

Paleoclimate data ranges across widely different time scales, generally from seasonal to millennial scales. One outstanding issue in paleoclimatology is how to incorporate low time resolution ( $> 1$  yr) proxy data into reconstructions of past climate. It is also unclear what components of Earth's climate system are best captured by this low resolution data. We present data assimilation based, pseudoproxy reconstructions of the AMOC that utilize both pseudoproxy and climate model data across multiple time scales. We compare three different reconstructions of the AMOC using only noisy atmospheric surface temperature data as pseudoproxies: (1) high frequency (1 yr) only, (2) low frequency (20 yr) only, and (3) a combination of both high and low frequency pseudoproxies. The reconstruction tests show that the incorporation of both high and low frequency pseudoproxy data is up to 3 times more skillful in reconstructing the AMOC than using high frequency pseudoproxy data alone. We will also discuss reconstructions of related oceanic variables and how the reconstructions vary depending on the climate model employed in the pseudoproxy experiments. Our results indicate that it may be possible to skillfully reconstruct the historical AMOC with our data assimilation technique using only proxies of surface climate. Our results also show that lower resolution proxies may usefully improve reconstructions of climate variables that have low frequency components, such as the AMOC.