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Past Greenland Ice Sheet Responses to Climate Change

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Deep ice cores from the Greenland ice sheet are providing an ever expanding set of records of past Greenland climatic conditions throughout the last glacial-interglacial cycle. Stable water isotope records from the ice cores have been influenced both by changing climatic conditions and by any elevation change that has happened at the ice core drill site. Comparing the stable water isotope records from the Greenland ice cores to records obtained from small topographically well constrained ice caps in the region, the height evolution of the Greenland ice sheet can be constrained. The combined height and climatic evidence gives the unique opportunity to study how the Greenland ice sheet responded to climate change during the past. A picture of a dynamic Greenland ice sheet shrinking and expanding in direct response to changing climatic conditions is now emerging. Indeed the glacial Greenland ice sheet must have covered vast areas that are now ice free: Expanding far out on the continental shelf and forming an ice ridge all the way to the Canadian high Arctic.