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A DANGEROUS PRECEDENT; THE GEODESIC DOME AS A CREDIBLE SPACE ARCHITECTURE TYPOLOGY.

Abstract

There is a persistent employment of the geodesic dome as an architectural typology for use in the environment of outer space and in an extraterrestrial, planetary surface context. So persistent is the geodesic dome typology in this context that it presents itself as a vernacular, regardless of the lack of tangible evidence of its functionality. This typology has been used in illustrations within NASA's 1977 publication, Space Manufacturing Facilities (Space Colonies) to herald, at the time, near future prototypical concepts of lunar architecture. The typology has permeated the genre of science fiction and appeared in countless films and television series to describe realistic and credible examples of a potential space architecture to a global audience. Examples include, but are not limited to, Earth II, Silent Running, Slaughterhouse 5, Battlestar Galactica, and recently The Expanse television series. In a terrestrial and realistic context, designer Buckminster Fuller had championed the geodesic dome as a highly versatile structure capable of supporting a multitude of programs. More recently, Bjarke Ingels and his terrestrial architecture firm, BIG, has used the geodesic dome typology as the foundation for the 2017 Mars Science City project, where he seeks, 'to explore what a Martian Vernacular will look like.' The reality of the geodesic dome typology in the context of space is that it is an inefficient structure due to aspects that include construction, maintenance, and performance inefficiencies. Even when deployed within an extreme environment in a terrestrial setting the geodesic dome has underperformed, with the now deconstructed Amundsen-Scott South Pole Station in Antarctica an example of the form's underperformance. The station could not withstand the stresses placed upon it, by such extreme environmental conditions. Yet, still the geodesic dome typology as a technologically credible habitat solution persists even though within architectural history and theory, it could be considered emblematic of a failure of a persistent modernism and the architectural movement's development, of which the space architecture program finds itself birthed from. This paper explores the development of the typology within the context of space architecture, the ramifications of such a pervasive architecture for the discipline of space architecture, and concludes with several directions that the discipline of space architecture might consider in order to progress forwards in a constructive manner, away from such culturally embedded and destructive typologies.