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Author: Dr. jushiro cepeda-morales
Mexico

Dr. Juan Pablo Rivera Caicedo
Mexico
Dr. Francisco J. OCAMPO-TORRES
Centro de Investigacion Cientifica y de Educacion Superior de Ensenada, BC - CICESE, Mexico

SEASONAL AND INTERANNUAL VARIABILITY OF CHLOROPHYLL AND SURFACE TEMPERATURE IN THE GULF OF MEXICO: 1998-2015

Abstract

To assess the impact of hydrocarbon exploitation in ocean and coastal ecosystems of the Gulf of Mexico (GoMex) is necessary to estimate the main satellite-remote-sensing oceanographic variables baseline (i.e. phytoplankton biomass, sea Surface temperature). This work characterized the seasonal and interannual variability of phytoplankton biomass, estimated as Chlorophyll-a concentration (CHLO), and sea surface temperature (SST). The CHLO analysis was based on monthly level L3 data, mapped in 4 x 4 km spatial resolution from the SeaWiFS (Sea-Viewing Wide Field-of-View Sensor), and MODIS (Moderate-resolution Imaging Spectroradiometer) sensors. Also, a time series were composed from 1998 to 2015. The chosen monthly SST data were GHRSST Level 4 AVHRR OI Global Sea Surface Temperature Analysis Blended product from 1981 to 2016. From 2003 to 2010, SeaWiFS and MODIS sensors measured CHLO. The impact on the time series due to spectral and algorithms configuration of each sensor were performed using an analysis of variance (Kruskal-Wallis). Significant differences were found between zones in the coastal area of the GoMex, while in oceanic area had no differences. In order to characterize the seasonal variability in the system, the adjusted harmonic method was conducted to each pixel along the CHLO and SST time series. Results of the fitted harmonic for CHLO had low levels of explained variance in the coastal zone (<50%), while the oceanic region there were high values (> 70%). And for the SST seasonal cycle, high values of explained variance all over the Gulf (> 90%). The interannual analysis showed a tendency to increased CHLO concentration during winters, which was also accompanied with high interannual variability in SST. In contrast, a positive trend in the maximum temperature was observed, while for CHLO concentration an increase in the minimum values was detected. Actual results suggest a possible classification of the GoMex in two regions, that should be treated independently when analyzing the annual trends.