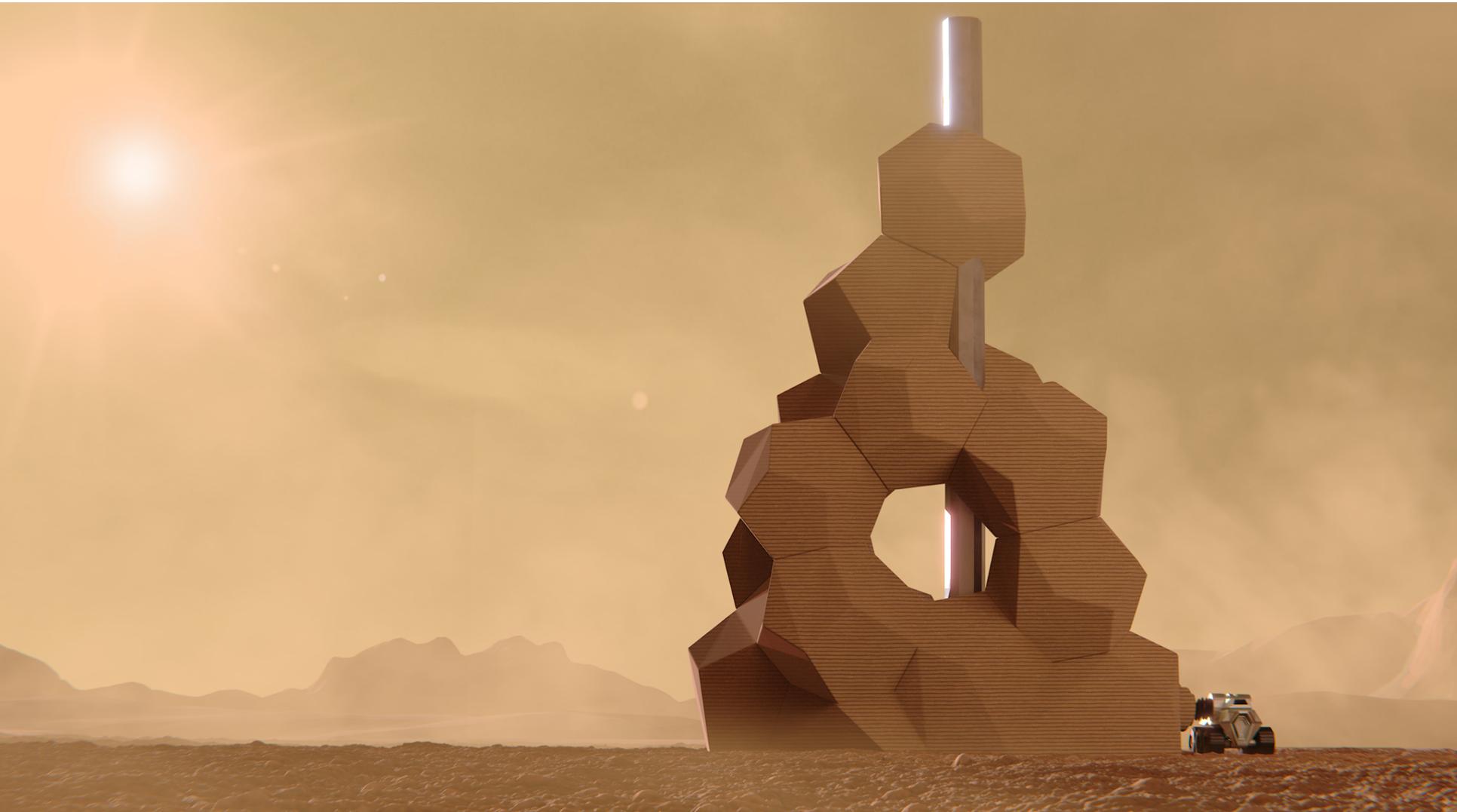


ODYSSEUS  
EUROPEAN YOUTH  
SPACE CONTEST

**3D PRINTED MARS SETTLEMENT**





**STUDENT  
DANIEL MOVILĂ**

*from*

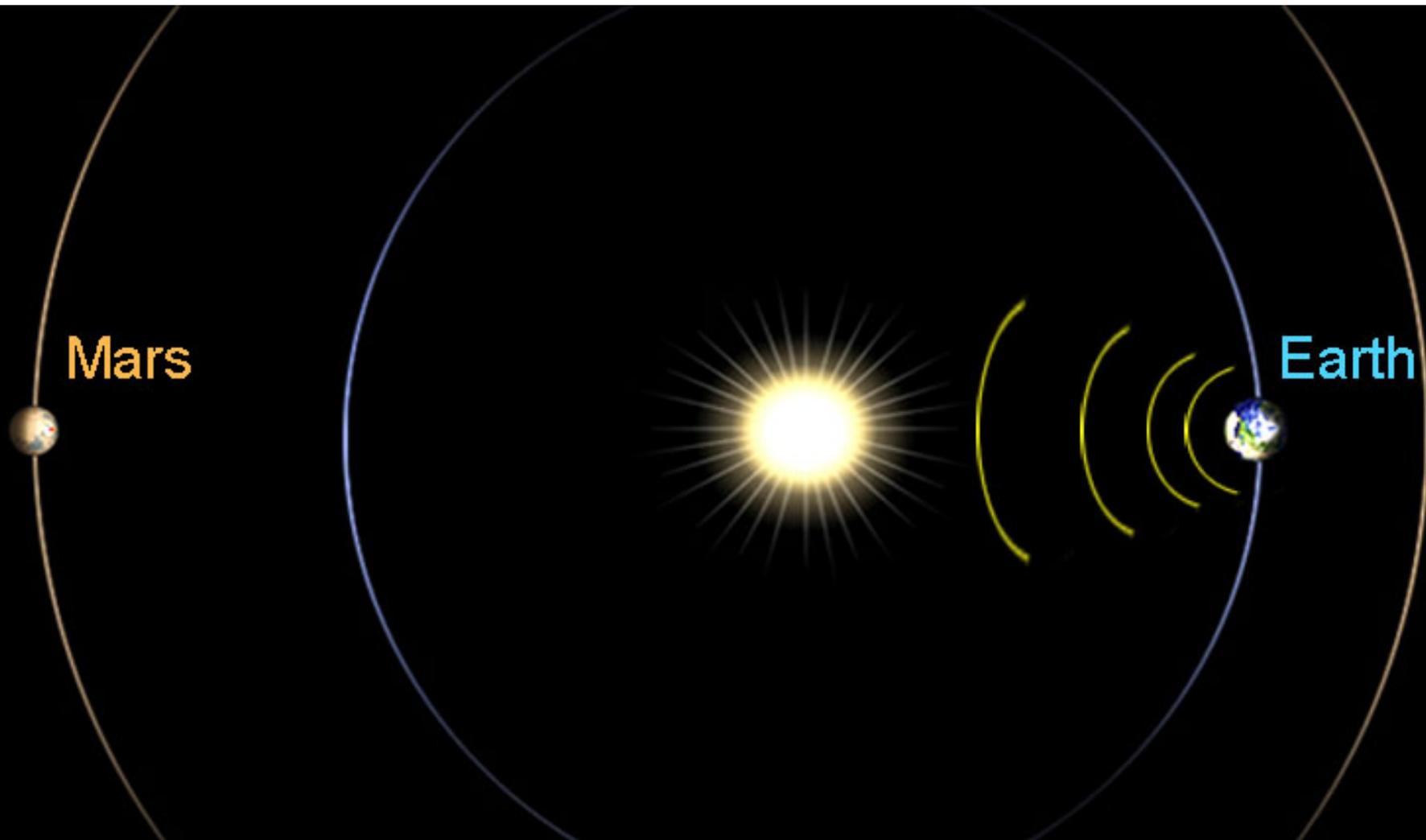


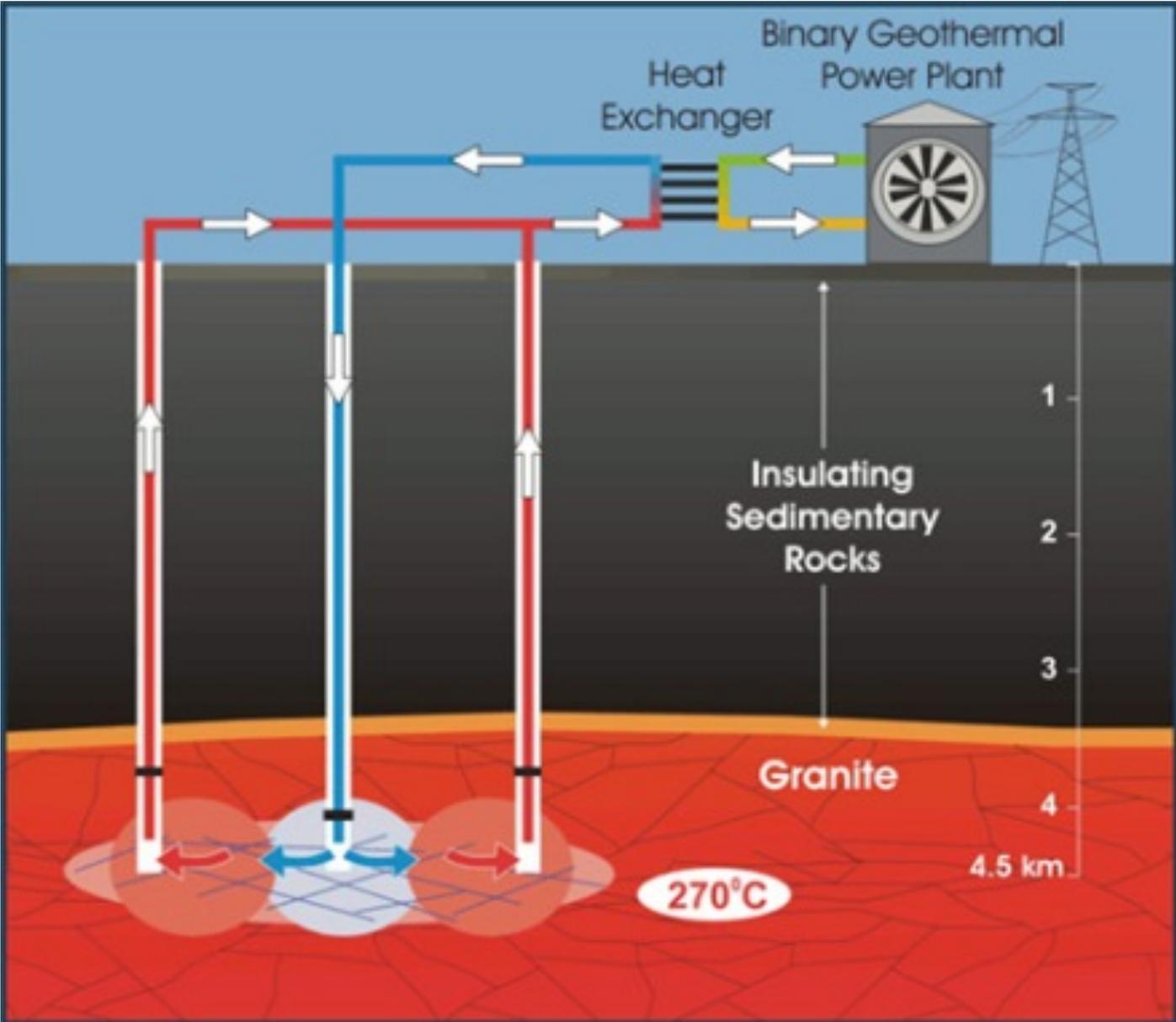
**TECHNICAL UNIVERSITY OF IAȘI  
FAULTY OF ARCHITECTURE " G.M. CANTACUZINO"  
ROUMANIA**

*for*

**ODYSSEUS EUROPEAN YOUTH SPACE CONTEST  
HORIZON 2020**



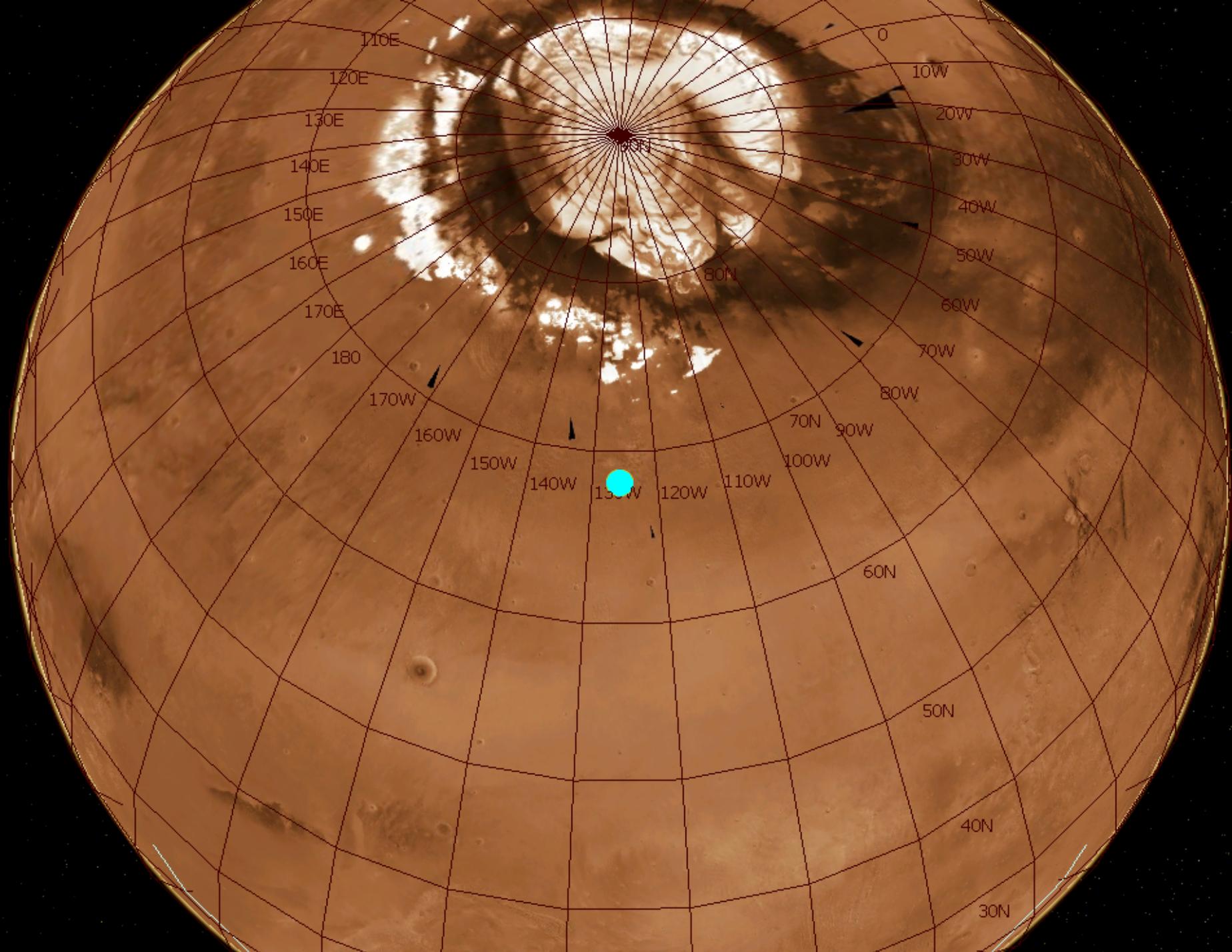






LOCATION

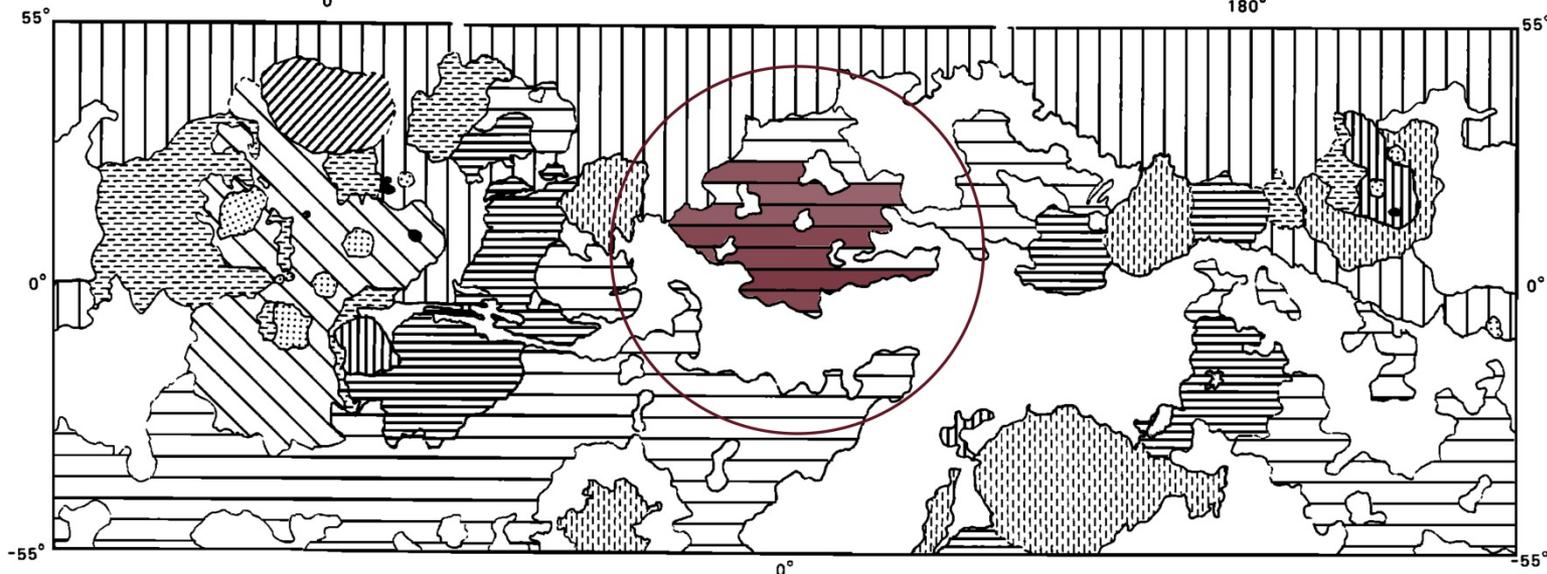
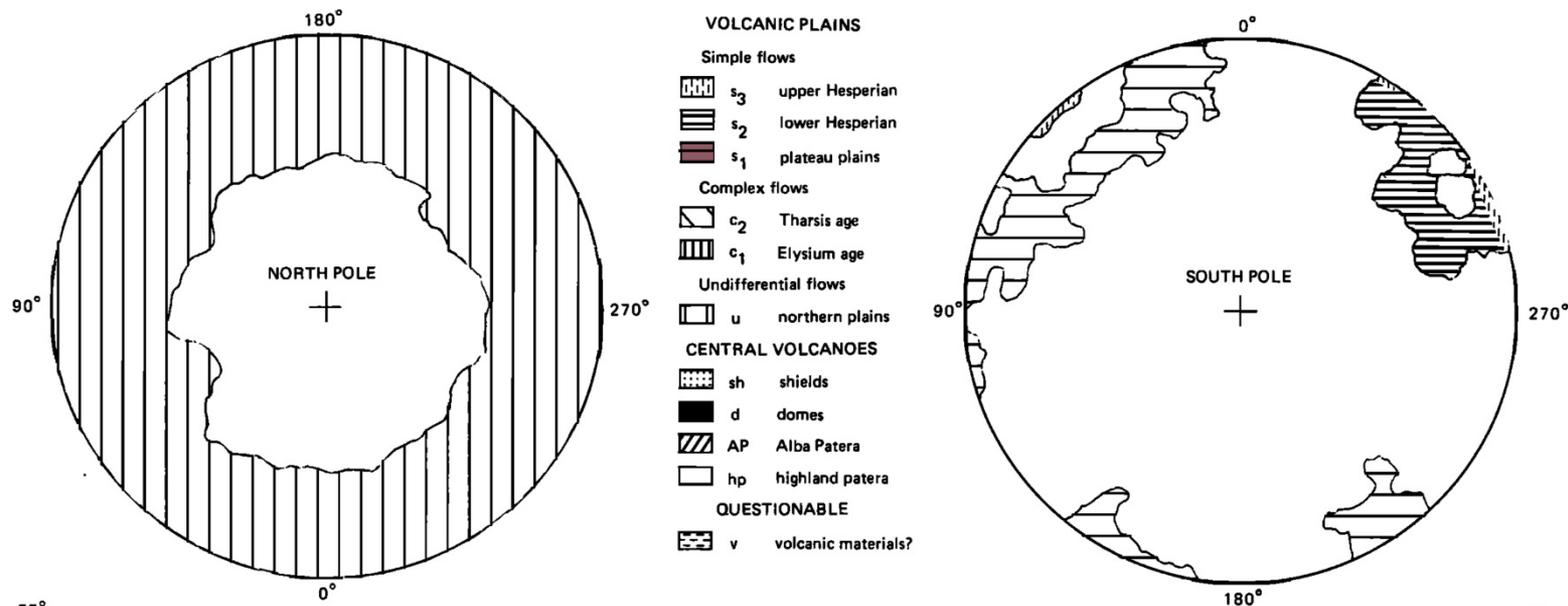




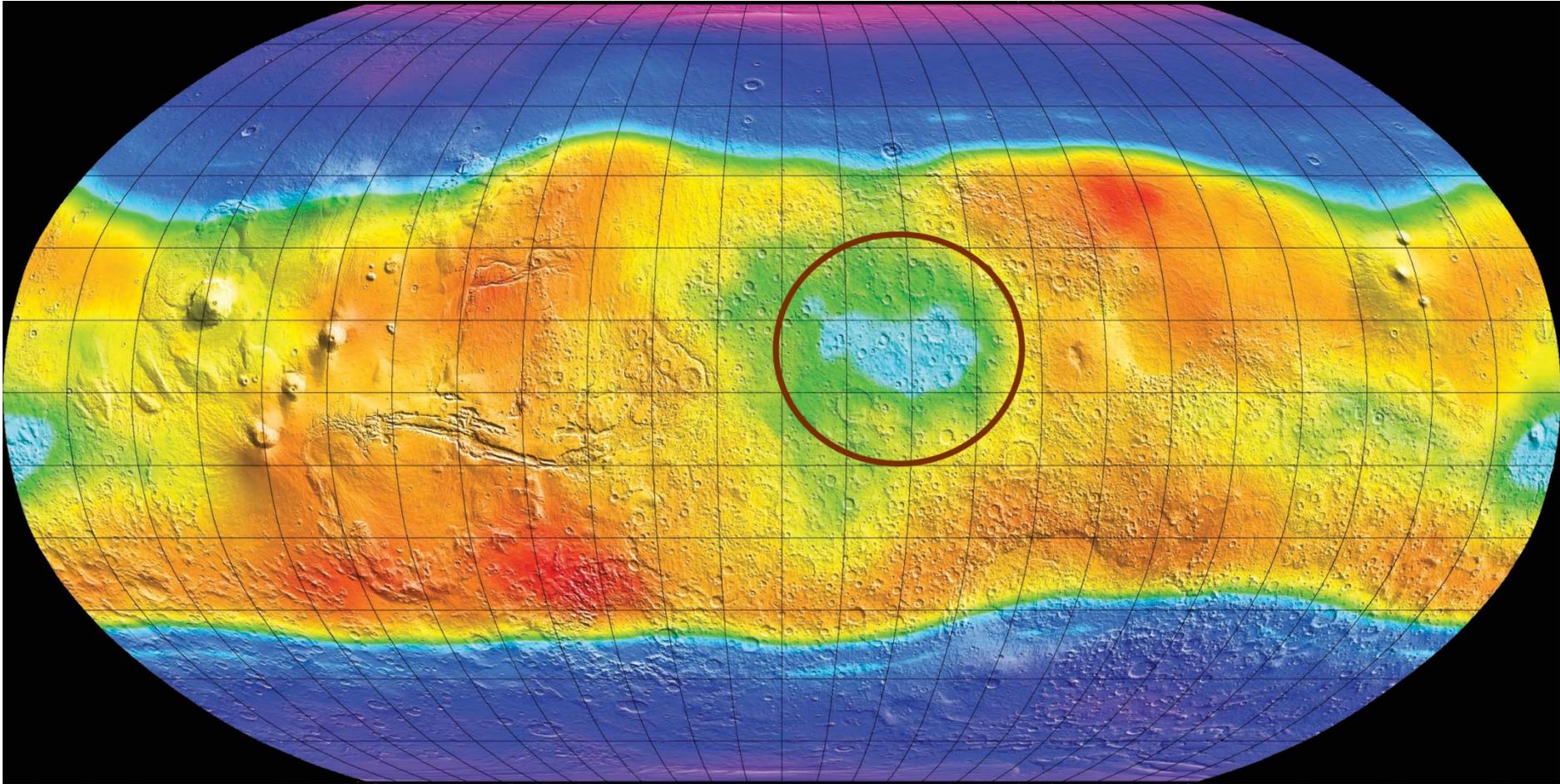
# MARS FACTS / TEMPERATURE



#JOURNEYTOMARS  
[mars.nasa.gov](https://mars.nasa.gov)

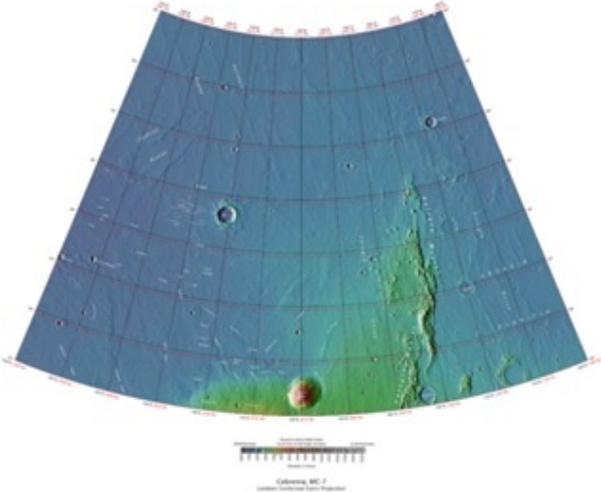


VOLCANIC ACTIVITY IN CEBRENIA QUADRANGLE

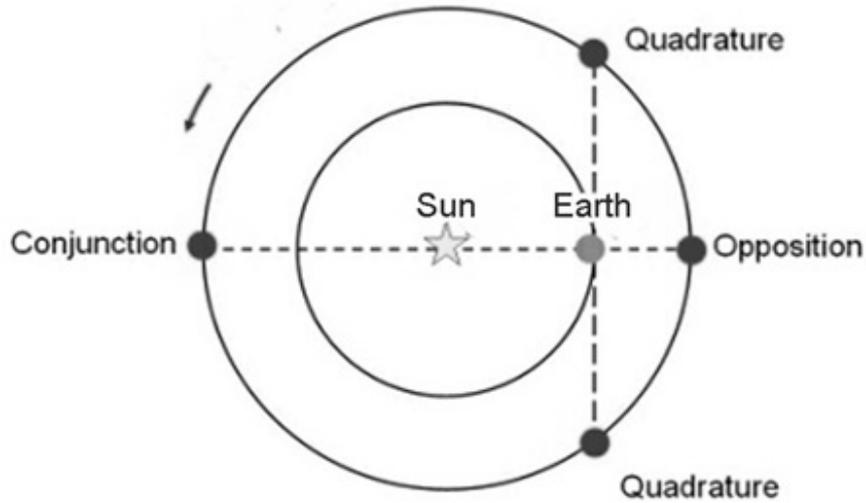


For example, observations carried out by the Mars Reconnaissance Orbiter- 2009 stated the presence of liquid water a few meters deep in 5 medium latitudes located between 43 and 56° lat. N (three of which are in the Cebrenia quadrangle).

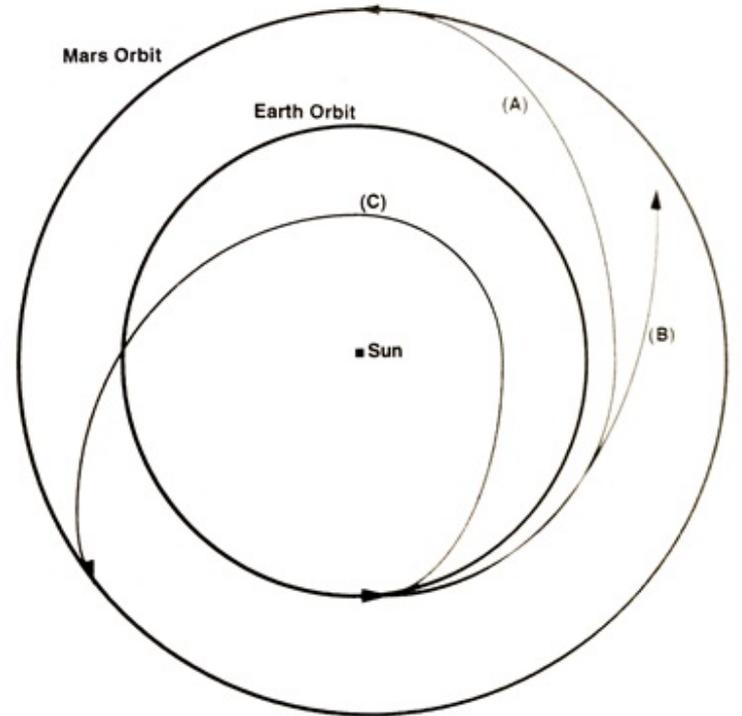
55.57° N, 150.62° E; 43.28° N, 176.9° E; si 45° N, 164.5 °E.



(fig 3.1.2) Cebrenia quadrangle from Mars Orbiter Laser Altimeter (MOLA) data. The highest elevations are { and the lowest are blue. ©Public domain image.

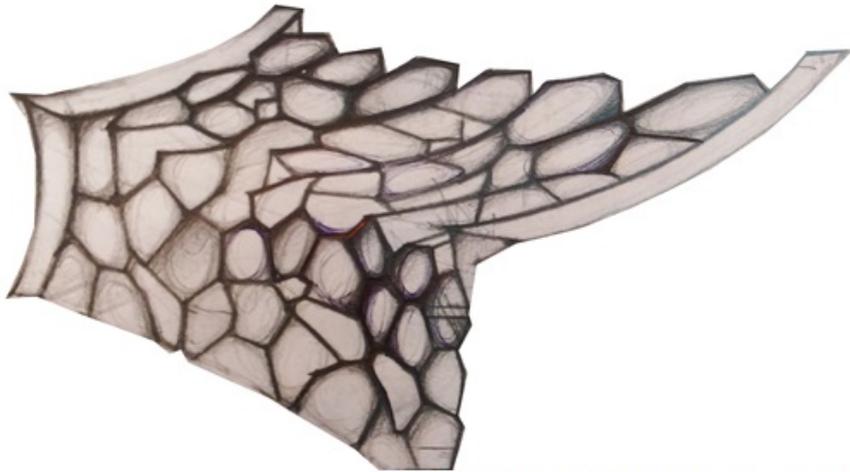


*(fig 3.2.1) Opposition, conjunction. At opposition, Mars stands directly on the opposite side of the Earth from the Sun. At conjunction, Mars stands behind the Sun as seen from the Earth.*

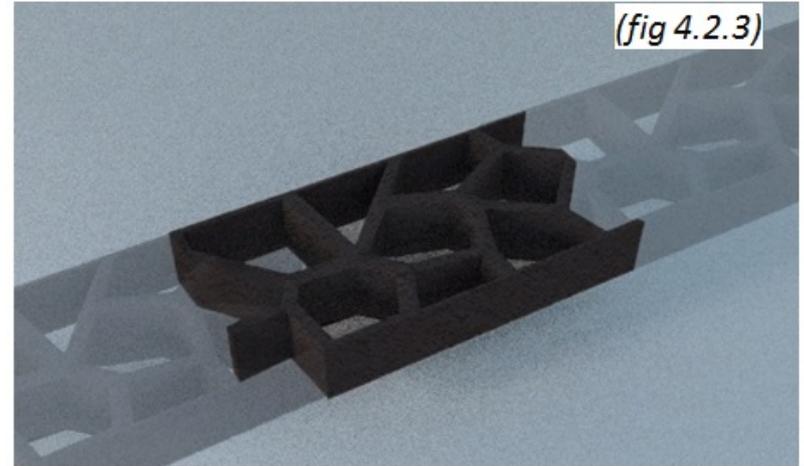


*(fig 3.2.2) Trajectory options to Mars: (A) Hohmann transfer orbit; (B) Fast conjunction mission; (C) Opposition mission. ©2011 Robert Zubrin*

*“Intelligent use of local resources- is not just the way the West was won; it’s the way the Earth was won,  
and it’s also the way Mars can be won” (Robert Zubrin)*



*(fig 4.2.2) Example of the inner pattern the printing process could develop in order to provide the reinforcement of the module's structure.*



*(fig 4.2.3)*

*The middle pylon method of 3D printing is also well tested on Earth in the form of printing 3D houses.<sup>14</sup> The concept involves bringing the tools for digging and 3D printing directly from earth and to be incorporated in the actual structure of the rocket.*



*(fig 4.2.1) This picture illustrates how a 3D printer with a main expandable pylon could build the structure without having to move any of its parts except for the robotic arm.*

# THE FORM

# 3D PRINTED HABITAT

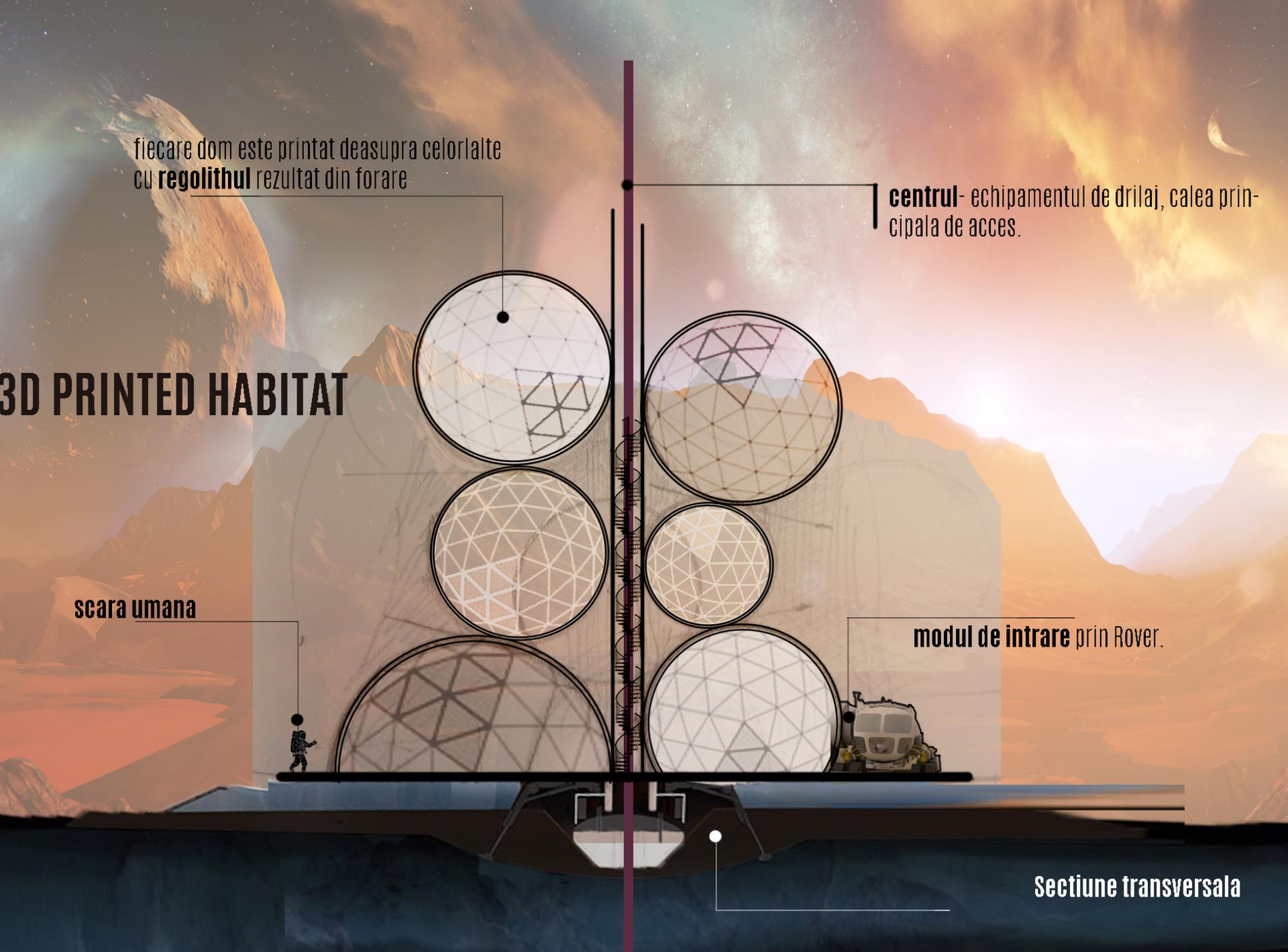
fiecare dom este printat deasupra celorlalte  
cu **regolithul** rezultat din forare

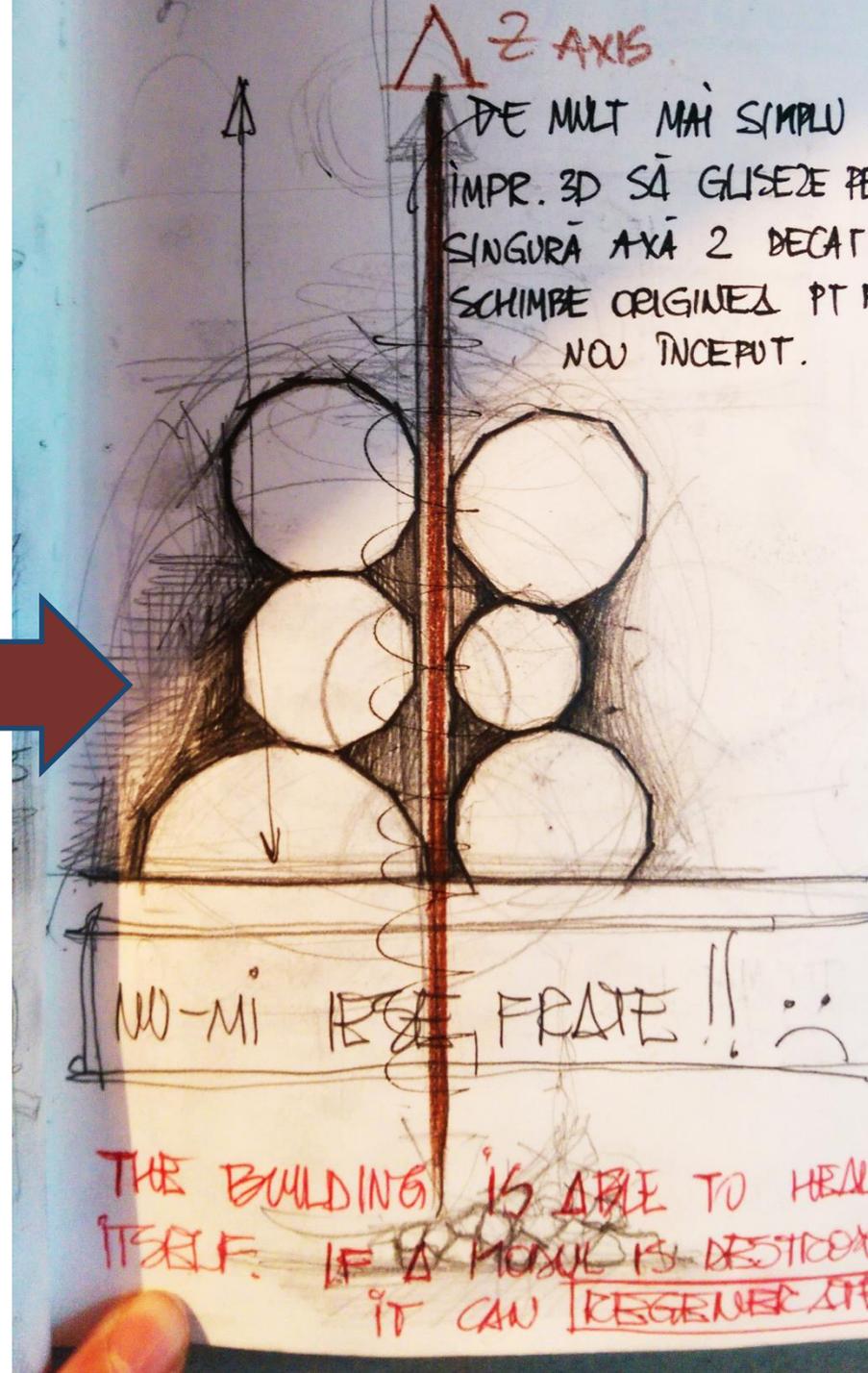
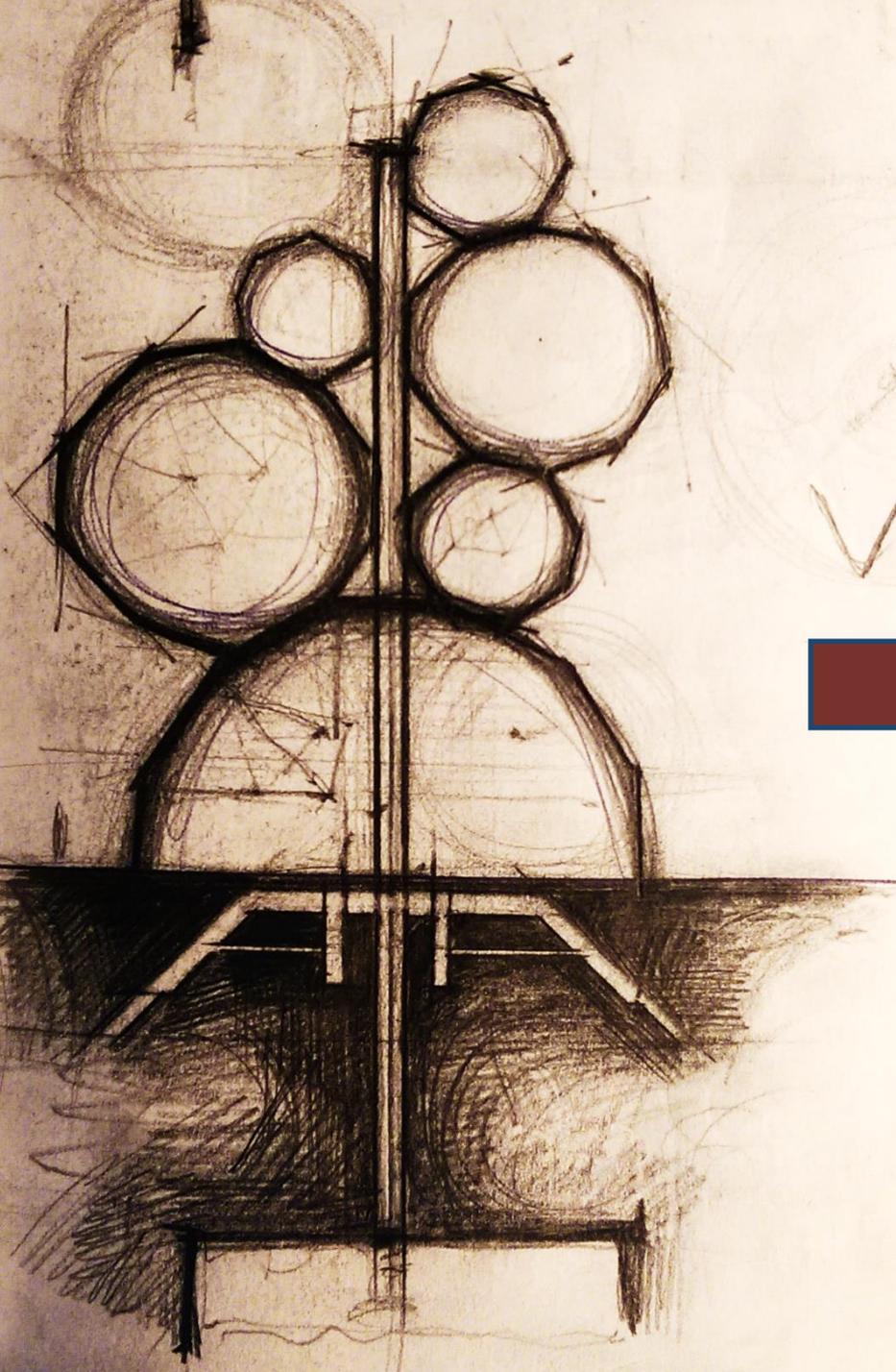
**centrul**- echipamentul de drilaj, calea prin-  
cipala de acces.

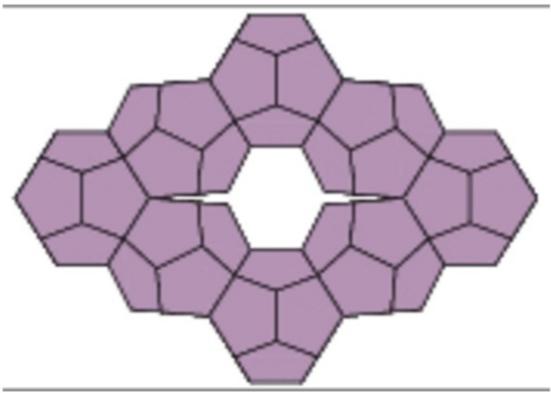
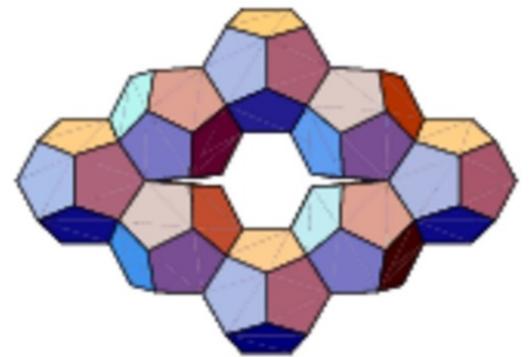
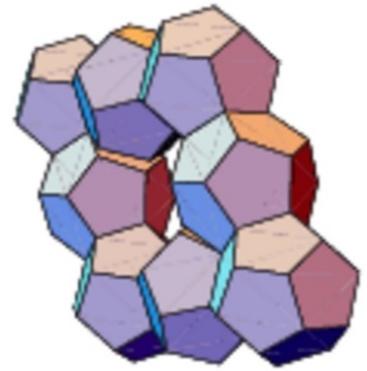
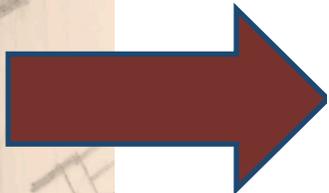
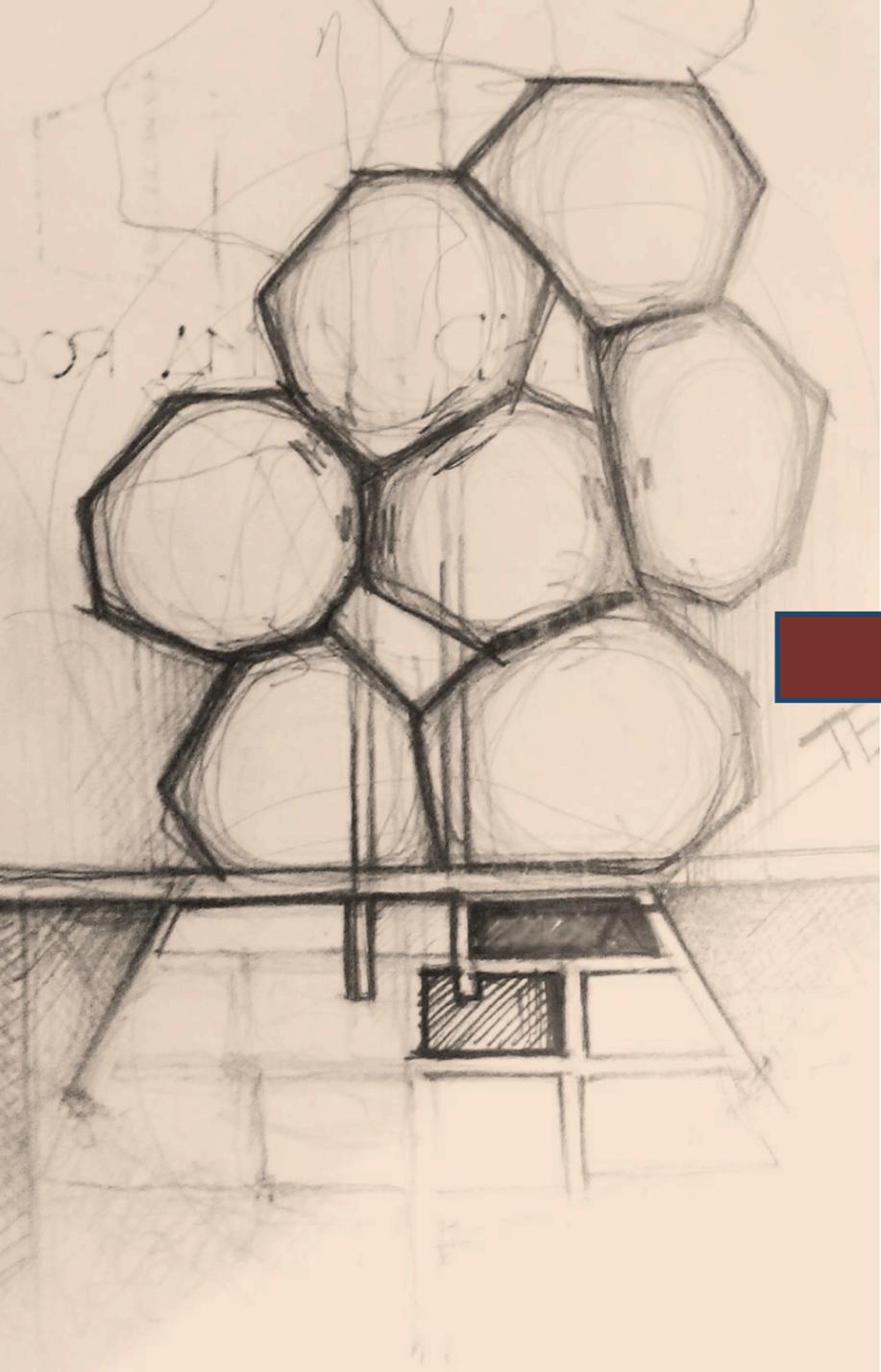
**scara umana**

**modul de intrare** prin Rover.

**Sectiune transversala**





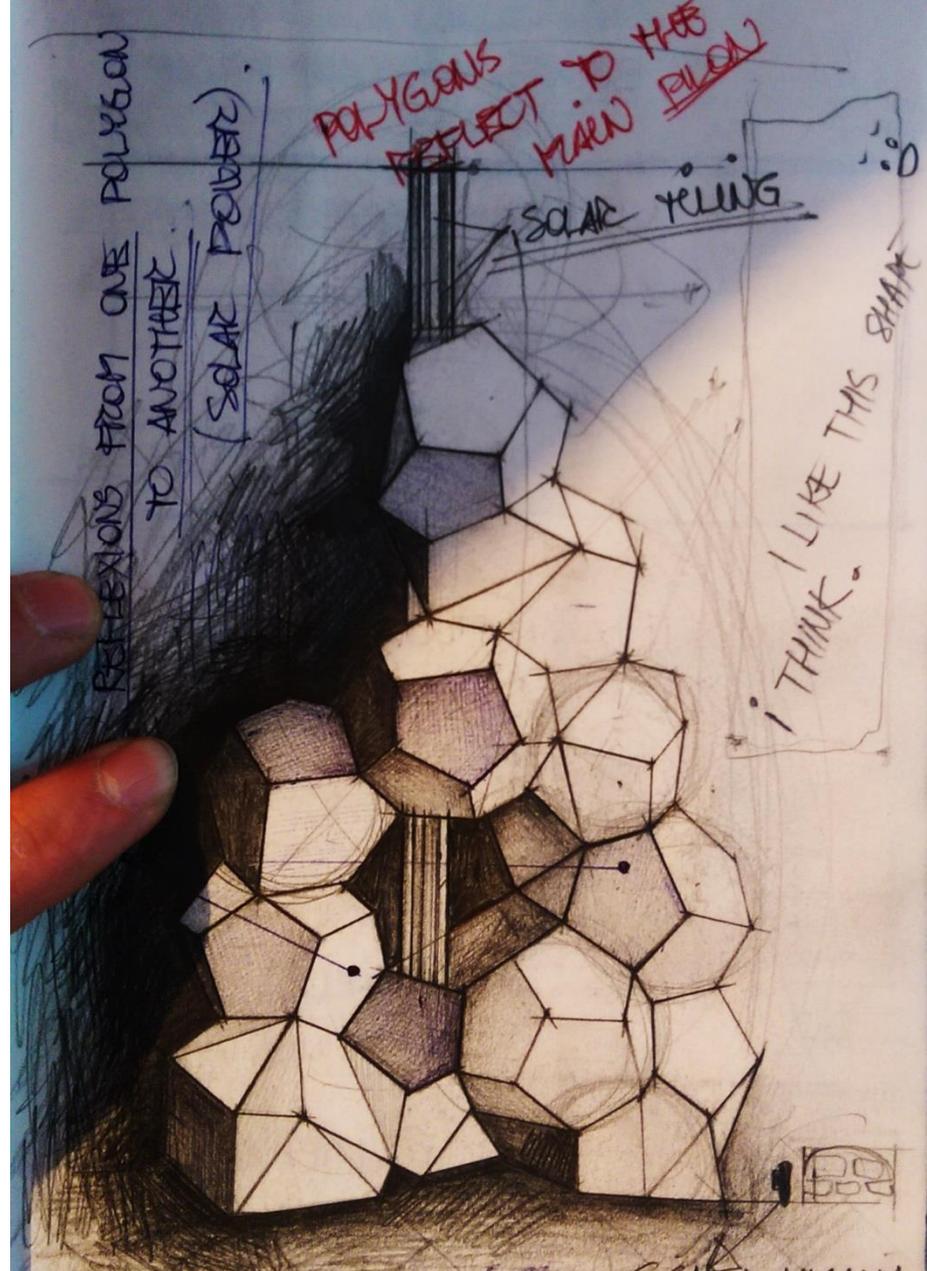


REFLECTIONS FROM ONE POLYGON  
TO ANOTHER  
(SOLAR PANELS)

POLYGONS  
REFLECT TO THE  
MAIN POLY

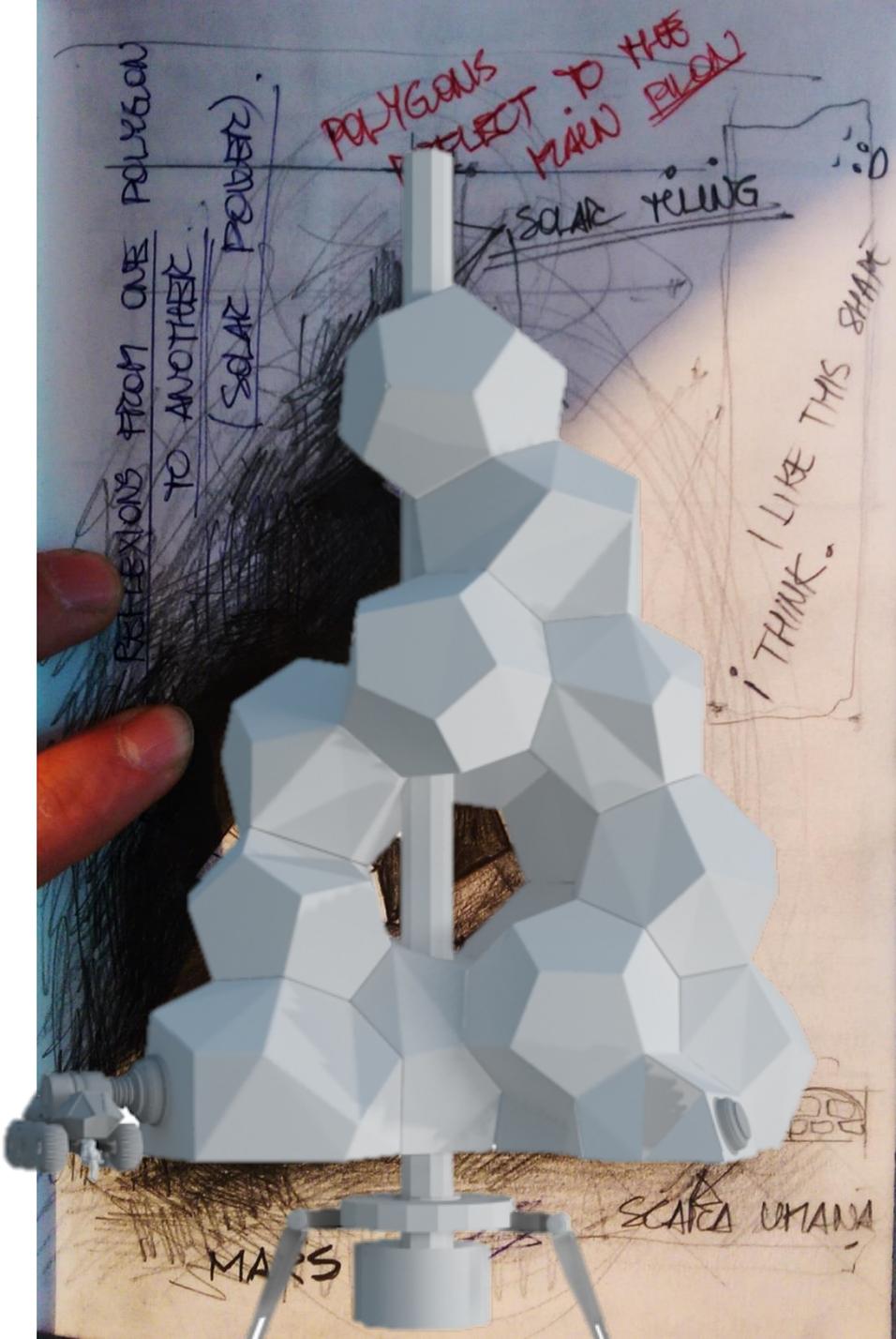
SOLAR PANELS

I THINK I LIKE THIS SHAM

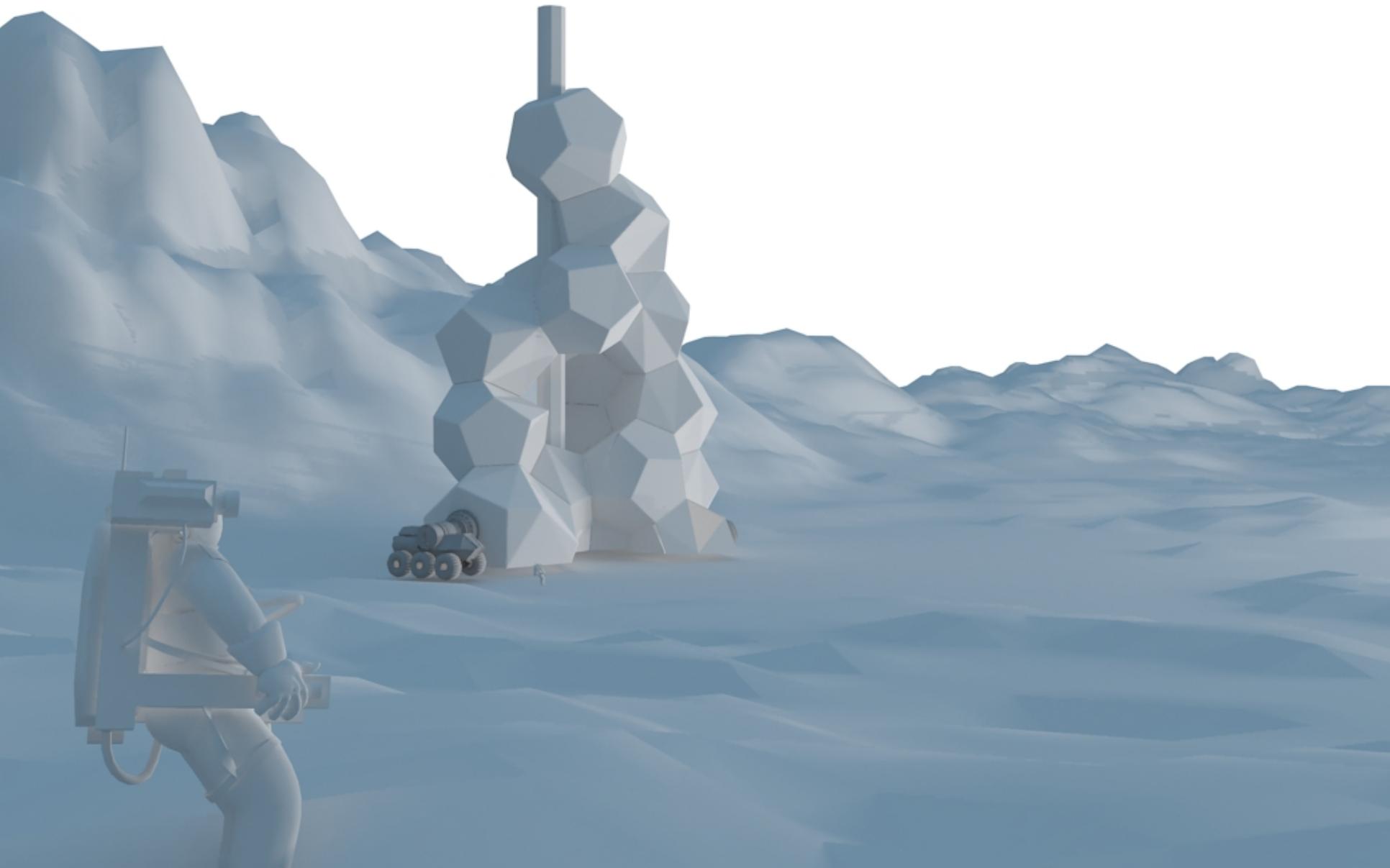


MARS 2.0

SCAPE UMANA







h	$(r+h)/h$	Result
$\sqrt{1}/10 (5 - \sqrt{5})$	$2\sqrt{5} - 3$	60 faced dimpled DELTAHEDRON
$1/19 \sqrt{1}/5 (65 + 22\sqrt{5})$	$3/19 (10 - \sqrt{5})$	PENTAKIS DODECAHEDRON
$\sqrt{1}/10 (5 - \sqrt{5})$	$2\sqrt{5} - 3$	60 faced star DELTAHEDRON
$\sqrt{1}/5 (5 + 2\sqrt{5})$	$\sqrt{5}$	SMALL STELLATED DODECAHEDRON



technical and logistic support

green life laboratories modules

rest modules

research laboratories

meeting modules

entrance modules technical support

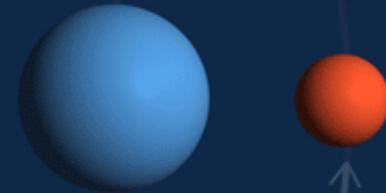
# MARS FACTS / YEAR

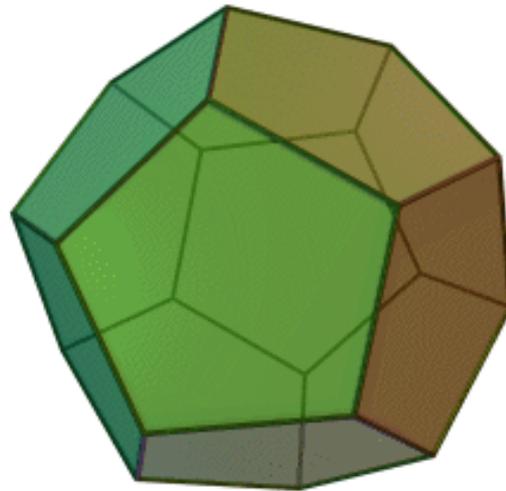
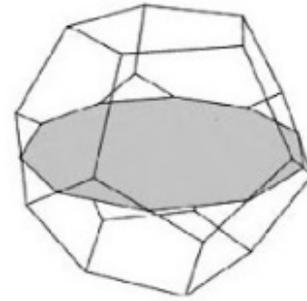
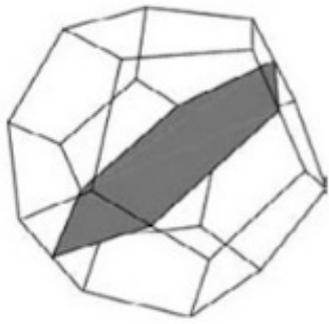
365 DAYS

687 DAYS

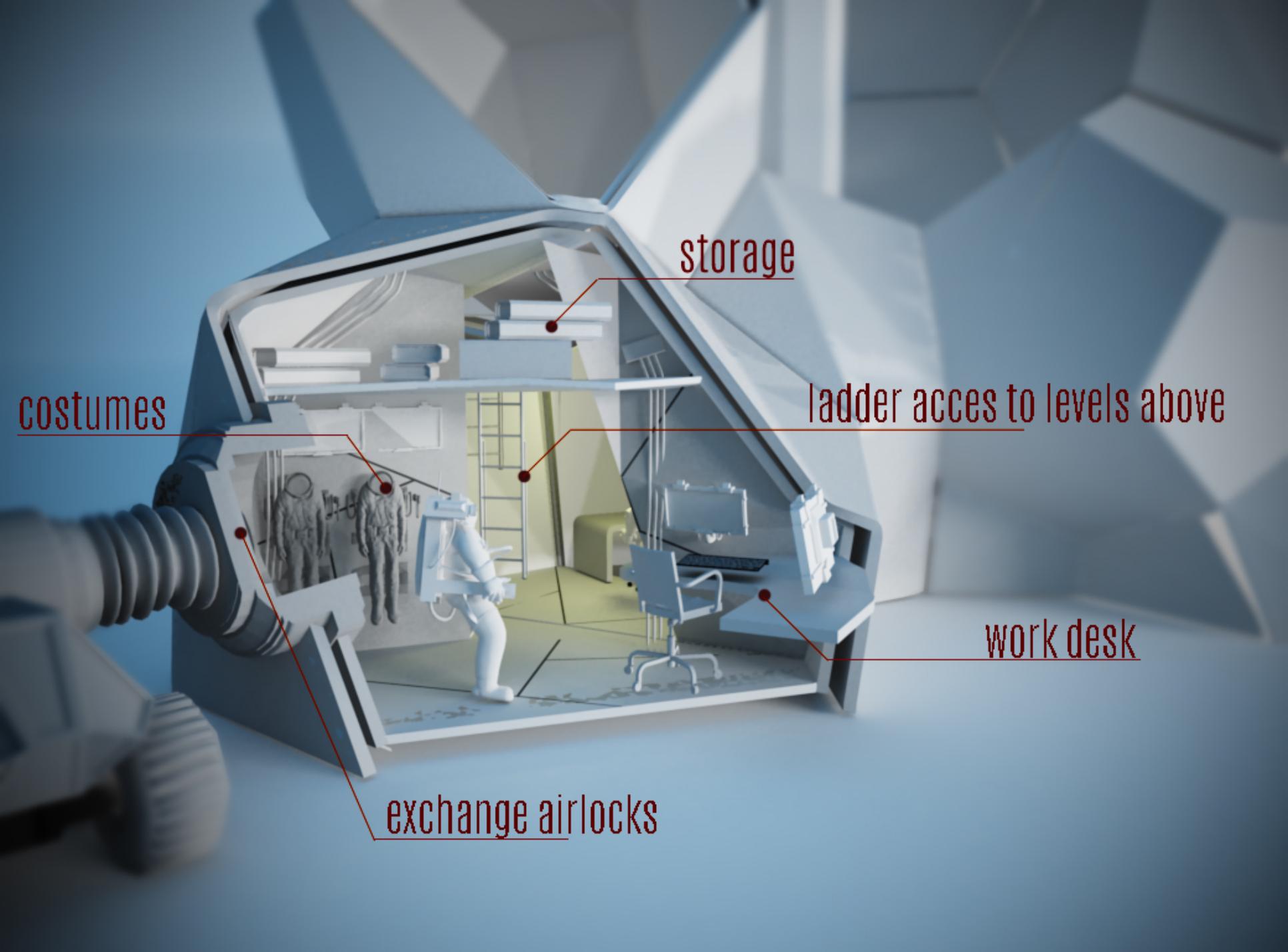
A year on Mars is almost twice as long as a year on Earth.

#JOURNEYTOMARS  
[mars.nasa.gov](https://mars.nasa.gov)





**dodecahedron**



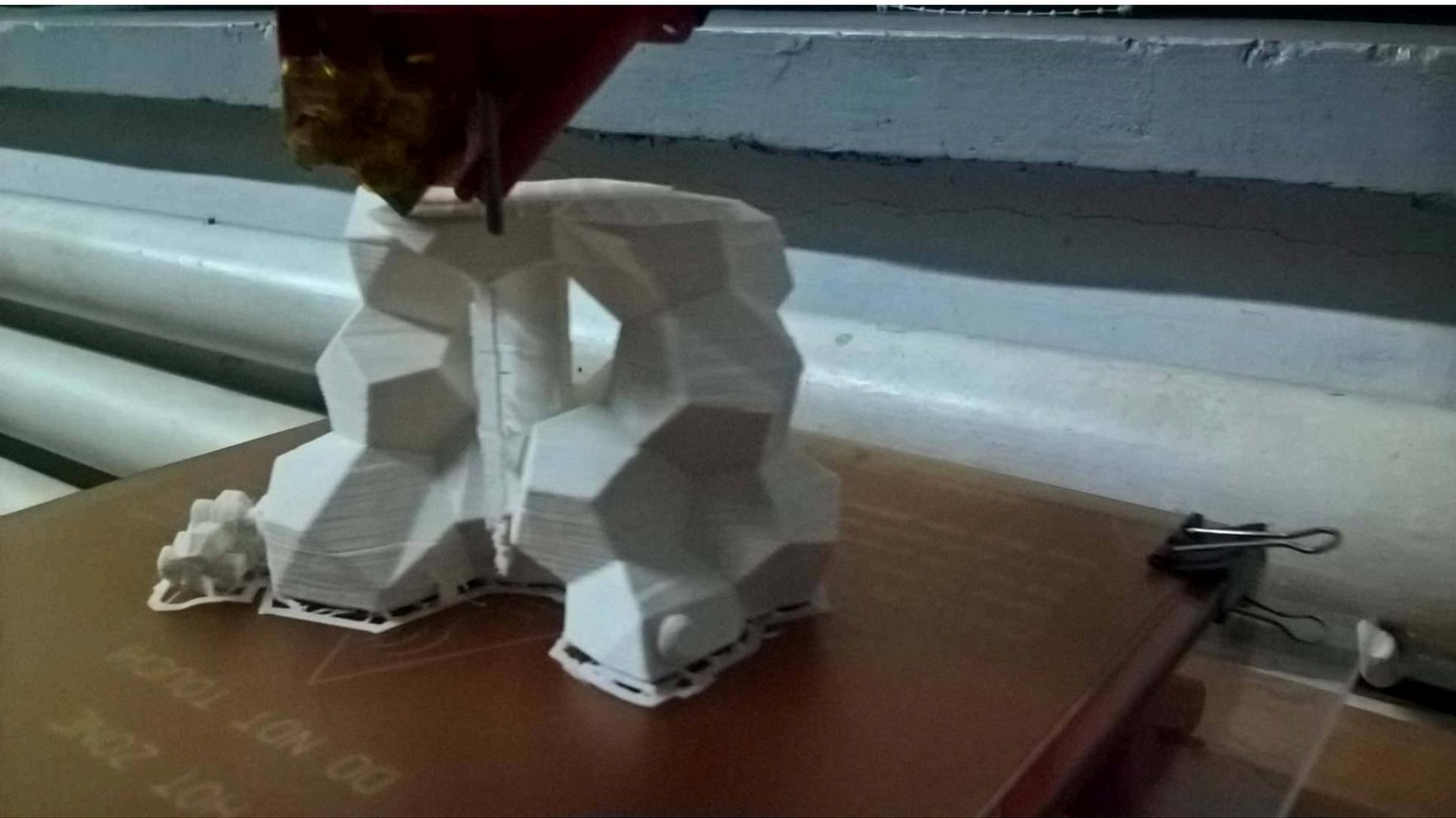
storage

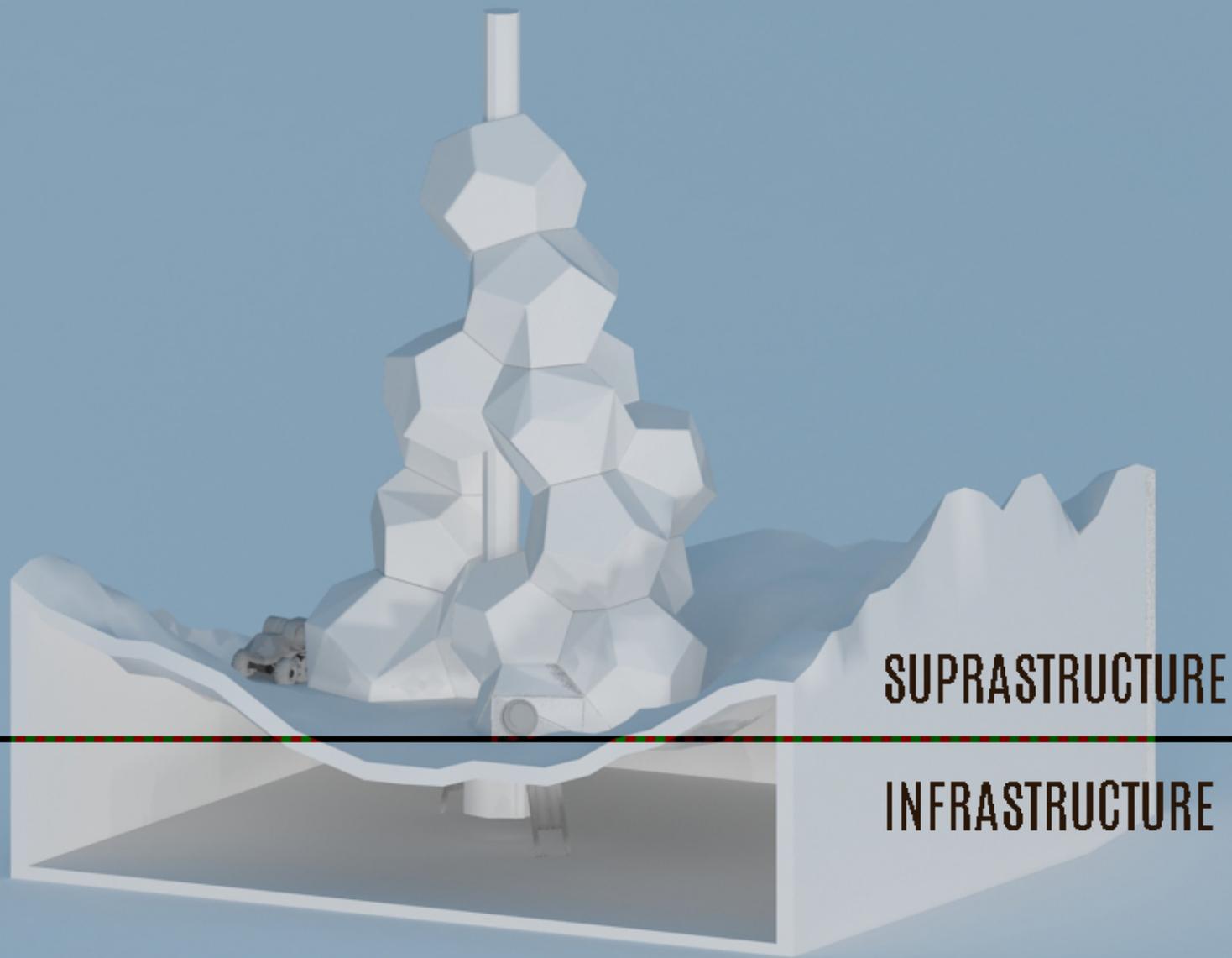
ladder acces to levels above

work desk

exchange airlocks

costumes





**SUPRASTRUCTURE**

**INFRASTRUCTURE**



FINAL.mp4



A photograph of an astronaut in a white spacesuit standing on the reddish-brown surface of Mars. In the background, a rover with large, treaded wheels is partially visible. The scene is set against a hazy, orange-tinted sky.

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A photograph of an astronaut in a white spacesuit standing on a reddish, rocky surface, likely Mars. To the left, a portion of a rover with large, treaded wheels is visible. The background shows a hazy, orange-brown sky.

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Thank you for your  
attention !



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FAULTY OF ARCHITECTURE " G.M. CANTACUZINO"  
ROUMANIA

