TRACING AND MAPPING THE EXTRATERRESTRIAL CONTAMINATION IN IMPACTITES WITH PORTABLE µ-XRF INSTRUMENTS: POTENTIALS AND REAL TIME FIELD TESTING AT ROCHECHOUART

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The first reports on projectile contamination at large terrestrial impact structure came from the recognition of anomalous high Ni concentration in impactites compared to the target rocks [e.g., 1 and 2]. Those were later completed by PGEs, or Cr- and Os-isotopes data allowing the identification of the projectile component [e.g., 3 and 4].

We have tested of the newest generation of portable µ-XRF handheld spectrometer Tracer Turbo³ manufactured by Bruker and its potentials for field measurement of Ni and Cr in impactites. Several well studied impact rock samples from Popigai, Lockne, Lappajärvi, Lake Mistastin, Rochechouart and Sääksjärvi were used for laboratory tests. A measuring time of 60 s was found to be sufficient to detect the presence of Ni down to ~10 ppm, a value significantly lower than the average composition of the continental crust ~ 60 ppm [6]. The reproducibly was better than 20 %, despite the small size of the measured spot of 5 mm in diameter. No significant effects due to roughness of the surface were observed. A comparison between impactites and target rocks and a mapping of the projectile contamination within selected suevites, impact melt rocks and fine-grained impactites will be presented as part of a full benchmarking and field testing experiment at Rochechouart. The measurements will be performed in real time during the 2009 MetSoc pre-conference field-trip. Data will be evaluated and discussed both in the field and at the conference as part of the testing experiment.

Conclusion: The new µ-XRF instruments are confirmed as powerful tools for fast in situ geochemical characterization of rocks and geo-materials, for example the potential for tracking and mapping extraterrestrial contamination at impact craters. The high element sensitivity and easy handling of these instruments are fundamental features for the geological field work in general.