D2862 | EGU2020-19416

Present-day Saharan dust fluxes across the Atlantic Ocean

Jan-Berend Stuut, Catarina Guerreiro, Geert-Jan Brummer, Laura Korte, and Michèlle Van der Does

Present-day Saharan dust fluxes across the Atlantic Ocean

Jan-Berend Stuut

Catarina Guerreiro, Geert-Jan Brummer, Laura Korte, Michèlle v/d Does

NASA/TED

Dust: a global phenomenon

www.nioz.nl/dust

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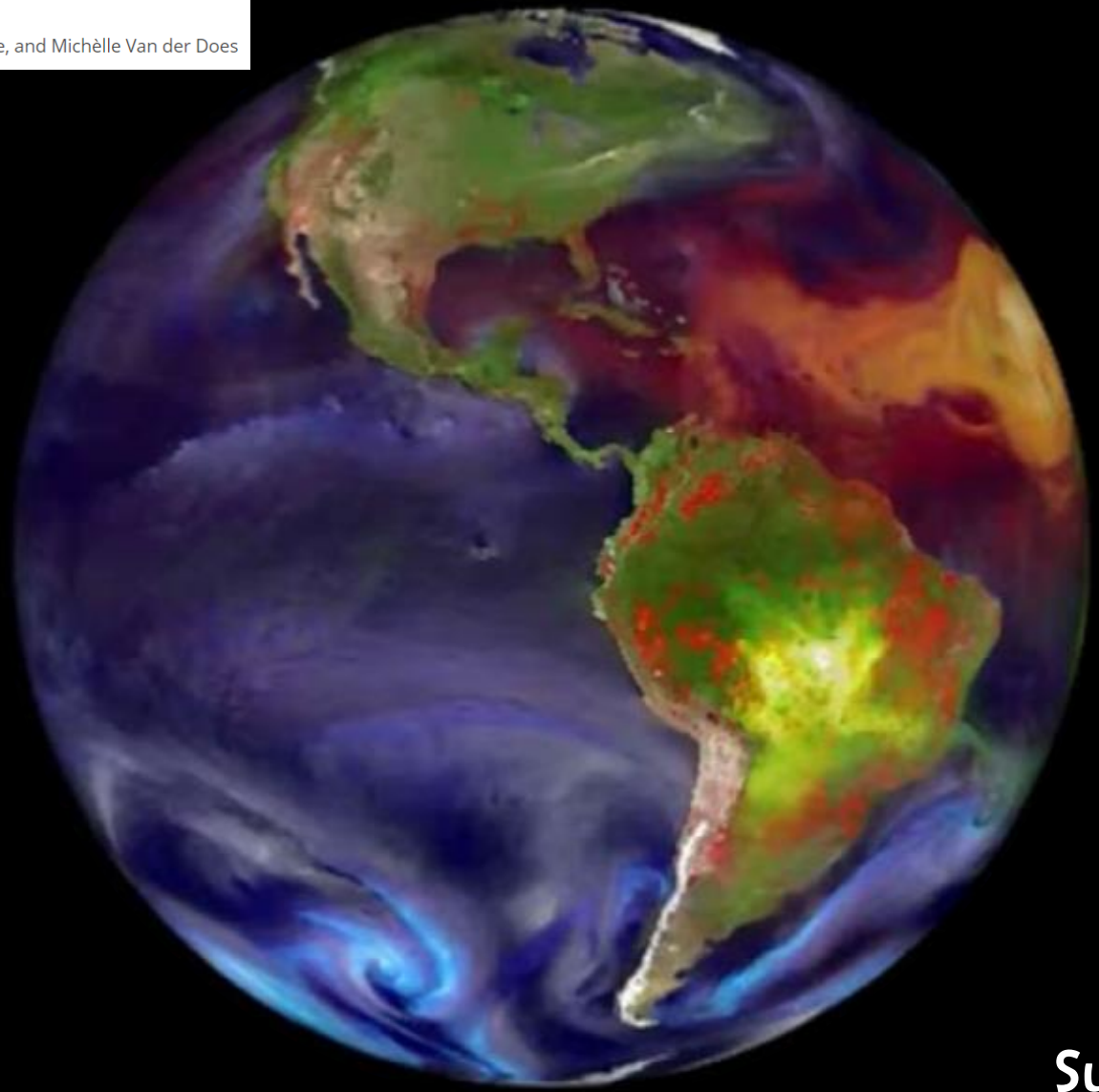
NASA/TED



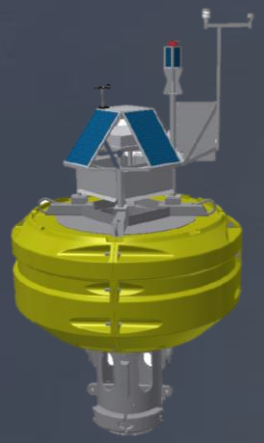
Mineral dust
Soot / Smoke
Salt (spray)
Sulfates (industry / volcanoes)

Mineral dust around the globe

www.nioz.nl/dust

Saharan dust from Source to Sink

- ☑ Submarine sediment trap
- ☑ 2-3 weeks
- ☑ @21°N: since 1988
- ☑ @12°N: 2012 - 2016



- ☑ Dust buoy
- ☑ 2-3 weeks
- ☑ 2013 - 2016

- ☑ MWAC
- ☑ 4 weeks
- ☑ since 2013

Saharan dust settling in the ocean

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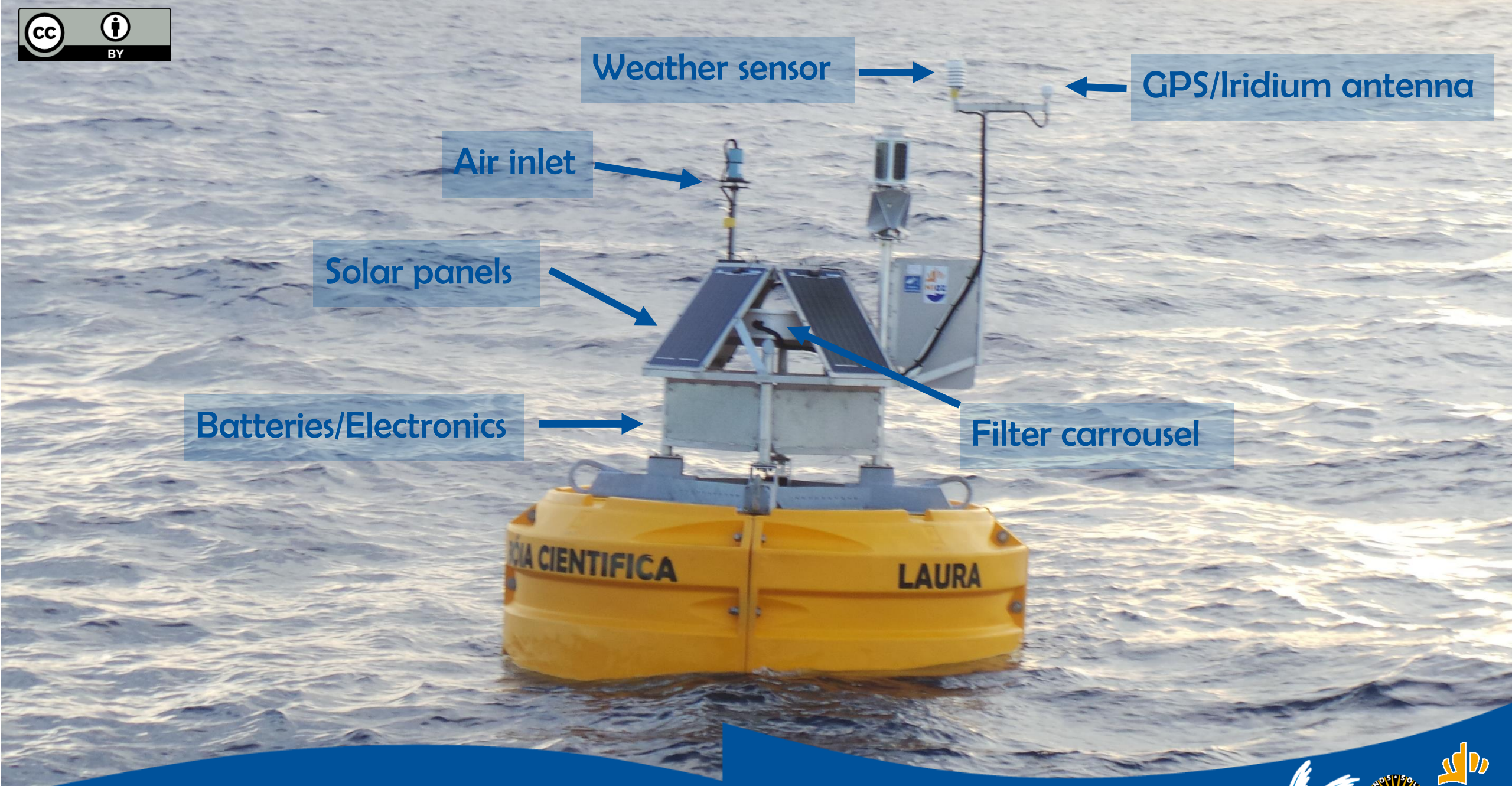
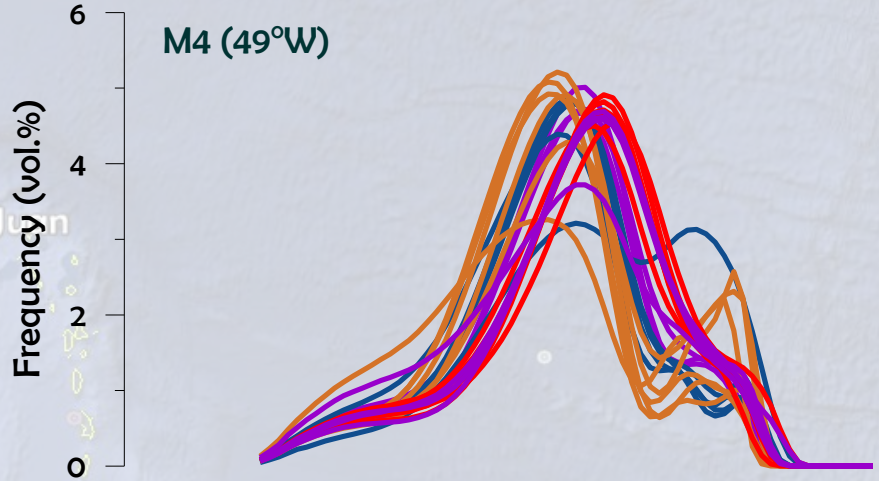
Dust collection at sea

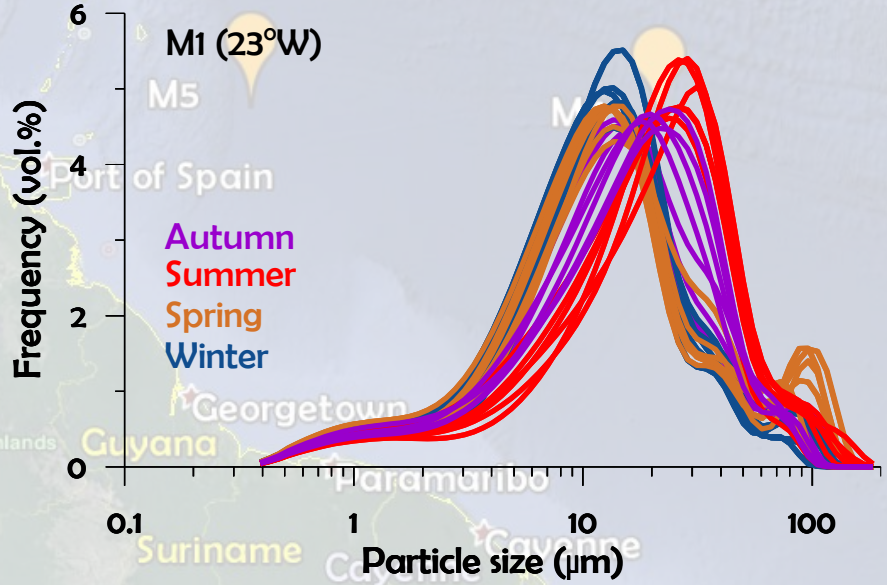
www.nioz.nl/dust

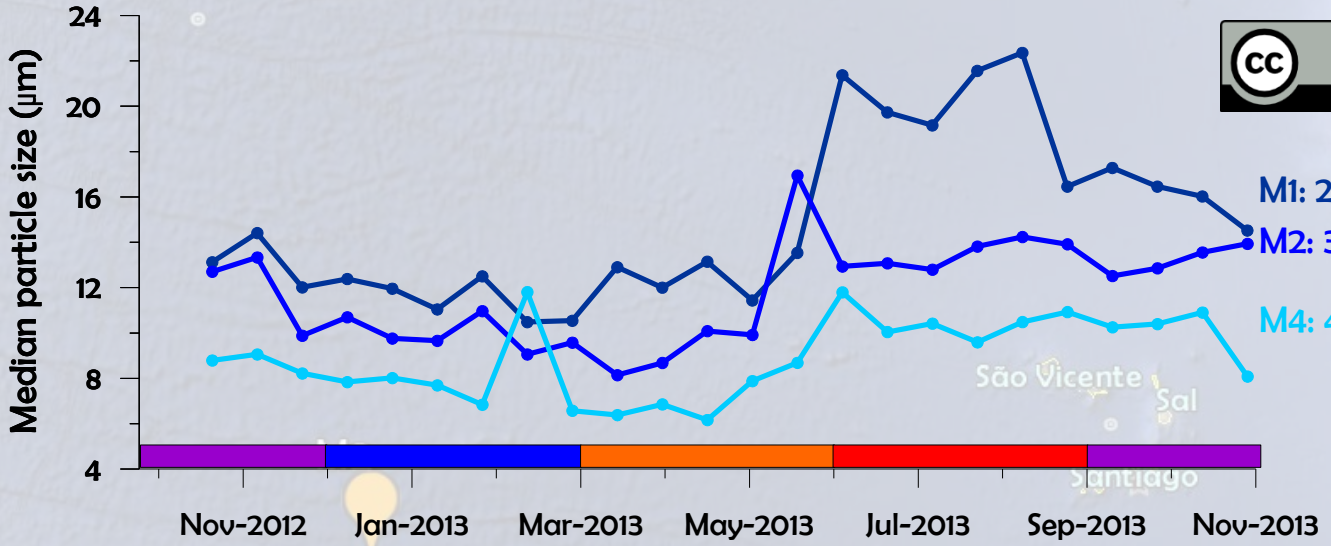


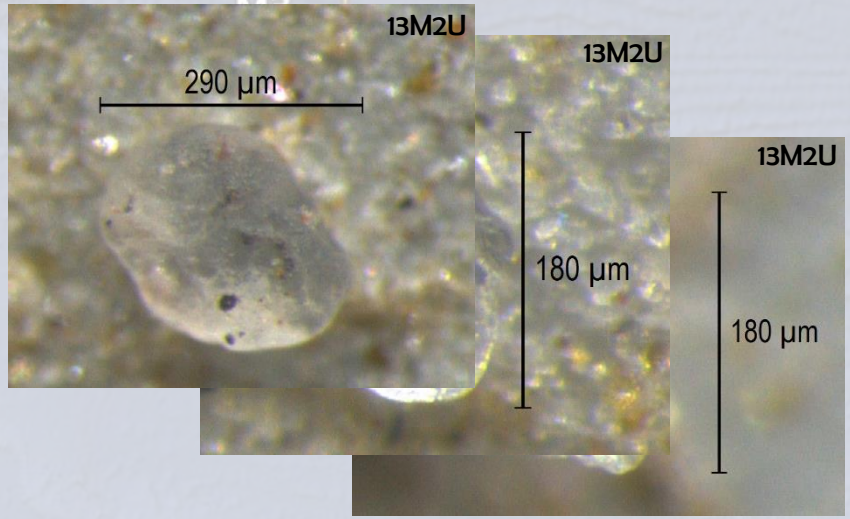
Dust collection at sea

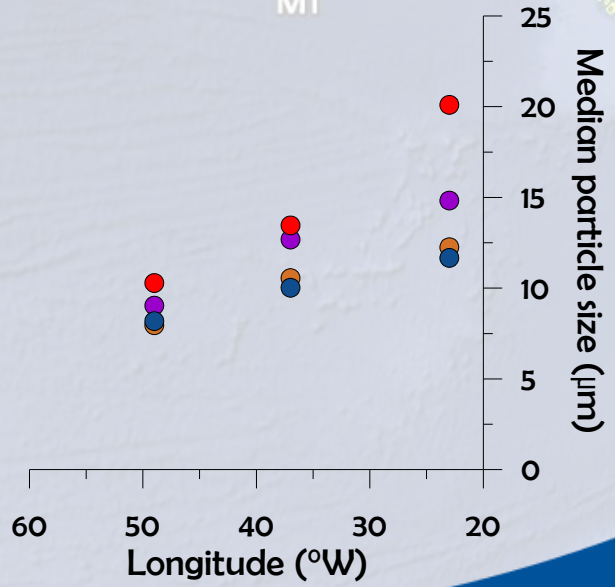
www.nioz.nl/dust











(Van der Does et al., 2016)

Sediment-trap results: particle size

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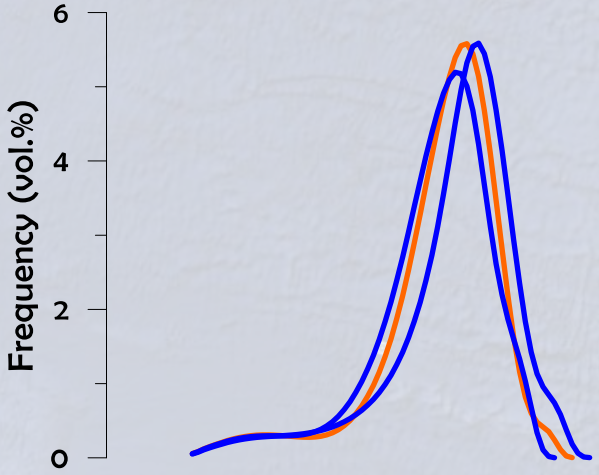
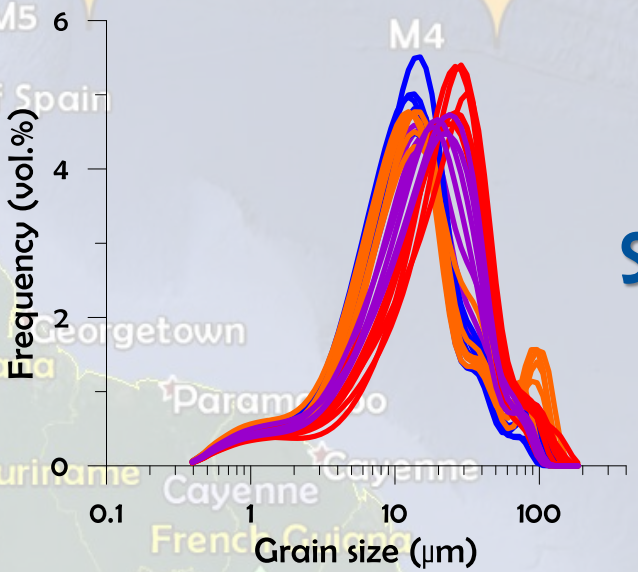


Buoy 17Laura (23°W)



Sediment trap 13M1 (23°W)

(Stuut et al., unpublished)

Dust particle size, *in situ*

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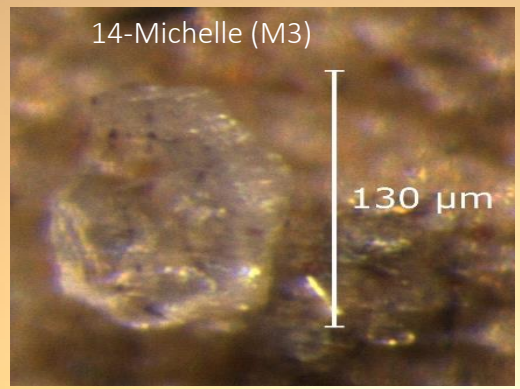
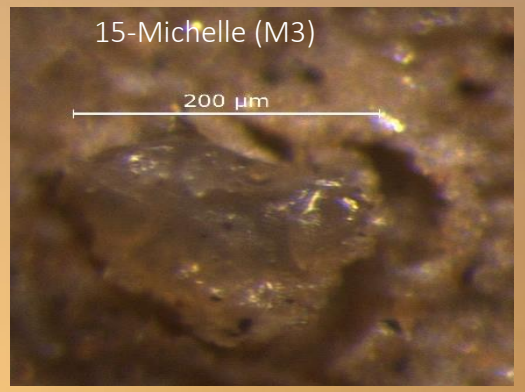
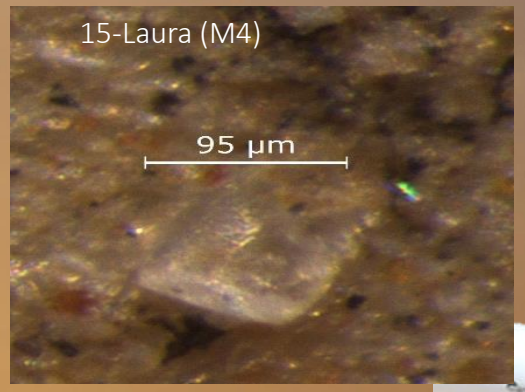
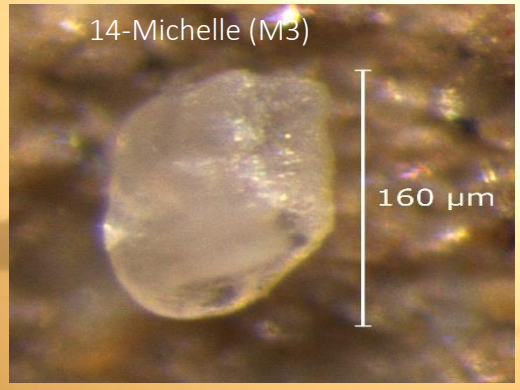
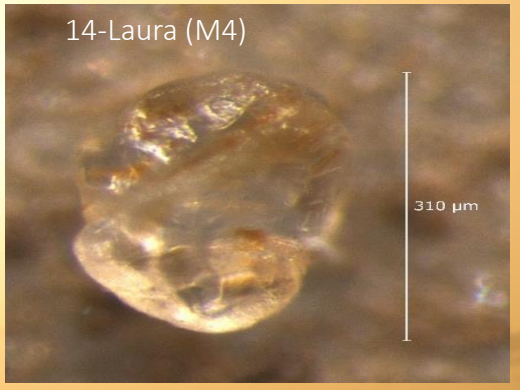
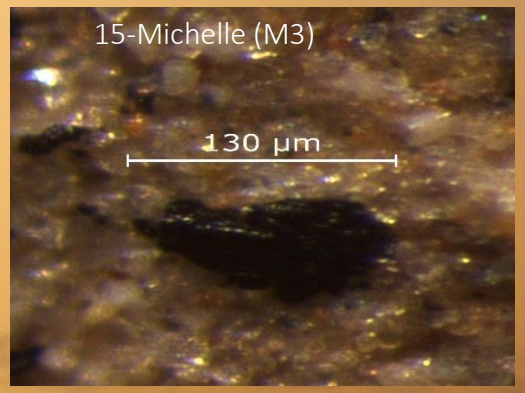


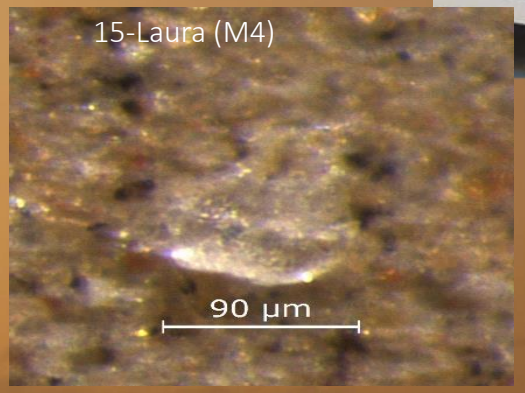


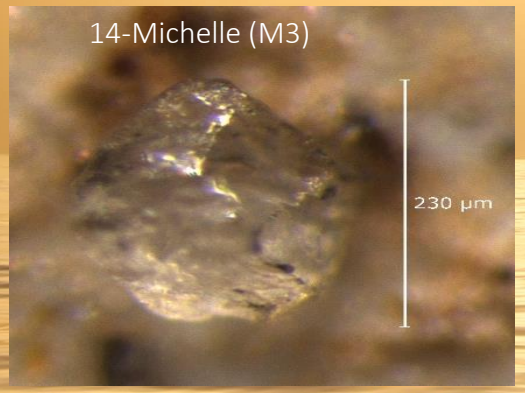


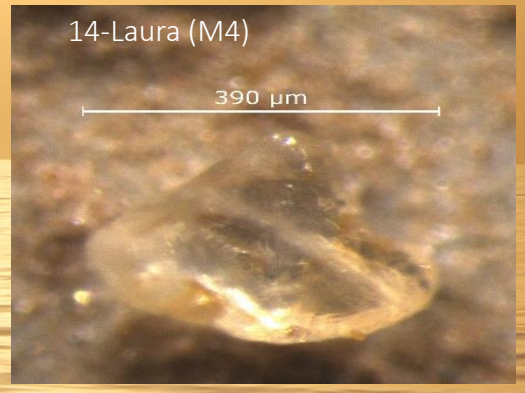


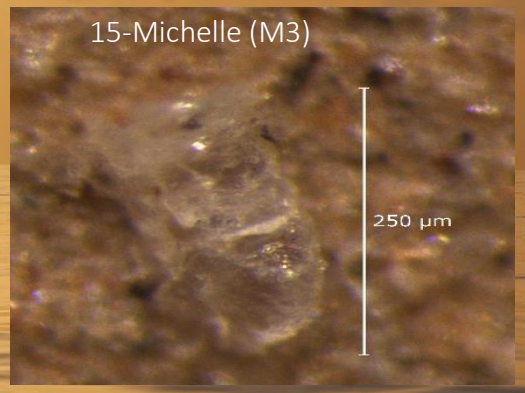


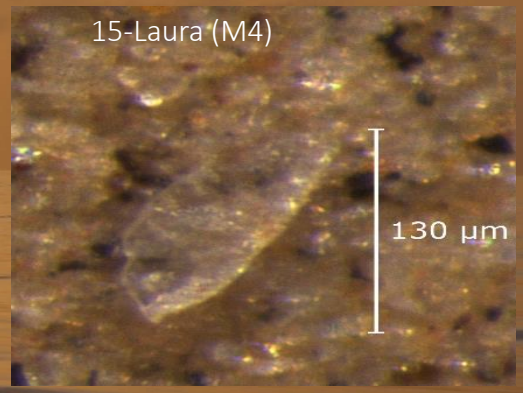








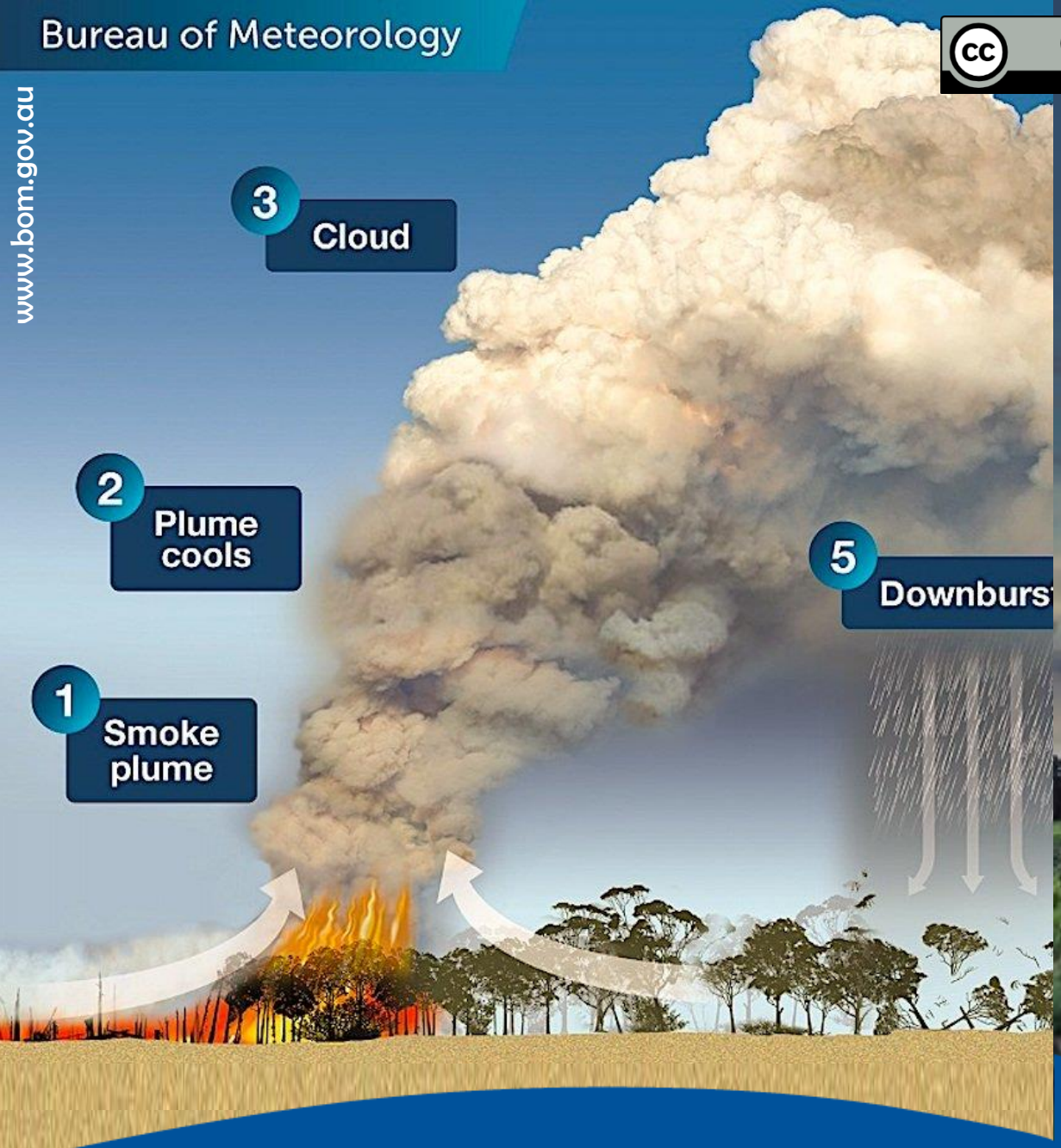




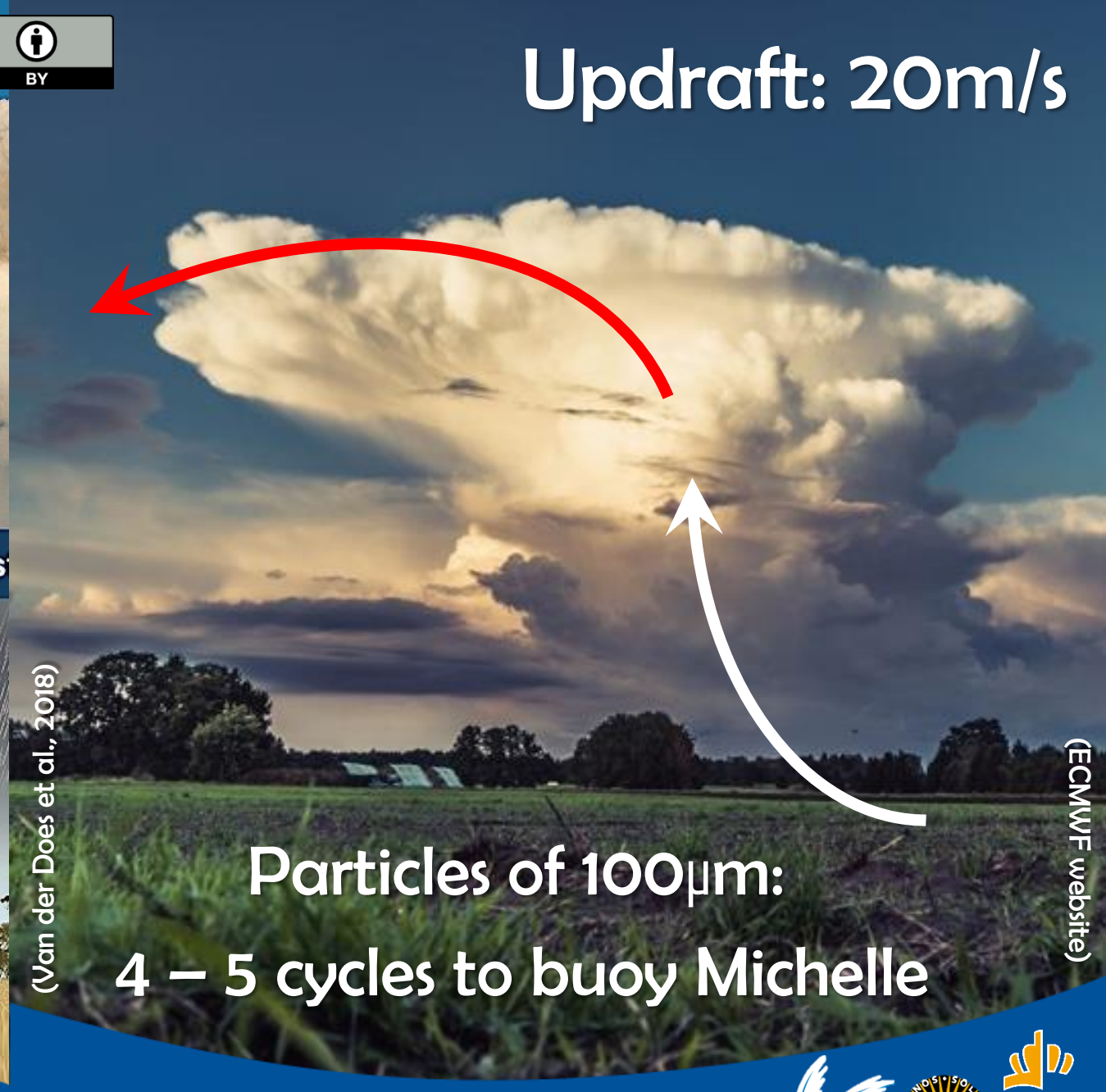
(Van der Does et al., 2018)

"Giant" particles collected by buoys

www.nioz.nl/dust



"Giant" particles collected by buoys



(Van der Does et al., 2018)

(ECMWF website)

www.nioz.nl/dust

(Nature news)

(Van der Does et al., 2018)

Mad Max science: tribo-electrification

www.nioz.nl/dust

How to transport giant aeolian particles:

1) Fast winds
2) Repeated uplift in convective clouds
3) Tribo-electrification
4) Combinations of the above

SCIENCE ADVANCES | RESEARCH ARTICLE

ATMOSPHERIC SCIENCE

The mysterious long-range transport of giant mineral dust particles

Michèlle van der Does[1]*, Peter Knippertz[2], Philipp Zschenderlein[2], R. Giles Harrison[3], Jan-Berend W. Stuut[1,4]

(Van der Does et al., 2018)

Giant particles blow 1000's km!

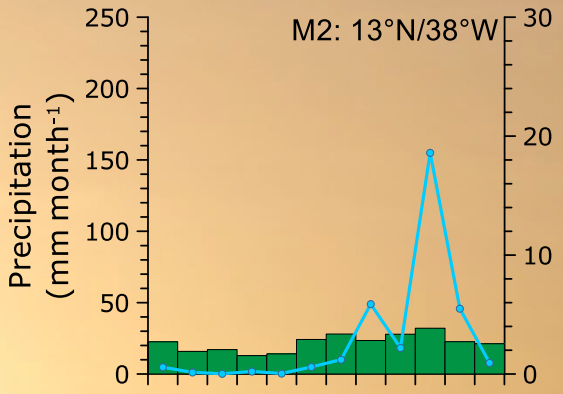
www.nioz.nl/dust

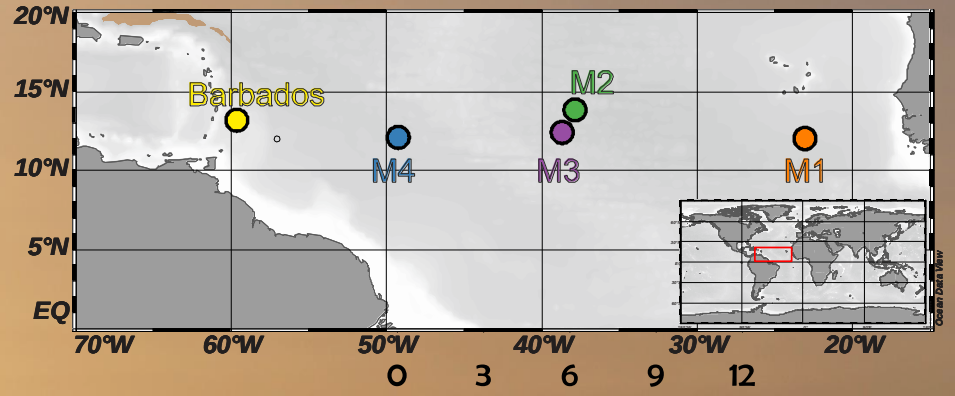
12 August

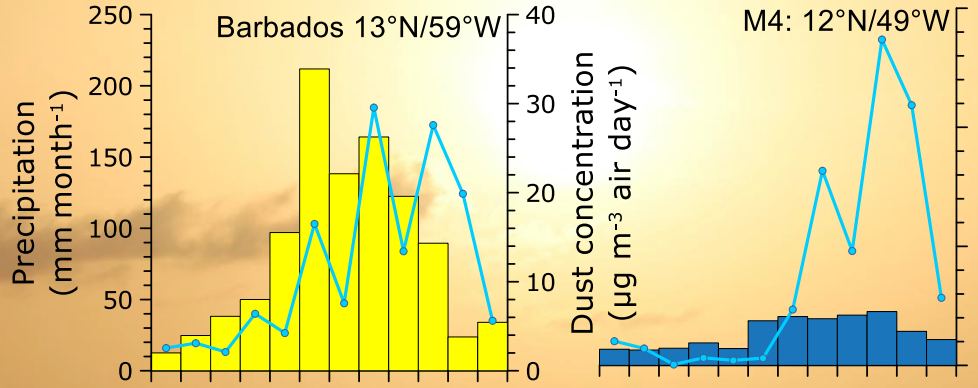
13 August : 0.85g/m²

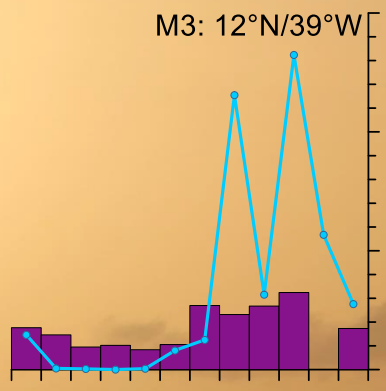
Dry & wet deposition

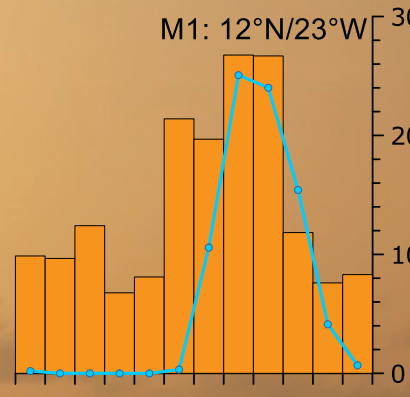
www.nioz.nl/dust



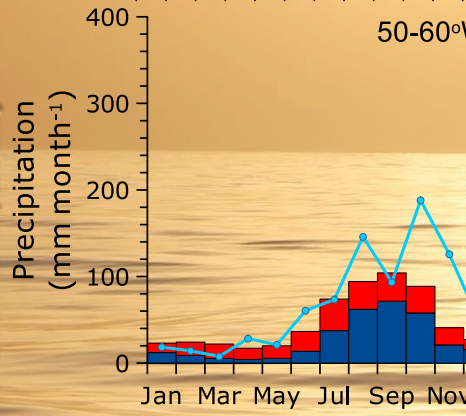


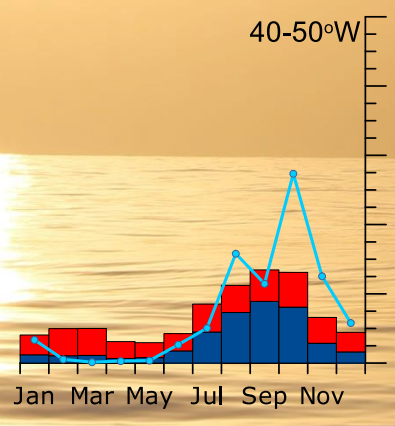


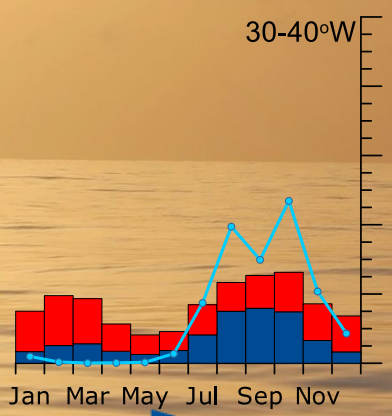


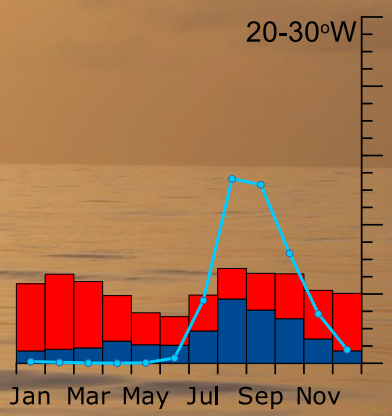


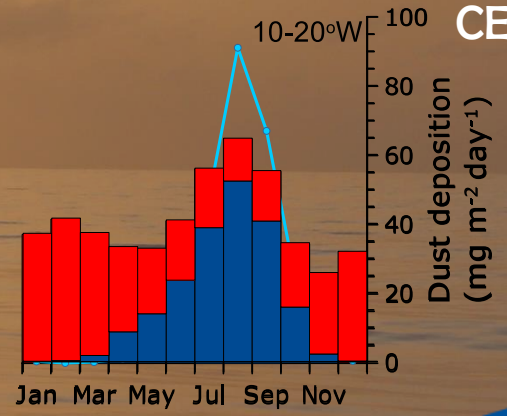
Traps











CESM

(Van der Does et al., 2020)

Dry & wet deposition: Traps vs CESM

www.nioz.nl/dust

Transatlantic study of Saharan dust:

- Large gradients across Atlantic Ocean / seasonal:
  - particle size
  - particle composition
  - particle deposition ('dry' vs 'wet')
- Significant occurrences of "giant" particles
- From East to West, dry fluxes decrease in favour of wet fluxes

See: www.nioz.nl/dust

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Present-day Saharan dust fluxes across the Atlantic Ocean

Jan-Berend Stuut, Catarina Guerreiro, Geert-Jan Brummer, Laura Korte, and Michèlle Van der Does

Geophysical Research Letters

RESEARCH LETTER
10.1029/2019GL086867

Key Points:
- Dust deposition fluxes collected while settling in the tropical North Atlantic show highest dust deposition in summer and autumn

Tropical Rains Controlling Deposition of Saharan Dust Across the North Atlantic Ocean

Michèlle van der Does[1,2], Geert-Jan A. Brummer[1,3], Fleur C. J. van Crimpen[1,4], Laura F. Korte[1], Natalie M. Mahowald[5], Ute Merkel[6], Hongbin Yu[7], Paquita Zuidema[8], and Jan-Berend W. Stuut[1,3,6]

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Atmos. Chem. Phys., 16, 13697–13710, 2016
www.atmos-chem-phys.net/16/13697/2016/
doi:10.5194/acp-16-13697-2016

Atmospheric Chemistry and Physics
Open Access
EGU

Particle size traces modern Saharan dust transport and deposition across the equatorial North Atlantic

Michèlle van der Does[1], Laura F. Korte[1], Chris I. Munday[1], Geert-Jan A. Brummer[1,2], and Jan-Berend W. Stuut[1,3]

Cited papers

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#welstoffignietsaai