasonal variability!

Ana Vukovic,2019

https://maps.unccd.int/sds/

Icelandic Aerosol and Dust Association (IceDust)

Rykrannsóknafélag Íslands (RykÍS)

Home | About | Who we are | Past events | Publications | Contact | Open positions | Witnessed dust storm?

Publications

ICELANDIC DUST AND VOLCANIC ASH IN PUBLICATIONS

1. Review papers and books on Icelandic and High Latitude dust
2. Long-term studies and quantification of dust events
3. Field *in situ* measurements of dust in Iceland – aerosol, surface samples, remote sensing
4. Long-range transport of Icelandic and High Latitude dust/ Saharan dust in the Arctic (Iceland) NEW
5. Radiative forcing and ice nucleating properties of Icelandic dust
6. Atmosphere-cryosphere interactions of Icelandic dust, volcanic ash and Black Carbon including their climate implications
7. Atmospheric chemistry studies involving Icelandic dust NEW
8. Health effects of Icelandic volcanic dust and ash
9. Extreme events in Iceland
10. New High Latitude Dust sources – *in situ* measurements/remote sensing NEW

https://icedustblog.wordpress.com/publications/

10. New High Latitude Dust sources – *in situ* measurements/remote sensing

Crocchianti, S., Moroni, B., Dagsson-Waldhauserová, P., Becagli, S., Severi, M., Traversi, R., Cappelletti, D., 2021. Potential Source Contribution Function Analysis of High Latitude Dust Sources over the Arctic: Preliminary Results and Prospects. Atmosphere 12, 347-362.

Kavan, J., Dagsson-Waldhauserova, P., Renard, JB, Laska, K., Ambrozova, K. 2018. Aerosol concentrations in relationship to local atmospheric conditions on James Ross Island, Antarctica. Frontiers in Earth Science 6:207, 207-223.

Bachelder, J., Cadieux, M., Liu-Kang, C., Lambert, P., Filoche, A., Aparecida Galhardi, J., Hadioui, M., Chaput, A., Bastien-Thibault, M.-P., Wilkinson, K.J., King, J., and Hayes, P.J., 2020. Chemical and microphysical properties of wind-blown dust near an actively retreating glacier in Yukon, Canada. Aerosol Science and Technology 54:1, 2-20, DOI: 10.1080/02786826.2019.1676394

Ranjbar, K., O'Neill, T., Ivanescu, L., King, J., Hayes, P., 2020. Remote sensing of a high-Arctic, local dust event over Lake Hazen (Ellesmere Island, Nunavut, Canada). Atmospheric Environment 118102, DOI: https://doi.org/10.1016/j.atmosenv.2020.118102

Kavan, J., Láska, K., Nawrot, A., Wawrzyniak, T., 2020. High Latitude Dust Transport Altitude Pattern Revealed from Deposition on Snow, Svalbard. Atmosphere 11, 1318.

Lewandowski, M., Kusiak, M.A., Werner, T., Nawrot, A., Barzycka, B., Laska, M., and Luks, B., 2020. Seeking the Sources of Dust: Geochemical and Magnetic Studies on "Cryodust" in Glacial Cores from Southern Spitsbergen (Svalbard, Norway). Atmosphere 11, 1325.

HLD TALK OUTLINE

- **HIGH LATITUDE DUST** SOURCES (HLD) AND THEIR CONTRIBUTION TO GLOBAL DUST BUDGET
- **HLD RESEARCH – UPDATE FROM ICELAND AND ANTARCTICA**
- SAHARAN DUST IN ICELAND
- IMPACTS OF ICELANDIC DUST ON ATMOSPHERE AND CLIMATE

Atmos. Chem. Phys., 14, 13411–13422, 2014
www.atmos-chem-phys.net/14/13411/2014/
doi:10.5194/acp-14-13411-2014

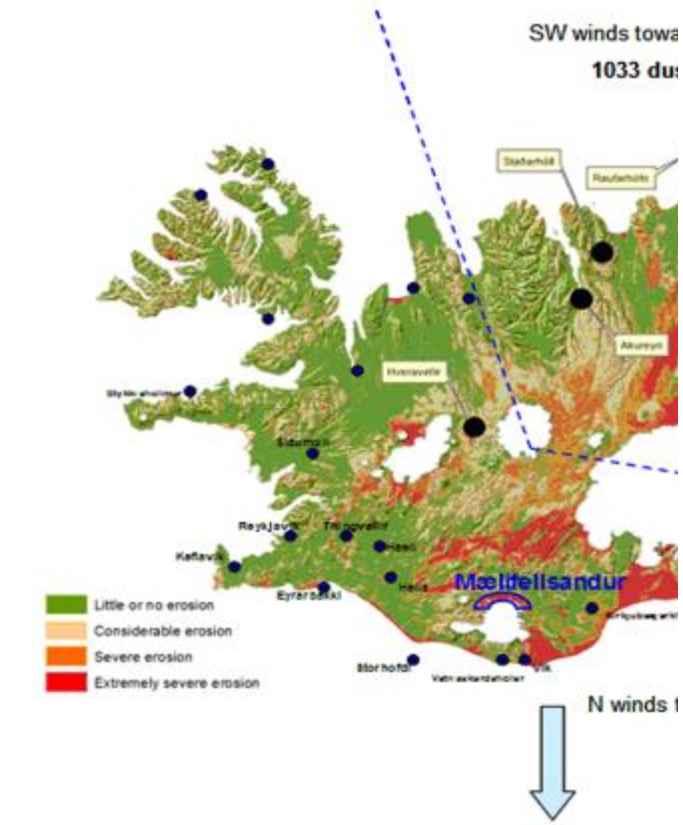
Atmospheric Chemistry and Physics
Open Access

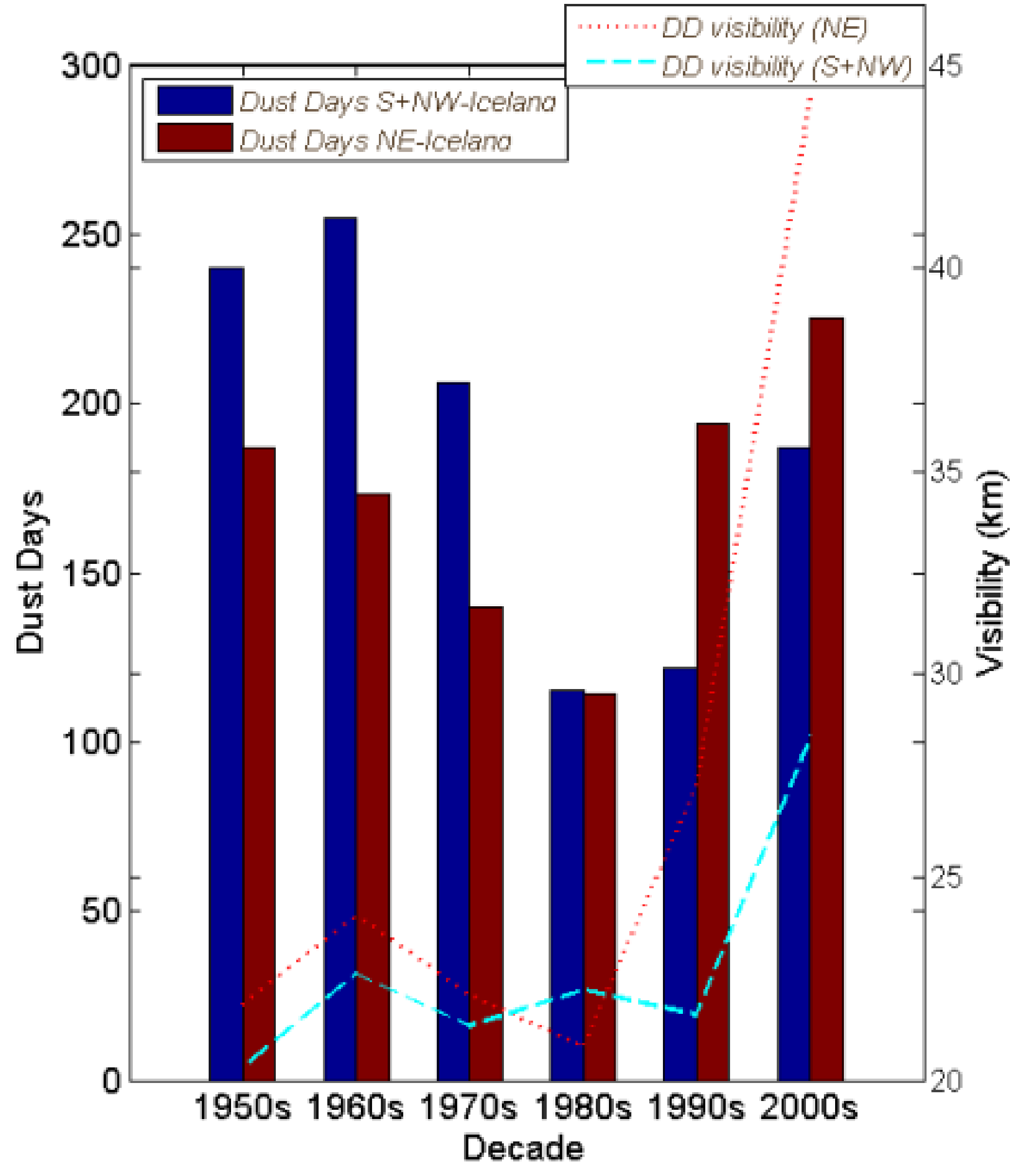
FREQUEN

variability of dust events in Iceland (1949–2011)

userova[1,2], O. Arnalds[1], and H. Olafsson[2,3,4]

- METHODS: A NETWOR 9-2011)





JST DAYS PER YEAR,

YEAR INCLUDING

C ASHES" + "DUST HAZE"

IED AS A DAY WHEN AT LEAST ONE STATION

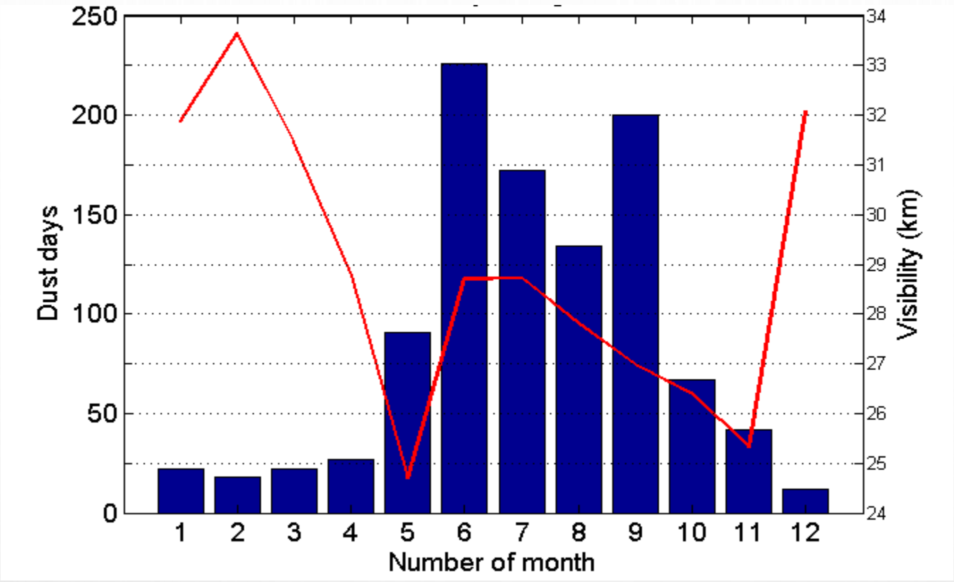
ECORDED AT LEAST ONE DUST OBSERVATION

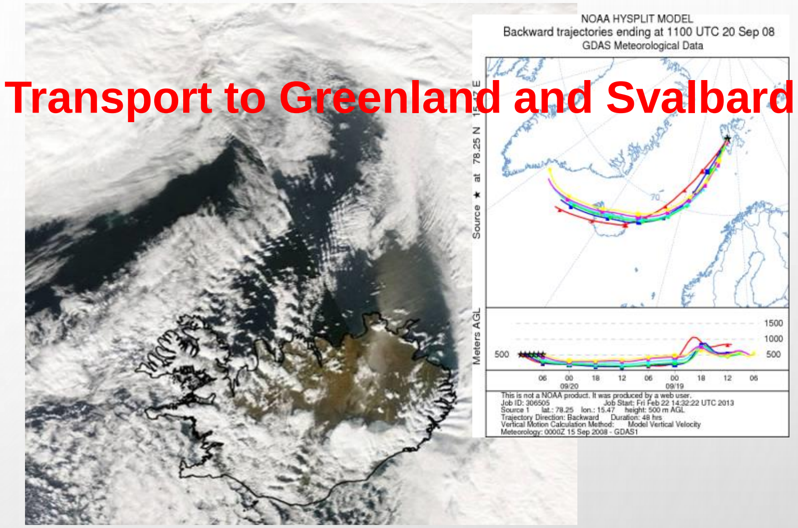
SEASONAL VARIABILITY OF DUST EVENTS

- NE ICELAND

"ARCTIC DUST EVENTS"

SUMMER

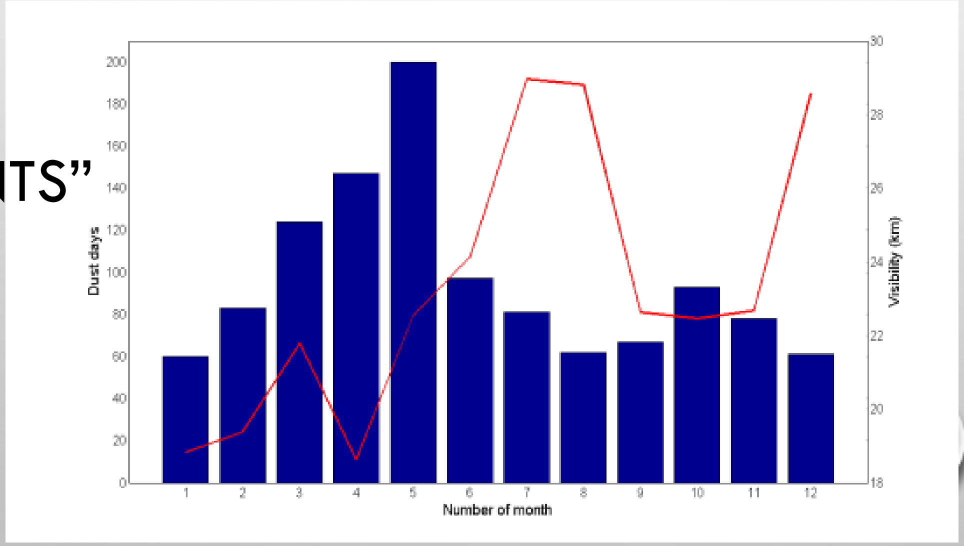


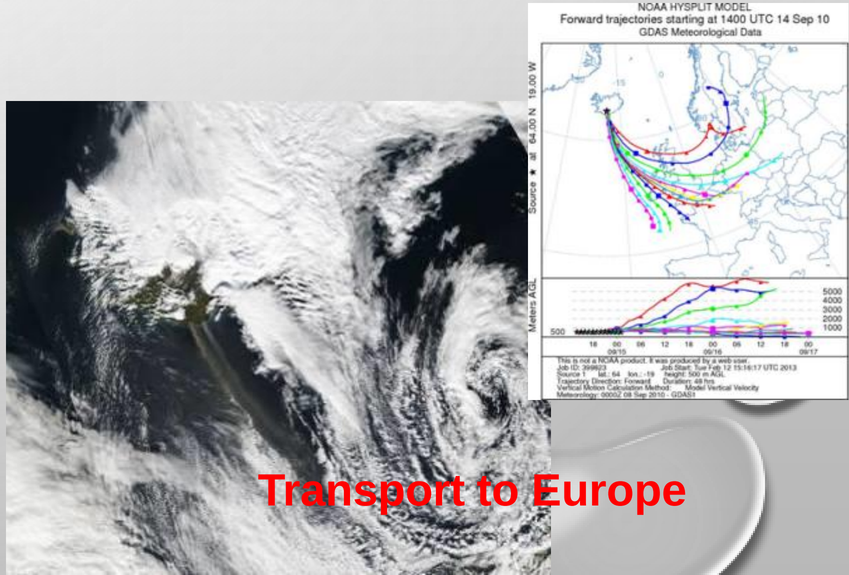


- S ICELAND

"SUB-ARCTIC DUST EVENTS"

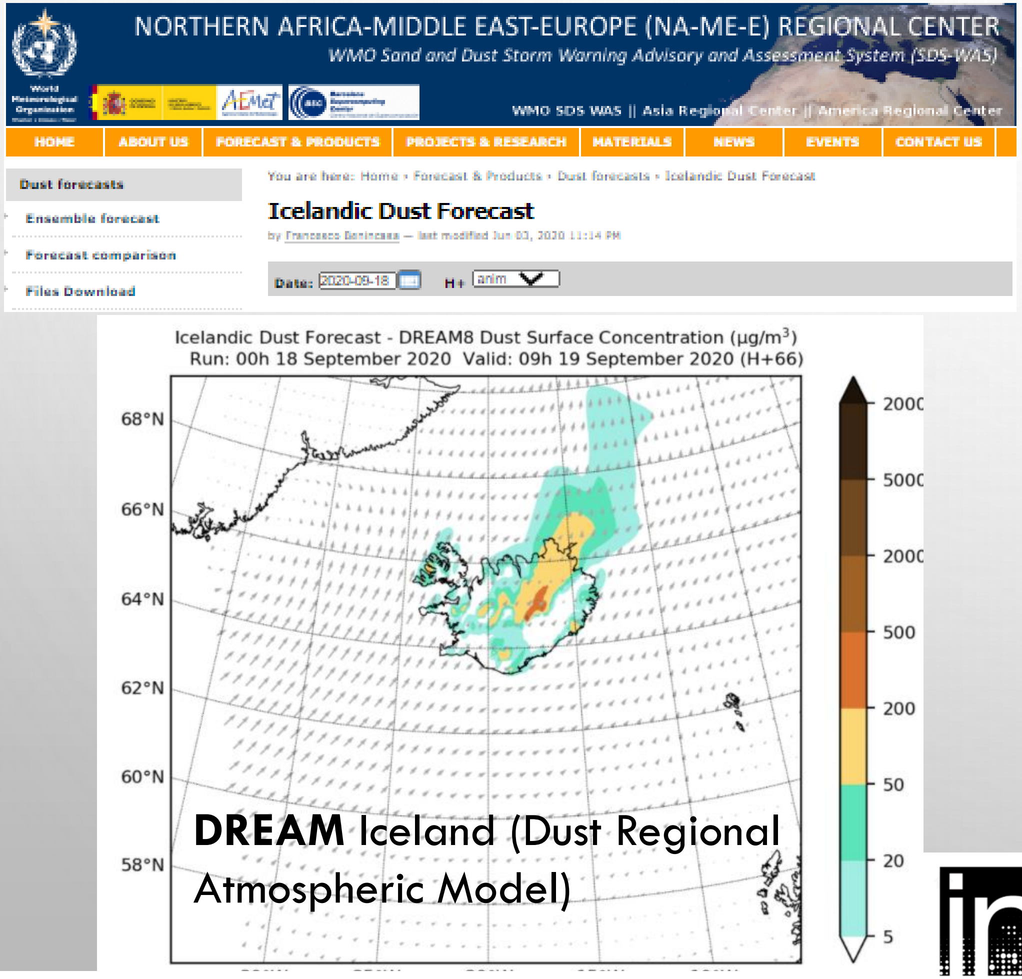
WINTER-SPRING





HLD RESEARCH – UPDATE FROM ICELAND

- **2021 – ICEDUST ASSOCIATION** - 48 INSTITUTIONS, 18 COUNTRIES, 100 MEMBERS, > 60 PAPERS
- **2020 –** FIRST OPERATIONAL HLD FORECAST AT THE WMO SDS-WAS



DREAM Iceland (Dust Regional Atmospheric Model)

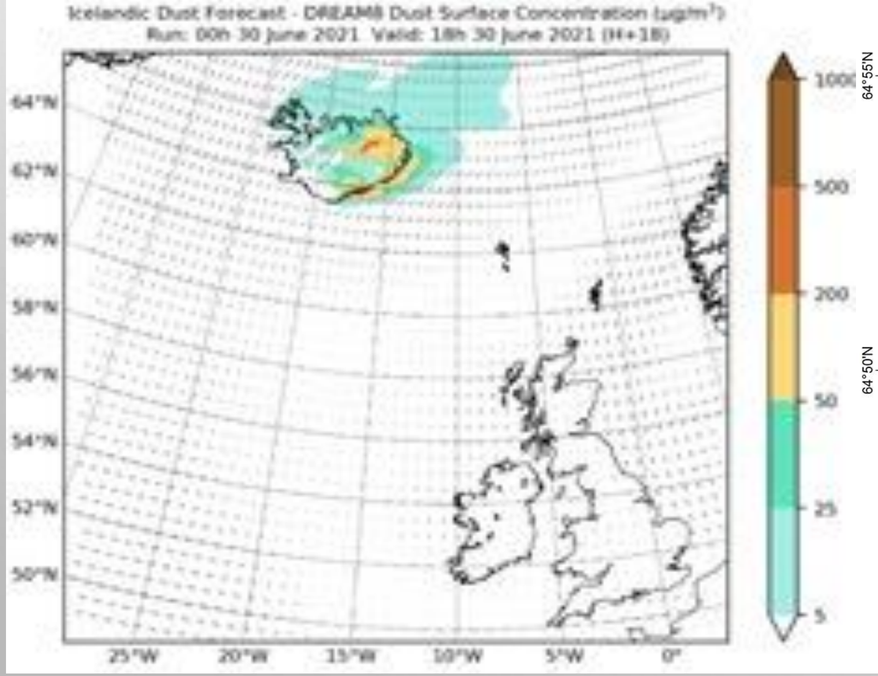
The largest (HLD) dust field campaign, NE Iceland, July-Sep 2021: European Research Council (FRAGMENT), German Research Foundation (HiLDA), NASA (EMIT), French Nat. Res. Inst. (INRAE), the Helmholtz Ass. of German Res. Centers (Helmholtz YI Group on Min. Dust), Icelandic Centre for Research (Rannís), Czech Science Foundation (GACR)

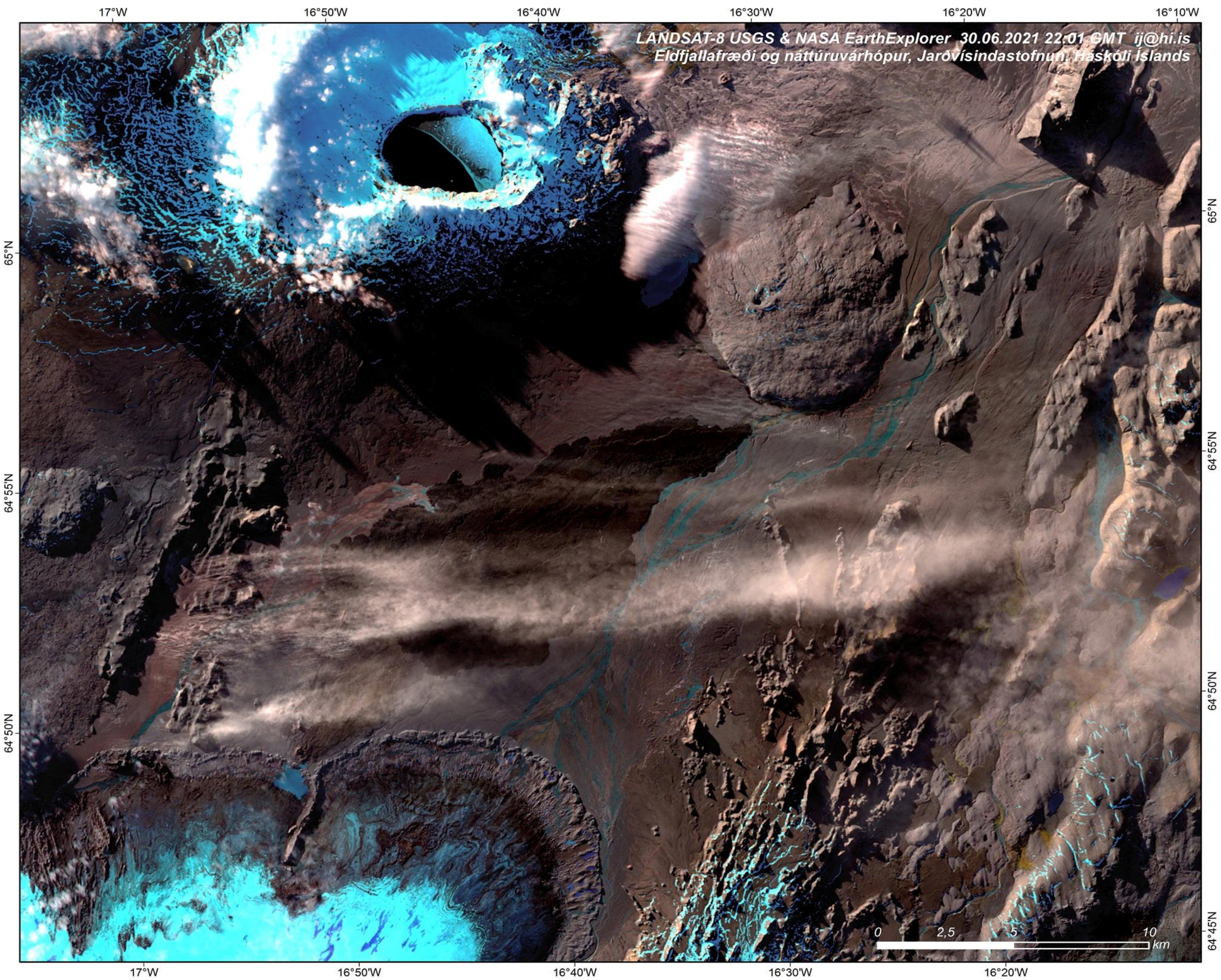
- 11 institutions
- 6 countries
- >70 instruments

inDust

The **International Network to Encourage the Use of Monitoring and Forecasting Dust Products**

INTERNATIONAL HLD FIELD CAMPAIGN 2021





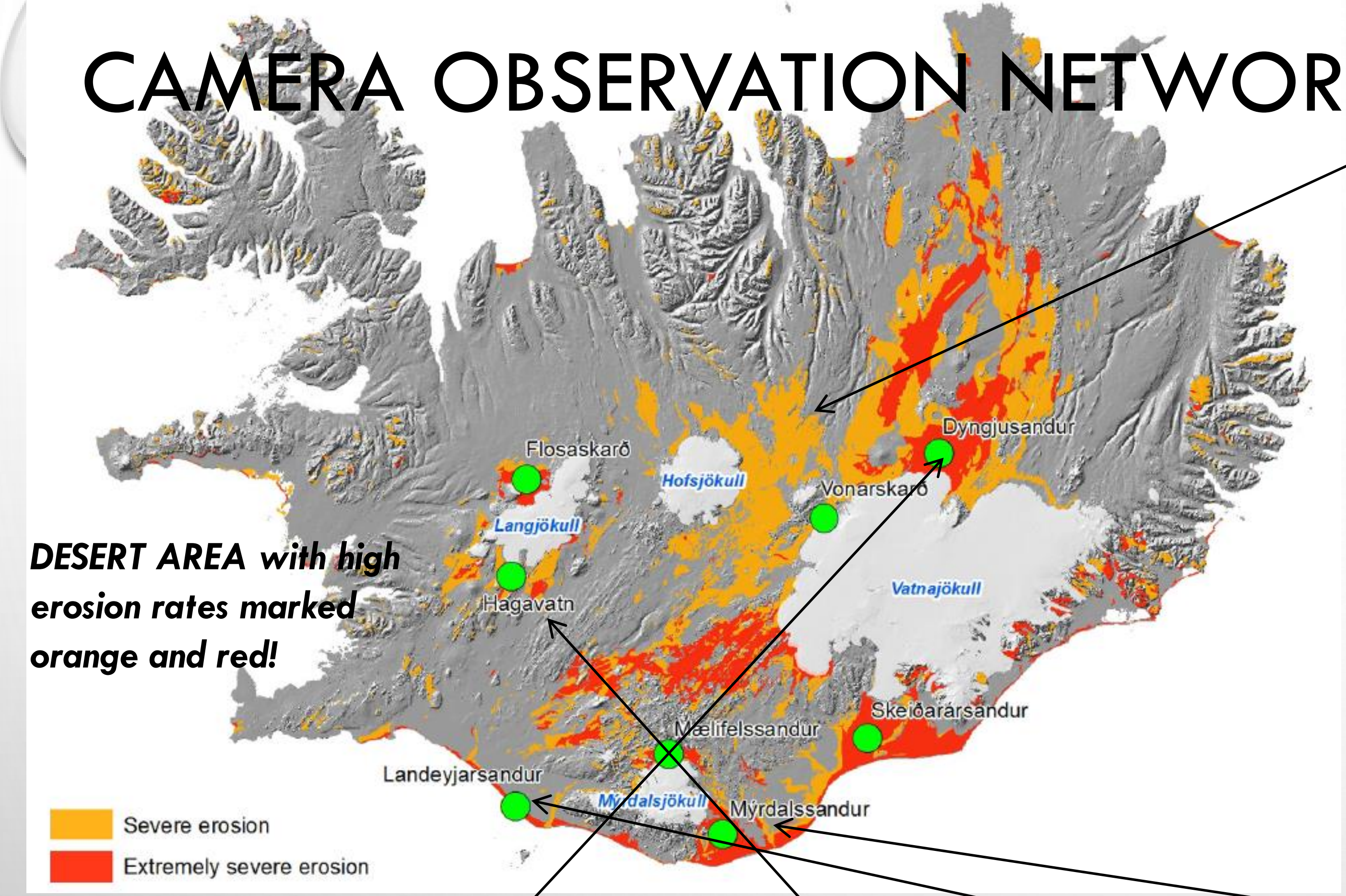
DYNGJUSANDUR DUST CAMPAIGN
> AN ANALOGUE FOR MARS?

Participants institutions:

- Barcelona Supercomputing Center (BSC)
- Environmental Assessment and Water Research – Spanish Research Council (IDAEA-CSIC)
- Technical University Darmstadt, Germany
- Freie Universität Berlin
- Karlsruhe Institute of Technology, Germany
- CALTECH, JPL, NASA
- National Research Institute for Agriculture, Food and Environment (INRAE), France
- Agricultural University of Iceland
- Czech University of Life Sciences Prague

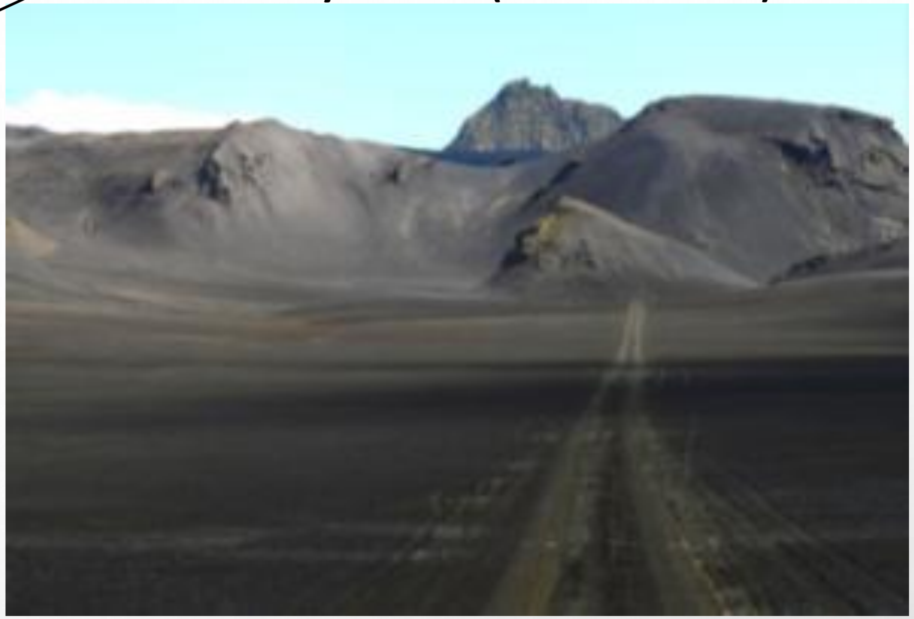
https://icedustblog.wordpress.com/2021/08/17/dust-experts-meet-in-dyngjusandur-to-conduct-the-largest-field-campaign-in-iceland/

CAMERA OBSERVATION NETWORK

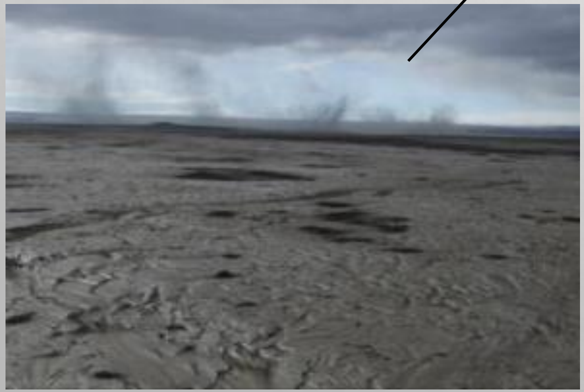


DESERT AREA with high erosion rates marked orange and red!

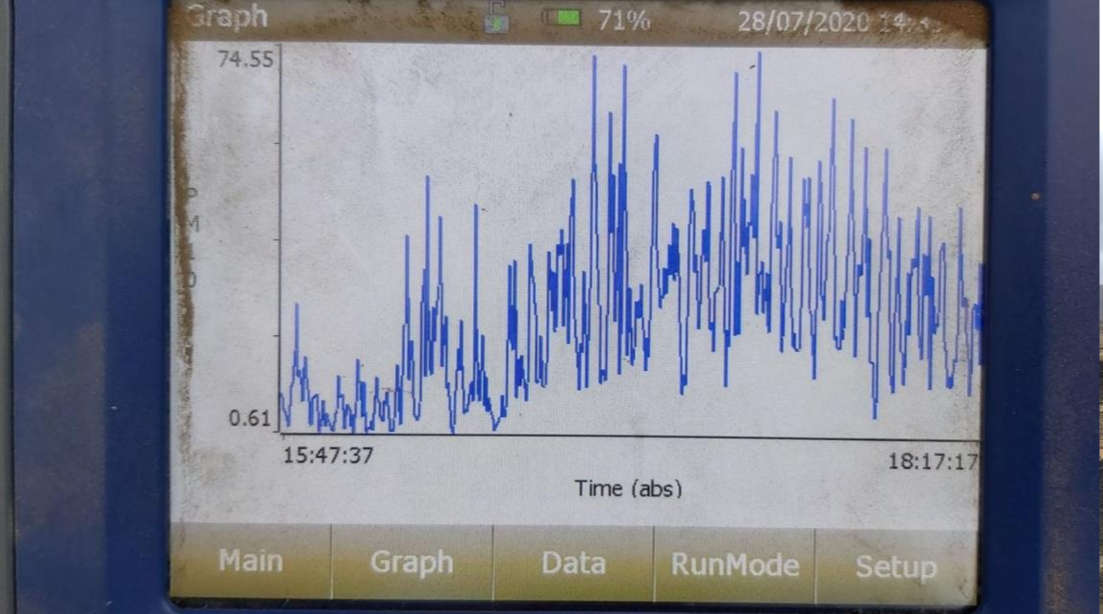
volcanic sandy deserts (22% of Iceland)

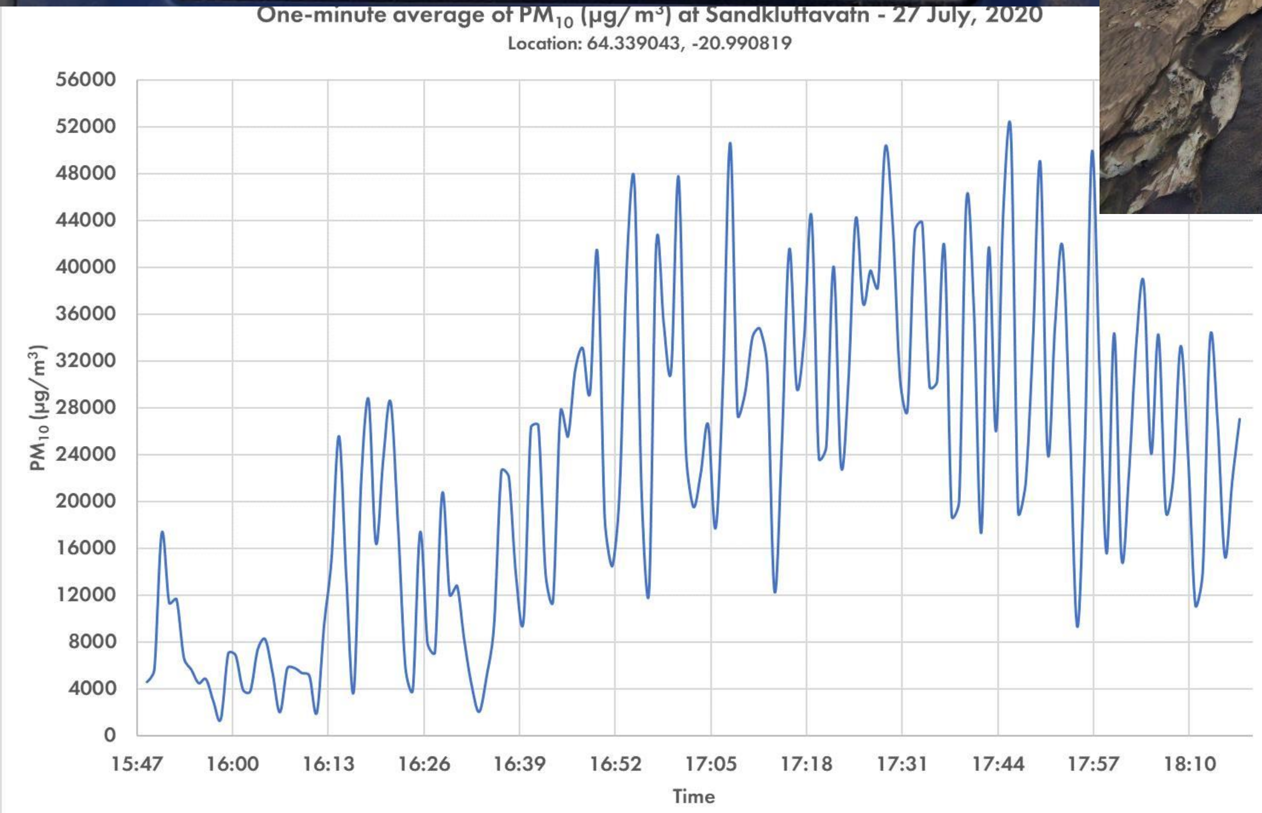


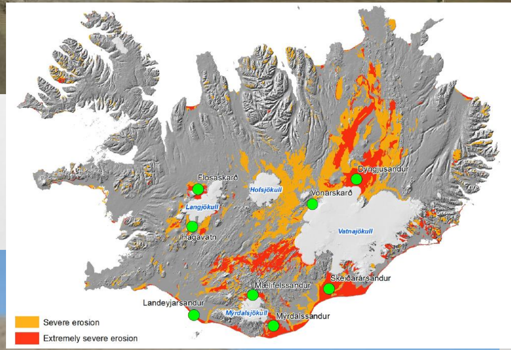
glacial riverbeds and ice-proximal areas = "dust hot spots"

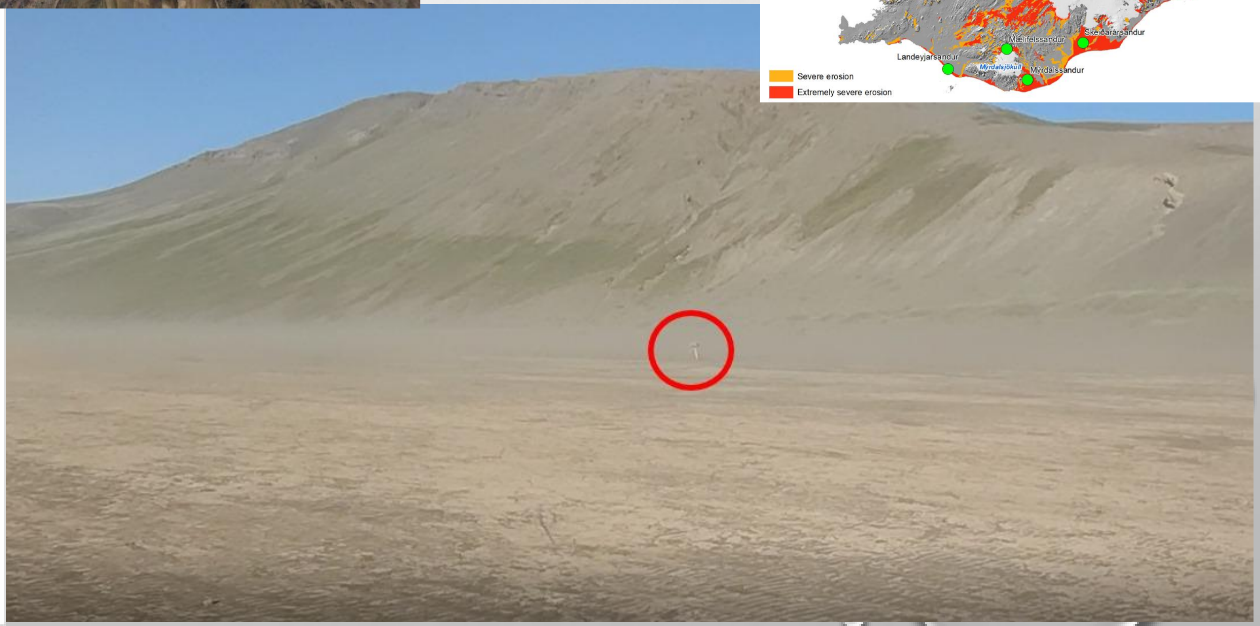


Field measurements in three Icelandic deserts 2020



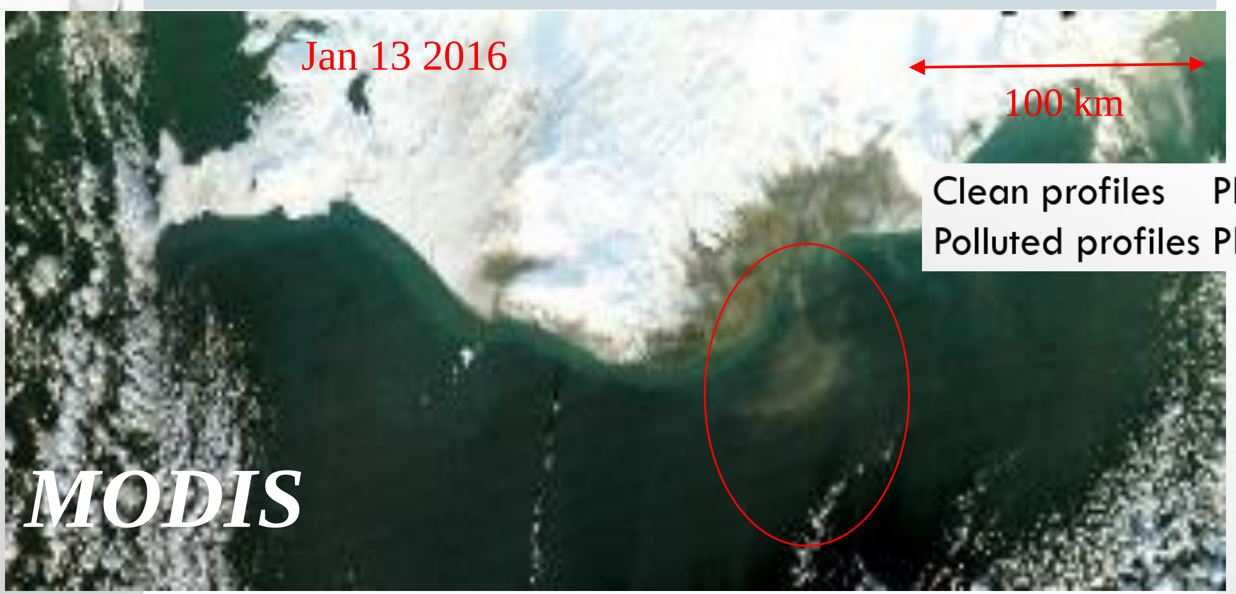




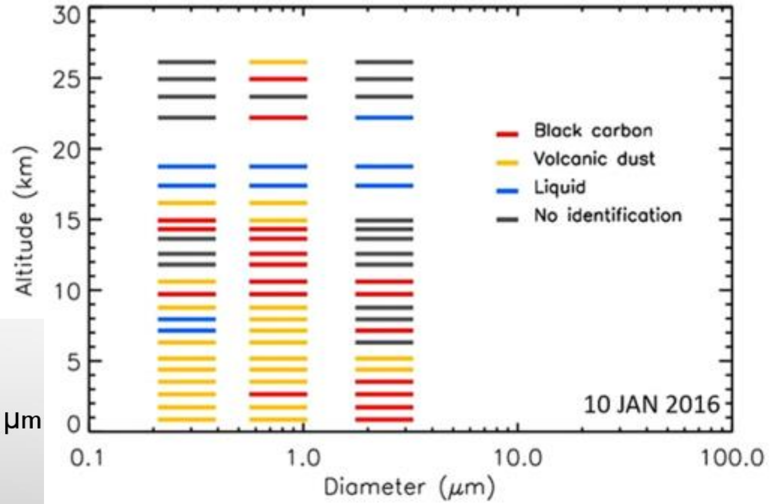


DUST IMPAIRS AIR QUALITY AT HIGH ATMOSPHERIC ALTITUDES DURING ARCTIC WINTER

www.nature.com/scientificreports/



Clean profiles	PNC < 5 particles cm^{-3}	Clean Arctic conditions
Polluted profiles	PNC > 250 particles cm^{-3}	Dirty Saharan dust layer



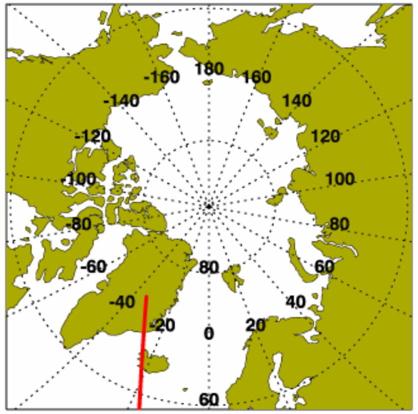
Particle sizes

Surface	up to 20 μm
900 m	submicron + few 10 μm
3,5 km	< 5 μm
6 km	submicron

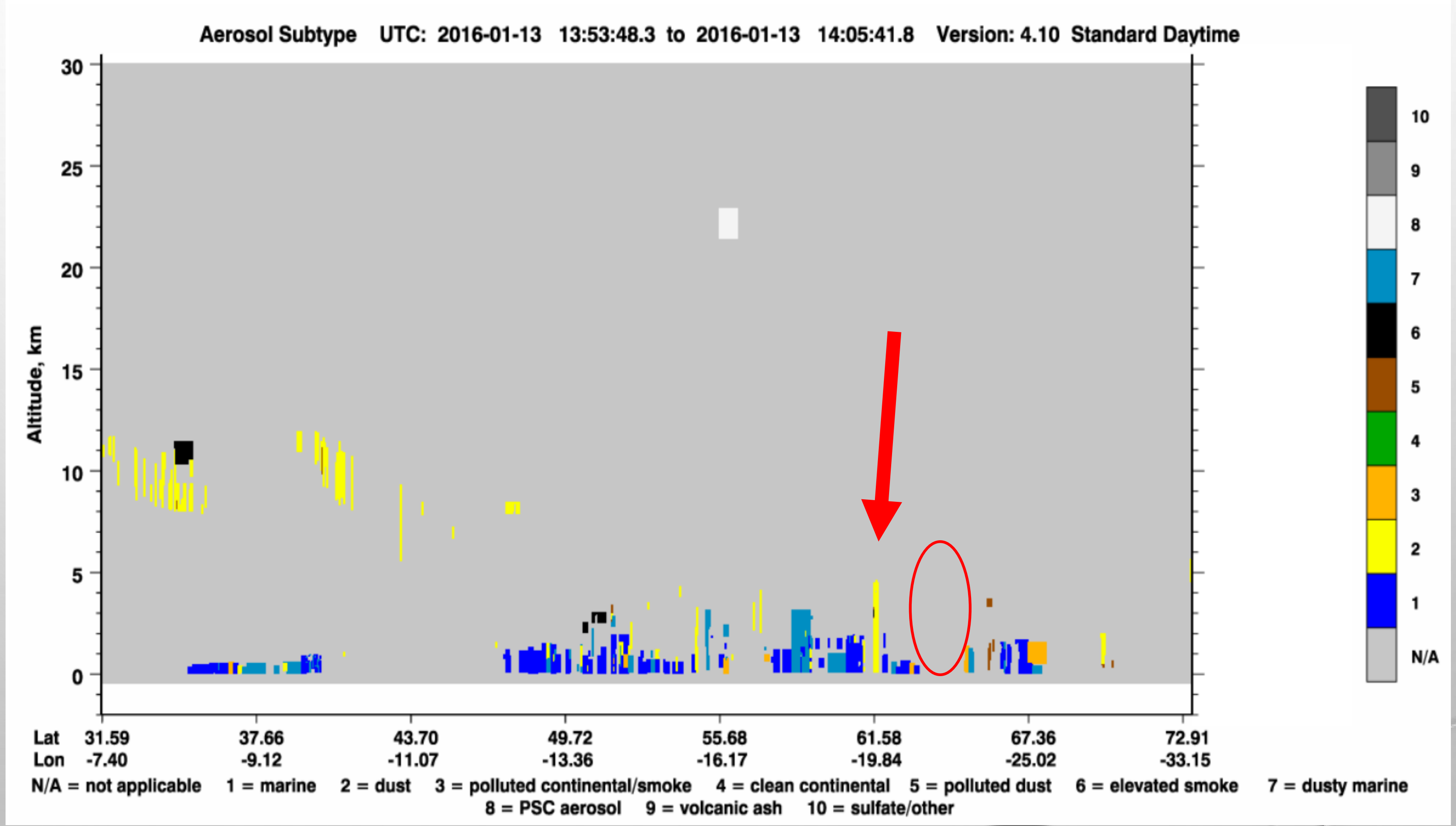
SCIENTIFIC REPORTS
natureresearch

Vertical distribution of aerosols in dust storms during the Arctic winter

Pavla Dagsson-Waldhauserova[1,2*], Jean-Baptiste Renard[3], Haraldur Olafsson[4,5], Damien Vignelles[3], Gwenaël Berthet[3], Nicolas Verdier[6] & Vincent Duverger[3]



Cloud-Aerosol Lidar and Infrared Pathfinder Satellite Observations (CALIPSO)



Cloud-Aerosol Lidar with Orthogonal Polarization (CALIOP) instrument that operates at two wavelengths (532 nm and 1064 nm)

NORTHERN HLD SOURCES
AND
THEIR CONTRIBUTION IN THE ARCTIC


AGU PUBLICATIONS
JGR
Journal of Geophysical Research: Atmospheres
RESEARCH ARTICLE
10.1002/2016JD025482
Key Points:
• High-latitude dust sources in the
Substantial contribution of northern high-latitude sources to mineral dust in the Arctic
C. D. Groot Zwaaftink[1], H. Grythe[1,2,3], H. Skov[4], and A. Stohl[1]

LONG-RANGE TRANSPORT OF ICELANDIC DUST?

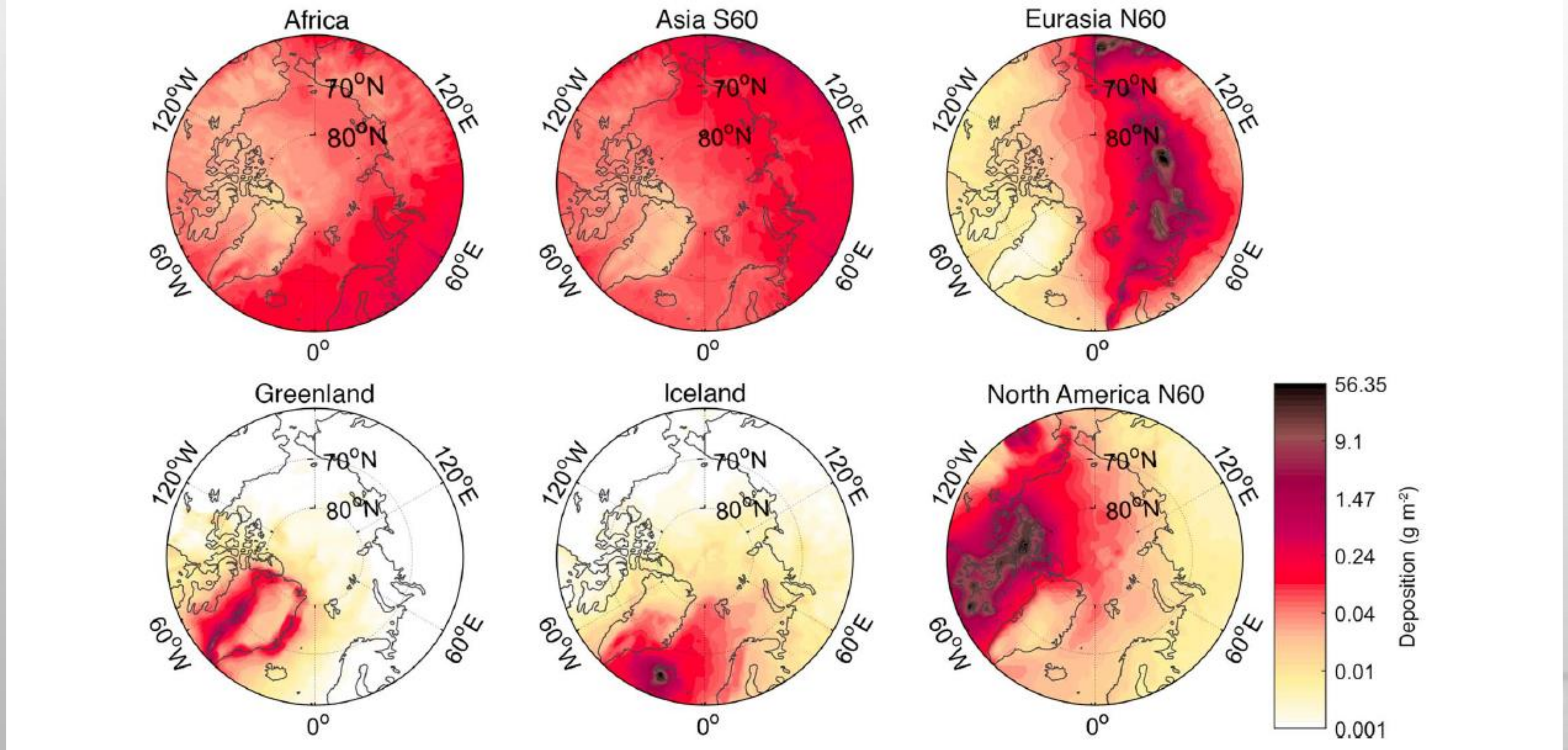


Figure 11. Simulated annual mean deposition of dust (g m^{-2}) in the near Arctic originating from different source regions averaged for years 2010–2012. Deposition is here given as the sum of dry and wet deposition.

~ **3% of global dust emission** from HLD sources

Total atmospheric dust loads in the Arctic:

Asia (~38%)

Africa (~32%)

HLD (27%)

Icelandic dust:

- About 7% of emitted dust is deposited in the high Arctic (>80°N)
- Europe deposition (3% of emitted dust)

IS THERE ANY EVIDENCE THAT ICELANDIC DUST HAS REACHED SVALBARD OR EUROPE?

ORIGINAL RESEARCH ARTICLE
Front. Earth Sci., 05 November 2018 | https://doi.org/10.3389/feart.2018.00187

Mineralogical and Chemical Records of Icelandic Dust Sources Upon Ny-Ålesund (Svalbard Islands)

Beatrice Moroni[1*], Olafur Arnalds[2], Pavla Dagsson-Waldhauserová[2,3], Stefano Crocchianti[1], Riccardo Vivani[4] and David Cappelletti[1]

Yes, in Svalbard

Volcanic dust travelled > 3000 km

Yes, in Ireland

Contents lists available at ScienceDirect
Atmospheric Environment
journal homepage: www.elsevier.com/locate/atmosenv
ELSEVIER
ATMOSPHERIC ENVIRONMENT

Volcanic sulphate and arctic dust plumes over the North Atlantic Ocean

J. Ovadnevaite[a,b,*], D. Ceburnis[a], K. Plauskaite-Sukiene[b], R. Modini[c], R. Dupuy[a], I. Rimselyte[b], M. Ramonet[d], K. Kvietkus[b], Z. Ristovski[c], H. Berresheim[a], C.D. O'Dowd[a]

ORIGINAL RESEARCH ARTICLE Provisionally accepted The full-text will be published soon. Notify me
Front. Earth Sci. | doi: 10.3389/feart.2019.00142

Can volcanic dust resuspended from surface soil and deserts of Iceland be transferred to central Balkan?

Dragana S. Đorđević[1*], Ivana Tosic[2], Sanja Sakan[1], Srđan Petrović[1], Jelena Đuričić-Milanković[1], David C. Finger[3] and Pavla Dagsson-Waldhauserova[4]

[1]Institute of Chemistry, Technology and Metallurgy, University of Belgrade, Serbia
[2]University of Belgrade, Serbia
[3]Reykjavík University, Iceland
[4]Agricultural University of Iceland, Iceland

Yes, in Serbia

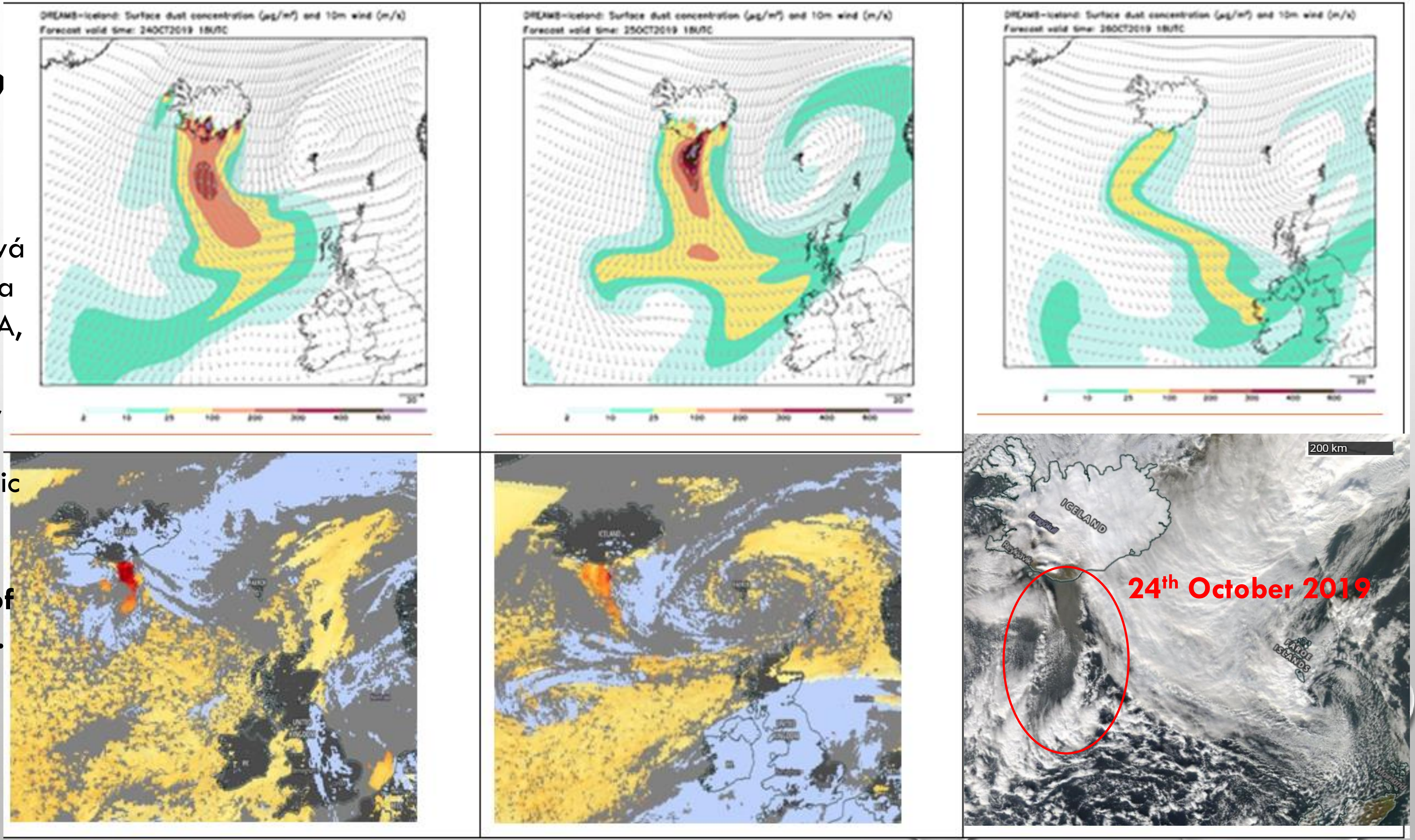
In this work we use chemical fingerprints as characteristics ratios of specific crustal elements Ca/Al, Fe/Al, K/Al, Mg/Al, Mn/Al, Ca/Fe and Mg/Fe to investigate the long-range transport of volcanic aerosols which are entering the atmosphere in suspended and resuspended processes from Icelandic deserts and hot spots in remote areas in Iceland and transmitted to the central Balkan area (Belgrade). For this purpose, backward trajectories from Belgrade (□=44°48'; □=20°28') in 2012 and 2013, simultaneous with atmospheric aerosols measurements, were calculated by using the Hybrid Single-Particle Lagrangian Integrated Trajectory (HYSPLIT) model. We found that about 17% of air masses passed over Icelandic territory and arrived to Balkan area. In almost all of these episodes ratios of some investigated elements in suburban aerosols of Balkan area corresponded to the ratios of elements investigated in surface soil of the Rangárvellir area - South Iceland in the vicinity of volcanoes. We identified several episodes, such as 6 – 8 August 2012, 2 – 6 June 2013, 26 – 28 June 2013, and 18 – 20 September 2013, with the characteristic ratios of the highest number of investigated elements in atmospheric aerosol of central Balkan corresponding to ratios from Icelandic soil material. This study provides evidence that Icelandic dust can travel long distances showing the importance of High Latitude Dust sources.

Source: GRID-Arendal, 2005. Barentswatch Atlas.

UP TO 71 LONG-RANGE DUST EVENTS FROM ICELAND IN 2020-2021

A case study
24th October 2019

Cvetkovic B, Petkovic S, Dagsson-Waldhauserová P , Arnalds O, Madonna F, Proestakis E, Gkikas A, Vukovic Vimic A, Pejanovic G, Rosoldi M, Ceburnis D, Amiridis V, Lisá L, Nickovic S, Nikolic J. **Fully dynamic numerical prediction model for dispersion of Icelandic mineral dust.** *Atmospheric Chemistry and Physics*, to be submitted.



FREQUENCY OF LONG-RANGE DUST EVENTS FROM ICELAND

JANUARY 2020 – FEBRUARY 2021

	Jan2020	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Jan2021	Total
Number of dusty day Iceland	31	29	31	30	31	30	26	17	21	15	20	14	9	304
Number of days when the dust reached **Faroe islands**	6	7	8	7	7	2	8	0	0	0	3	0	1	49
Number of days when the dust reached **UK/Ireland**	4	5	8	3	3	0	5	0	2	0	1	0	0	31 (-21 also in Faroe)
Number of days when the dust possibly reached **Scandinavia**	5	1	3	2	2	0	0	1	2	0	2	0	0	18 (-6 also in Faroe)
														Total events 71

Bc thesis of Nathalie Burdova

ANTARCTICA MEASUREMENTS

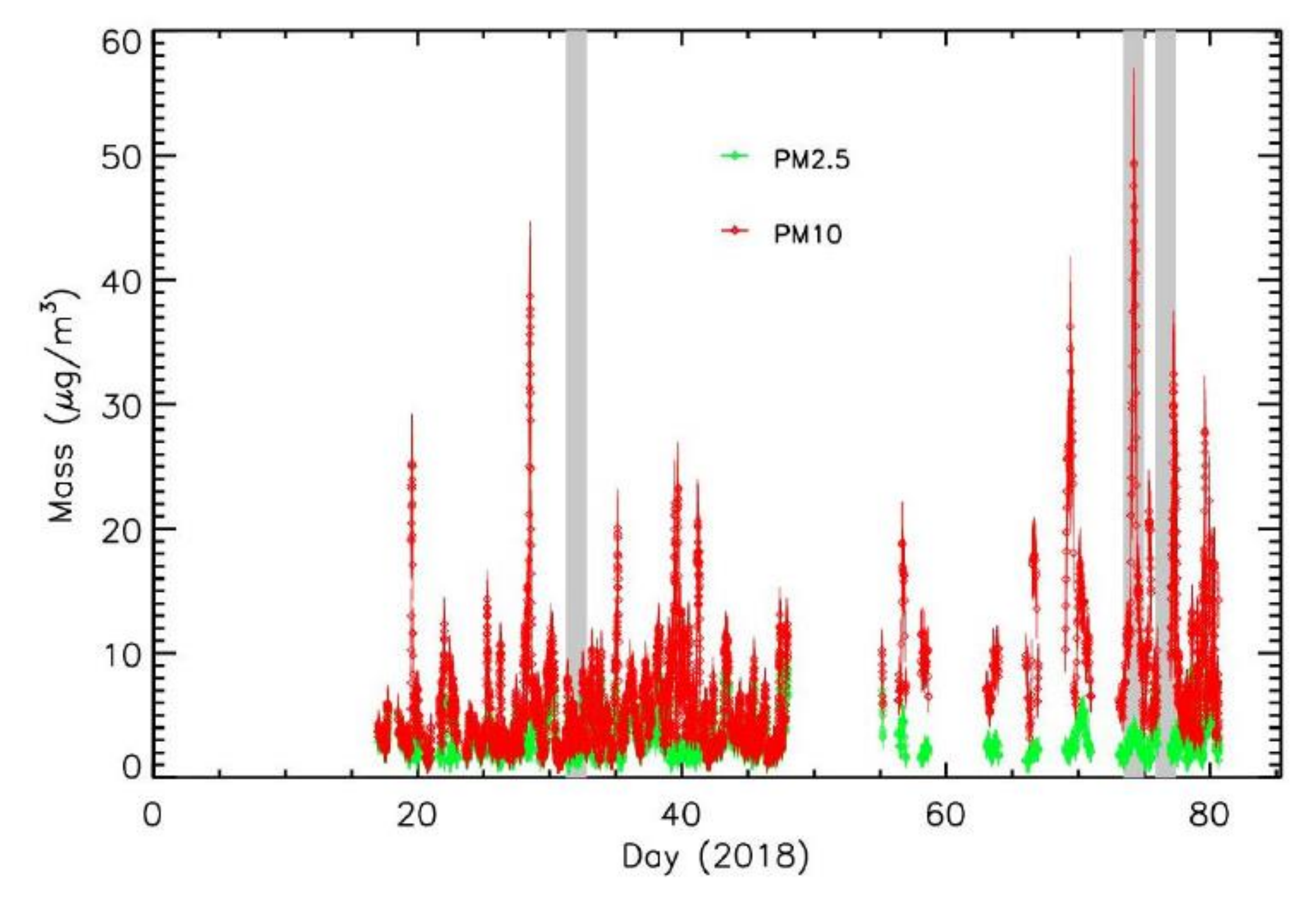
PM10 in <u>Antarctica</u> similar to North Europe!

ORIGINAL RESEARCH ARTICLE
Front. Earth Sci., 03 December 2018 | https://doi.org/10.3389/feart.2018.00207

Check for updates

Aerosol Concentrations in Relationship to Local Atmospheric Conditions on James Ross Island, Antarctica

Jan Kavan[1*], Pavla Dagsson-Waldhauserova[2,3], Jean Baptiste Renard[4], Kamil Láska[1] and Klára Ambrožová[1]

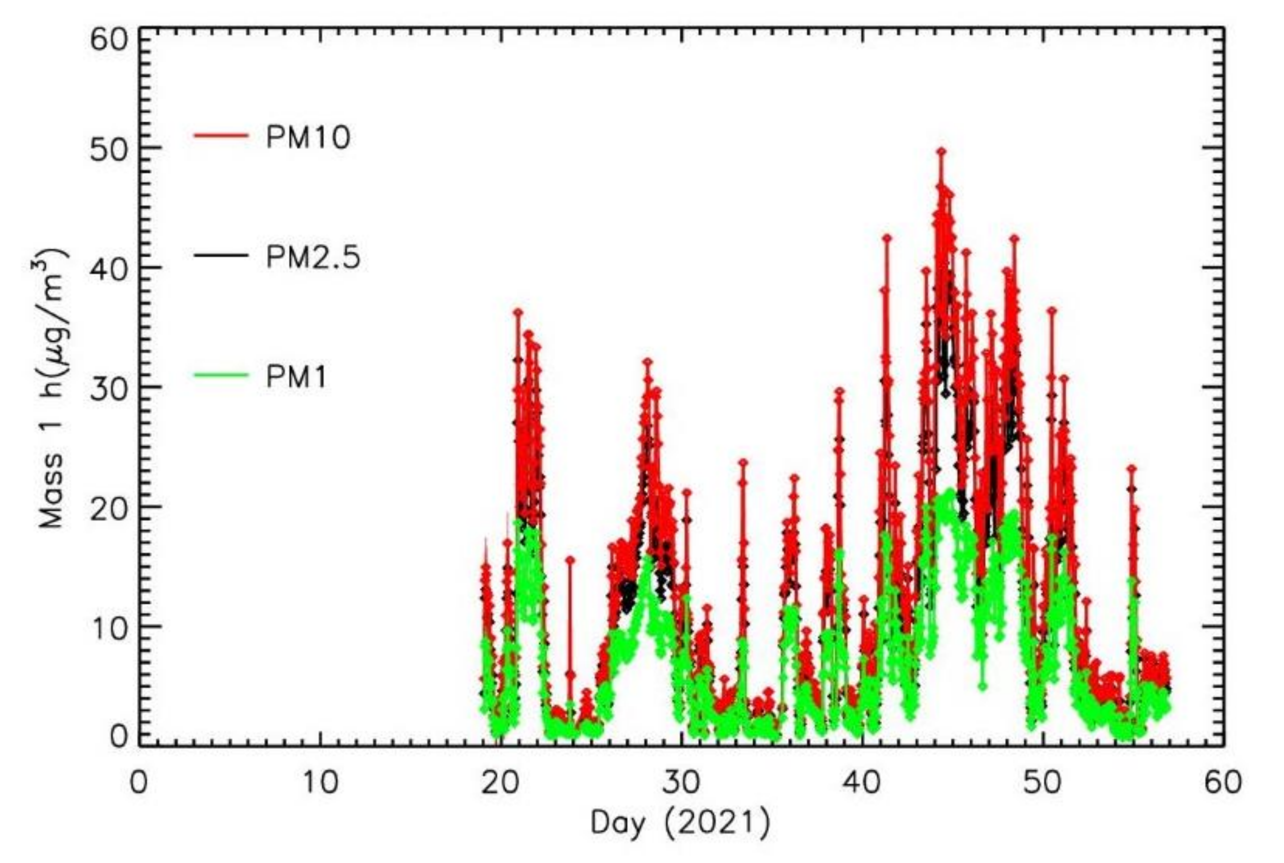


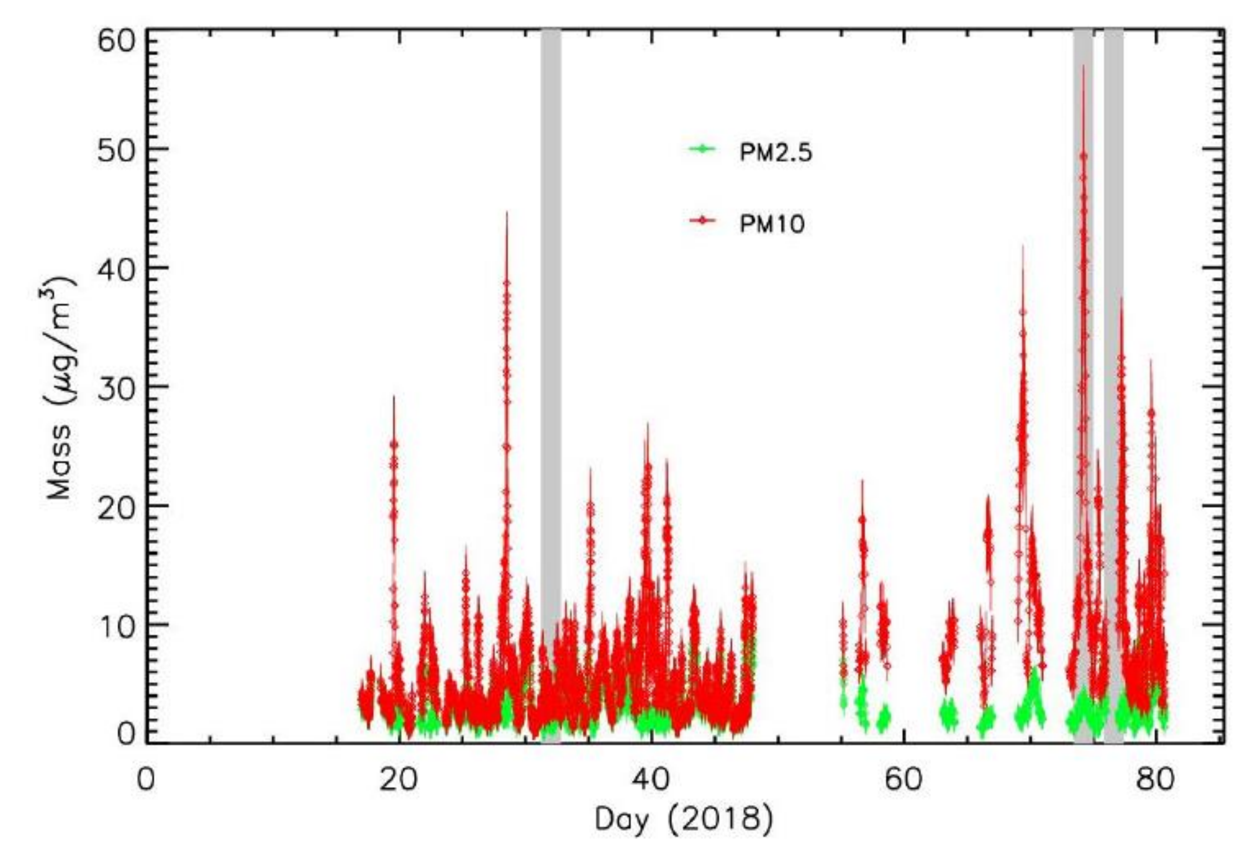
Mean (median) mass concentrations:

PM_{10} were **6.4** ± 1.4 (3.9 ± 1) μgm^{-3}
$PM_{2,5}$ were 3.1 ± 1 (2.3 ± 0.9) μgm^{-3}

for the period January-March 2018

ANTARCTICA 2021 – preliminary results





Daily concentrations much higher than 6 ug m-3

Icelandic dust has different composition that crustal dust

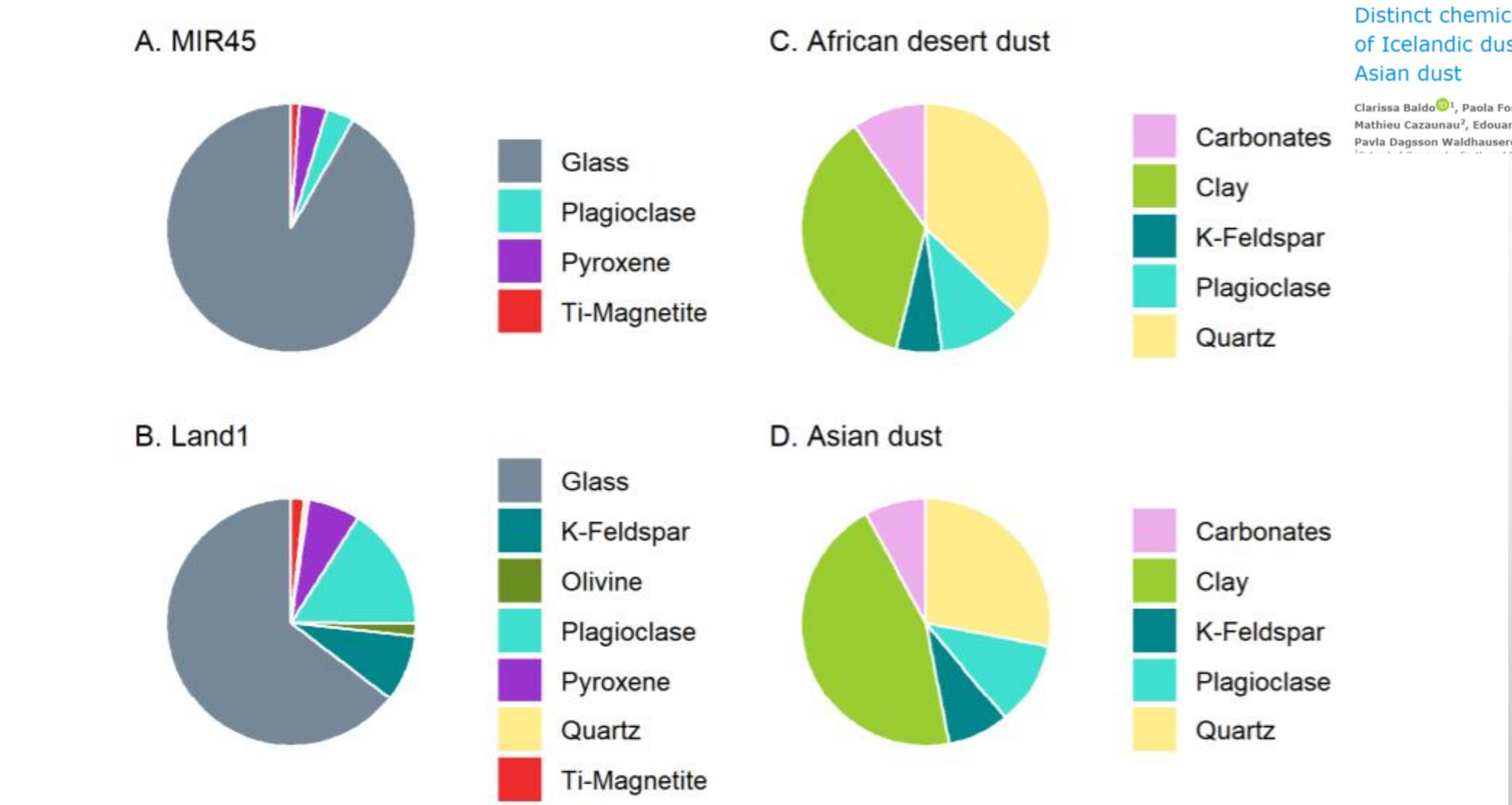


Figure 6: A-B. Mineralogy of Icelandic dust (MIR45 and Land1; PM_{10}). C. Mineral composition of North African desert dust (PM_{20}), representing the average bulk composition by X-ray diffraction of Tibesti, Western Sahara, Niger, and Mali samples (Shi et al., 2011b). D. Mineral composition of Asian dust (PM_{10}), average bulk composition by X-ray diffraction of dust from arid regions in Mongolia and North China collected in Seoul (Korea) during eight dust events in 2003-2005 (Jeong et al., 2008).

Abstract | Discussion

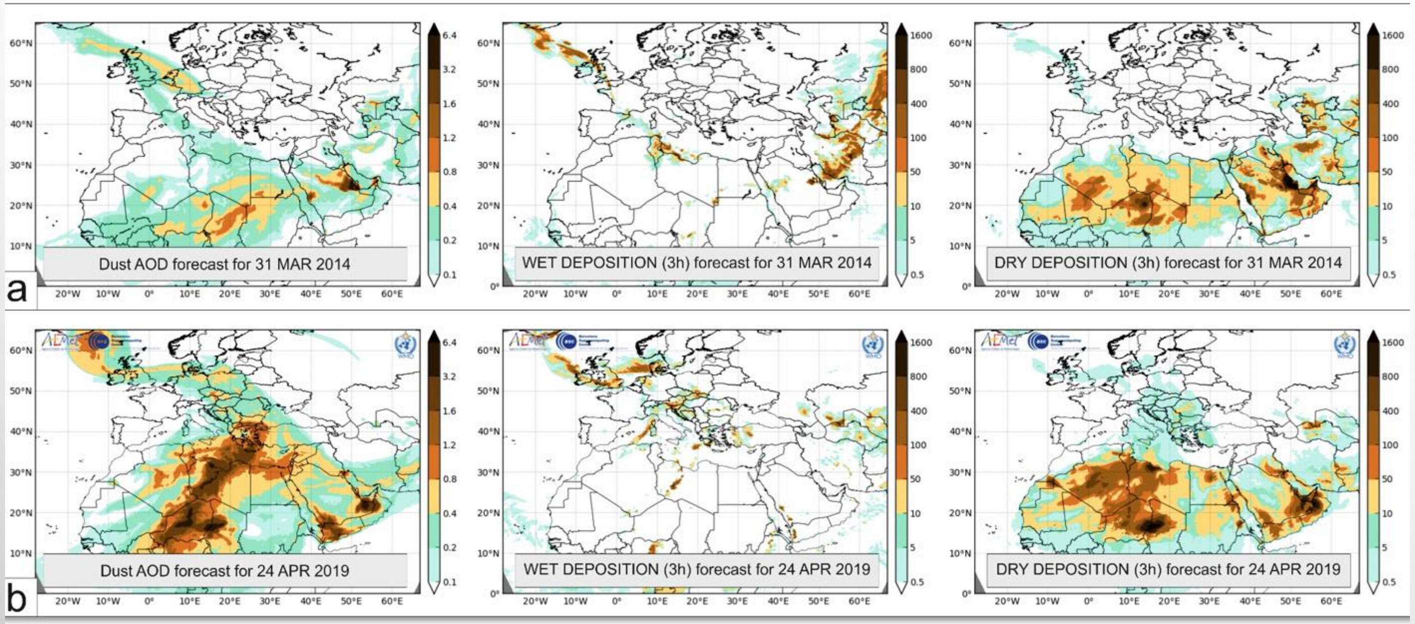
Distinct chemical and mineralogical composition of Icelandic dust compared to North African and Asian dust

Review status
A revised version of this pr
accepted for the journal AC
expected to appear here in
course.

Clarissa Baldo[1], Paola Formenti[2], Sophie Nowak[3], Servanne Chevaillier[2], Mathieu Cazaunau[2], Edouard Pangui[2], Claudia Di Biagio[2], Jean-Francois Doussin[2], Konstantin Ignatyev[4], Pavla Dagsson Waldhauserova[5,6], Olafur Arnalds[5], A. Robert MacKenzie[1], and Zongbo Shi[1]

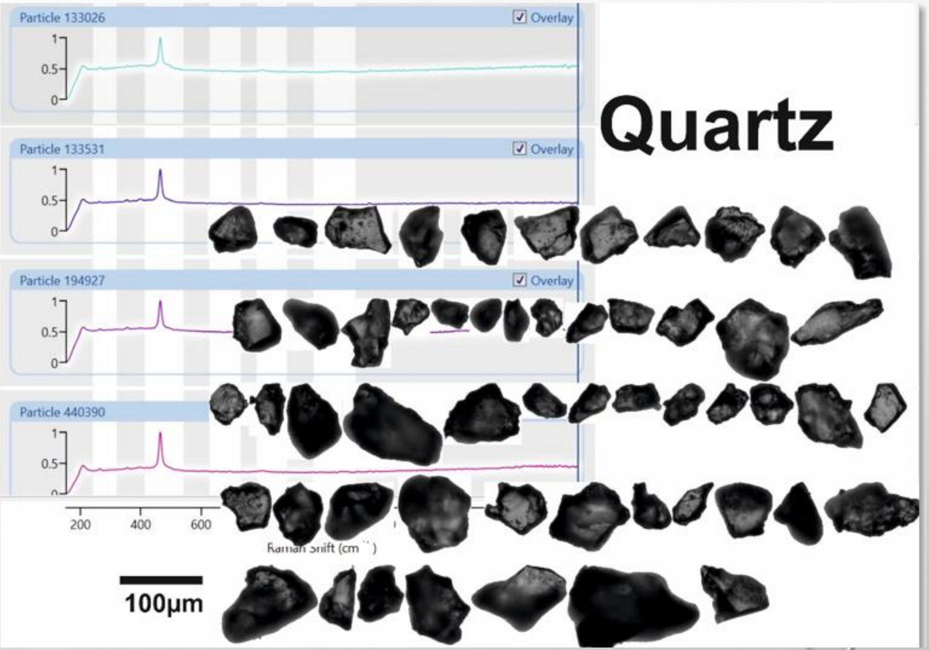
DUST FROM ICELAND OR DUST TO ICELAND?

Saharan dust depositional events (SDE#1-2) in Iceland



→ **15 Saharan dust events** in Iceland in 2008-2020

Giant quartz particles traveling > 4,500 km

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Saharan dust and giant quartz particle transport towards Iceland

György Varga[1], Pavla Dagsson-Walhauserová[2,3], Fruzsina Gresina[1,4] & Agusta Helgadottir[5]

ICELAND 24.4.2019

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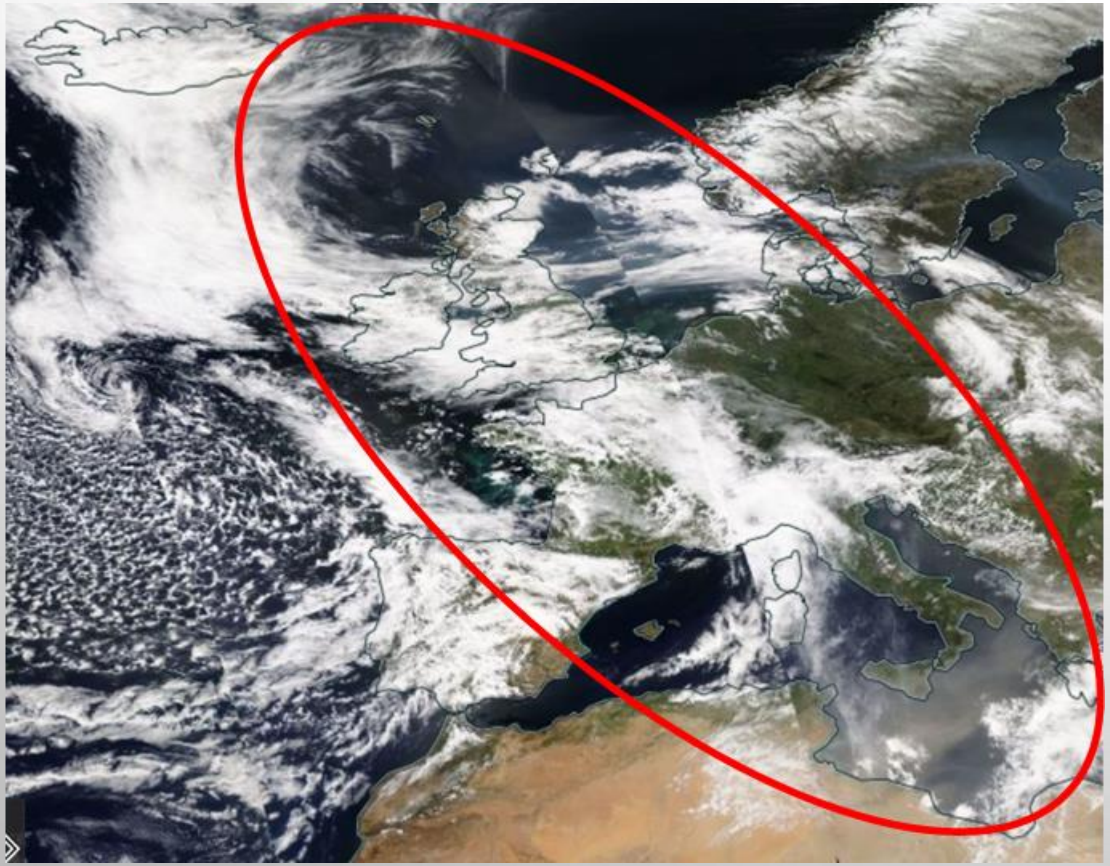
Saharan dust and giant quartz particle transport towards Iceland

György Varga[1], Pavla Dagsson-Walhauserová[2,3], Fruzsina Gresina[1,4] & Agusta Helgadottir[5]

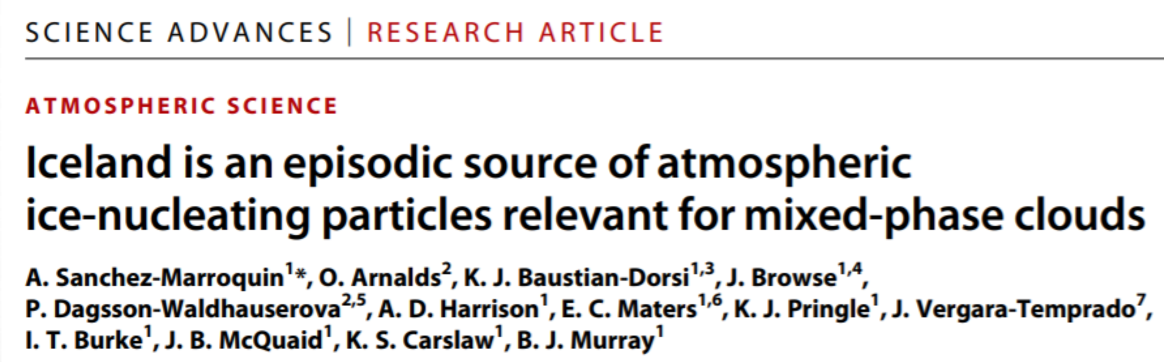


ICELANDIC DUST MAKES ICE IN CLOUDS

- Icelandic volcanic dust is an active Ice-Nucleating Particle (INP) similarly to Low Latitude Dust (LLD)

- Airborne Icelandic dust sampled from the aircraft is more active INP than LLD at temperatures above −17°C

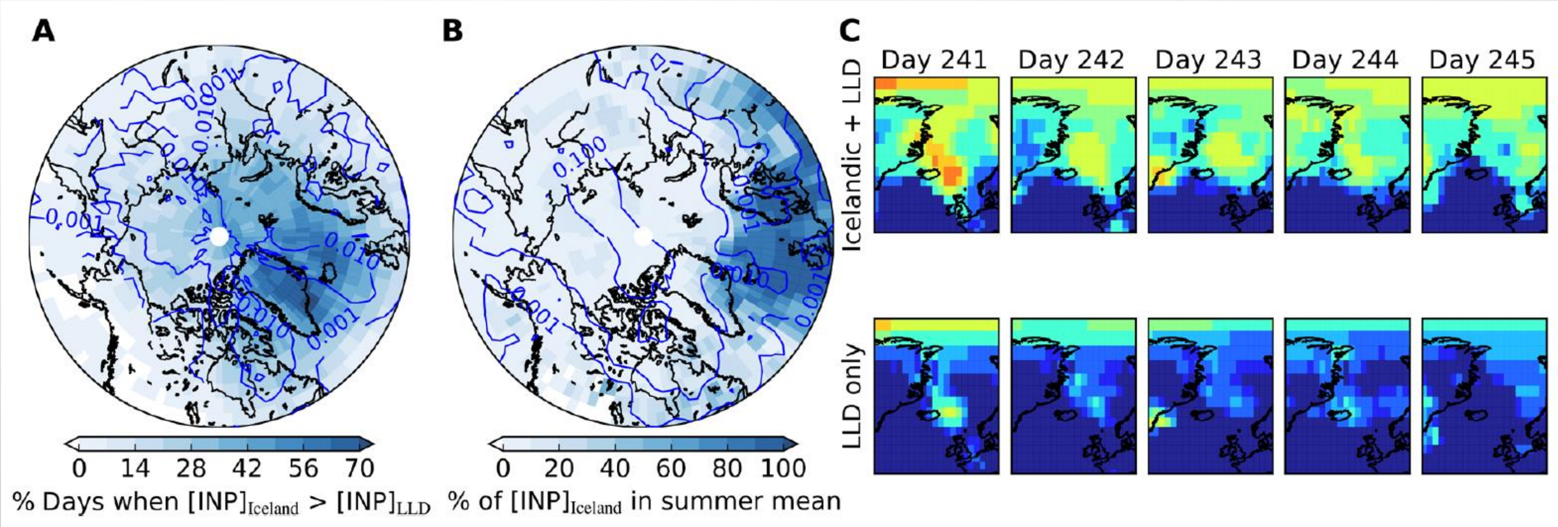
- The greatest contribution of Icelandic dust to the INP population occurs during the summer over large areas of the North Atlantic and the Arctic at altitudes between 3-5.5 km, where mixed-phased clouds are known to occur.
- In future, increased INP concentrations would lead to **a reduction in supercooled water** and a **decrease in shortwave reflectivity** of clouds to produce a positive climate feedback, which has not yet been considered in climate simulations


SCIENCE ADVANCES | RESEARCH ARTICLE

ATMOSPHERIC SCIENCE

Iceland is an episodic source of atmospheric ice-nucleating particles relevant for mixed-phase clouds

A. Sanchez-Marroquin[1]*, O. Arnalds[2], K. J. Baustian-Dorsi[1,3], J. Browse[1,4], P. Dagsson-Waldhauserova[2,5], A. D. Harrison[1], E. C. Maters[1,6], K. J. Pringle[1], J. Vergara-Temprado[7], I. T. Burke[1], J. B. McQuaid[1], K. S. Carslaw[1], B. J. Murray[1]



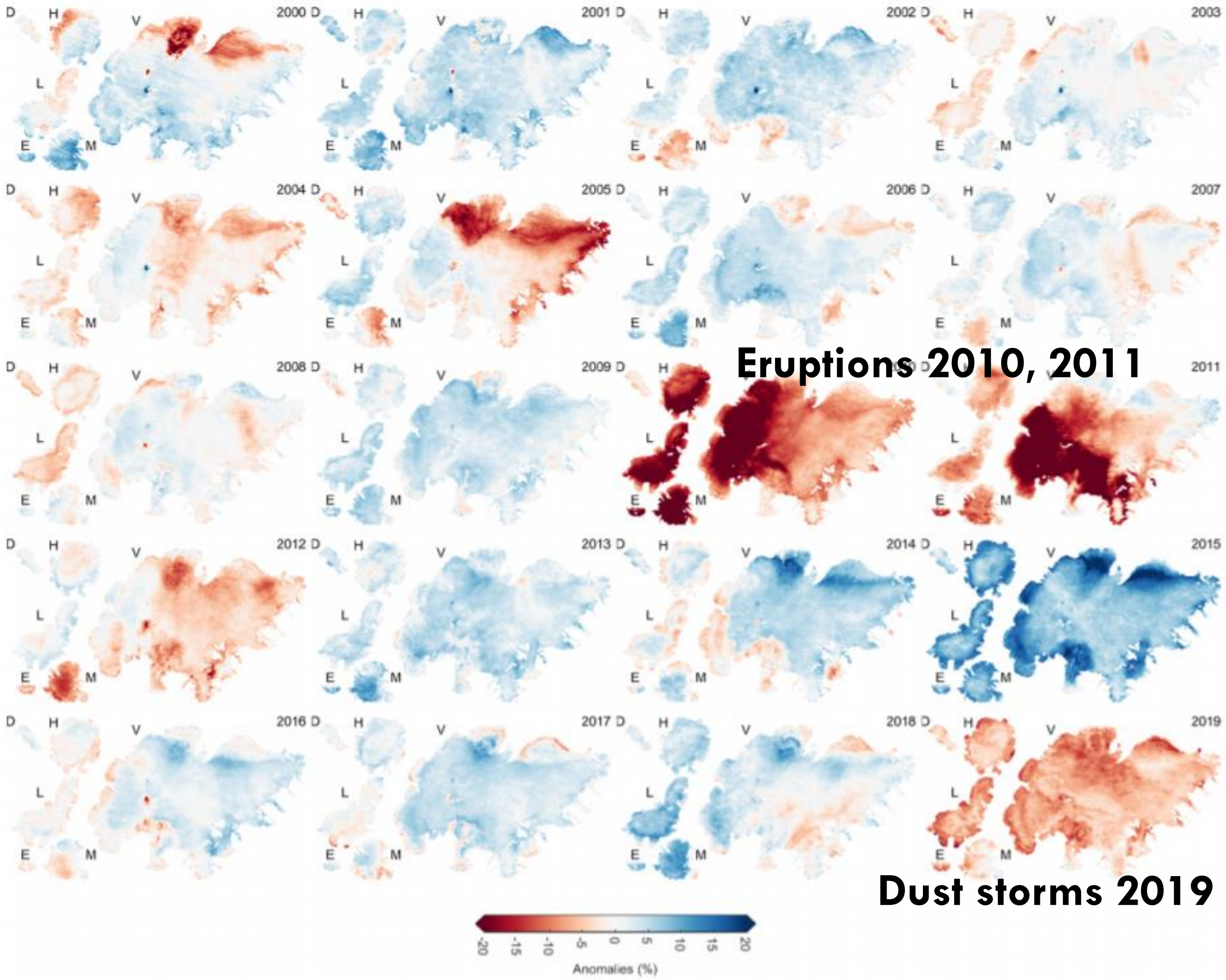
- ice crystals in a mixed-phase cloud makes the cloud instable
- ice phase will grow at expenses of the liquid one, removing the liquid content
- clouds optically thinner, and therefore they have less albedo (less bright).

The Cryosphere, 15, 547–570, 2021
https://doi.org/10.5194/tc-15-547-2021

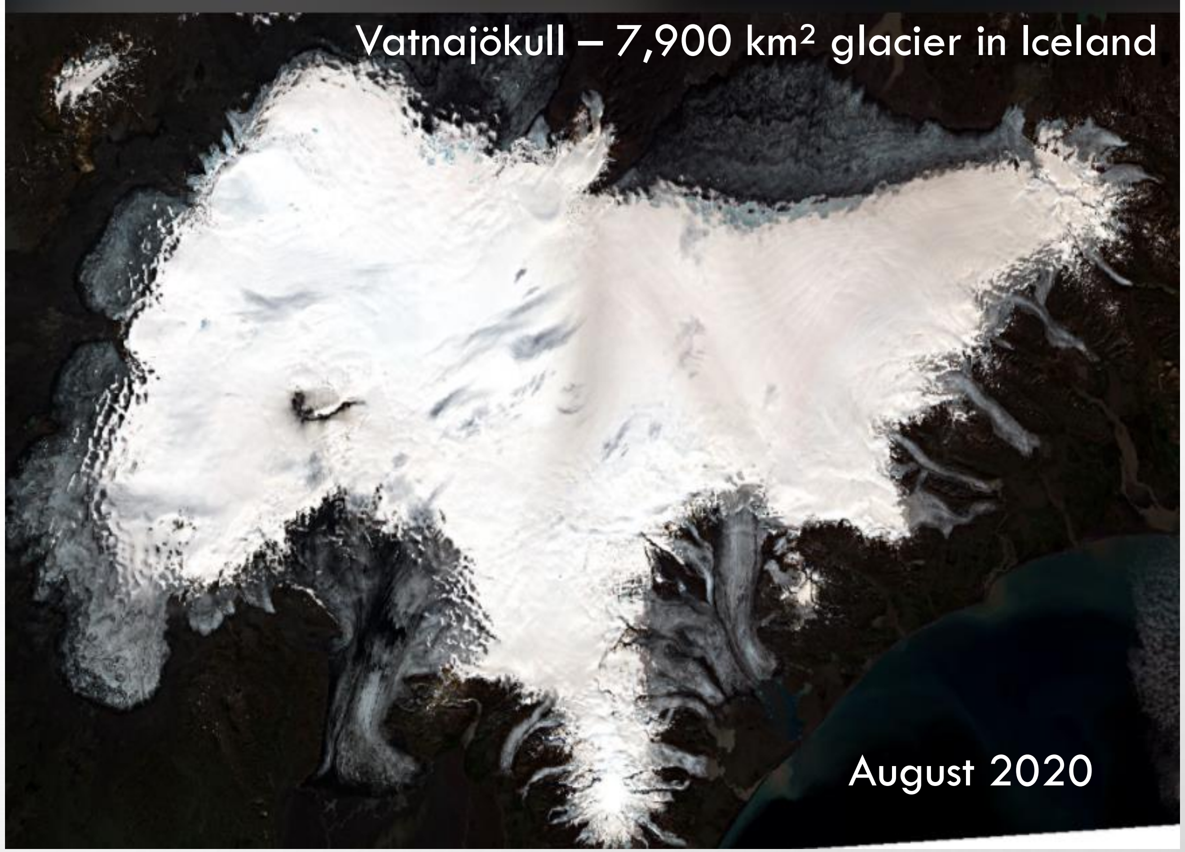
The Cryosphere
Open Access
EGU

Annual and inter-annual variability and trends of albedo of Icelandic glaciers

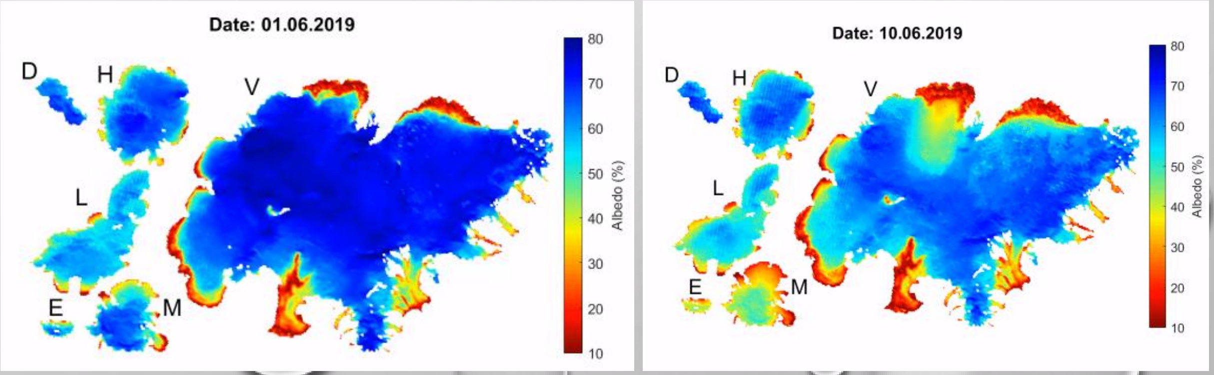
Andri Gunnarsson[1,4], Sigurdur M. Gardarsson[1], Finnur Pálsson[2], Tómas Jóhannesson[3], and Óli G. B. Sveinsson[4]



ure 9. Annual spatial patterns for melt season (MJJA) albedo anomalies for 2000–2019.



Severe albedo reduction due dust storms in June 2019



Courtesy of Andri Gunnarsson, IceDust, Landsvirkjun.

The Cryosphere, 9, 2323–2337, 2015
www.the-cryosphere.net/9/2323/2015/
doi:10.5194/tc-9-2323-2015

The Cryosphere

Soot on Snow experiment: bidirectional reflectance factor measurements of contaminated snow

J. I. Peltoniemi[1,2], M. Gritsevich[1,2,8], T. Hakala[1], P. Dagsson-Waldhauserová[5,6,7], Ó. Arnalds[6], K. Anttila[1,3], H.-R. Hannula[4], N. Kivekäs[3], H. Lihavainen[3], O. Meinander[3], J. Svensson[3,9], A. Virkkula[5], and G. de Leeuw[2,3]

Soot On Snow (SOS) 2013

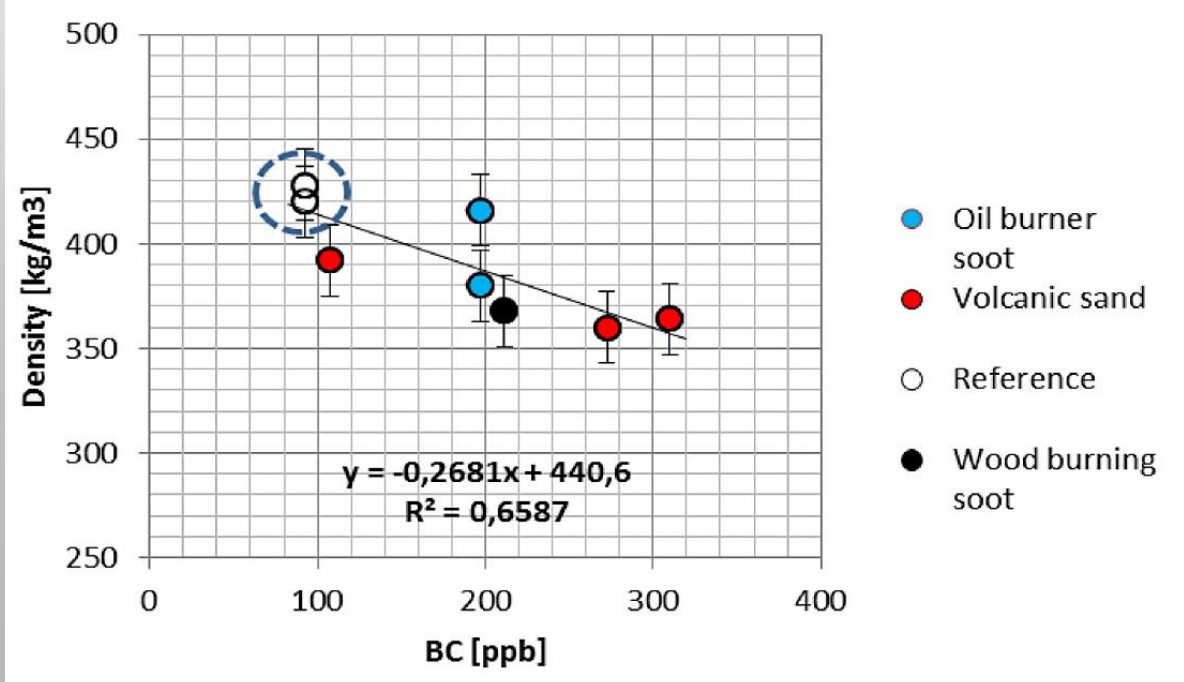
The Cryosphere, 8, 991–995, 2014
www.the-cryosphere.net/8/991/2014/
doi:10.5194/tc-8-991-2014

The Cryosphere

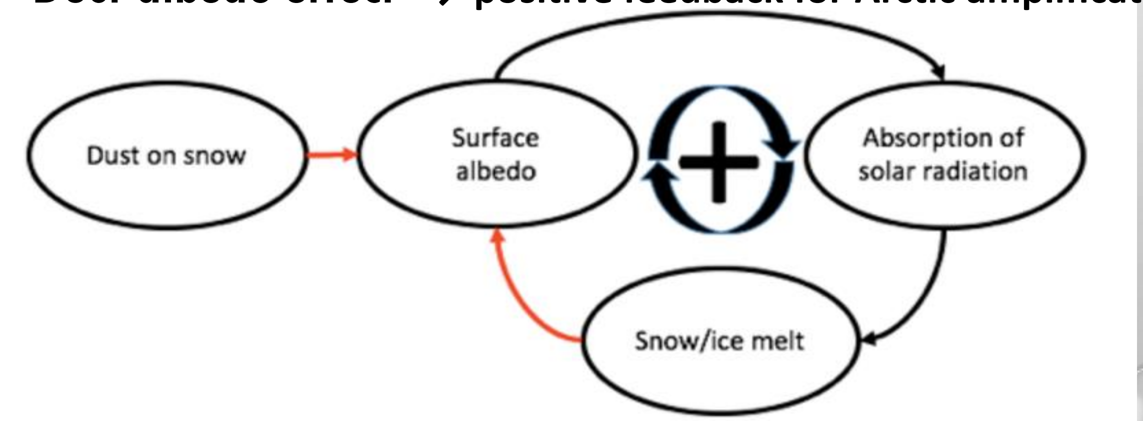
Brief communication: Light-absorbing impurities can reduce the density of melting snow

O. Meinander[1], A. Kontu[2], A. Virkkula[1], A. Arola[2], L. Backman[1], P. Dagsson-Waldhauserová[4,5], O. Järvinen[6], T. Manninen[1], J. Svensson[1], G. de Leeuw[1,6], and M. Leppäranta[6]

- VOLCANIC DUST DECREASES SNOW ALBEDO SIMILARLY **AS BLACK CARBON**
- SOOT DECREASES WATER RETENTION CAPACITY AND DENSITY OF SNOW



'Dust-albedo effect' → positive feedback for Arctic amplification



Atmos. Chem. Phys., 19, 2015–2061, 2019
https://doi.org/10.5194/acp-19-2015-2019

Atmospheric Chemistry and Physics

Interactions between the atmosphere, cryosphere, and ecosystems at northern high latitudes

Michael Boy[1], Erik S. Thomson[2], Juan-C. Acosta Navarro[3], Olafur Arnalds[4], Ekaterina Batchvarova[5,6], Jaana Bäck[7], Frank Berninger[7], Merete Bilde[8], Zoé Brasseur[1], Pavla Dagsson-Waldhauserova[4,9,10], Dimitri Castarède[2],

CONCLUSIONS

Icelandic Aerosol and Dust Association (IceDust)

Rykrannsóknafélag Íslands (RykÍS)

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Witnessed dust storm?

2 WEEKS AGO

Dust experts meet in Dyngjusandur to conduct the largest field campaign in Iceland

JANUARY 17, 2021

High Latitude Dust Workshop 2021

inDust

JANUARY 4, 2021

Dust Webinars 2021 – online by inDust

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Upcoming Dust Events

- **HLD Workshop 2022** February 15, 2022
- **HLD Workshop 2022** February 16, 2022

JUNE 25, 2020

The potential of Icelandic dust to affect the Arctic clouds

NOVEMBER 30, 2019

Workshop on Effects and Extremes of High Latitude Dust (HLD Workshop), Reykjavík,

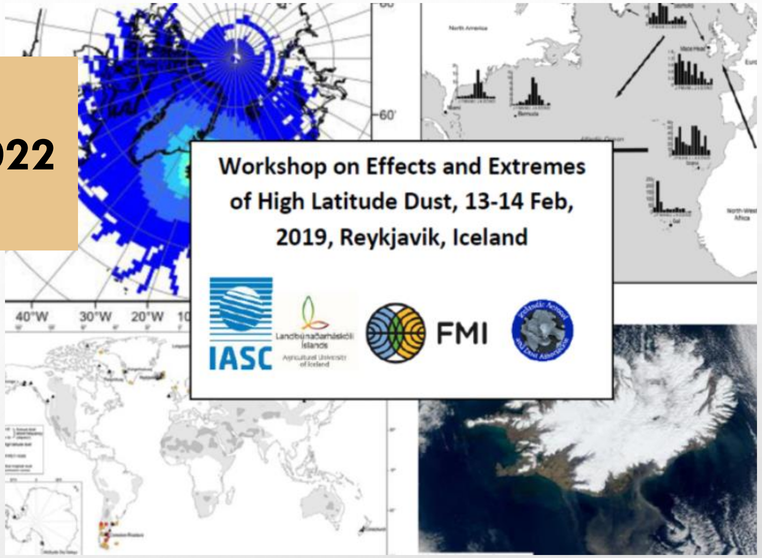
OCTOBER 4, 2019

Open call for travel grants to the Workshop on Effects and Extremes of High

HTTPS://ICEDUSTBLOG.WORDPRESS.COM/

Dust Storms in Iceland
Public Group

HLD Workshop VI
February 15-16 2022
Reykjavik



- 48 research institutions
- from 18 countries
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ITS3.12/AS2.10 EDI

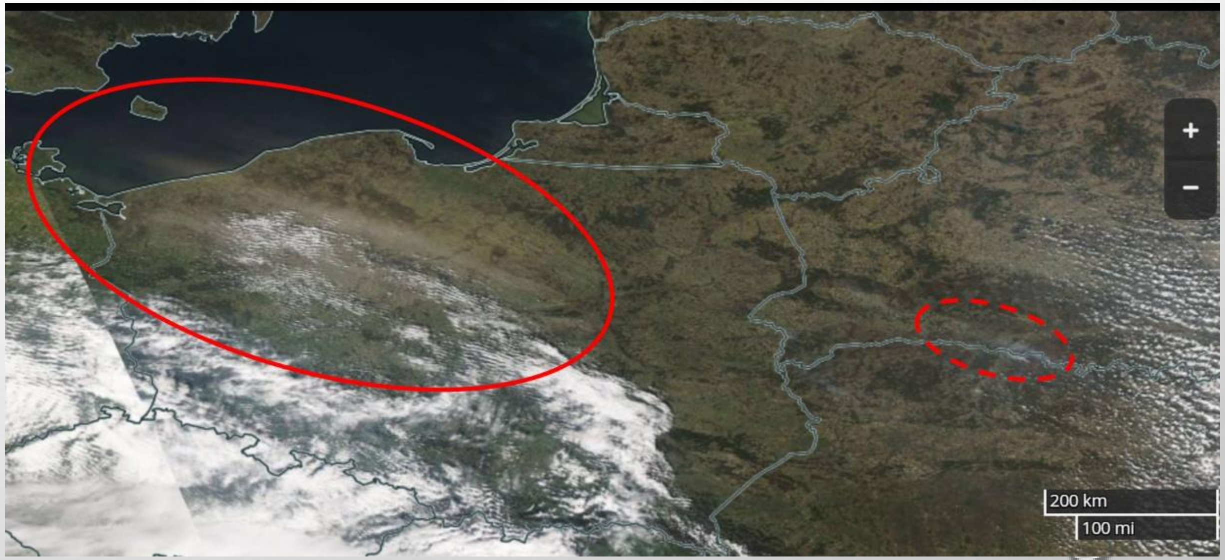
Atmosphere – Cryosphere interaction with focus on transport, deposition and effects of dust, black carbon, and other aerosols

Co-organized by BG3/CL4/CR7/NH1

Convener: Pavla Dagsson Waldhauserova[ECS] | Co-conveners: Biagio Di Mauro, Marie Dumont, Outi Meinander[ECS]

Dust storms from the agricultural fields in Central Europe

Poland – April 23rd 2019



Dyngjusandur, NE Iceland
= Bodele of the North
Waiting for the HLD
Thank you for your attention!
pavla@lbhi.is
Geldingadalur eruption, 19.3.2021