



Impact of a Last Glacial Maximum sea-level drop on the circulation of the Mediterranean Sea

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During the Last Glacial Maximum (LGM), the global sea level was about 120m lower than today. While such a sea level drop has limited consequences in the open ocean, it has strong consequences in marginal seas such as the Mediterranean Sea whose hydrology strongly depends on narrow straits. Here we analyse the impact of the LGM sea-level decrease on the Mediterranean Sea using a $1/8^\circ$ resolution ocean model. With a sea-level lowered by 120 m, the water mass transports at the Gibraltar and Sicily straits are reduced by about two thirds, leading to a global slow down of the circulation of the Mediterranean Sea. This acts on the temperature and salinity distributions, by limiting the exchanges between the western and the eastern Mediterranean basins. The sea-level drop leads to a decrease of the temperature and an increase of the salinity of the whole basin. However, the salinity trends are different in the eastern and western basin: the salinity of the eastern sub-basin increases, while the salinity of the western basin decreases. These property changes are related to changes in two components: the atmospheric forcing acting on the Mediterranean Sea and the exchanges at the Gibraltar and Sicily Straits. In this study, we show that the decrease of the exchanges at these straits is the main factor controlling the Mediterranean Sea properties.