

ABSTRACT

Strong winds crosses the Gulf of Tehuantepec during Norther events that occur during autumn and winter around. The northers are caused by high pressure systems that reach the Gulf of Mexico coming from the Rocky Mountains in the United States with an associated cold front that reduces the temperature, causes precipitation and strong winds. The impact of the Northers also affect the Gulf of Tehuantepec when the pressure difference between the Gulf of Mexico and the Gulf of Tehuantepec generates strong gap winds that crosses Mexico through isthmus of Tehuantepec reaching the Gulf of Tehuantepec. It has been studied that these winds cause a decrease in the surface temperature and generate eddies but its impact in the sea level has not been studied. Here, based on coastal sea level observations from the UNAM tide gauge network, the impact of these events is presented.

INTRODUCTION

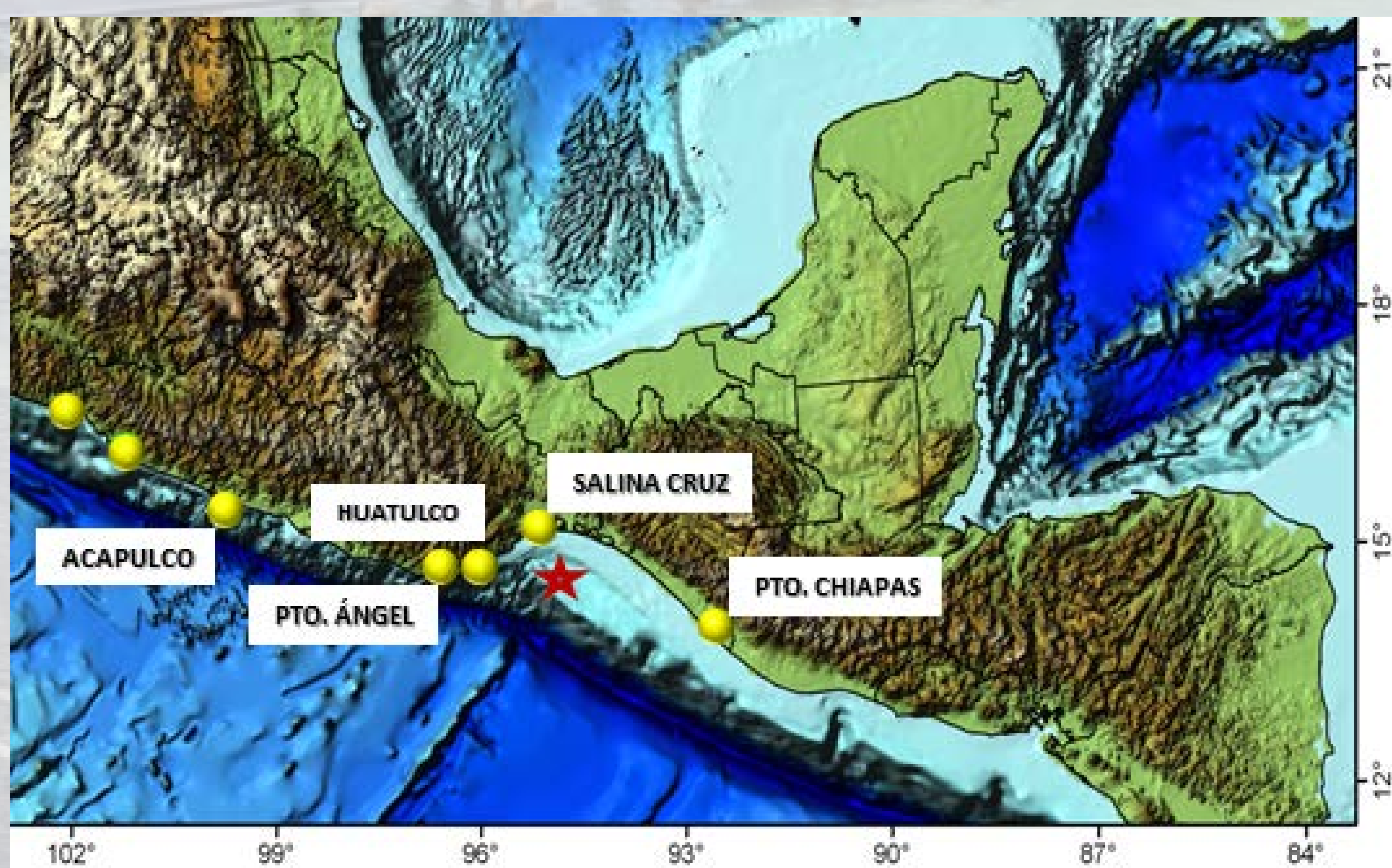


Figure 1. Location of the Sea Level stations in the Mexican Pacific used in this study (yellow) and wind time series (red star)

The Servicio Mareográfico Nacional, based in the Institute of Geophysics of UNAM, initiated in 1952 the monitoring of the oceanic tide gauges with mechanical float sensors and recording the tides in paper rolls (mareogramas).

Since 2007 started the reactivation and modernization of tidal stations of the Servicio Mareográfico Nacional with the aim of achieving tide gauge stations with GLOSS quality. There have been installed digital radar sensors, float and pressure sensors monitoring the sea level every minute; meteorological variables such as wind, temperature, atmospheric pressure and relative humidity every 10 min and high installing precision GPS receivers, with redundant transmission in near real-time satellite data, GPRS and the internet.

Nowadays the network is composed by 28 tide stations, 12 located on the Pacific coast and 16 in the Gulf of Mexico and Caribbean Sea. The stations of the Pacific Ocean have redundant transmission. Ten of them are equipped with high precision GPS.

METHODS

The Sea Level time series of the stations located in and near the Gulf of Tehuantepec were analyzed and correlated with the meridional winds in the Gulf of Tehuantepec using winds from a reanalysis from UNAM using WRF model. The wind and sea level series were normalized dividing by their corresponding standard deviations and correlated.

ANALYSIS AND RESULTS

The meridional wind component was obtained from the WRF model at a point located approximately 50 km offshore Salina Cruz (Fig. 1).

The time series of the wind component and the sea level of the tide stations near the Salina Cruz station (Puerto Chiapas, Pto Angel, Huatulco and Acapulco) were filtered to remove high frequencies (less than 36 hrs) (Figure 2).

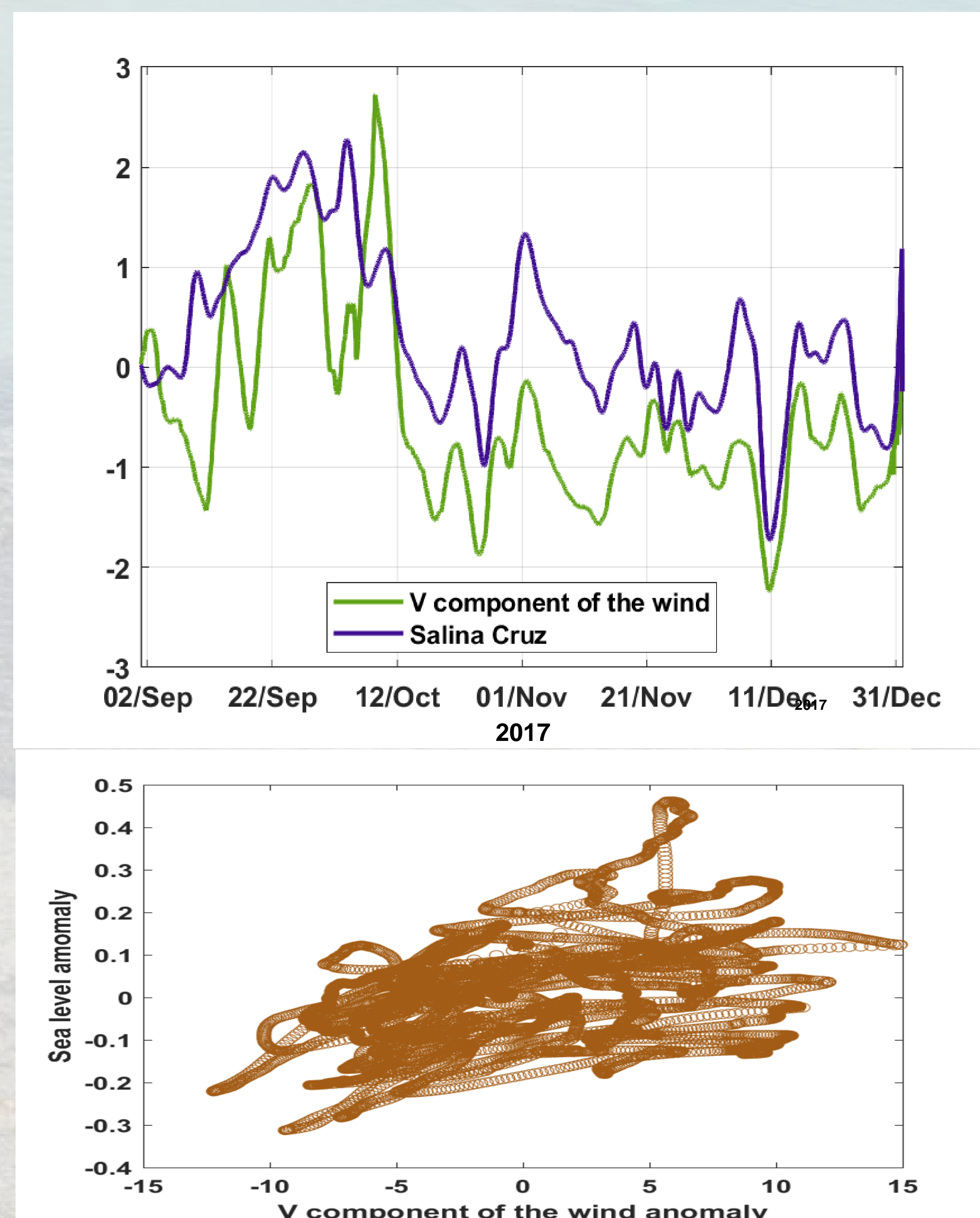


Figure 2. Sea level data anomalies from the stations against the wind anomaly

The correlation coefficients obtained are Salina Cruz 0.78, Puerto Angel 0.44, Huatulco 0.60, Acapulco 0.71 and Puerto Chiapas 0.30.

CONCLUSIONS

There is a strong relation between the sea level in Salina Cruz (in the coast of the Gulf of Tehuantepec) and the Northers. The sea level anomaly barely propagate to the sites northwest of Salina Cruz.