Invariance of the Carbonate Chemistry of the South China Sea from the Last Glacial Period to the Late Holocene

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Dramatic and correlated changes in marine carbonate ($CaCO_3$) content of oceanic sediments commonly accompany the transitions from cold glacial periods to warm interglacial periods. The South China Sea (SCS) is said to be ocean-dominated at depth, and its $CaCO_3$ records should reflect and preserve the effects of changes in the carbonate chemistry of the western Pacific Ocean. Using published and newly acquired $CaCO_3$ data and a model for carbonate compensation dynamics, we show that a significant change with respect to carbonate saturation is unlikely to have occurred in SCS during the last glacial-interglacial transition. Thus, changes in SCS records cannot reflect inferred western Pacific saturation variations. Instead, the results from a carbonate deposition model argue that the saturation state of the SCS was largely invariant and that alterations in the SCS records are better explained by changes in the lithogenic input. Specifically, we advance that the lithogenic flux was approximately 1.8 times higher during the Last Glacial Period and briefly was as high as 3-4X greater in the early Holocene. In turn, this begs the question of the assumed degree of chemical connectivity between the SCS and the Pacific during this time frame, a question that can be raised for other marginal seas as well.