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Temporal and Spatial Patterns of Sea Surface Temperatures and Chlorophyll-a in a Tropical Coastal Lagoon (Western Gulf of Mexico)

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The tropical coastal lagoon of Tamiahua is located at the Northwestern part of the Gulf of Mexico. It is the third largest lagoon of Mexico, where fisheries and touristic activities are conducted inside it. The coastal lagoon has a length of 110 km and 25 km of width and is shallow water lagoon (1-3 m). It has two connections with the open-sea, where the exchange of water is promoted by the diurnal tide of the Gulf of Mexico. The first mouth is found at the south of the lagoon, it is named Boca Corazones and the second one is located at the north, and it is an artificial open-sea connection. Monthly Sea Surface Temperatures (SST) and Chlorophyll-a images from the period of December of 2008 to March of 2011 were analyzed at five localities of the Tamiahua Lagoon in order to analyze their fluctuation. The first two localities are out of the lagoon: one in front of Boca Corazones and the second one in front of the artificial mouth. These localities showed a mean temperature values of 26.24±2.94 °C and 25.82±3.24 °C, respectively, being the Northern zone colder than to the south zone. More to the northward and inside to the lagoon there are two localities which showed mean warmer values of temperature 26.33± 3.10 and 27.01±3.63 than those observed at locations out to the Lagoon. Finally the last location showed the lowest values of temperature in the period analyzed, 25.78±3.1647. Regarding to values of Chlorophyll-a the zones out of the lagoon presented mean oligotrophic values of 3.31±1.91 mg/m^3 (south) and 3.73±2.85 mg/m^3 (north), respectively. Oppositely inside the lagoon the primary productivity increase considerably 14.31±10.68 mg/ m^3 (southern part of the lagoon), 10.68±4.90 mg/ m^3 (center of the lagoon) and 11.99±9.05 mg/ m^3 (northern part of the lagoon). The monthly SST images had a strong seasonal signal whereas the Chlorophyll-a images not showed a clear signal, and the spatial distribution not showed structure in the first mode, which have about 90% of the variance. The correlations between SST and Chlorophyll-a images showed lower values at the zones out of the lagoon. Inside the lagoon the correlation values increases in the central and north parts. Thus probably the SST is highly influenced by the exchange between the lagoon and the atmosphere and Chlorophyll-variability is associated to precipitation.