

## Effects of the Bering Strait closure on AMOC and global climate under different background climates

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Previous studies have suggested that the status of the Bering Strait may have a significant influence on the global climate variability on centennial, millennial, and even longer time scales. Here we use multiple versions of the NCAR CCSM versions 2 and 3 to investigate the influence of the Bering Strait closure/opening on the Atlantic Meridional Overturning Circulation (AMOC) and global mean climate under present-day, 15 thousand-year before present (kyr BP), and 112 kyr BP climate boundary conditions. Our results show that regardless of the version of the models used or the widely different background climates, the Bering Strait's closure produces a robust result of a strengthening of the AMOC, and an increase in the northward heat transport in the Atlantic. As a consequence, the climate becomes warmer in the North Atlantic and the surrounding regions, but cooler in the North Pacific, leading to a seesaw-like climate change between these two basins. For the first time it is noted that the absence of the Bering Strait throughflow causes a slower motion of both Arctic sea ice and upper ocean fresh water across the Arctic from Pacific to Atlantic, reduced sea ice export and less fresh water in the North Atlantic, and a contribution to a positive feedback to increase upper ocean density there thus strengthening the AMOC. Potentially the changes in the North Atlantic could have a significant effect on the ice sheets both upstream and downstream in ice age climate, and further influence global sea level changes.