

IAF/IAA SPACE LIFE SCIENCES SYMPOSIUM (A1)
Radiation Fields, Effects and Risks in Human Space Missions (5)

Author: Dr. Marco Peroni
Italy, peroni@marcoperoni.it

ACTIVE SHIELDED MARS BASE

Abstract

the subject of our study is the design of a future human settlement on mars. a base on mars built when man will have become familiar with the planet (not a first settlement) and will want to establish a small city safely inhabited by a certain number of settlers (of about 500 hosts). in this case we imagine (with technologies all already possible to realize) a large, inhabited dome with a diameter of about 100m built partly with 3D printing technology by sintering "in situ" materials and partly by assembling on site a large glass window in geodesic geometry that illuminates the interior of the space base and allows the inhabitants a view outside. the elements of the glazed geodesic structure will be made of high-strength aluminum and will be carried, along with the glass itself, by the large space launchers that may soon land on mars. the possibility of being able to have a bright environment and to observe the external panorama is enabled by the fact that around the dome, at a suitable distance from it (at a minimum 50m), is protected by a set of electric cables (superconductors with very high voltage currents) arranged along the parallels of an ideal sphere supported along the meridians by rigid circular elements. these cables will produce an artificial magnetic field sufficient to shield dangerous cosmic rays but far enough away from the inhabited area. this configuration (very innovative, compared to the state of the art) will allow future settlers to live comfortably without suffering from the indoor stresses to which they would instead be subjected in a light-enclosed environment. the meridian structures themselves will support, in addition to the cables, the elements of an "overhead crane" that will allow the construction of the structure itself (by means of "additive manufacturing" technique) and the necessary maintenance of the elements of the large exterior glass window that will have to be cleaned of martian dust and possibly replaced (in its outer sacrificial layers) in case they are hit by micro-meteorites.

inside the inhabited dome there will be gardens, parks, and lakes as well as a series of inhabited floors overlooking the large volume illuminated by external sunlight with views toward the dunes of the red planet. it would not only be an outpost in which to survive then, but an exciting and fun place to spend an unforgettable space vacation as well!