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Challenges in coupled on-line-on-mine-real time mineralogical and chemical analyses on drill cores

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The SOLSA project aims to develop an innovative on-line-on-mine-real-time expert system, combining sonic drilling, mineralogical and chemical characterization and data treatment. Ideally, this combination, highly demanded by mining and metallurgical companies, will speed up exploration, mining and processing.

In order to evaluate the instrumental parameters for the SOLSA expert system, portable and laboratory analyses have been performed on four samples with contrasting lithologies: siliceous breccia, serpentinized harzburgite, sandstone and granite. More precisely, we evaluated the influence of the surface state of the sample on the signals obtained by portable X-Ray Fluorescence (pXRF) for chemistry and portable Infra-Red spectroscopy (pIR) for mineralogy. In addition, laboratory Raman spectroscopy, X-Ray Diffraction (XRD), XRF and ICP-OES laboratory analyses were performed to compare surface bulk mineralogical and chemical analyses.

This presentation highlights (1) the importance of coupling chemical and mineralogical analytical technologies to obtain most complete information on samples, (2) the effect of the sample surface state on the XRF and IR signals from portable instruments. The last point is crucial for combined instrumental on-line sensor design and the calibration of the different instruments, especially in the case of pXRF.