Exomars at Oxia Planum, probing the early Martian environments.

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The European Space Agency (ESA) ExoMars 'Rosalind Franklin' Rover will launch in 2022, and land on Mars in 2023. The goals of the mission are to search for signs of past and present life on Mars, to investigate the water/geochemical environment as a function of depth in the shallow subsurface, and to characterize the surface environment. Of these, the key goal is the search for ancient biomarkers. To meet this scientific goal and minimize the risk of landing, eight candidate sites were whittled down to only one: Oxia Planum.

Thanks to several generations of Martian orbiters, the surface of Mars can be imaged down to 50 cm per pixel, measured in term of topography and investigated in term of mineralogy thanks to several spectrometers at different wavelength and spatial resolution. Combining this complementary data set, the characterization of the landing sites is possible both in term of engineering constraint and geological evolution.

Oxia Planum exhibits outcrops of Noachian phyllosilicates over hundreds of kilometers of terrain. The site also hosted during Noachian times a standing body of water leading to the formation of a delta fan enriched in hydrated silicates. Hence, this site recorded at least two clearly distinct ancestral aqueous environments and contexts, both during the Noachian: 1) the alteration of the 50 to 100 m of layered deposits and 2) the fluvio-deltaic system post-dating wide-spread clay-rich layered unit. The intense erosion undergone by Oxia planum attested by both the lack of impact craters and inverted morphologies, would have uniquely exposed these two types of noachian sediments. Deciphering the formation environments for such diverse noachian altered rocks would fulfill the goals of the ExoMars Rover.

Mots-Clés : Mars, landing site, exomars

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