



## **Were the sea conditions harsher in 2010 for the Northeast coast of Rio de Janeiro state - Brazil? A 14 year analysis of remote sensing, in-situ wave data and NCEP reanalysis**

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The Campos Basin is situated between the north coast of Rio de Janeiro and south of Espirito Santo states, South-east of Brazil, and it currently accounts for nearly 84% of Brazilian oil production. The increasing demand for oil has pushed the offshore activities to outer boundaries of coastal waters increasing the exposure of exploration (ocean) structures to harsher weather and sea conditions. That led the Brazilian oil company, Petrobras, to start monitoring in real time meteorological and oceanographic conditions at this site. In 2010, due to security of the offshore activities during rough seas conditions, the severeness of the storms was theme of internal investigation to evaluate if the conditions were worse than in the previous years.

In order to answer the proposed question we stuck to the analysis of Significant Wave Heights (SWH), one of the main environmental issues for offshore operations. The wave climate in the study region is dominated by short-period (5 - 10s) wind sea from North to East during good weather conditions and long-period (10 -15s) waves from the Southwest-Southeast during storm events, more frequent in winter time.

The first step was to build a long enough time series which could allow a reliable answer. After previous qualifications, reanalysis data made available by the National Centers for Environmental Predictions (NCEP) and cross-calibrated along-track altimeter measurements of SWH from the Radar Altimeter Database System (RADS) were used to complement the relatively short time series obtained by the PETROBRAS in-situ instruments. The final series covered the period from 1996 to 2010. Bearing in mind the operational character of such study, two different analyzes were undertaken. One aimed to answer if the mean wave heights for the Campos Basin were higher in 2010 than in the previous sampled years. Another was based on the peak-over-threshold approach which allows one to concentrate the analysis on the extreme events. This study is pioneer on the comparison between in-situ wave data collected by directional wave radar and altimeter

wave measurements in the South Atlantic Ocean. As far as the authors know, this is also the first try to describe the behavior of mean significant wave height in the last 14 years in the area using both modeled and measured data.