3D Imaging on heterogeneous surfaces on laterite drill core materials

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ABSTRACT:

The SOLSA project aims to construct an analytical expert system for on-line-on-mine-real-time mineralogical and geochemical analyses on sonic drilled cores. A profilometer is indispensable to obtain reliable and quantitative data from RGB and hyperspectral cameras, and to get 3D definition of close-to-surface objects such as rheology (grain shape, grain size, fractures and vein systems), material hardness and porosities. Optical properties of minerals can be analyzed by focusing on the reflectance.

Preliminary analyses were performed with the commercial scan control profilometer MICRO-EPSILON equipped with a blue 405 nm laser on a conveyor belt (depth resolution: 10 μm; surface resolution: 30x30 μm^2 (maximum resolution; 1m drill core/4 min). Drill core parts and rocks with 4 different surface roughness states: (1) sonic drilled, (2) diamond saw-cut, polished at (3) 6 mm and (4) 0.25 μm were measured (see also abstract Duée et al. this volume). The MICRO- EPSILON scanning does not detect such small differences

of surface roughness states. Profilometer data can also be used to access rough mineralogical identification of some mineral groups like Fe-Mg silicates, quartz and feldspars). Drill core parts from a siliceous mineralized breccia and laterite with high and deep porosity and fractures were analyzed. The determination of holes' convexity and fractures) is limited by the surface/depth ratio. Depending on end-user's needs, parameters such as fracture densities and mineral content should be combined, and depth and surface resolutions should be optimized, to speed up "on-line-on-mine-real- time" mineral and chemical analyses in order to reach the target of about 80 m/day of drilled core.