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A WEB-BASED, INTERACTIVE MODEL OF AN OFF-WORLD, HUMAN COMMUNITY.

Abstract

SIMOC [see-mok] is a scalable, interactive model of an off-world community and a platform for engaged, informal education and formal learning environments. Developed through Arizona State University's Interplanetary Initiative, SIMOC provides a means to conduct an iterative, authentic science investigation into what is required to sustain human life in the harsh conditions of long-term space travel and living on other worlds in our solar system.

SIMOC is built upon four decades of NASA research in bioregenerative life support systems and active partnerships with the Arizona Science Center, University of Arizona's Biosphere 2, Paragon Space Development Corporation, and the National Geographic Society.

For informal learning, the well-crafted web interface provides an intuitive step-by-step guide to mission planning. Classrooms, science centers, and after-school programs can go deeper, building upon the NGSS-aligned curricula that introduces myriad subjects such as mission objectives, power generation and storage, human and plant metabolism, mechanical life support systems, and the symbiotic relationship between humans and their environment – all too easily taken for granted on planet Earth, but mission critical on a remote planet, moon, or asteroid.

Not a game, SIMOC employs the actions and interactions of individual and collective, autonomous agents (i.e. humans, a greenhouse, a square meter of strawberries, sweet potatoes, or wheat; solar PV arrays, batteries, etc.) such that their behavior, when allowed to unfold over a specified time, exhibit realistic, dynamic and probabilistic behavior. SIMOC's configuration wizard and interactive dashboard provide a graphical interface with live readouts, and data generated during the run for analytical post processing and classroom investigation.

SIMOC will be introduced to the Arizona Science Center, Phoenix in March of 2019 and made live on the National Geographic Society's educational portal in Q3. In February, the Biosphere 2 supported the first of several on-site experiments in growing various edible plants in order to capture a live data stream (light, humidity, temperature, CO2, and biomass) then introduced to SIMOC to fine-tune the model's real-world simulation.