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Integrating Small Satellites into the United States' K-12 STEM Education Discussion

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Abstract

U.S. science education policy and practices are under review, with the release of the Next Generation of Science Standards (NGSS) and the emergence of Science, Technology, Engineering, and Mathematics (STEM) education. Policy makers, including those from the White House, the National Academy of Sciences (NAS), and the National Science Foundation (NSF), are producing studies, guidance, and recommendations that target, and therefore will impact, course content, curriculum design, and instructional pedagogy practiced in these subject areas throughout the country. Though computer and space-borne technological advancements in the U.S. have provided unprecedented opportunities in education for over four decades, our nation now faces a serious shortage of students prepared for the twenty-first century workforce in STEM-related fields. In addition, the Geosciences have been historically underrepresented in the U.S. precollege community (Kindergarten through 12th grade, or K-12).

This paper seeks to make the case for the inclusion of such disciplines, and suggests that satellites and the data and/or imagery produced have a critical role to play in preparing the twenty-first century workforce. While a robust set of resources exists, it remains difficult, if not impossible, to find programs or instruction in K-12 classrooms across the U.S. that utilize products derived from space-borne platforms, or provide guidance related to careers in the space industry. The role of small satellites and the introduction of a GeoSTEM Education approach are a pathway towards *Integrating Small Satellites into the United States' K-12 STEM Education Discussion*.

1. Introduction

On April 1, 1960, TIROS-1 was launched, providing more than 22,000 pictures of the Earth from its orbit (see Figure 1). This new way of looking at Earth revolutionized the science of storm prediction. In the mid-1980s, high school students (ages 14-18) began building satellite tracking devices that gained access to polar orbiting satellite imagery known as Direct Read-Out Data. In the United States, the introduction of Remote Sensing and the use of satellite imagery, real time data, and computer visualizations in the K-12 classroom co-evolved alongside the development and use of computers in the classroom, the Internet, and emerging Earth

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