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Meridional Saharan dust transport towards higher latitudes

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Over the past decades, an increasing number of Saharan dust storm events have been identified across Europe, using satellite measurements and imagery, numerical simulation data, meteorological analyses, air mass dispersion trajectories and surface observations, thus excluding subjective forcing factors. Both the frequency and intensity of dust storm events have been increasing over the last decade.
Saharan dust reached the Carpathian Basin at least 250 times between 1979 and 2022. The episodes of intense dust deposition in Hungary clearly showed the effect of the downwelling of high-latitude jet streams, leading to (1) extreme weather events and intense dust storms in the Atlas region and (2) increased atmospheric meridionality, which transported the large amounts of dust northwards.
To identify such events, we started our research in the North Atlantic region, where we identified 15 Saharan dust storm events in Iceland between 2008 and 2020, two of which were also surface sampled. The scope of these studies has now been extended to 1980 to 2022 to identify further events. Laboratory analyses of the sampled dust material have found abundant quartz particles larger than 100 μm, indicating that large dust particles can sometimes travel thousands of kilometres.
Similar studies have been initiated in the region of Finland, where 59 Saharan dust storm events were identified between 1980 and 2022. Note that we also found 22 dust storm events from the Aral-Caspian region and 5 episodes with Middle Eastern sources.
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