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## Climate analogs as input for ice sheet models during the glacial

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Simulations of continental ice sheets require climate forcing over time periods that are infeasible to run with comprehensive climate models. The alternative to use climate models of reduced complexity often yields data of insufficient quality for a good simulation of the ice sheet surface mass balance. Here we reconstruct the climate of the last glacial climate based on 22 marine proxy records and two Greenland ice cores for the Atlantic region. The reconstruction is based on multiple climate simulations, which serve as potential analogs.

The analog search is based on air and sea surface temperatures. To mitigate regional biases due to the availability of reconstructions, and to filter non-essential modes of variability, the search is carried out in the reduced space of the first few principal components. For every hundred years of proxy data the best ten climate analogs are identified and their weighted sum serves as the reconstruction. The obtained climate fields provide a full set of atmospheric variables to be used as input for our surface mass balance model.

We assess the quality and uncertainty of our reconstruction by using different objectives for the analog search as well as accounting for the different spatial and temporal distributions of the proxies. In addition, the method is evaluated in comparison to reconstructions based on the glacial index.

The performance of the method decreases during the deep glacial period with the used model pool. In addition, the climate model data does not sufficiently explain the variability observed in the marine proxy data.