

## **Rock behaviour under dynamic loading: Application to drilling in extreme environments**

Hard rock drilling is a major issue for the development of geothermal energy due to its prohibitive cost. At great depth, the rock is subjected to a strong geostatic and hydrostatic confinement which increases its resistance and modifies its behaviour. Currently, traditional rock destruction techniques (punching failure with a tricone bit or shearing failure with a PDC bit) do not effectively destroy the rock (fragile bits, limited efficiency). It is therefore necessary to use a rock cutting mechanism more efficient and better adapted to these conditions. In shallow drilling, the use of percussion has shown its effectiveness for drilling hard and fragile rocks with a combined compression and tensile rock failure. The use of this technology in deep drilling should make it possible to increase drilling efficiency. Although there is numerous theoretical and experimental works on the dynamic rocks cutting at atmospheric pressure, the literature is less prolix when it comes to considering the effect of confinement, one of the major difficulties being to develop a representative experiment. An experimental component will be developed and carried out impact tests under representative pressure conditions of deep drilling. The results will be treated by a non-destructive rock damage measurement methodology. A numerical model component will be developed and validated to ensure the modelling of rock behaviour under dynamic loading, and of the solicitation during the impact.