



## **Inferring ocean salinity and temperature with geostatistical seismic oceanography inversion**

Leonardo Azevedo (1), Xinghui Huang (2), Luís M. Pinheiro (3), Nunes Rúben (1), Caeiro Maria H. (4), Song Haibin (5), and Soares Amílcar (1)

(1) Instituto Superior Técnico, CERENA, Portugal (leonardo.azevedo@tecnico.ulisboa.pt), (2) Graduate University of Chinese Academy of Sciences, Beijing 100049, People's Republic of China, (3) Departamento de Geociências and CESAM, Universidade de Aveiro, 3810-193 Aveiro, Portugal, (4) Partex Oil and Gas, Rua Ivone Silva, 6 - 1 [U+25E6] , 1050-124 Lisbon, Portugal, (5) State Key laboratory of Marine Geology, School of Ocean and Earth Science, Tongji University, Shanghai 200092, China

Geostatistical seismic inversion has been routinely used in the oil and gas industry to characterize the subsurface in terms of its petro-elastic properties, such as P- and S-wave velocities and porosity. Advantages of these modelling techniques are related with the ability to constrain inverted models to data with different support scales (i.e. seismic and well data) and propagating the geophysical uncertainty along the entire inversion procedure, then incorporating it as part of the inverse solution and identify critical areas as associated with higher risks. Here we show a geostatistical seismic oceanography methodology able of inverting conventional seismic oceanographic data simultaneously for high-resolution temperature and salinity ocean models spatially constrained by both seismic oceanography and XBT data. Resulting models are able to reproduce direct measurements of the ocean properties of interest at its locations, the relationship between them at the expected water depths and the spatial uncertainty of each property individually. We show an application example over a real set of contemporaneous XBT data and two-dimensional seismic profile acquired southwest of Portugal. The performance of the inverted temperature and salinity models was assessed by comparing its values against direct existing XBT not used to constrain the inversion procedure.