Influence of mineralogy on the preservation of biosignatures under simulated Mars conditions

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Planetary field analogues (i.e. terrestrial samples with similar geological or environmental conditions as those on extra-terrestrial planetary bodies) are used for *in-situ* testing of protocols and technologies, as well as for analyses in the laboratory. In parallel, laboratory analogues (i.e. laboratory set-ups) are used to mimick extraterrestrial planetary conditions (e.g. pressure, atmospheric composition, radiation, temperature, etc.) [1]. In order to successfully detect organic molecules in future life-detection space missions, in particular on Mars, it is important to determine the influence of mineralogy on the preservation of biosignatures under simulated Mars conditions, i.e., when using laboratory analogues that simulate the conditions of Mars.

We have analyzed the preservation degree of amino acids spiked onto Mars-relevant minerals under simulated Mars conditions [2]. Our results indicate that smectite clays (i.e. montmorillonite, nontronite and saponite), and sulfates (i.e. gypsum and jarosite) were the minerals with the highest proportion of preserved amino acids. These results were discussed in the context of several variables, e.g. surface area, pore size, iron content, etc. Data suggests that smectites protected amino acids under simulated Mars conditions due to high surface areas and small pore sizes, while jarosite protecteded these biosignatures because of its opacity to UV radiation [2]. The use of laboratory analogues helps to target the best locations to search for habitability conditions and life on the Red Planet. Indeed clays and sulfate minerals on Mars are relevant in the astrobiology context as they indicate past habitable environments where water was present [3,4]

[1] Z. Martins et al., *Space Science Reviews* **209**, 43 (2017). [2] R. dos Santos et al., *Icarus* **277**, 342 (2016). [3] Squyres et al., *Science* **306**, 1698–1703 (2004). [4] Downs et al., *Elements* **11**, 45–50 (2015).