



The Influence of Oceans on Land Surface Temperature Variability

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In global warming scenarios continental surface temperatures warm with greater amplitude than sea surface temperatures, leading to a land-sea temperature contrast. The land-sea contrast is also seen in warming and cooling on interannual timescales due to natural variability. The temperature contrast is due in part to the larger heat capacity of oceans and differences in surface moisture availability, however it is hypothesised that temperature signals from the tropical oceans are amplified over tropical land areas, and to a lesser extent extra-tropical land.

Focusing on natural variability in observations and models, strong correlations exist between tropical SSTs and global land surface temperatures. The relationship between these correlations and the land-sea contrast is investigated, as is the role of ENSO. There is a lagged relationship between Pacific SSTs, global tropical SSTs and land surface temperatures, whereby a signal which originates in the ENSO region is then seen in the tropical oceans and then tropical land, with a delay of around six months between ENSO and land. AGCM sensitivity experiments show the importance of the tropical oceans in relaying the ENSO signal to land with the appropriate delay. The tropospheric response to ocean forcing, and the land response to tropospheric forcing is discussed as a mechanism.