Use case title

Analysis of the Inverse Barometer Effect in Pemba

Summary

The inverse barometer is a phenomenon whereby an increasement of 1 hPa of pressure influence in decrease of 1 cm in the sea level. In this study was observe the behavior of the sea level and the pressure for the Pemba Bay in a period between 2008-2009, describing the sea level variation in relation in the pressure variation. For found the relation between the variables was used linear regression method, where we obtained nonlinear relationship.

Keywords

Inverse barometer, sea level, Pemba Bay.

Primary actor (who might follow the use case)

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Introduction

The atmosphere is compound by a mixture of gas that involves the earth, making pressure in to the surface. The variation of pressure has a direct influence to sea level, an increase of 1 hPa atmospheric pressure influence on the decrease of 1 cm in the sea level, called these phenomena of "Inverse Barometer Effect" (Ainscow, B. 1985), Although, this relationship is assumed to hold true for most locations, departures from the 1mb: -1cm ratio have been found in some locations (Mathers and Woodworh, 2001). Nevertheless, low atmospheric pressure makes a significant contribution to the elevation of the sea surface that is associated with a storm surge. The meteorological overhead is obtained by difference between sea level predict and the sea level observed ((Bié, A. 2017), (Viera, A. 2012)). There are some regions where atmospheric pressure, with inverse barometer effect influence more than 50% of increment storm surge (Olbert, A. 2010), causing flooding in the coastal regions.

Pemba is the provincial capital of the Cabo-Delgado, is localized in the African oriental coast, south Nampula province and north Republic of Tânzania, in west Niassa province and in the east is bathed for Indian ocean. It's situated between the parallels 12˚57' up to 13˚7' S latitude and 40°28' up to 40°31' E longitude (Pereira, R. P. S. 2012). Present dry subhumid climate, where mean precipitation varies between 800 up to 1000 mm and mean temperature varies between 24 up to 26º C.

Objective

The objective of this study is to verify the inverse barometer effect happen in Pemba Bay. Where would be observe the behavior of the sea related with pressure variation at sea level, studying the relationship between these two variables for a period of 5 years (2008-2009). Trying to understand linear relation between sea level and pressure variations.

Results

Based on the observation of the tidal curve figure 2 it was possible to observe that in Pemba, the tide has a semi-diurnal behavior the same observed by (Sete, at all 2002), presenting two maxima in a day. Using the simple lien regression, it was possible to obtain the degree of dependence between the pressure and the tide variation, which was -0.14673. Since the correlation coefficient is negative, this raises the conclusion that the variables are inversely propositional. Thus, as the pressure decreases to an increase in sea level.

Conclusions

During the period of study of the tide and the pressure in the city of Pemba, they showed a non-linear relationship and a negative correlation coefficient of -0.14673, agreeing with the effect of the inverted barometer.

The sea level during the summer months presented a pattern below the predicted level, in the winter months it presented a pattern above the predicted level, where these situations occurred in most cases except for some periods.

Affiliation

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Mode of presentation

Oral