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The atmospheric fingerprints of Dansgaard-Oeschger and Heinrich Events

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The discovery of rapid changes in well-mixed atmospheric gases associated with Dansgaard-Oeschger (D-O) events played an important role in establishing their global significance. Building on the legacy of Hans Oeschger, three decades of increasingly detailed ice core data from many groups provide important, though still incomplete, fingerprints of the impacts of both D-O events and Heinrich events on global biogeochemical cycles. Combining existing and new data on methane, carbon dioxide, nitrous oxide and atmospheric oxygen reveals large perturbations of tropical hydroclimate during both types of event. New data have implications for when Heinrich events occurred during Greenland stadials, how long the influence lasted, and the sequence of impacts on terrestrial and ocean carbon and oxygen cycles. They also lead to questions about what modes of climate variability are perturbed by these events, and lessons for future changes in both the tropics and high latitudes.