



Country /City Italy, Ferrara

University / School University of Ferrara

Academic year 2020/2021

Title of the project Mars underground : a Landscape Strategy for Long Term Human Colonies on the Red Planet

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TECHNICAL DOSSIER

Title of the project Mars underground : a Landscape Strategy for Long Term Human Colonies on the Red Planet
Authors Francesco Axel Pio Romio
Title of the course Landscape Architecture and Infrastructure
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Department / Section / Program of belonging Department of Architecture, Sealine Research Center
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Written statement, short description of the project in English, no more than 250 words

On Mars, research has shown the presence of underground conduits of volcanic origin known as “pyroducts” or “lava tubes”, which are also present on Earth and Moon. Underground conduits enjoy little consideration in the Space Architecture literature. After Earth, Mars is the only planet in the solar system in which life forms may have existed, but nowadays the Red Planet is an arid environment where high radiations, micrometeorites impacts, frigid temperatures and other hazards make its surface uninhabitable, if not under heavy shielding. On the other hand, lava tubes provide a space that is already protected from these extreme conditions. Because of the different gravitational acceleration on the planet, they are much bigger in sizes than they are on Earth. This thesis aims to offer lava tubes as a safe alternative for the location of the habitats of long term colonies on Mars. To do so, the goal was to enable the habitability of these below ground structures with the creation of a new landscape inspired by previous terrestrial examples, such as “Los Jameos del Agua” by the Artist César Manrique in the island of Lanzarote, focusing on the importance of vegetation and natural light. For the creation of the needed structures and materials, native resources and cutting edge technologies (3d printed, sintering..) were considered.

For further information

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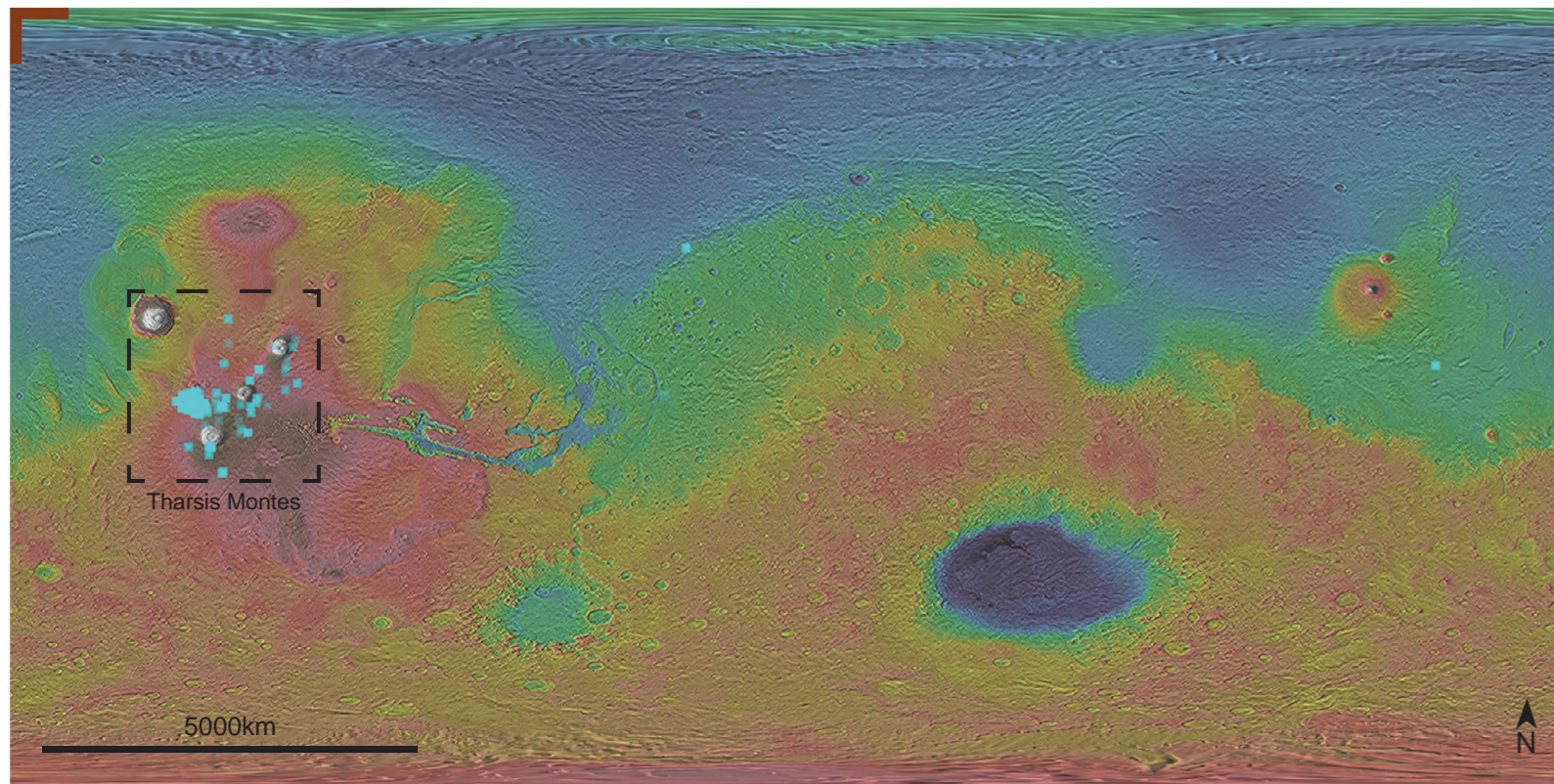
COAC - Colegi oficial d'Arquitectes de Catalunya

Carrer Arcs, 1-3
08002 Barcelona - Spain

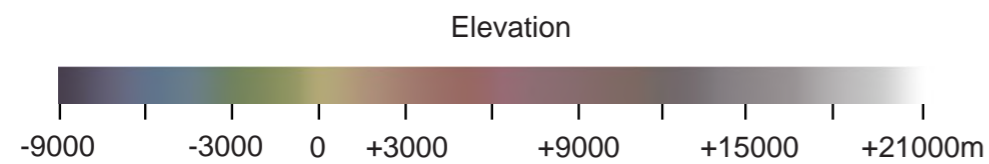
12th International Biennial Landscape Barcelona

Barcelona November 2023

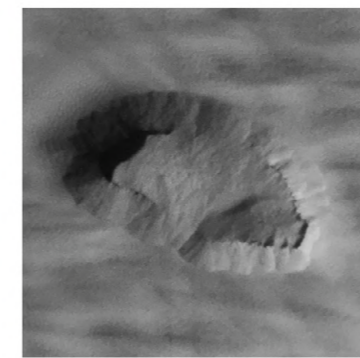
SCHOOL PRIZE



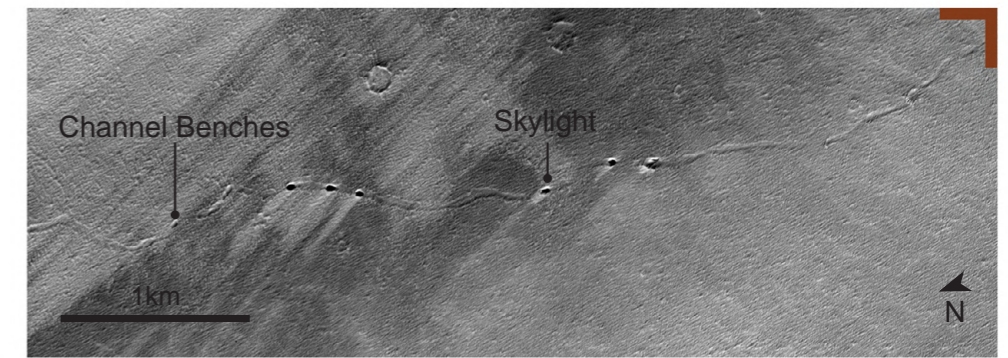
Worldwide distribution of lava tube cave entrances (skylights) on Mars



Skylights



Martian skylight



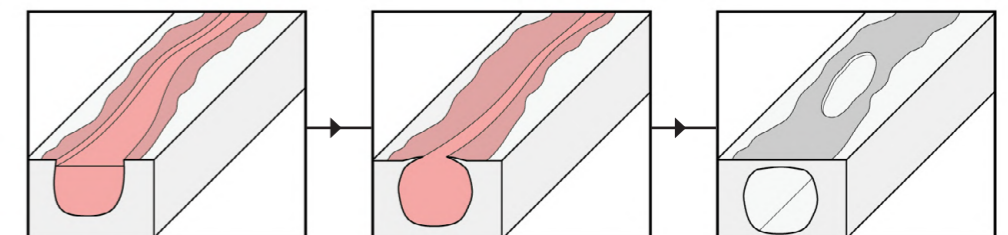
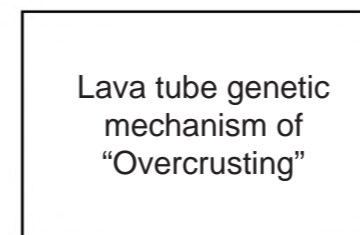
Martian lava tube in Tharsis Montes, Mars



Terrestrial skylight



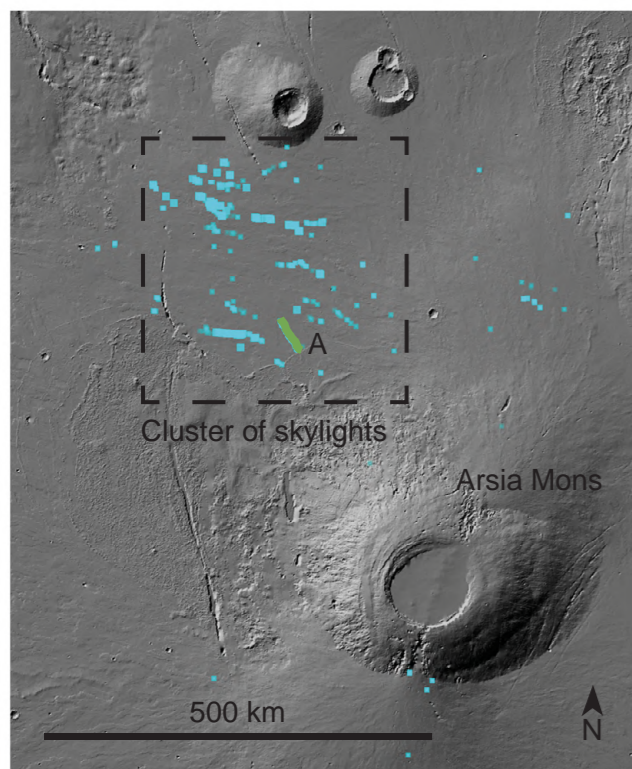
Terrestrial lava tube in Lanzarote, Canary Islands



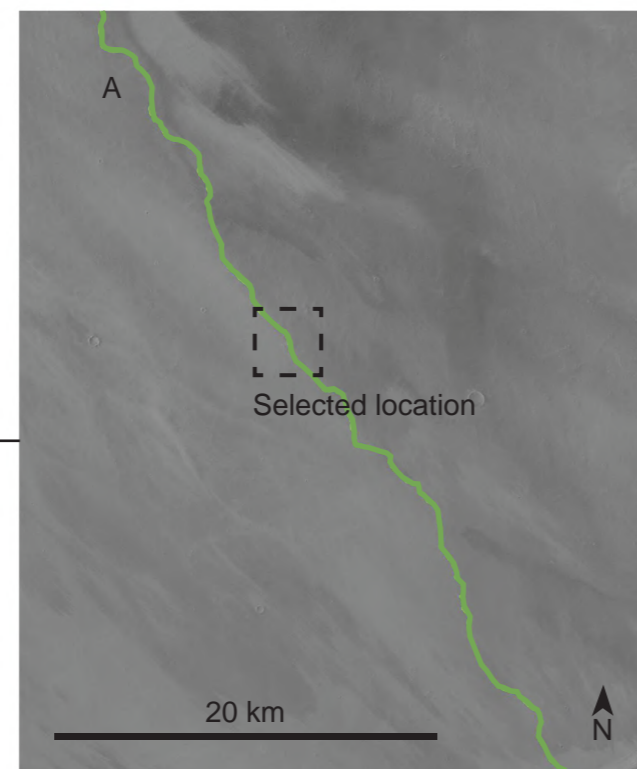
1. Active lava flow

2. Roof formation

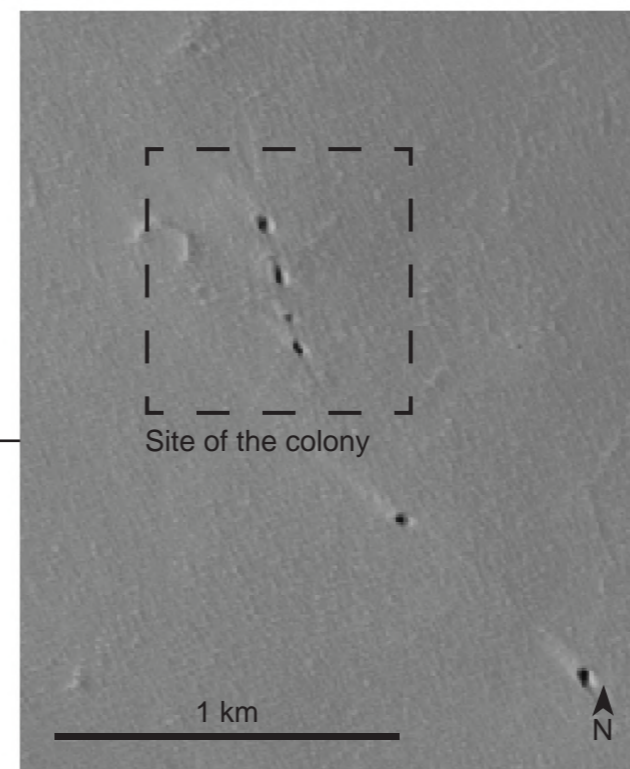
3. Lava tube



Cluster of lava tubes around Arsia Mons & selected lava tube A.



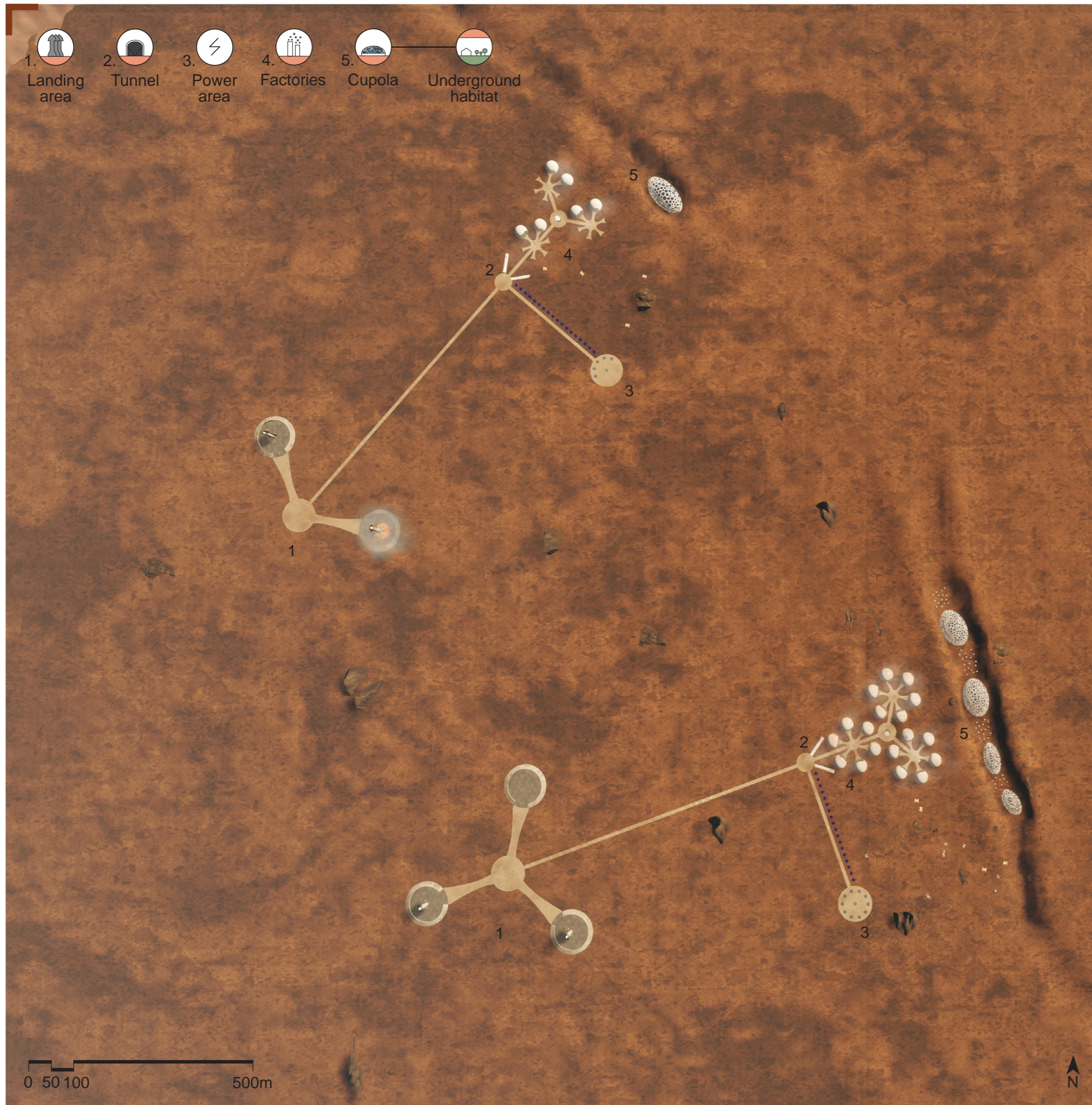
Mapped path of the lava tube A and selected location for the colony.



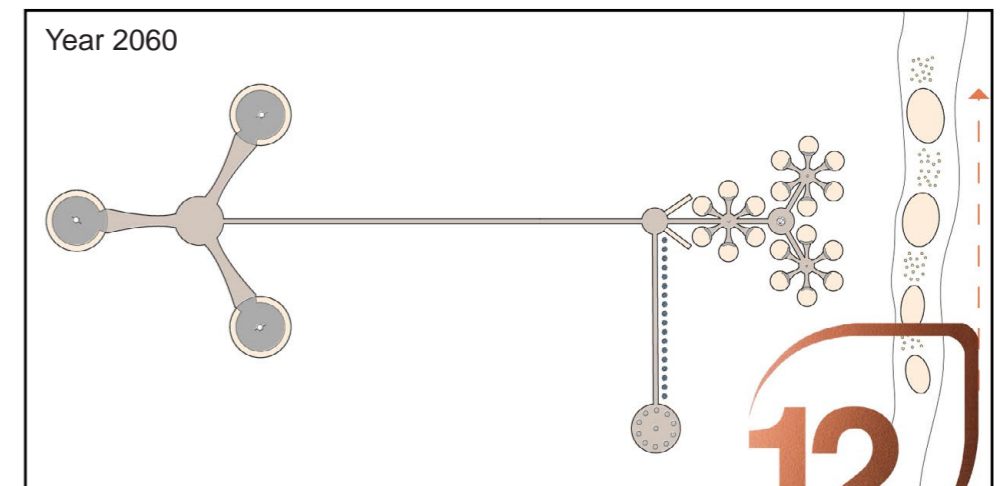
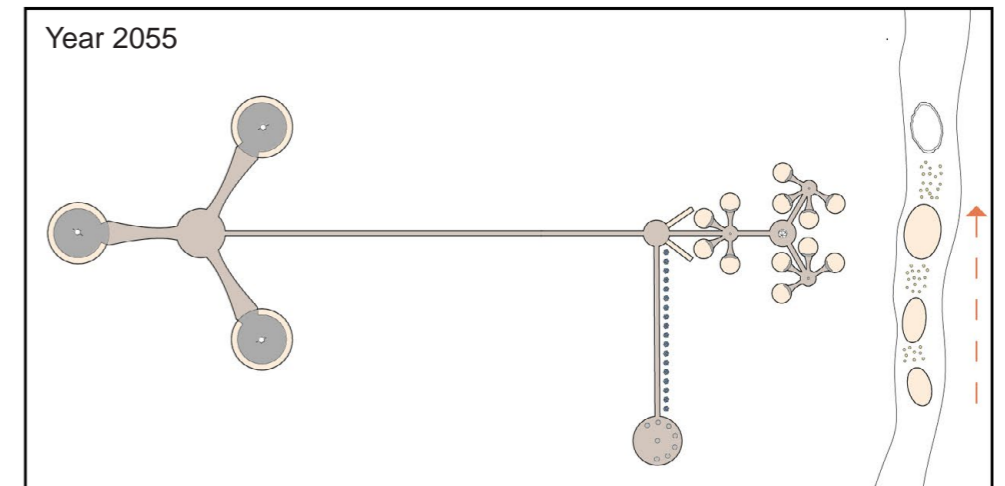
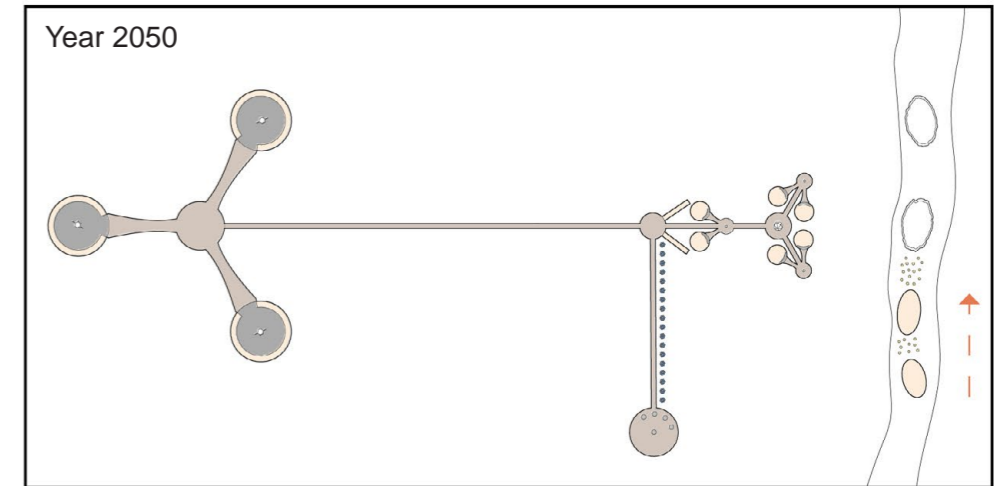
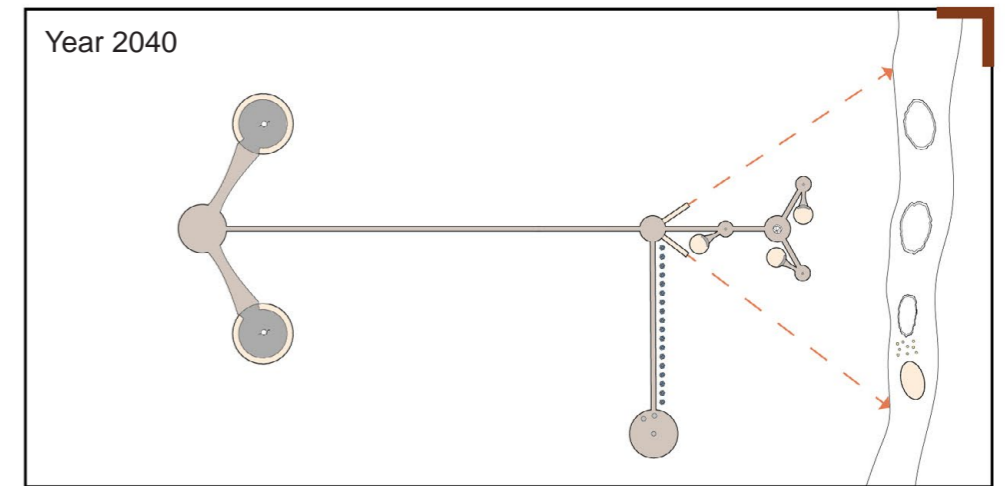
Segment selected for the colony development



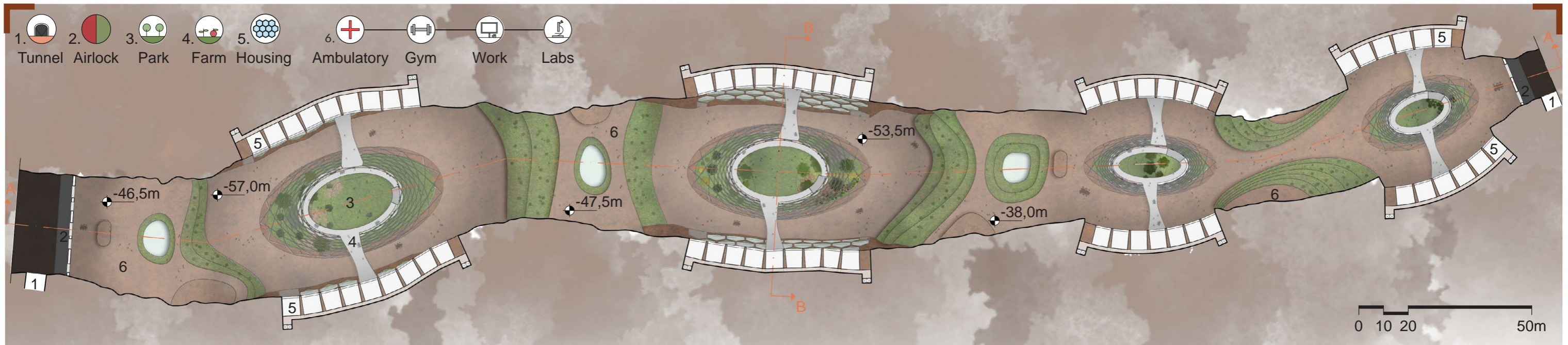
Design reference for the lava tube colony design: Los Jameos del Agua, by César Manrique in Lanzarote.



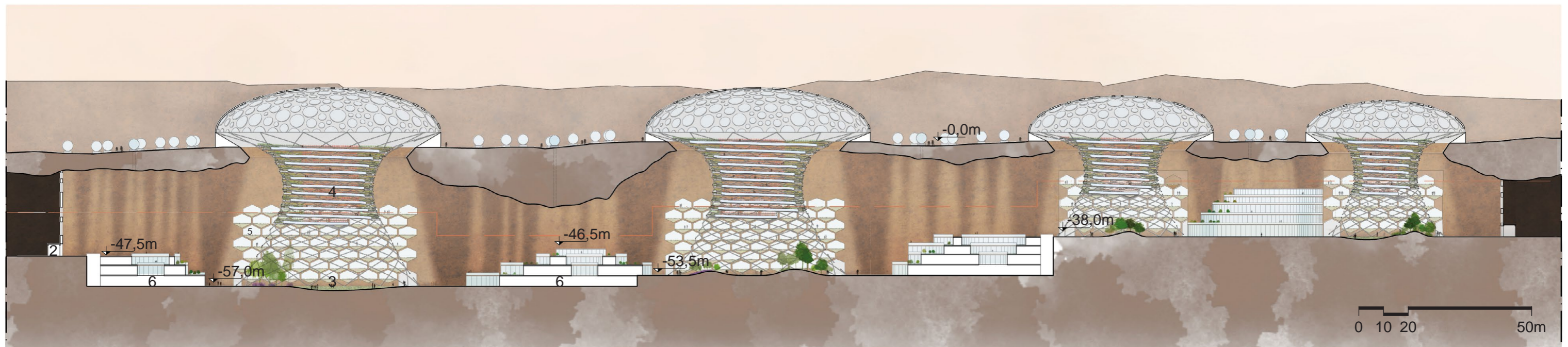
Masterplan - surface



Development phases of the settlement



Masterplan - Underground



Longitudinal Section - A.A

