Global Warming: a Descriptive Analysis of Sea and Air Temperature in the West Gulf

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Introduction
Global warming is the increase in average earth temperature due to the effect of greenhouse gases, such as emissions of carbon dioxide from fossil fuels or deforestation, which trap heat. Over the years and along Warming of Earth’s oceanic water is a major impact of climate change that is already being experienced around the globe. The world’s oceans are warmer now than at any point in recent decades, and have grown much warmer since the beginning of the 19th century. This top layer is now heating at a rate of 0.2 °F per decade.

Purpose
The purpose of this project is to carry out a descriptive statistical analysis of the basis of NDBC data to explore the issue of global warming and climate change, particularly through the data of sea temperature (WTMP) and air temperature (ATMP). And thus analyze how the annual sea temperature has evolved in the selected region.

Methodology
We apply statistical methodology to analyze and detect any signs of significant rise or fall of the temperature of air and water. Meteorological data were obtained from the National Oceanic and Atmospheric Administration’s (NOAA), which provides historical meteorological data in real time by the National Data Buoy Center (NDBC), from the WEST GULF BOUY -207. The database contains the wind, sea temperature, air temperature, wave, pressure and other marine data. The WTMP (Water Temperature) and ATMP (Air Temperature) station data 42002 (LLNR 1405), located in East of Brownsville, TX, years 2000-2016, is filtered and analyzed descriptively using the R-Studio software, version 3.3.2. Values ”999” in the data set represents the missing values, because the buoy temporality was not able to record the weather information.

Findings
The average sea temperature over the years 2000-2016 was 26.35°C (0.69°C) and 24.72°C (1.24°C), respectively (standard deviation in parentheses). During the four quadrennials (2000-2003, 2004-2007, 2008-2011, 2012-2015, 2016-2019) the average sea temperature was 26.33°C (0.29°C), 26.36°C (0.10°C), 26.67°C (1.47°C), 26.19°C (0.17°C) and 25.79°C (...). For the same periods, the average air temperature was 24.8916°C (0.18862048°C), 25.17844°C (0.02653978°C), 23.84608°C (2.50994542°C), 25.04430°C (0.53752123°C), 24.35140°C (...).

There were several atypical data from both the sea and the air. However, acceptable values were considered. Although no formal comparison tests have been performed, there is no noticeable increase in the marine and air temperature data analyzed. However, the variation for 2008-2011 appears to be higher than the other time periods.

Conclusions
During this time period, marine meteorological data do not validate the global warming hypothesis. It would be necessary to increase the time to improve this analysis.

References