BIOSIGNATURES IN PRECAMBRIAN AND CAMBRIAN CARBONATE RICH SEDIMENTARY SEQUENCES OF ANTI-ATLAS, MOROCCO. M. Glamoclija[1], A. Murphy[1], K. Taj-Eddine[2,3], G.G. Ori[3,4], [1]Department of Earth and Environmental Sciences, Rutgers University-Newark, Newark, New Jersey, U.S. (m.glamoclija@rutgers.edu), [2]Faculté des Sciences Semlalia, Université Cadi Ayyad, Marrakech, Morocco, [3]Ibn Battuta Centre, Marrakech, Morocco, [4]International Research School of Planetary Sciences, Universitá d'Annunzio, Pescara, Italy.

Introduction: Both current Mars2020 landing site candidates contain sedimentary sequences with carbonates. Mars2020 will investigate outcrops at Jezero Cater or Midway localities and select the samples that have high biosignature preservation potential to have brought back to the Earth by Mars Sample Return mission. The Noachian and Hesperian lithological sequences of Jezero and Midway contain minerals indicative or aqueous regional history as well as carbonate bearing rocks.

Carbonate-rich lithological sequences on Earth are common fossiliferous strata and Mg-Ca carbonates (dolomites) will also preserve organics; however, the diagenetic processes and lithification involved in dolomitization will obliterate organismal/fossil morphology. Our intention is to look at carbonate rich sedimentary sequences that had obviously been microbially mediated, i.e. stromatolites, and had endured different levels of diagenetic and metamorphic changes to evaluate biosignatures using high-resolution petrological analyses, isotope geochemistry, and organic chemistry.

Rationale: Learning how the Earth has developed as a habitable planet is fundamentally important to our understanding of data from other planets, in particular exploration of the habitability of extinct Martian environments. To assess the preservation of Precambrian and Cambrian habitats we have conducted a several transects in Anti-Atlas Mountains. We targetted volcanic-sedimentary lithologies of Precambrian to use as fossil bare end member strata and Cambrian sedimentary lithologies of western Anti-Atlas, that contain well preserved fossil remnants to eastern Anti-Atlas sedimentary lithologies that had been exposed to active volcanism and possibly thermal alteration. Some of the transects of the eastern Anti-Atlas Mountains in Morocco are geochemically well studied and their $\delta^{13}C$ isotope record exhibits the isotope shift in values between Ediacaran and Cambrian periods [1]. The shift in isotope values reflects to change in C cycling due to transition in biological ecology. We have collected samples along two transects that will cover this environmental change. One of our goals is to investigate preserved stromatolites and other fossils to gather data about preservation of organics in these lithologies and geochemistry that could reflect environmental changes close to rise of the Cambrian.

We targeted several locations to collect relevant lithological sequences and capture transition from Moroccan Upper Precambrian (Ouarzazate group) and Ediacaran to later Cambrian environments. The Ediacaran period is characterized by strong volcanism so most of the lithologies from this period belong to the volcanic complex and not to sedimentary sequences that may hold fossils. We have sampled the end of the volcanic Ouarzazate conglomerates as clearly non-fossiliferous lithology and Precambrian Serie de Base was identified based on the Ediacaran fossils at the lower level at two different transects. Above this sequence lays a thick sequence Dolomie Inferieure which contains the δ13C excursion and Precambrian-Cambrian border, we have sampled this sequence too at two different transects. Above the dolomites is Vie de Lin Series containing Stromatolites and stromatolite-like features that will be examined and analyzed. One of the sampled western Anti-Atlas transects is directly comparable to classic Tiout section, the other one is newly selected. In this way we have generated the best sample collection for the targeted period. Additionally, the first occurrence of Moroccan stromatolites is associated with Ediacaran Ouarzazate volcano-sedimentological Supergroup of Zenaga and Saghro Anti-Atlas inliners [2]. These famous reddish stromatolite dome structures represent interplay between lava flows, tuffs, terrigenous sedimentation, and microbial carbonates and are the first published fossils from Ediacaran period of the eastern Anti-Atlas. We have collected these at two locations and as well as their contextual lithologies to determine the environmental settings in which the stromatolites started to form and the environmental settings that caused their preservation. We will be comparing the level of preservation of biosignatures among these Precambrian and Cambrian carbon bearing strata and will aim to identify the processes that were conducive to the preservation and the specific causes of biosignature alteration.

References: [1] Maloof A. C. et. al (2010) *Geol, 38/7,* 623–626. [2] Alvaro J. J. et. al (2010) *Precamb. Res., 179,* 22-36. **Acknowledgments:** This work was supported by Europlanets 17-EPN3-038 grant to M.G.