IAF SPACE SYSTEMS SYMPOSIUM (D1)
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ABRAHAM'S OASIS IN THE STARS: ORBITAL MICRO HABITATS FOR EMERGENCY AND FUNCTIONAL ASTRONAUT USE

Abstract

Our story begins remembering the Space Shuttle Columbia tragedy (STS-107). We explain how the selected orbit inclination provided more research time, but precluded escape to the ISS, and how this dilemma continues. Rapid changes in technology, health, business, and geopolitics, along with new commercial cargo and crew launchers and the question of the future of the ISS, push us to look for new space infrastructure concepts. The authors present a design concept for orbiting micro habitats (OMH) as life-boats for increased human space safety and a vision of more affordable space habitats for private, commercial and government customers. Our preliminary design considers dangers in the low Earth orbit (LEO) environment, including vacuum, radiation, space debris and challenges to controlling temperature, breathable air, food and waste disposal. The technological building blocks for OMH have already been tested in space. We address technical considerations including pressure containment, entrance closure interfaces, CO2 scrubbing, temperature, electrical power, and spaceflight dynamics. These systems and their integration are designed for the best human experience. OMHs, with lifesaving supplies and equipment, could be launched before missions or during emergency. We hope to use inflatable walls to make OMHs small enough to fit on a crew launch mission or a large station. It is anticipated that OMHs would be less expensive and easier to launch and to keep in orbit than larger orbiting modules, especially if OMHs can be deflated for launch and when not in use. We propose standards for OMH as life-rafts and as short-term habitats, including interoperability with crew vehicles (like Dragon) for CO2 scrubber cartridges and electrical parts. We hope our work will encourage international research and commercial products and open the conversation of how to make spaceflight safer and more affordable, like life in the air and undersea. In that regard, OMHs could support microgravity research, "space tourism," manufacturing in space, technology testing, publicity and education. The affordability and functional

flexibility of OMHs could enable sustainable "LEO economy" growth and provide space opportunities to the nations of the world, motivated individuals, couples and institutions to put their flags, names and influence on the future of humanity. Biblical stories of Abraham recall the symbolism of stars for the growth of humanity in future generations and Abraham's inviting strangers from the desert. In the spirit of the UAE/Israel "Abraham Accords," we explain how the OMH concept can encourage the regional culture of hospitality in space.