



Onshore Gas leakages geochemical and geological study: A synthesis and exploration of potential utilization possibilities

Bellas, Spyridon ^{1#}, Pasadakis, Nikos ^{1,2}, Marinakis Dimitrios ², Gontikaki, Evina ¹ and Selekou Konstantina ¹

¹ Institute of GeoEnergy (IG/FORTH), Chania, Greece

² School of Mineral Resources Engineering, Technical University of Crete

Presenting author

* Corresponding author: Spyridon Bellas, email: spyrosbellas@ipr.forth.gr

ABSTRACT

Onshore and Offshore gas leakages occur worldwide in various geological settings, and may originate and can be related to a) hydrocarbon accumulations (thermogenic), b) biological processes (biogenic) c) coal seams (as Coal-Bed Methane, CBM) or d) volcanic activity [1]. Such types of gases (composed mainly by CH₄) are formed by decomposition of organic matter through temperature and/or pressure increase (burial) or by biological action.

The present study investigates gas leaks identified in northern Greece, Municipality of Deskati, near the Community of Katakali, a project supported by the Western Macedonia Region [2]. Hydrogeological wells have been drilled near Katakali in the past, which have later been abandoned due to the release of unknown gases along with water. These gases are capable of igniting and have been continuously leaking for a period of over 40 years.

Geologically the area covers the so-called Karpero sedimentary basin, which equals an acreage of 115 sq.km. Paleogeographically, it was part of an elongated trench, called Mesohellenic Trough, which runs in a NNW-SSE direction, although the basin itself developed almost vertically to this direction, possibly due to the T5 tectonic event [3].

We examine the phenomenon of gas leaks in two sites, giving precise GIS based locations of the old and newly identified wells that leak, trying to match the geological context to the gas escapes. The methodology applied includes a) a separator that was constructed and mounted to the well heads (each with a different diameter), b) sampling of the gases, water and the surrounding soil to detect the presence of methanotrophic bacteria using phospholipid fatty acid (PLFA) stable isotope analysis (GC-C-IRMS), c) laboratory geochemical analysis by Gas-Chromatography (GC) supported by a Dielectric-Barrier Discharge Ionization Detector (BID), d) combination-synthesis with the geology and legacy geophysical data.

Data analysis will attempt to elucidate the biogenic or thermogenic origin of the escape gases, which will allow us to proceed with a number of scenarios for the proper exploitation of this potential resource. In context of the energy poverty of the region, this study could provide proof of a new gas energy field that would distribute affordable energy to the local community in various forms, such as electrical, warming of greenhouses, hydrogen production, or alternatively as an educational and tourist attraction hub in the frame of the wider Tethys-GeoPark of the area.

REFERENCES

- [1] Daskalopoulou, K., Calabrese, S., Gagliano A.L., D'Alessandro, W., 2019. *Applied Geochemistry*, 106: 60-74.
- [2] Project Agreement between Western Macedonia Region and FORTH/IG, 2021. Preliminary assessment of gas leakages in the Katakali area of Grevena Regional Unit and potential utilization.
- [3] Killias, A., Vamvaka, A., Falalakis, G., et al. 2015. *Journal of Virtual Explorer*, 48: 1-23.