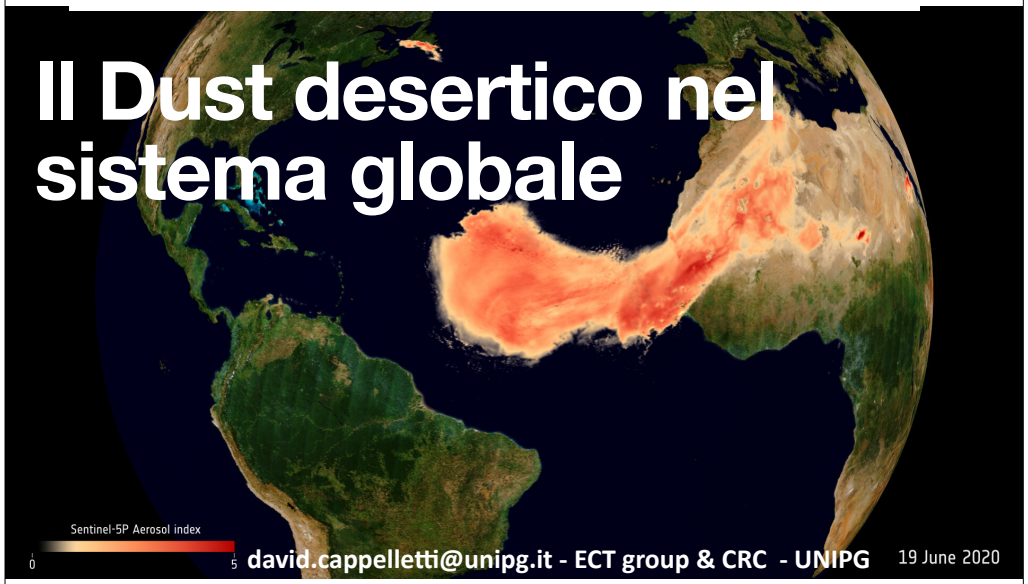
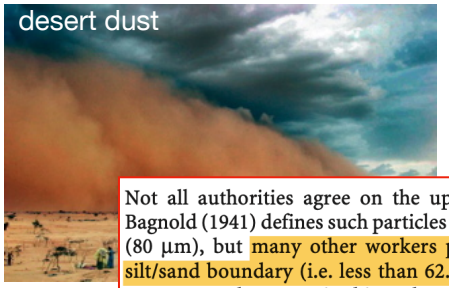
Il Dust desertico nel sistema globale

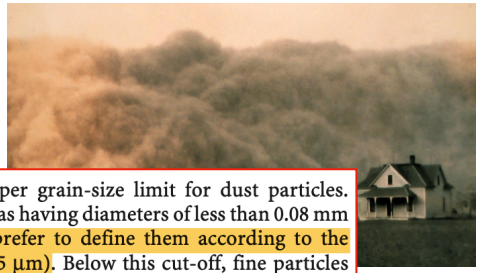


david.cappelletti@unipg.it - ECT group & CRC - UNIPG

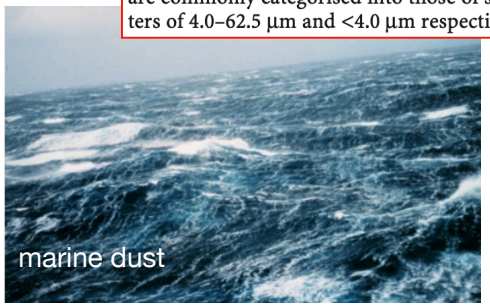
19 June 2020

What we talk about when we talk about dust?

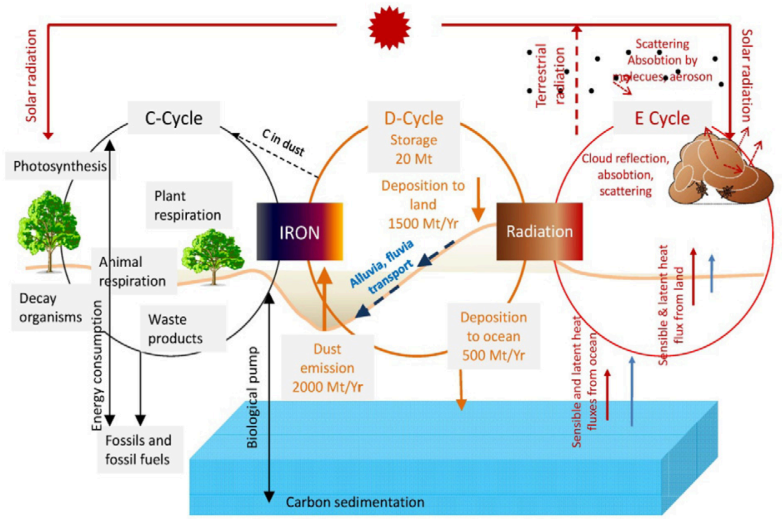




Not all authorities agree on the upper grain-size limit for dust particles. Bagnold (1941) defines such particles as having diameters of less than 0.08 mm (80 µm), but many other workers prefer to define them according to the silt/sand boundary (i.e. less than 62.5 µm). Below this cut-off, fine particles are commonly categorised into those of silt and clay sizes, with grain diameters of 4.0–62.5 µm and <4.0 µm respectively (Wentworth 1922).

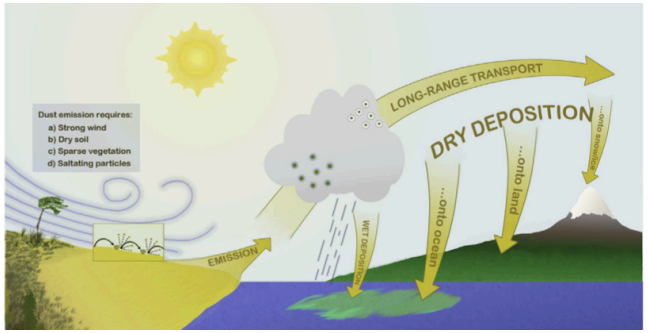


the global dust cycle

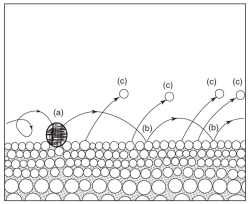


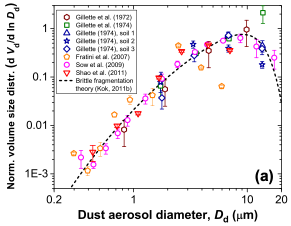
adapted from Shao et al. 2011

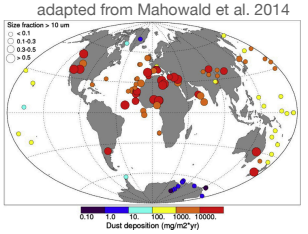
Size distribution and impacts



adapted from Mahowald et al. 2014

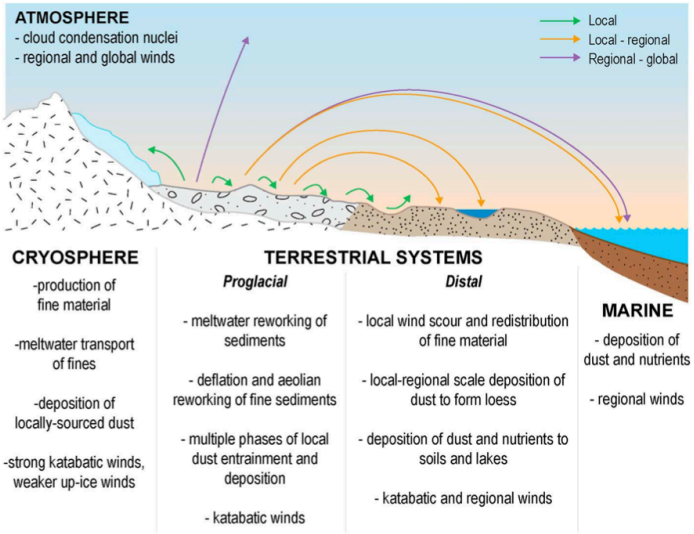




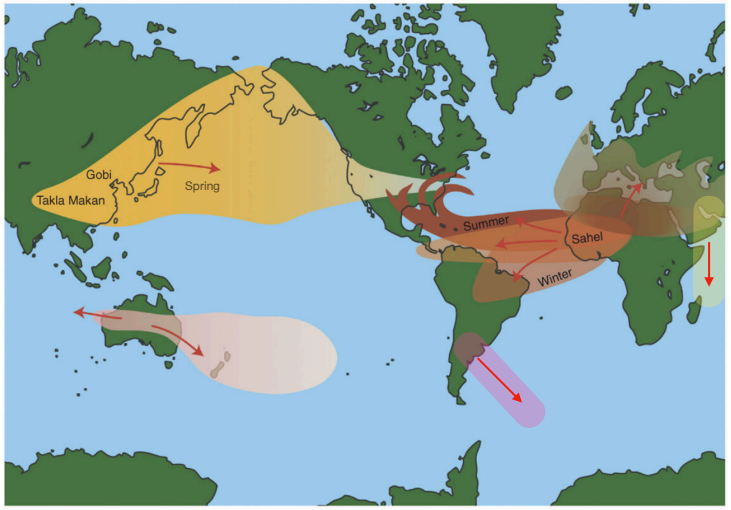


BUT ...neglect of mineral particles with diameters larger than 20 μm under the erroneous assumption that they deposit quickly after their emission. (see i.e. Drakaki ACP 2022)

High latitude dust (HLD)

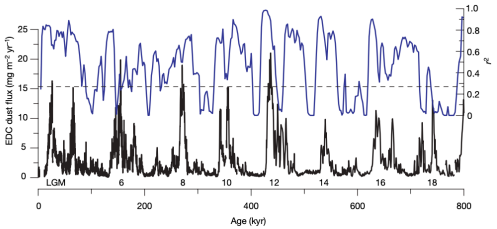


Dust transport patterns



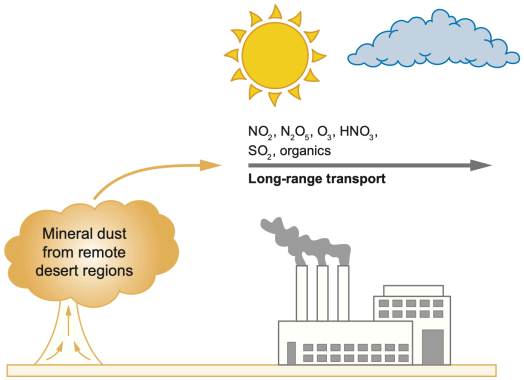
adapted from Kellog et al. 2006

Dust and climate

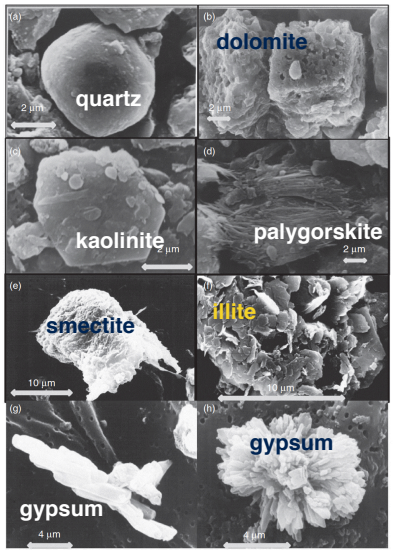


adapted from Lambert et al. 2008

Chemistry and photochemistry of mineral dust



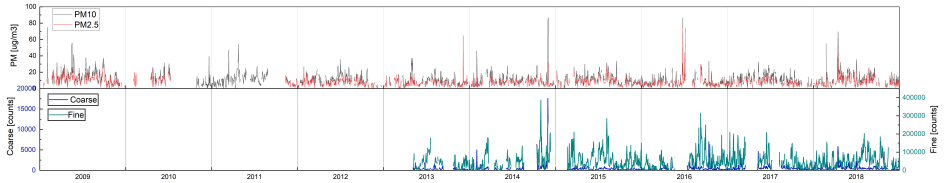
- role of RH
- O_3
- HONO
- Fe solubility



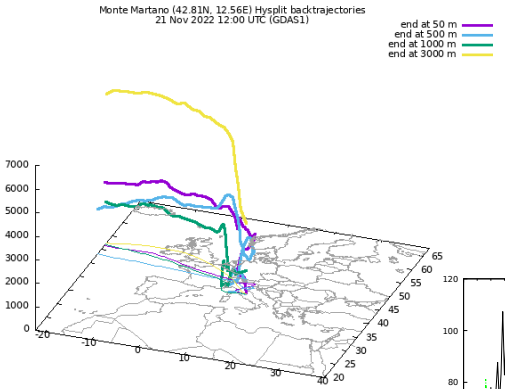
adapted from Grassian 2008

Dust research at Monte Martano

SDS-WAS since 2013; EMEP since 2018

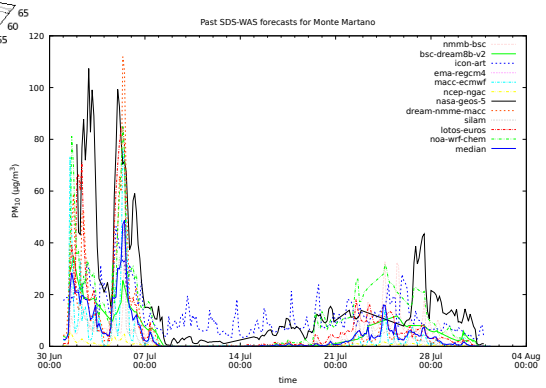


Forecast and alert at MM

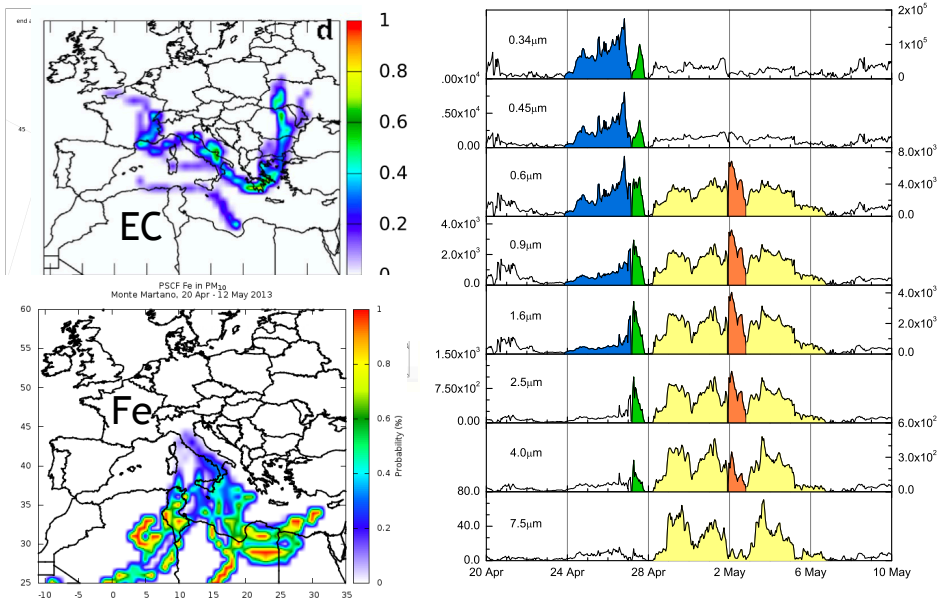


BT

CTM

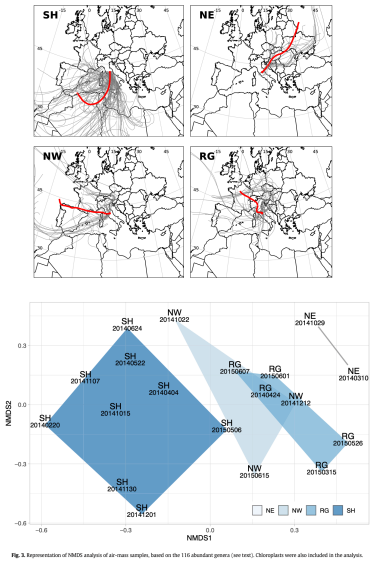


BB & dust event

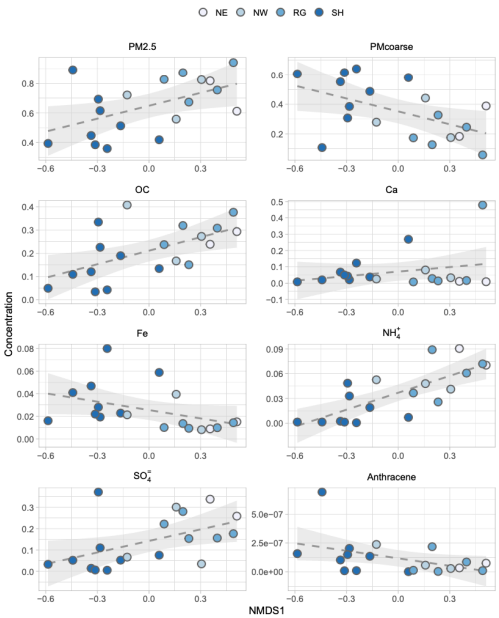


adapted from Petroselli et al. Atm. Res. 2018

Dust, chemistry and bacteria



adapted from Petroselli et al. STOTENV 2021



Health effects

Increased associations with mortality of PM_{10} have been observed during Saharan dust

- respiratory problems
- cardiovascular complaints
- meningococcal meningitis
- conjunctivitis
- skin irritation
- deaths and injuries associated with transport accidents

- high concentrations
- mixing with anthropogenic pollutants
- mixing with bioaerosol
- thinning of PBL

- forecast and alert system (health and air quality)

adapted from Pandolfi 2014; Querol 2019