that were imprinted on the seafloor, much like traces left behind at a crime scene. Taken together, these suggest that when Lake Agassiz-Ojibway ended in a catastrophic outburst, the water made its way underneath the damming Laurentide Ice Sheet to the Tyrell Sea — the prehistoric sea occupying Hudson Bay at this time.

It is not that the morphology of the Hudson Bay seafloor was unknown⁴, but the multibeam data provide a new level of detail. And the inferred subglacial flood is compatible with one model experiment that suggested a complex multiple flooding scenario³. Such a scenario is also supported by additional sediment core studies².

But what causes an ice-dammed lake to burst underneath a huge ice sheet? As long as the damming ice sheet is thicker than the lake is deep, there is little risk of an outburst. Cracks in the ice can even become sealed if the pressure from the overlying ice is higher than the pressure from the water in the dammed glacial lake³. However, as the climate becomes warmer, the ice sheet shrinks and the lake expands. The self-stabilization mechanisms fail as water pressure approaches the pressure of the damming ice sheet. Lajeunesse and St-Onge point out that the break point

occurs when the lake levels are about 90% of the ice thickness. At that point, the lake water is not held back by the dam any longer and may eventually lift the ice dam up like a giant iceberg: catastrophic flooding is unavoidable.

This type of flooding scenario is evident from the seafloor morphology of Hudson Bay². The flooding lake water from Lake Agassiz-Ojibway interacted with the bottom and generated sandwaves while squeezing its way underneath the ice sheet with high velocities (Fig. 1). Without the overlying ice sheet constraining the water passage, Lajeunesse and St-Onge point out that it is difficult to create sandwaves over such an extensive and relatively flat area as the southern Hudson Bay. The multibeam images show another critical detail: the sandwaves are not cross cut by the characteristic curved or arc-shaped features resulting from scouring of the seafloor by icebergs. This scour zone is mapped northward of the sandwaves (Fig. 1), suggesting that it was the ice sheet margin distal to the dammed Lake Agassiz that collapsed and disintegrated first in response to the flooding.

The staggering amount of cold freshwater bursting into the North Atlantic Ocean could have affected ocean circulation

and triggered the climate cooling event 8,200 years ago⁶. But climate may not only have been affected by the disturbance of the North Atlantic ocean. Large ice-dammed lakes act as regional climate 'coolers' during summer and thereby reduce ice melting⁶, and have been shown to stabilize their damming ice sheets. Therefore, even though the final outburst probably triggered the cooling event 8,200 years ago, the disappearance of Lake Agassiz-Ojibway may nevertheless have accelerated the final disintegration of the Laurentide Ice Sheet.

More extensive multibeam mapping of Hudson Bay similar to those presented by Lajeunesse and St-Onge may further constrain the final stampede of Lake Agassiz-Ojibway and provide refined boundary conditions for modelling the outburst. This, in turn, is the key to deciphering how the outburst could trigger a global cooling event.

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CLIMATE SCIENCE

Predicting dry lands

Cacti and tumble weeds have long been the photogenic icons of dry desert climates, far removed from the lush green areas many call home. But more-frequent extended periods of drought are one of the most worrying potential impacts of anthropogenic climate change. Will increasing greenhouse gases mean that these prickly plants will soon replace our forests and gardens?

After analysing simulations from eight climate models that formed the basis of the Fourth Assessment Report of the Intergovernmental Panel of Climate Change, Justin Sheffield and Eric Wood of Princeton University, USA, suggest that it may be some time before greenhouse-gas-related changes in drought will stand out against the noisy climate background of the past decades (*Clim. Dyn.* doi:10.1007/s00382-007-0340-z; 2008).

People in the Mediterranean, southern Africa and most of South America (as well as wine lovers elsewhere) may notice the ill-effects of greenhouse-gas-induced aridity first.

These regions are expected to experience more droughts lasting four to six months by the middle of the century. In the model simulations, it takes several more decades before statistically significant changes in drought extent and frequency occur in other regions, including most of North America.

By contrast, northern Europe, Australia, the Tibetan Plateau, the easternmost part of central Africa and the island nations of Southeast Asia should escape relatively unscathed, as changes in their drought patterns are not predicted to stand out against past climate variability by the end of the century.

The exact timing of these impending hydrological changes will depend on the rates of future emissions of greenhouse gases. In the scenario with the highest emissions (SRES A2), the models predict that statistically significant changes in drought for some regions will occur in less than twenty years.

None of the models account for other anthropogenic changes to the water

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budget, such as water diversion, irrigation and land-use changes, all of which may spur greater drought responses. The potential dire consequences of increasing droughts underscore the need for careful water resources management and planning in the coming century.

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