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Leka Ophiolite Complex as analogy to the serpentinization-carbonation system on Mars.

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Serpentinization and carbonation have affected ultramafic rocks on Noachian Mars in several places. Among the most prominent systems revealing mineral assemblages characteristic of serpentinization/carbonation is the Nili Fossae region [1]. Jezero crater – the target of the Mars 2020 rover – hosted a paleolake which constitutes a sink for sediments from Nili Fossae [1]. Thanks to the near infrared spectrometer onboard Mars2020 [2], the mission has the potential to offer ground truth measurement for other putative serpentinization/carbonation system documented on Mars. Several important aspects that may be addressed are: Do carbonates result from primary alteration of olivine-rich lithologies or are they derived by reprocessing of previous alteration minerals [3]? What is the composition? and nature of the protolith, which appear to be constituted of considerable amounts of olivine [4]? To reveal critical information regarding the conditions of serpentinization/carbonation, accessory minerals need detailed studies [1; 5]. In case of Jezero Crater, and serpentinization on Mars in general, the main alteration minerals are identified, but little is known about the accessory minerals.

The Nili Fossae-Jezero system has potential analogues in terrestrial serpentinized and carbonated rocks, such as the Leka Ophiolite Complex, Norway (PTAL collection, <https://www.ptal.eu>). Here, distinct mineral assemblages record different stages of hydration and carbonation of ultramafic rocks [6].

We perform petrological and mineralogical analyses on thin sections to characterize the major and trace minerals and combine with Near Infrared (NIR) spectroscopy measurements. We study the significance of the mineralogical assemblages including solid solution composition and nature of accessory minerals. Effect of the presence of accessory minerals on the NIR signal is investigated

and their potential incidence on the amount of H₂/CH₄ production in mafic or ultramafic system is discussed [5; 8]. This could improve our understanding of serpentinization and carbonation processes on Mars, which can guide future in-situ operations and also help for a better interpretation of the remote sensing data acquired on other possible serpentinization/carbonation systems.

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