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How cold was the Last Glacial Maximum?

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Several collations of proxy data dating from the Last Glacial Maximum have been published, but they have rarely if ever been synthesised into a true global field or mean. While various arguments have previously been presented to the effect that the LGM mean temperature change was around -5C relative to pre-industrial, a recent analysis of Schmittner et al has rekindled interest in this question with a remarkably warm anomaly of -3C with a likely range of -2.1 to -3.3C, based on a model fit to the recent proxy collections of MARGO, Bartlein et al and Shakun et al.

Here we present a number of analyses of essentially the same proxy data, based on methods ranging from purely statistical analyses to highly model-based fits. We use a number of cross-validation tests to evaluate the methods. We argue that the Schmittner et al analysis is likely too warm, and identify some possible explanation for this bias. While our analysis does not directly address the question of equilibrium climate sensitivity, some simple semi-quantitative reasoning suggests that this result of Schmittner et al may also be biased low. As well as a global mean temperature change, we present spatial fields that may be used for model testing and validation.