

# **Contribution of geochemical gas analyses to the understanding of the subduction-related petroleum system's dynamics of North Peruvian fore-arc**

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The North Peruvian forearc system (NPFS), is one of the few forearc systems with proved petroleum potential and have been studied and explored for several decades (Raez Lurquin, 1999[1]; Fernandez et al. 2005[2] , Fildani et al., 2005[3]; Espurt et al., 2018[4], Lemgruber-Traby et al., 2020[5]). However, several questions persist concerning the origin of its active petroleum system.

The Modelling of long-term basin scale cooling caused by the oceanic lithosphere subduction permits to constrain the thermal structure and source rock maturity history of this complex forearc (Lemgruber-Traby, 2020[5]). The results of this previous work show that the known source rocks are immature in the northern part of Talara basin and in the onshore Tumbes basin. However, in these zones, the hydrocarbon discoveries are mainly gas fields.

The present work is part of Lemgruber-Traby 2020[5] study and aims to constrain the origin of this gas. For that, gas bubbling from three thermal seeps and one oil seeps were sampled and analysed. The gas composition, isotopic and noble gas analysis will be presented. The mechanism of gas generation will be investigated and their implications on the petroleum system dynamics will be discussed based on both literature and our previous results.

[1] Raez Lurquin, M.A. (1999), Perupetro Ingepet '99 seminar, Lima, Peru, Oct 26-29, EXPR-1-MR-12, 19p.

[2] Fernández, J., et al. (2005), PeruPetro S.A. Basin Evaluations Group Exploration Department.

[3] Fildani, A., et al. (2005), AAPG Bulletin, vol. 89, n° 11, p. 1519–1545.

[4] Espurt, N., et al. (2018), Tectonics, vol. 37, n° 1, p. 251–282.

[5] Lemgruber-Traby (2020), PhD report.