Seasonal and Inter Annual Variation of Cyclone Heat Potential from Argo and Model Simulations

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Cyclone heat potential (CHP) is one of the most important oceanographic parameter for air-sea interaction processes. For example, cyclogenesis and intensification/movement of cyclones are linked with the high value of upper ocean heat storage in the mesoscale features like warm core eddies or deeper mixed layer. It was also demonstrated that patterns of lower atmospheric anomalies are more consistent with the upper ocean thermal structure that finally gets reflected in the heat content than just with sea surface temperature (SST). When SST reduces due to strong wind-induced mixing, the pre-existing higher heat storage contained in these mesoscale features provide the heat source for the atmospheric phenomenon like cyclones. Hence, heat storage contained in the upper ocean is an important parameter. In this study, the seasonal and intramural variation of heat content has been studied using the Argo in situ and model simulation over the North Indian Ocean (NIO) during 2000-2009.

CHP with respect to the 26°C isotherm has been estimated from the Argo temperature profiles. We simultaneously ran an ocean model to obtain the temperature profiles from which CHP was estimated. Since the Argo observations are limited over the NIO we obtained a statistical relation between the model and the in situ estimations of CHP. Since the model derived CHP compares well with the in situ observations, this relation is used to estimate CHP from the model simulations to study the seasonal and inter annual variations over the NIO.

Monthly variations of CHP shows a bi-model oscillations in the Arabian Sea and the Bay of Bengal with two peaks in May/June and in December, having lower values in January/February and in August/September. The impacts of winter cooling in the Arabian and the summer cooling in the Bay of Bengal are clearly reflected in the CHP variations of these two basins.