


UE Induced seismicity

 ECTS
3 credits

 Component
UFR PhITEM
(physique,
ingénierie, terre,
environnement,
mécanique)

 Semester
Printemps

- > **Teaching language(s):** English, French
- > **Open to exchange students:** Yes
- > **Code d'export Apogée:** PAX8GEAE

Presentation

Description

During the 60'-90' numerous studies pinpointed on the evidence for seismicity triggered by the different types of geo-resource productions (mining, oil and gas extraction, reservoir impoundment, geothermal production, water supply) and discussed the possible triggering processes. Half a century later, the key challenges for the research community remain to be able to estimate where, when, how long will the induced seismicity sequence last, and what is the maximum possible earthquake size. In order to address these questions, this module revisits case studies related to each type of geo-resource exploitations by selecting the cases where the seismicity and deformation before the exploitation onset are documented, and the production history is known. On such a basis, each of geo-resource exploitation styles are (i) analyzed in term of observed induced deformation and seismicity and (ii) mechanical models of the associated induced stress changes over time and space are presented. A specific focus on the partitioning of the deformation between slow plastic response and brittle seismic failure will be developed as a function of the local geo-mechanical context (tectonic setting, local forcing rate, boundary conditions).

Apart from such these global analyses, tools to extract patterns of time series for these human induced seismicity sequences will be defined using standard statistical seismology law in time space and size domains (e.g. frequency size distribution, aftershocks triggering, ...). These patterns and laws they derive from, will be used to compare the induced seismicity sequences both to the regular tectonic earthquake sequences and to the production history. Some implications-applications for production monitoring will be discussed.

Course parts

UE Sismicité induite / Induced seismicity - CM/TD

Lectures (CM) & Teaching Unit (UE)

21h

Useful info

Campus

› [Grenoble - University campus](#)