Geophysical Research Abstracts, Vol. 7, 06028, 2005
SRef-ID: 1607-7962/gra/EGU05-A-06028

Irrepressible El Nino: Perspectives on ENSO and climate change from the hothouse climates of the deep past.

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The tropical thermocline is shallow enough in today's climate to permit upwelling of cold, subthermocline water on the equator. As a consequence, the tropical oceans can transport a significant amount of heat poleward; furthermore, interaction between upwelling rate, SST and surface wind stress leads to strong interannual fluctuations of equatorial SST, the phenomenon known as ENSO. This is not a necessary state of affairs, however: an alternative regime is conceivable where no upwelling, heat transport or ENSO variability occur. A transition into such a regime would clearly have major consequences for global climate. Can increased radiative forcing drive such a transition? Warm climates of the deep past provide an excellent context in which to explore this question. We present results from a suite of deep-paleoclimate simulations using NCAR's fully-coupled Climate System Model (CSM), which show not only that ENSO survives even in these warm climates, but in fact plays an even bigger global role than at present. These results are supported by comparison with annually-resolved geological proxy data for the Eocene case.