Mapping and petrographical characterization of Pleistocene travertine deposits in Gardiner, Montana, USA.

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The travertine deposits at Gardiner are the less known Pleistocene counterparts of the Mammoth Hot Springs (MHS) formations. Gardiner's travertines are formed at juvenile stage by the precipitation of $CaCO_3$ from Hot-Springs. The travertine build-ups have shaped but also followed the local geomorphology. The travertine deposits were precipitated during small-scale retreats of the Pinedale Glacier during the Quaternary (Pleistocene to Holocene) (Sorey, 1991; Sturchio et al., 1994). The study area is composed of patches of travertine deposits exposed along roads and in former small-scale quarries over an area of about 3 km^2 and they overlay basalt columns and quartzite deposits and interfinger with glacial, coarse grained diamictite. This work will be focused on the White Rubble Area I, White Rubble Area II, the Volcanite Outcrop and the Red Quarry. The following 2 questions present the "objectives" of this project: (i) Can we identify the same "Facies types" in the study area of Gardiner as observed in Mammoth Hot Springs (the recent analogue of Gardiner)? (ii) Which diagenetic processes take place and what parameters control these processes? The "5 Facies Model" (Fouke et al., 2000) is used to recognize the features on the field at Gardiner. These facies types are seen at the Mammoth Hot Springs in the YNP, Wyoming, USA – the modern analogue of Gardiner's travertine. Because Gardiner has no active springs, these facies have been under the influence of diagenetic modifications and thus are not easily identified on the field. Additionally, in contrast to the well-known sub-recent deposits of the Mammoth Terraces, the ancient springs deposits show a variety of colors ranging from whitish – similar to the recent MHS deposits – to yellow and red and different degrees of diagenetic modification, including cementation, recrystallisation and complete dissolution. Further investigation such as thin sections analyses, mineralogy (XRD) and detailed carbon-oxygen stable isotope geochemistry of different carbonate phases will help to classify them.

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