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# Investigating the Climate Response to Reduced Mediterranean Sea Stand between 5.96-5.33 Ma

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Roughly 6 Ma, plate tectonics restricted Atlantic water from entering the Mediterranean Sea (MS), triggering the event known as the Messinian salinity crisis (MSC). Evaporative drawdown resulted in a substantial fall in MS level evidenced by a 1500-2500 m thick layer of evaporite sedimentation. Although proxy data for the Miocene is poorly constrained, previous climate studies of the MSC lack realistic boundary conditions and use prescribed Sea Surface Temperatures (SSTs). In this study, we use the slab ocean configuration of the Community Climate System Model version 3 (CCSM3) in which SSTs can respond to atmospheric changes. This study is the first to detail both the regional and global climate impacts of desiccation and changing MS base level and examines the role of precession and dust loading on the hydrological budget during the MSC. In our dust simulations an online aerosol model is implemented in the slab ocean-CCSM3.

The climate response to stationary wave forcing induced by topographic changes is observed. Topographic forcing alone results in adiabatic warming in the basin and a geopotential height field response that generates Rossby waves. This is responsible for significant climate effects throughout the Northern Hemisphere. For example, cooling in the Gulf of Alaska in our lowered MS simulations coincides with proxy evidence of initial tidewater glaciation.

Accurate values of water budget terms are fundamental to numerical models that simulate salt precipitation. Since the precessional cycle has a profound effect on the sedimentary record, we compare the impact of precession minimum and maximum on the regional hydrological budget for a filled and partially filled MS.

Increased Saharan dust flux occurs when precession favors drier conditions over North Africa. A substantial dust source may exist when precession related drying occurs simultaneously with a desiccated MS. Accordingly, we examine the role of dust radiative forcing on the MS hydrological cycle.