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DEEP-TECH SPACE-EARTH SYNERGIES FOR FUTURE EXPLORATION AND TERRESTRIAL APPLICATIONS

Abstract

On Earth, climate change, water scarcity, sustainable food production, waste recovery and inefficient resource management are amongst the most pressing challenges facing humanity today. They are forcing us to innovate and to rethink space exploration and look for synergies between circular support systems for both space and terrestrial applications. This paper analyses the technology gaps and identifies both technology innovation synergies and market enablers in four thematic areas: circular design methodology for life-support systems, waste management, urine and food management. The identified technology innovation synergies will be in benefit for future deep space human and robotic spaceflight and in benefit to terrestrial applications. The paper is based on the analysis of the results of an open call for ideas. A number of 74 proposals were received and assessed by experts from ESA and the EIC and evaluated against the criteria of completeness, innovation potential and excellence of contribution. The final aim of this paper is to establish a community of innovators in the selected thematic areas through establishing synergies and identifying early market opportunities of circular economy technologies starting from lessons learnt and best practices from space-based technologies. Besides, this paper will facilitate the transition of circular technologies from Space to Earth and vice-versa so contributing to the EU's Green Deal.