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Cuatro Amigos- the four stromatolites in a row. The first 3D image of the oldest evidence of life in the geologic record

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The 3.48 Ga Dresser Formation, Pilbara Craton, Western Australia provides the Earth's most convincing evidence of early life through a diverse array of biosignatures. However, identifying biosignatures in Archean rocks is difficult due to billions of years of erosion, deformation, and metamorphic alteration. Characterisation of community-accepted biosignatures also remains challenging, particularly the robustness of textural biosignatures as indicators of early life in Archean rocks. The textural biosignatures identified in the Dresser Formation are identified in surface outcrops that are weathered. Therefore, in May 2019, fresh Dresser deposits were drilled to aid in a better understanding of these ancient biosignatures and to provide validity to a biogenic origin.

Three well-preserved cores of 5-30 m thickness and 8 cm in diameter were extracted from ~70 m beneath the land surface. The cores provide excellent preservation of biosignatures, including the preservation of fossilized, pyritized, stromatolites. One stromatolite horizon within the core exhibits extraordinary morphological structures. Here we present preliminary results of the 3D geometry of these fossil stromatolites. 3D structures were obtained using the neutron imaging station DINGO at ANSTO. A full tomography of a first sample has been scanned with 1896 projection with an angular step of 0.19° and an exposure time of 60 seconds per projection. The data was reconstructed using filtered backprojection technique with Pydingo (a free in-house developed python toolbox). 3D-rendering was done with VG-Studio. This horizon aids in better defining the biogenicity of these textural biosignatures.

Level of Expertise

Student

Presenter Gender

Woman

Pronouns

She/Her

Which facility did you use for your research

Australian Centre for Neutron Scattering

Students Only - Are you interested in AINSE student funding

Yes

Do you wish to take part in the Student Poster Slam

No

Condition of submission

Yes

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