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THE EVOLUTION OF SATELLITE PROGRAMS IN DEVELOPING COUNTRIES

Abstract

The United States is pursuing an ambitious Vision for Space Exploration. Part of the Vision seeks out ways that international partners can share the effort of taking humans to the moon, to Mars and beyond. The goals of the Vision are truly global in nature: achieving the goals will have a global impact and will require a global effort. The nature of space activity has changed greatly over the last half century. Initially the funding, expertise and accomplishments were dominated by the United States and Soviet Union. Gradually, however, many other countries have carved their own place in the space faring society. The first mission of the US Vision for Space Exploration, the Lunar Reconnaissance Orbiter, demonstrates this point. This unmanned spacecraft, which represents the US return to the moon, is scheduled for launch in early 2009. The LRO mission closely follows the launch of three other satellites that were sent into lunar orbit by India, China and Japan between 2007 and 2008. Interest and capability in space is becoming more widespread. Currently, many developing countries are seeking to increase their level of space activity. Some of these countries, such as South Africa, Nigeria and Peru, are creating a new national space agency. Others, such as India and China, plan to drastically extend the capabilities of their existing programs. In this new era, how should the US think about partnerships for the Vision in the short and long term? This paper contributes to this question by analyzing the evolution of space programs in developing countries. It explores how closely their progress follows an idealized process based on technical complexity and managerial autonomy. Countries are considered from Africa, Asia and Latin America. Using historical analysis of the accomplishments of the countries, the trajectories of each country's space achievements are mapped and compared. The map is based on two original frameworks for measuring the technology and management architectures of space activities. The first framework is called the Space Participation Metric (SPM). Using this framework, one can assign a Space Participation score to countries based on their involvement in various space related activities. This first method uses a macro level of analysis. The second framework is called the Mission and Management Ladders. This framework considers specific space projects within countries and ranks them on "Ladders" that measure technical (mission-oriented) challenge and managerial accomplishment. This second method is at a micro level of analysis. Both frameworks provide a quantitative way to compare countries based on their space capabilities and achievements. This analysis tests the assumption that countries move through uniform through stages of increasing technical challenge and autonomy. The results of this work create a visual comparison of how developing countries have evolved with respect to space. This knowledge leads to policy recommendations, both for countries that aspire to grow in their space capability and for countries such as the US that may one day partner with them.