Geophysical Research Abstracts
Vol. 13, EGU2011-13682, 2011
EGU General Assembly 2011

Projection of extreme marine climate in coastal areas using statistical downscaling

Cristina Izaguirre, Paula Camus, Melisa Menendez, Fernando J. Mendez, and Inigo J. Losada
Environmental Hydraulics Institute "IH Cantabria", Universidad de Cantabria, Santander, Spain (mendezf@unican.es)

The estimation of future extreme marine climate in coastal areas is addressed obtaining ocean climate projections (associated to different socio-economic scenarios) based on a statistical downscaling approach, which relate the large-scale atmosphere circulation weather types (sea level pressure fields) with extreme local met-ocean parameters (wind, waves and surge).

It is well known nowadays that the seasonal-to-interannual variability of ocean climate (wind, waves and storm surge) is linked to the anomalies of the atmosphere circulation. In this work, we propose an extreme value model for a local met-ocean parameter (wave height, storm surge, ...) (predictand) conditioned to the synoptic-scale weather type (predictor). We combine different state-of-the-art extreme value models based on the Generalized Extreme Value (GEV) for block maxima and the Poisson-Pareto model for exceedances over a threshold and clustering techniques (self-organizing maps, K-means) applied to n-days-averaged sea level pressure field (SLP) anomalies to describe the weather types.

We fit the statistical model using as predictor the n-days-averaged SLP fields calculated by NCEP atmospheric reanalysis (1948-2010) and as predictand the distribution of maxima every n-days in a specific shallow water location of the wave (DOW1.0) and storm surge (GOS1.1) reanalysis of IH Cantabria. The spatial and temporal domain of the predictor is chosen by means of a sensitivity analysis and based on physical criteria. We analyze the suitability of this methodology to be used for long-term projection of extreme ocean climate to different climate change scenarios, considering different IPCC-AR4 GCM models.