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New insights in the analysis of the millennial scale dust variability and an integrated scheme of its recording in the Northern hemisphere ice and terrestrial records.

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The last glacial period (110 – 15 ka) has been marked by millennial scale climate variations, the trigger of which is still under debate. Such variations have been recorded in marine, ice and continental records over most of the world, but especially in the Northern Hemisphere. We first investigate the high-resolution δ18O and dust records from Greenland ice, indicating important variations in the respective moisture and dust source areas. We show that the dust concentration decrease associated with the Dansgaard-Oeschger (DO) warming events 17 to 2 happened on average within about 50 years, and that δ18O reached peak DO interstadial values faster than dust, suggesting a lag in the continental response to the abrupt warming. The individual analyzed interstadial phases lasted between 200 and 4200 years. In European eolian sequences, the different duration of the interstadials is expressed by different types of paleosols observed along a west-east transect at 50° latitude North. Discussing the paleodust cycle variations during the last climate cycle, we propose a link between European loess sequences, Chinese ones, dust records in Greenland and the variations of the North Atlantic sea ice extent and surface temperature. Changes in the dust sources are discussed (present-day deserts, but also emerged continental shelves due to sea-level lowering, dried river beds, glaciogenic dust sources along the ice-sheet edges, areas exposed to eolian erosion due to a scarce vegetation in cold climate conditions), as well as in the transport pathways in the stadial versus interstadial phases.