Degree Heating Weeks (DHW) index for predicting bleaching phenomenon in coral reefs of the Persian Gulf

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Abstract

The capability of Degree Heating Weeks index (DHWs) was examined for prediction of bleaching events in the coral reef communities of the Kish Island located in the north of the Persian Gulf. In doing so, weekly Sea Surface Temperature (SST) values (in 1°×1° spatial resolution) prepared by National Oceanic and Atmospheric Administration (NOAA), coupled with documented bleaching surveys such as official reports, published papers, as well as direct field observations were employed. The SST values of the study area were extracted between 1982 and 2014 and subsequently, the corresponding DHWs were determined for the same period. Thereafter, a threshold for DHWs was specified, based on the historical recorded bleaching events. Moreover, for quality assessment of the results, the accuracy of the applied methodology was quantified using Peirce Skill Score (PSS) technique. This technique enabled us to quantify the quality of our hind-casts/ forecasts, based on hit rate and alarm rate factors. The results demonstrated that a DHW threshold value equal to 5.3 can be selected as an alarm for prediction of bleaching in the studied area. In addition, PSS was determined equal to 0.62, where (3/4=0.75) and (3/23=0.13) values were calculated for hit rate and false alarm rate factors respectively. The determined threshold value also showed the higher resistance of coral reefs of the study area to positive SST anomalies in comparison with other similar studied areas.

Keywords:

Bleaching, Remote sensing, SST, Coral reefs, Persian Gulf