Abrupt Climate Change and WAIS

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The concept of abrupt climate change has expanded greatly from its roots in North Atlantic circulation changes. Humans tend to focus most on how environmental change will affect us, our health and happiness, and how they are supported by economies and ecosystems. We build for the world we have, so at least in the short term most changes tend to be costly, but we are relatively skilled at adapting to sufficiently slow environmental changes that we see coming. Fast and unforeseen changes are thus especially damaging. Such abrupt changes can be caused by abrupt forcing—a meteorite impact or explosive volcanic eruption, for example. Or, slow changes in the physical environment can cross a threshold that triggers abrupt physical change, such as increasing meltwater into the North Atlantic triggering a "shutdown" with great extension of wintertime sea ice, leading to changes around the globe. But, even in the absence of abrupt physical thresholds, slow climate change may push ecosystems or economies or parts of the built environment across thresholds—either a storm surge will overtop a levee in New Orleans or the entrance to the New York subway system, or it won't, and the sea-level rise since the last design changes may be really important.

WAIS continues to play a major role in understanding and projecting abrupt changes. The paleoclimatic results from the WAIS Divide core and other studies are revealing key details of the ice-age events once viewed through a primarily North Atlantic lens. The real potential for large, rapid and difficult-to-predict sea-level rise from WAIS changes, shown through history, ongoing changes, physics and models, presents major challenges on multiple levels, with WAIS the most-likely source of any abrupt sea-level rise. Additional issues motivate continued vigorous research and communications efforts.