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Slowdown of the THC and regional consequences for the climate in Europe

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The ocean thermohaline circulation (THC) in the Atlantic is generally accepted to be causing the comparatively mild climate of western and northern Europe. Global general circulation climate models1,2 and observations3 associate periods of weak or absent Atlantic THC with considerably lower temperatures in and around the northern North Atlantic. However, it is uncertain whether such change would spread longitudinally around the globe or would be limited to a narrow strip near the coast2,4. Moreover, the relatively low spatial resolution of global climate models has prohibited more detailed statements about possible or probable THC-induced climate change in Europe. This uncertainty is disconcerting as anthropogenic greenhouse gas emissions might cause rapid THC change in the future5,6. Here, we use a THC-slowdown scenario obtained with a global climate model to force a regional climate model for Europe. We find that a THC slowdown causes cooling over Europe because sea surface temperatures drop, reduced precipitation, and increased snow cover and albedo leading to positive feedback.