



How does data assimilation in the Southern Hemisphere affect the representation of climate during the Holocene climate optimum?

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Over the last decades, the Antarctic Peninsula region experimented a drastic warming, sea ice retreat and glacier melting, while overall Antarctic sea ice cover did not change much. At the Holocene scale, discrepancies similarly existed between Antarctic Peninsula and East Antarctica climates. Little is known on this apparent dichotomy because (1) temperature and sea ice monitoring started only during the last decades, and (2) Holocene data compilation was not done yet at the Southern Ocean scale. In this framework, we analysed Holocene climate change in simulations performed with the climate model LOVECLIM constrained to follow the signal recorded in proxy records through data assimilation. The proxy records selected represent surface temperature changes in the Southern Hemisphere (South of 25°S) derived from various types of archives and proxies. We here focused on surface temperature records because they are more numerous and quantitative, while most Antarctic sea ice records are qualitative. The results of those simulations are analyzed with a particular focus on the changes in atmospheric and oceanic circulation induced by the data assimilation and how it affects the regional representation of climate. Moreover, we assessed the way those changes allow a better understanding of the signal recorded in the proxies and how these simulations can provide insight on some climate variables not directly accessible to proxy data.