

SST LAG: A VITAL LINK IN CLIMATE CHANGE

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The sea surface temperature (SST) lag for the world ocean (evaluated from the NOAA WOA05 1⁰ resolution climatology) shows a pattern of tongues of high SST lag in all ocean basins extending poleward and eastward from the equatorial regions where the SST lag has a maximum of about 110 days. Under global warming, significant changes are occurring in the SST lag field, and in particular, the Indian Ocean tongue and the North Atlantic Ocean tongue are becoming stronger and hence the SST and the atmospheric temperature (AT) lags along the southern and western coasts of Australia, and in the north-western Atlantic Ocean are increasing. We argue that this ‘teleconnection’ has a direct effect on climate, tending to decrease the rainfall in southern Australia, induce permanent El Nino conditions, and promote ice melting in the Canadian arctic. A simple model which predicts the SST and AT lags, shows the high SST tongues arise principally from the increase in stability of the ocean mixed layer which occurs in a warming environment. An important conclusion of the study is that the ability of climate models to successfully simulate the evolution of recent observed lag patterns is an important prerequisite before they can be used with confidence to predict 21st century climate change.