

Identification of New Seismic Evidence Regarding Gas Hydrate Occurrence and Gas Migration Pathways Offshore Uruguay

Tomasini, Juan ¹; de Santa Ana, Héctor ¹; Johnson, Arthur H. ² (1) ANCAP, Montevideo, Uruguay. (2) Hydrate Energy International, Kenner, LA.

Natural gas hydrates are crystalline solids formed by natural gas (mostly methane) and water that are stable at thermobaric conditions of high pressure and low temperatures that are found in nature in areas of permafrost and in offshore basins of continental margins.

Besides the various applications related to the study of this subject, international interest in natural gas hydrate has grown in recent years mainly due to the estimations of large amounts of carbon stored in this form and its potential as an energy resource. An increasing number of countries have established research programs regarding hydrates.

In the Uruguayan territorial sea, seismic evidence for the occurrence of gas hydrate has been identified based on the presence of BSRs (bottom simulating reflectors) in 2D seismic reflection sections. Initial determinations concerning the presence of BSRs indicate an area of 5,000km² (de Santa Ana et al 2004) according to information from seismic surveys performed offshore Uruguay between 1970 and 2002, which are available so far in non-digital media (paper and acetate).

In order to reach to a better understanding of the extent of gas hydrate-bearing sediments offshore Uruguay, we interpreted more than 10,000 km of regional and semi-detailed 2D reflection seismic sections from surveys shot in 2007 and 2008, using the Kingdom Suite© seismic interpretation software. Special seismic processing was also performed on some of these new seismic sections using multi-attribute and neural networks focused on the identification of gas chimneys.

In this paper we present recent results regarding the identification of BSRs in 2D seismic data acquired in the years 2007 and 2008, which indicate the presence of BSRs in areas that were not previously identified. The BSRs extend over an area of approximately 22,000 km² and show that the potential for this non-conventional resource offshore Uruguay is higher than thought.

We also show seismic evidence suggesting the existence of free gas below the hydrate stability zone (sub-hydrates prospects) through the presence of increased amplitudes below the BSR. Additionally, we present the results of the processing for identifying chimneys, which suggest a thermogenic origin of the gases that reach the hydrate-bearing layers.