Carbonate ooids cemented by evaporites in Pleistocene Salt Lakes in the Qaidam Basin, Tibetan Plateau

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We found three sedimentary beds containing carbonate ooids cemented by evaporites in the northwest Qaidam Basin, one of the largest Martian analog on Earth [1]. These ooids were dated by U-series disequilibrium methods for their formations. A dolomitic ooid layer formed at 293 $\pm$ 4 kyr and cemented by gypsum at 266 $\pm$ 3 kyr, an aragonitic ooid layer formed at 163 $\pm$ 1 kyr and cemented by halite at 111 $\pm$ 0.8 kyr, and another aragonitic ooid layer formed at 38 $\pm$ 0.5 kyr and cemented by gypsum at 23 $\pm$ 0.3 kyr. The stable carbon and oxygen isotopes indicate an abiotic genesis of these ooids. The Raman spectroscopic study of organic extracts from these ooids indicate ubiquitous preservation of scytonemin, a unique cyanobacterial ultraviolet radiation-shielding pigment [2]. This discovery suggests that ooids are capable of preserving biomarker from their depositional environment for a long period of geological history. The signals belonging to scytonemin should also be detected in older ooids samples.

[1] Angelica & Li (2017) *J. Geophys. Res.-Planets* **122**, 856-888. [2] Sun et al., (2019) *Geophys. Res. Lett.,* **46**, 10375-10383.