



## In-soil hydrogen concentration measurements using MONHyTOR.

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Soil gas analysis is among the commonly used methods in the early stages of natural hydrogen exploration. While most punctual [H<sub>2</sub>] measurements can provide information on spatial variation, observing temporal variation requires long-term monitoring. The University of Pau and Adour Countries developed a hydrogen-monitoring instrument called MONHyTOR. It is a passive instrument capable of acquiring [H<sub>2</sub>], temperature, and relative humidity data with up to 1-s sampling interval at 1-m depth for up to several months in full autonomy.

Preliminary field data from multiple sites show that (1) an “installation peak” is almost systematically observed after drilling; (2) measured [H<sub>2</sub>] is nil most of the times; (3) daily oscillations are present in some datasets; (4) small-amplitude isolated peaks are seemingly related to weather events such as storm and heavy rain. These observations raise the question regarding the influence of water saturation and pressure balance in the atmosphere-soil-instrument system. To understand them, experiments are carried out in a controlled environment using airtight container filled with coarse homogeneous sand with a given water saturation level, where hydrogen is introduced via low-pressure (mbar) injections of 5%-95% H<sub>2</sub>-N<sub>2</sub> mixture. The aim of this study is to see how variations in the pressure balance impact [H<sub>2</sub>] measurements by MONHyTOR.