

Sea level variability in the North and North West coast of Spain

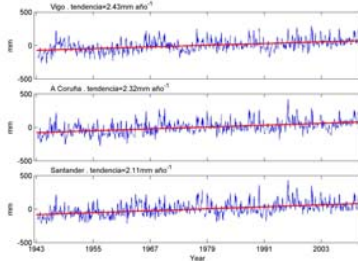
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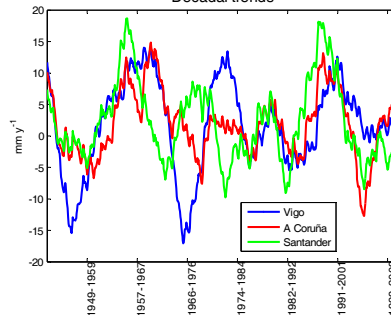
Mean Sea Level variability

Long term trend



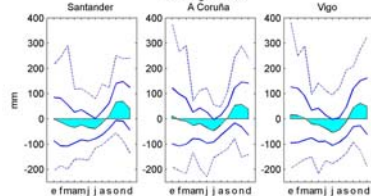
Long term trend values present consistency with the global sea level rise trend (1.5-2 mm/y in the XX century). The mean sea level behavior varies at each station depending on local factors, as the wind stress impact that is affected by the coastal orientation, the waves amplification rely on the bathymetry and basin characteristics, and the importance of the vertical crustal movements because them mask the absolute variations of sea level.

Decadal trends



Considering decadal periods, the maximum trends around 18 mm/y are obtained for the periods 1956-1966, 1961-1970 and 1960-1969 for Vigo, A Coruña and Santander respectively. Cycles of decadal variability can be observed at the joint figure. Trend values for the decade (2000-2009) are -1.92 mm/y at Vigo, 3.23 mm/y at A Coruña and 2.60 mm/y at Santander.

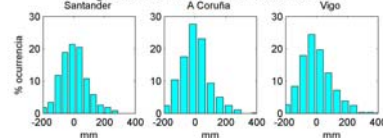
Climogramas



Annual cycles show maximum values in Autumn and minimum ones in Summer. The higher variability along the years appears in winter months.

Figure: climograms (blue). Standard deviation (continuous line). Extreme mean sea values (dot line).

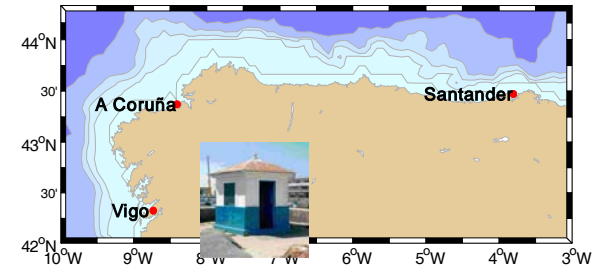
Histogramas de Frecuencias. Niveles Medios.



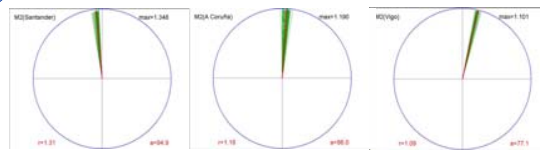
Frequency histograms show similar Gaussian patterns at the 3 stations, but with slight differences.

Observation System

Mareógrafos (Red IEO)



Tides



On the north-west Spanish coast the tides are semi-diurnal, and the moon component M2 is the most energetic contribution. As the tides are propagated as Kelvin waves around an amphidromic point (50°N, 39°W), this M2 is propagated from the Portuguese coast along the Spanish coast and more, until the North. This explains that the high tides arrive first to Vigo, and then to A Coruña and Santander.

Extremes and return periods

Maximum annual series are considering in order to calculate return periods in base to Gumbel distributions (Pizarro and Novoa, 1986).

Expected maximum values for 120 years return period

| | |
|-----------|-------------|
| Santander | 5.59±0.06 m |
| A Coruña | 5.26±0.06 m |
| Vigo | 5.59±0.06 m |

