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Geophysics, Geomechanics, Geotechnics Innovation Laboratory (LABCOM): a private/public research project for natural hazard monitoring and warning.

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The joint laboratory *Geophysics, Geomechanics, Geotechnics Innovation Lab.* [1] is a research structure joining the Institute of Earth Sciences (CNRS & Univ. Grenoble Alpes) and the Geolithe private company. This joint laboratory aims at developing new techniques and instrumentation prototypes to monitor natural or artificial instabilities such as landslides, rockfalls, mines or civil engineered structures, but also hazards induced but global warming such as rocky glacier destabilization and other permafrost issues.

Among other emerging techniques, we develop:

1. Ambient seismic noise monitoring based on natural resonance frequency analysis for unstable rock mass on cliffs [2].
2. Ambient seismic noise monitoring using cross-correlation technique to track relative changes of rigidity of the soil, to anticipate landslide acceleration phases [3].
3. Microseismic monitoring with advanced algorithms for classification of sources and repeaters detection [4,5].
4. Ground deformation from RFID tags [6].
5. Ground deformation from image correlation, lasergrammetry and stereo-photogrammetry [7].

We will illustrate these techniques by different field examples. An advantageous specificity of our approach is often to connect observations of the surface (ground deformation from optics or RFID) to observations at depth in the bulk of the material (seismology).

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