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Spatial distribution and Timing of Dust-Induced CO_2 Drawdown during the Last Termination

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Mineral dust aerosols in the atmosphere are thought to impact on Earth's climate system directly by absorbing and scattering electromagnetic radiation, and indirectly by acting as cloud nuclei and by influencing biogeochemical cycles through micronutrient fertilization of the biosphere. Iron fertilization of the world's High Nutrient Low Chlorophyl (HNLC) oceanic regions through increased dust deposition during glacial times has been linked to the lower atmospheric pCO_2 levels during the Last Glacial Maximum (LGM), 21 ka ago. According to the latest estimates, of the 80-100 ppm difference in atmospheric CO_2 concentration between average Holocene and LGM climates, about 40 are due to ocean stratification, 20 to iron fertilization, and 30 to other effects like ocean salinity and temperature, terrestrial biomass, etc. Using a biogeochemistry EMIC with focus on the carbon cycle, we estimate the contribution of the main global dust sources (North and South America, Oceania, Central and East Asia, Sahara, South Africa) to the total iron fertilization effect. We also determine the timing of each region's dust contribution during the last glacial termination.