



Institut des Sciences de la Terre

### Research Engineer position:

#### Field exploration of hydrogen (H<sub>2</sub>) and associated gas – Methodologies and assessment strategy

Over the last 30 years, geochemical research has demonstrated that H<sub>2</sub>, formed by chemical and nuclear reactions, occurs on Earth in several specific geologic environments. Hundreds of natural H<sub>2</sub> seepages, generally connected with circulation of hydrothermal fluids through ultramafic rocks, have been discovered both under the seafloors and on the continents. Recent exploration of deep ancient fluids trapped in some Precambrian crystalline bedrocks have also revealed surprisingly high level of H<sub>2</sub> and CH<sub>4</sub>, and observations of intra-cratonic H<sub>2</sub> seepages and accumulations with no obvious genetic link with ultramafic formations challenge our understanding of hydrogen production and fate in the crust.

The existence of geological fluids rich in natural hydrogen raises the question about the energy potential of this carbon-free resource. However, to date there is no exploration strategy based on robust methodologies and pathfinders. Therefore, it is important to develop an exploration guide that is not only focused on surface gas monitoring, but that also considers the local deep geological setting integrating the entire hydrogen system from source to trap or leakage into the atmosphere.

Our multidisciplinary team at ISTerre laboratory is committed to address every facet of the H<sub>2</sub> system (sources, migration, sinks and seeps) in order to define specific exploration strategy. We develop a holistic approach encompassing water-rock hydrothermal experiments, reactive transport modelling, geomechanics and geophysics. All this knowledge is then transposed in the field where we deploy a state of the art [mobile laboratory](#) specially design to explore H<sub>2</sub> and He migration.

The hired Research Engineer will develop innovative methodologies for gas monitoring in the field (gas adsorption sensors, onsite measurement of noble gases content and stable (H, C, O) isotopes fractionation, remote detection of gas seepages), and in rock samples (fluid inclusions, thermal desorption, crushing). Integration of new geophysical equipment (magnetotelluric, electromagnetic conductivity) will be particularly important. She/he will participate to field investigations. The objective will be to track H<sub>2</sub> seepages and to reveal geological/topographic control on gas migration. The main activities are expected to be the following:

- developing and deploying or mobile laboratory for H<sub>2</sub> exploration (gas geochemistry and geophysics) – 40%;
- field missions, and in particular the DIVE ICDP project (Ivrea Zone, Italie): 2 months per year – 20%;
- developing magneto-telluric acquisition (20%);
- providing support to the team (3 PhDs, 3 Postdocs, 2 Engineers, 4 permanent Researchers) depending on personal skills (e.g. SEM, Raman, hydrothermal experiments, water or gas analysis, XRD, geophysics, thermodynamic modelling) – 20%.

Even if the proposed position is primarily designed to develop and deploy H<sub>2</sub> explorations instruments in the field, the hired engineer will be highly encouraged to publish her/his results on H<sub>2</sub> prospectivity mapping and assessment strategy in international scientific journal.

**Profile:** The applicant should hold a PhD in one of the following fields: geochemistry, geophysics, mineralogy, geomechanics, mass spectrometry, isotopes geochemistry. In addition, the candidate should be accustomed to field missions in remote areas. The candidate is expected to be proficient in English.

**Conditions:** position of **1 year**. Expected date of employment: **December 1<sup>st</sup> 2022**.

**Wage:** gross monthly salary starting from 2038€ and depending on the candidate's experience.

**Application:** send your CV, motivation letter, and letter of reference to 1) Laurent Truche (Pr, Univ. Grenoble Alpes, [ISTerre](#)), [laurent.truche@univ-grenoble-alpes.fr](mailto:laurent.truche@univ-grenoble-alpes.fr) and 2) Frederic-Victor Donzé (Pr, Univ. Grenoble Alpes, [ISTerre](#)), [frederic.donze@univ-grenoble-alpes.fr](mailto:frederic.donze@univ-grenoble-alpes.fr)

Application deadline: **no later than November 15<sup>th</sup> 2022**.