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Planetary and astrobiological significance of Canary Islands (Spain): review, state-of-the-art and future developments

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So far, we do not know of a place on Earth which is truly like Mars or any other planet or moon in our solar system. Nevertheless, it is possible to identify terrestrial analogue sites, where environmental conditions approximate, in some specific ways, those possibly encountered on other celestial bodies, at present or earlier in their geological history. These sites are also privileged areas to define scientific models and testing new instrumentation, paving the way for understanding lunar and planetary processes and habitability conditions.

The Canary Archipelago (Spain) is one of the main and most geodiverse and interesting chain of oceanic islands worldwide, displaying a long history of eruptions and a huge variety of volcanic and plutonic rocks. The islands are dominated by basaltic rocks, but show a great petrologic and geochemical diversity including alkaline basalts (some of them showing tholeiitic tendencies), trachybasalts, basanites, tephrites, rhyodacites, rhyolites, trachytes, phonolites and carbonatites.

Several areas of the Canary archipelago have been (and are) used as analogue sites for performing scientific and engineering studies, in relation with the exploration and research of Mars and the Moon. They include:

a. geological, mineralogical and geochemical studies of volcanic rocks, rock-fluid interactions and mineralization processes;
b. operational and instrumentation activities, such as field testing of rovers and the use of portable spectroscopic prototypes (e.g. Raman), and
c. the use of volcanic materials (e.g. basaltic rocks and soils) for the fabrication of asteroidal, lunar and Martian regolith simulant.

This contribution provides a review and state of the art of the previous works which were carried out, until now, at Tenerife, La Gomera and El Hierro Islands and the future plans and developments, mainly focused on Lanzarote (Lanzarote and Chinijo Islands Geopark) as a potential location for developing Mars analogue studies and geoeducational and geocultural activities).