



Explaining a perpetual Pliocene El Niño with enhanced organized convective activity

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The early Pliocene (3-5Ma) climate is considered a potential analogue for the future because of its near-modern continental configuration, estimated temperatures 3°C warmer than present, and CO_2 levels of 300-500ppm, essentially those expected in the near future. Proxy data for sea surface temperatures suggest that the area of the modern cold tongue was much warmer during this period, similar to a modern El Niño event, and other proxy data have been interpreted to suggest an El Niño-like signature on the overall Pliocene climate. In this work we test an explanation for these anomalies based on a perpetual or more frequent El Niño resulting from a sustained reduction in the mean equatorial surface easterlies. Such a reduction is hypothesized to result from enhanced convective activity over the Pacific in the warmer Pliocene atmosphere. This convective activity acts as a stochastic source of atmospheric Rossby waves, which produce an equatorward convergence of westerly momentum, weakening the surface easterlies. Results are presented from a hierarchy of models examining each element of the hypothesis.