33rd IAA SYMPOSIUM ON SPACE AND SOCIETY (E5)
Interactive Presentations - 33rd IAA SYMPOSIUM ON SPACE AND SOCIETY (IP)

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STANDARDIZED CARBON FOOTPRINT FOR A CUBESAT MISSION, A SUSTAINABILITY STUDY CASE ON EMERGING COUNTRIES WORKING ON SPACE TECHNOLOGY.

Abstract

The space industry is becoming one of the most relevant and thriving industries of this decade. In fact, the space market is expected to become a multi trillion-dollar industry in the following years (1). On the other hand, the world is facing the climate change emergency, being 2020 the hottest year on record. The concentration of greenhouse gasses has been rising steadily and mean global temperatures along with it (2). If this trend continues Earth could have an average temperature up to 5,4 degrees Celsius warmer than today (3). As consequence, the frequency and magnitude of extreme weather events has increased. For these reasons, there have been recent studies analyzing the environmental impact of propellant choices (4) and rocket launches (5). Nonetheless, emission allocation for products going into space or organizational carbon footprint of space industry start-ups has not yet been reviewed. For this study we aim to determine the carbon footprint of the launching of an ion- type- satellite on a CubeSat Mission by a Falcon 9 vehicle and allocated the corresponding emissions, in order to include on the organizational carbon footprint measurement of the Ecuadorian Space Technology Start-Up: Astralintu Space technologies. This resulted in 1115 t CO2 eq/launch approximately. In addition, we have defined the emission sources relevant for scopes 1, 2 and 3 and as a next step of this study, we plan to complete the GHG Inventory of Astalintu Space Technologies under the ISO 14064:1 2018, serving as the main tool to comply with the commitments acquired as part of the national initiative Zero Carbon Ecuadorian Program and the United Nations Global Compact alliance. In addition, this study provides insights to determine the main sources of GHG emissions in space technology startups and serves as basis for the development of effective carbon reduction initiatives and strategies.

Key words: sustainability, carbon footprint, CubeSat mission, space technology, emerging countries, Ecuador.