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Poster
Sea level reconstruction is an active area of climate research that is focused on extending the relatively short sea level data record provided by satellite altimetry into the past. Questions persist, however regarding how best to reconstruct sea level variability and trends from historical observations using the satellite altimetry. In this work we analyze two basic methods of sea level reconstruction that differ only in the choice of basis functions used to fit to the historical tide gauge measurements. We examine the use of empirical orthogonal functions (EOFs) versus cyclostationary EOFs (CSEOFs) as the basis of the reconstructions, and evaluate techniques based on each of these bases for estimating climate signals and regional sea level trends. Additionally, the reconstructions' sensitivities to tide gauge sampling, both in space and time, will be investigated. In these tests, the 20-year satellite altimeter data record is treated as "truth" and used for idealized tests of the reconstruction techniques. EOF and CSEOF basis functions will be calculated from the satellite altimeter and both observed and synthetic tide gauge data will be used to optimally interpolate sea level over the 20-year altimeter data record. The resulting reconstructions will be compared with the actual satellite altimetry data to determine which, if either, method captures certain signals and variability better in this idealized setting. Global correlations, relative amplitudes and trends of observed climate signals in the sea level reconstructions will be compared, including the Pacific Decadal Oscillation, El Nino-Southern Oscillation, and Atlantic Multidecadal Oscillation. A primary goal will be to keep the comparisons as consistent and realistic as possible. Comparisons of this nature have not been performed to date and will yield valuable insight into two basic techniques of sea level reconstruction.
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