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## **Methane Seep Hunting: landforms depiction and associated Species Distribution Modelling (SDM) on the Sinu continental shelf, Colombian Caribbean**

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In the marine environment, cold seeps release fluids, either gases or liquids, from the seafloor. Methane is among the most common gasses. Various landforms, such as pockmarks and mud volcanoes, are associated with fluid flow systems, and they can be easily detected through acoustic investigations. In addition, cold seeps harbour unique ecosystems populated by methane-related species (e.g. foraminifera, crustaceans). Finally, it is worth mentioning that methane is a potent greenhouse, and emissions from the seabed may enter the atmosphere and contribute to the global carbon budget. The offshore Colombian Caribbean, deemed a methane-dominated gas province since the 1970s, still lacks comprehensive understanding. The Colombian project

"Methane Seep Hunting" employs a multi-scale, multi-method approach to detect methane seeps, assess their activity, and identify sources using cutting-edge technology. A Multibeam Echosounder (MBES) survey offshore the Morrosquillo Gulf uncovered more than 20,000 pockmarks in a 220 km<sup>2</sup> area, ranging from 40 to 320 m in depth. Despite the little active seepage detected from the water column data during the survey, the analysis of the bathymetric and backscatter data revealed numerous potential natural seepage sites. Biological sampling over 25 sites allowed the collection of different methane-related species, which were used for Species Distribution Modelling (SDM) to predict the likelihood of encountering other methane emissions in the region.

**Keywords:** Methane, Cold seeps, Pockmarks, Fluid system, Submarine geomorphology, Colombia Caribbean