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# Summer insolation is the primary driver for orbital-scale dust storm variability in East Asia

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Eolian dust plays an important role in the global climate system through its influence on radiation, albedo and precipitation properties, and through delivering micronutrients like iron to the oceans. Glacial periods of Earth's climate are recognized to be dustier than interglacials, but the conditions leading to greater dust mobilization are poorly defined. We present a high-resolution dust flux record based on $^{230}$Th-normalised $^{4}$He flux from Ocean Drilling Program (ODP) site 882 in the Subarctic North Pacific covering the last 170,000 years. Today, dust storms in the vast dry regions of East Asia are almost exclusively springtime phenomena, due to a specific set of climate conditions driven by the seasonal evolution of the meridional temperature gradient between high and low latitudes. The dust flux record points to high dust storm activity in East Asia during cold periods, with highest dust flux during Marine Isotope Stages 4 and 5d. We interpret periods of higher dust supply as the result of an expansion of the dust season into the summer, primarily controlled by reduced summer insolation at high latitudes and resulting lower air temperatures in Siberia over orbital timescales. Changes in the extent of the large Northern Hemisphere ice sheets in North America and Fennoscandinavia, and atmospheric teleconnections, act as a secondary control. On millennial timescales, the occurrence of Heinrich Stadials 1 and 11 signals during the last two terminations in Subarctic North Pacific dust records indicates that dust flux variability over millennial timescales was influenced by climate changes in the North Atlantic.