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Intraseasonal variations of Ocean Heat Content in the tropical Indian and Pacific Ocean

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The ocean heat content (OHC) is an important thermodynamical parameter in the Earth's climate system as about 90% of the Earth's Energy Imbalance (EEI) is stored in the ocean. It is therefore important to understand how this quantity varies on different timescales and how different thermodynamical and dynamical processes affect it. On intraseasonal timescales, there is a two-way interaction between the atmosphere and ocean whereby atmospheric forcing leads to ocean dynamics causing changes in OHC and OHC, in turn, possibly playing a role in affecting the intensity of the Madden-Julian Oscillation (MJO) through air-sea interactions. In this study, we focus on the variations of OHC in the equatorial Indian and Pacific Ocean on intraseasonal timescales. A heat budget analysis for the upper 100 m was performed using HYCOM Reanalysis for the period 2005 – 2015. The simple three-term heat budget comprised of a surface heat flux term *(Q),* an advection and adiabatic redistribution term *(ADV)* and finally a residual term *(RES)* to account for processes not resolved using the reanalysis product. When averaged over the equatorial Pacific Ocean, the heat budget analysis shows that the *ADV* and *RES* terms contributed the most to the ocean heat content tendency *(OHCT).* Zonal wind anomalies are observed to excite intraseasonal Kelvin waves in the equatorial Pacific Ocean. These Kelvin waves are associated with the eastward advection of intraseasonal OHC anomalies from the western Pacific warm pool to the central Pacific. This eastward propagation of intraseasonal OHC anomalies associated with Kelvin waves is seen to contribute to the warming leading to El Niño events such as the 2009 El Niño. In the Indian Ocean, intraseasonal OHC anomalies along the equator were seen to be in phase with the MJO as revealed by the negative intraseasonal outgoing longwave radiation (OLR) anomalies, while the off-equatorial intraseasonal OHC anomalies were seen to be out of phase with the MJO. Off-equatorial intraseasonal OHC anomalies in the Indian Ocean may be a useful parameter to investigate further as it may provide the residual heat energy for air-sea interactions for subsequent MJO events and hence improve subseasonal predictability.