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Hydrothermal, deuteric and acidic basalt alteration at the Skouriotissa Mine, Cyprus: relevance for Mars.

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Basalts are the prevalent rock type on Mars and the products of aqueously altered basalts and hydrated minerals associated with basalts are of particular interest as possible tracers of a past, slightly more clement climate on the planet and/or magmatic processes [1,2]. Study of alteration processes of basalts on Earth that show some similarities to surface and subsurface processes occurring on Mars will help understand and interpret martian features.
The Skouriotissa mine in Cyprus is an open pit copper mine (consisting of a very massive sulphide deposit, VMS) exposing the upper pillow basalt formation in the Troodos ophiolitic zone. The basalt has been altered by (1) hydrothermal and deuteritic processes and (2) acidic water (pH <5) associated with the mining working.
We have analysed the mineralogical evolution of the basalt through different alteration facies (phyllosilicates, including Mg-smectite, vermiculite, nontronite, and zeolites), depending on the type of alteration. Similar mineralogical associations have been described on Noachian/early Hesperian Mars (e.g. [1,2.3]) and may have been formed by the same kinds of processes.
These suites of rocks form part of the collection of Mars analogue rocks that is being prepared at the CNRS/Observatoire des Sciences de l'Univers en région Centre (OSUC) in Orléans to help calibrate present and future flight instruments (e.g. MSL, the international Mars- 2018 in situ mission). This collection is named International Space Analogue Rockstore (ISAR) and the relevant information is contained in the website: http://www.isar.cnars-orleans.fr [4,5].

[1] Bibring et al., 2006, Science 312; [2] Ehlmann et al., 2011, Nature 479; [3] Meunier et al., in prep. ; [4] Bost N. et al., in review (Icarus).[5] Bost N. et al., This Conference, abstract 1403.