Mineralogical and chemical information at the mesoscale by LIBS, EDXRF and hyperspektral methods

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A number of methods such as LIBS (Laser Induced Breakdown Spectroscopy with 200 μm resolution), EDXRF (Energy dispersive X-Ray Fluorescence Spectroscopy with down to 20 μm resolution), Hyperspectral imaging (VNIR, SWIR, both 1400 - 25 μm, and LWIR 1400-400μm resolution can be applied to large samples e.g. drill cores to provide textural, mineralogical and chemical information.

The methods applied are quite fast regarding data acquisition, but data interpretation is based on the generation of a complex data base, especially for individual members of solid solutions such as plagioclase or amphiboles. Based on diagnostic endmember or spectral feature extraction a relative objective way is provided for characterization of core sequences according to mineralogy and/or chemistry for the individual methods.

The process of pixel based data characterization is yet partly automatized for the EDXRF method and can be applied to larger sample numbers.

Since none of the applied methods is able to provide all necessary information data merging is needed to enhance the information level. Linking data by pixel co-registration and spectral combination is a major and time consuming issue.

Merged chemical and mineralogical pixel based information of the individual methods by a hyperspectral software such as ENVI provides a new dimension for sample interpretation especially for mineralization, alteration, rock nomenclature, cryptic layering, textural features such as lamination, veining, grain size etc..