

## Experimental illustrations of seismic-wave properties of interest for hydrogeological studies

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### Résumé:

The joint study of pressure (P-) and shear (S-) wave velocities (VP and VS, respectively), as well as their ratio (VP/VS), has been used for many years at large scales (compared to near-surface applications) to study fluids in earth materials. Theoretical and experimental developments have been aimed at understanding the effect of saturation and pore fluids on body wave velocities, more particularly in consolidated media. In the field of hydrocarbon exploration for instance, the measurement of VP/VS ratio helps discriminating different pore fluids in reservoirs. But it is only until recently that this approach has been successfully applied to the characterization of hydrosystems. We showed, thanks to controlled field experiments, the ability of VP/VS ratio in imaging spatial and/or temporal variations of water content at the critical zone scale. These promising results still lack quantitative links between water saturation and seismic properties in such materials and context. We consequently developed laboratory experiments to simulate seismic acquisitions on small-scale controlled granular media with varying water levels. The first results clearly showed the influence of the water level on first arrival times, dispersion and amplitude of the recorded wavefields, and how these measurements could be used as monitoring tools.