SPACE EDUCATION AND OUTREACH SYMPOSIUM (E1)
Interactive Presentations (IP)

Author: Ms. Emily Bathgate
International Space University, Australia, emily.bathgate@community.isunet.edu

Prof. David Bruce
International Space University (ISU)/University of South Australia, Australia, david.bruce@unisa.edu.au
Mr. Brandon Blake
International Space University, Australia, Brandon.blake@community.isunet.edu
Mr. Gregorio Camacho
International Space University, The Philippines, gregorio.camacho@community.isunet.edu
Ms. Evelina Onopriyenko
International Space University, Australia, evelina.onopriyenko@community.isunet.edu
Dr. Omar Eduardo Rodriguez
Australia, dr.eduardo2011@yahoo.com

STRATOSPHERIC BALLOON CONSTELLATIONS FOR EDUCATIONAL PURPOSES: BENEFITS AND CHALLENGES

Abstract

In January 2017, students from the Southern Hemisphere Space Studies Program, a joint program of the University of South Australia and the International Space University, in collaboration with the Amateur Radio Experimenters Group (AREG), simultaneously launched a pair of high-altitude balloons (HABs) from Mt. Barker and McLaren Vale in South Australia. This mission was launched to simulate how a constellation of small satellites (small sats) could be built using low cost commercial off-the-shelf materials to gather useful information for agricultural and telecommunications applications. Data returned from this mission included: elevation, location, pitch, yaw, roll, nadir infrared (IR) imaging and visual imaging (oblique and nadir). HABs provide good analogues to test small sat payloads easily, effectively and inexpensively. As such, HABs are more accessible to all educational institutions, providing several learning applications at multiple levels. Currently, HABs are used to enrich the experiences of both secondary and tertiary students and encourage them to continue pursuing science, technology, engineering and mathematics (STEM) fields in Europe, United States of America and Australia. Many countries both developed and emerging, could benefit greatly from a similar program. Our team consisted of an international and interdisciplinary group of 39 students from 11 countries. The group was split into subteams consisting of: payload integration, launch and logistics, media, image processing, weather prediction and writing. These teams were responsible for handling the various aspects of the project, which required participants to learn and apply different skills over a limited time period. Some of the key takeaways from the mission included programming and payload integration, media communication, data and image processing for Geographic Information Systems (GIS), and weather and flight prediction tools. As demonstrated, the project can teach students important STEM concepts and provide them with real hands-on experience with analogue satellite applications. The most important learnings for our team concerned communication and project management. Teams had to learn to communicate effectively both within teams and with external parties. There were many instances during the project where communication issues influenced the success of the mission. The management of this small project had parallels with the project management of a small sat mission and offers significant opportunities for educational developments.