Exploration of Other Destinations (5)
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GLOBAL DIMENSIONING OF A NEAR-TERM MANNED MISSION IN THE ATMOSPHERE OF VENUS

Abstract

This article studies the global dimensioning of a manned mission in the atmosphere of Venus using existing or available technologies in the short term. A manned atmospheric base will allow the maintenance and direct control of atmospheric and surface equipment as well as sample analysis in the laboratory. thereafter, it will be the base camp for the manned surface expeditions throughout the equator. From a technical and human point of view, this would be a formidable challenge which would allow to carry out an interplanetary mission and catalyze the development of technologies usable on earth and for the future of space exploration. This project is therefore based on technologies studied for the exploration of Mars, which presents similar constraints in terms of mission duration, composition of the crew, transit in deep space and use of atmospheric CO2. The structuring choices of the project are a crew of 6 members, Hohman interplanetary trajectories, the use of in-situ resources, mainly chemical propulsion and existing or developing orbital launchers. These choices can be reviewed in future optimizations that do not fall within the scope of this global sizing study. It studies the different architecture of the Venus ascent vehicle and atmospheric base, the assembly and / or supply of the transit vehicle in different orbits, and the number of orbital launchers used according to their capabilities. Reuse options are studied to lower the cost of successive missions. It is concluded that a mission of 6 crew members in the Venusian atmosphere is possible in the short term with two starship supply around ten times, 3 to 5 super heavy launchers CZ-9 / SLS bloc1B / SLS bloc2 / Yeinesei or around twenty heavy launchers Ariane 6.4 / CZ-5 / Delta IV heavy / Falcon heavy / H3 heavy / new glenn / vulcan.