

SPACE SYSTEMS SYMPOSIUM (D1)
Innovative and Visionary Space Systems Concepts (1)

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PERMANENT CREWED SOLAR OBSERVATORY AT L1 (SOL) FOR HELIOPHYSICS
EXPLORATION AND CONTROLLING LONG-TERM TERRESTRIAL CLIMATE CHANGE

Abstract

Recent scientific findings indicate that the production of carbon dioxide is not an immediate threat to our way of life. But, in the long term, this may well become a serious problem for the world's population. We do know that, in addition to manmade pollutants, the sun will emit increased amounts of energy as it ages. Thus, some kind of climate change will occur, threatening Earth's environment. Terrestrial-based solutions will surely be prohibitively expensive in terms of the global economy, productivity and the quality of life in general. Realistic environmental solutions should have many contributing factors. Increased atmospheric heating by the sun may be most-effectively controlled through the use of an energy filter located between the sun and Earth. Thus, the development of a permanent crewed Solar Observatory at L1 (SOL) for both solar system exploration and Earth climate control could be a first step toward the very-long-term survival of the human race. Such a station could be the focal point for heliophysics observations, a fuel depot, an in-space assembly and integration facility, a departure and return point for solar system expeditions and the control center for an Earth climate control solar shield system. The proposed paper explores the many space-based exploration and exploitation advantages of the SOL concept. Since L1 is a neutral-gravity point between the sun and Earth, it offers a direct and unobstructed view of the sun while propulsive energy requirements for solar system exploration are minimal. SOL can serve as an early warning station for solar storm activity, and a station for assembling robotic and manned exploration missions to Mars, asteroids and other destinations. SOL is also ideal for conducting medical research on long-term radiation and low-gravity exposure. A long-term objective of SOL would be the construction and deployment of a solar shade system for controlling Earth's global climate. The creation of such a shade system would be accompanied through a global research effort to integrate the effects of solar shading with related impacts on the atmosphere, climate, ocean currents and many other affected areas. Since this would be a long-term program, many new technologies could be developed that would surely improve the standard of living and productivity on a global basis, just as the Apollo Program did. Program costs could be amortized over the decades needed to complete the program. The many challenges, benefits and opportunities associated with SOL are addressed in the proposed paper.