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### Long term assessment of Red sea heat waves and the associated thermal stresses on the rich coral reefs spots

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#### Abstract

Coral reefs are experiencing increasing impacts of climate change through heatwave events resulting in mass coral bleaching being widely reported. The optimum aim of the current paper is to study the heat waves over the Red Sea using 0.25 daily gridded Optimum Interpolation Sea Surface Temperature (OISST) data from 1982 to 2020. The Red Sea was divided into 16 clusters according to warming characteristics. The analysis indicated that the Red Sea experiences heatwave events, most pronounced over the Gulf of Aqaba where the most marked heatwave event lasts for 18 days between 29 July 2012 to 15 August 2012. Moreover, twelve sites of rich coral reefs in Egypt and Saudi Arabia were assessed based on the long-term thermal stress by the calculations of Thermal stress anomalies and Degree Heating Weeks (DHW) indices. The bleaching threshold limit varies between 27° degree Celsius in the northern parts to 32° degree Celsius in the western and southern parts. The long-term analysis of the different locations confirmed that the frequency of the elongated thermal stress periods increases in the last decade if compared with the last four decades. Although it is widely believed that the bleaching events are concentrated on the western and southern parts of the Red Sea, the Northern parts experienced high levels of thermal stresses without confirmed reports of mass bleaching. The study represents a good database for studying the resilience of the Red Sea coral reefs and confirms the inevitable need of studying the local hydrodynamic characteristics of each location.

#### Keywords

Red Sea , Heat Waves , Coral Reefs , Bleaching