

## SUMMARY

The detection of mineral phases under *in situ* conditions has become a primary but sometimes also challenging task in many fields of geoscience. Raman spectroscopy has been used as a powerful tool for the identification of various minerals and organic compounds. The advantages and the relative simplicity made this method a promising choice in the future planetary exploration missions to Mars. The deposits of *aqueous* minerals including sulfates have been found on the Martian surface. With the development of miniaturized handheld spectrometers there is a need for evaluation of Raman spectroscopy as a method of identification of sulfate phases in their natural conditions. In the first part of this work a handheld spectrometer equipped with 532 nm excitation laser was tested under laboratory conditions during which the ability to distinguish mineral samples representing sulfates of different chemical composition and different degree of hydration was investigated. In the second part, two handheld Raman spectrometers equipped with 532 and 785 nm excitation lasers were used for the characterization of sulfate phases on sites of their natural occurrence located in the Czech Republic. The quality of the Raman spectra acquired under outdoor conditions by both spectrometers was rather average but sufficient to distinguish among the different sulfates. Common simple sulfates (gypsum, rozenite) were easily identified. Identification of specific phases in the natural mixture of sulfates forming isomorphic groups (jarosite or copiapite) was ambiguous. Contemporary handheld Raman spectrometers can be used for identification of sulfates under *in situ* conditions. However, an additional verification of certain sulfates using other methods remains necessary.