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Writing and Research

6 December 2016

## The Advancement of Humanity Through Space Exploration

### An Annotated Bibliography

*Working Thesis:* Space exploration should continue to be funded by government entities because it positively impacts our society through innovative technological advancements.

Bell, Jim. "A Sea Change for NASA." *Sky & Telescope* 119.6 (2010): 86. *Academic Search Complete*. Accessed 25 Sept. 2016.

This article begins by talking about the proposal NASA considered in 2010 to give private companies contracts to send their payloads into space. The author goes on to discuss how this proposal raised controversy and put NASA missions back into the spotlight—for better or for worse. In accordance with the author’s opinion, it was unfortunate that there was little public and media interest in the shuttle program and in 2011, the program was retired. Funding for many of NASA’s missions has been inadequate since then. Interest in manned missions to go back to the Moon have also decreased as well. As a result, this new proposal could be great news for NASA’s robotic exploration where they could be funded at healthy levels. “Presidents since John F. Kennedy have realized that America’s space program is a global projection of its national power and personality.” The cartoon in this article captivates the overall message.

This article can be found in an issue of *Sky and Telescope*, which is a scholarly periodical reporting on current events of the space industry. This article is also secondary

source because it is written about the proposal NASA announced in 2010. Although this article is a few years out of date, I still find it to be relevant to my research. The credibility of this source is established as a result of being written by Jim Bell, President of the Planetary Society and professor of astronomy at Cornell University. This article will be useful because it highlights the shift that NASA, one of the major contributors to space exploration was facing. Today, with many new private companies now in the mix, NASA can instead focus on different, innovative technologies rather than put their time and effort into rocket design, testing, and manufacturing. I plan to highlight how companies like SpaceX and Orbital ATK are currently being contracted by NASA to take care of getting payloads to the International Space Station.

International Space Exploration Coordination Group. "Benefits Stemming from Space Exploration." 20 Sept. 2013. Accessed 25 Sept. 2016.

This article began by highlighting the many societal benefits that improve the quality of life on Earth which have stemmed from human activity in space. For example, satellites originally designed to study the environment of space have contributed critical advances in telecommunications, GPS, and weather forecasting. The source goes on to talk about how space exploration has provided a better understanding of our universe and the solar system in which we live. This knowledge has created useful products and services to help solve challenges around the globe. One of the claims the source makes is that the future of space exploration calls for sending humans and robots to establish sustained access to destinations such as the Moon, asteroids, and Mars. Space activity and exploration have generated innovative and inspiring benefits for individuals and

communities around the world. According to this source, renewed investments in space research will have similarly positive impacts for future generations.

This is a secondary source because it details the many societal benefits that space exploration provides by referencing other sources as well. It is a reliable, scholarly source because it is written by the International Space Exploration Coordination Group.

Although there may be some bias in this source, I believe it will provide me with plenty of information to support my overall thesis. I plan on using a lot of the information in this source as a stepping stone into specific examples. In turn, this can lead me to discuss my other sources as well. I also have the option to use the various figures provided within this source.

Bolden, Charles. "Mars Matters." *Vital Speeches of the Day* 82.6 (2016): 158-160. *Academic Search Complete*. Accessed 25 Sept. 2016.

This source is actually a speech given by Charles Boden—the current administrator of NASA—a few months ago. Boden began his speech with the idea of how far we have come as a society and the simple fact that “space is hard.” This idea then transitioned to Robert Goddard, and how many people thought he was mad for thinking we as a society could ever go to the moon. Goddard’s story and legacy are now a part of space exploration history. “For as long as human beings have known about Mars, we’ve dreamed about going there.” For the rest of Boden’s speech, he focuses on Mars and makes it clear that as a civilization we are closer than ever to sending humans to Mars.

This is a primary source because it is a recent speech given by the administrator of NASA. For this reason, there is no question in its credibility and the information it provides for my research. In this source the speaker, Charles Boden highlights how far

space exploration has come and the possibilities it can achieve. He uses many rhetorical devices in this speech to strengthen the overall message as well. I will use this source to support my thesis in the fact that space exploration is a technology generator and provides a way to discover the unknown. This acquired knowledge we gain from missions to Mars can help improve life on Earth.

Carreau, Mark. "Asteroid Mission Could Shed Light on Origins of Life on Earth." *Aviation Week & Space Technology* (2016): 8. *Academic Search Complete*. Accessed 25 Sept. 2016.

This article begins by highlighting the most recent NASA mission to gather asteroid dust. It then discusses the characteristics of the Osiris-Rex spacecraft. This quote from the program executive, Gordon Johnston, demonstrates what this mission can provide. "It's going to help us understand how the Solar System formed and the potential for life in the Solar System, on Earth and elsewhere." The article then goes on to discuss the cooperation between NASA and the Japanese space program for this mission. Further mission details are discussed as well.

This is a current secondary source because it is an article written about a current NASA mission that began about three weeks ago. The article is reliable because it is written by Mark Carreau, who has more than 25 years of experience providing news reports on America's space program. Although this is not considered an academic source, I believe there is enough valid information in regards to the current mission and how it can directly influence life on Earth. However, all of the technical information that is included in this article may be unnecessary in supporting my overall thesis. I will have to make sure I use information that is relevant and does not distract my audience, while at the same time supporting my argument.

Cordell, Bruce. "21st Century Waves: Forecasting Technology Booms and Human Expansion into The Cosmos." *Futures Research Quarterly* 22.3 (2006): 21-41. *Academic Search Complete*. Accessed 25 Sept. 2016.

This source begins with what the author believes are stunning words from the March 22<sup>nd</sup> issue of *Collier's Magazine*. After discussing some of the early space age pioneers, the article transitions to its overall purpose. As described by the author, the purpose of this article is to briefly answer three questions. To summarize, these questions include: How can we be so confident? What are we waiting for? What kind of economic, technological, and political events can we expect to culminate near 2025? The author then goes on to discuss these questions by providing detailed evidence. This evidence includes the past, present, and future analysis of the "space vision."

This article is a secondary source because it references many primary sources as well as events that occurred in the past. This is a scholarly source written by Dr. Bruce Cordell, who is an educator and consultant that has contributed many works in the field of space exploration and colonization. Published in 2006, I still find this article will be relevant to supporting my thesis through the amount of compelling evidence provided. I will use this evidence in my research as a way to connect the similarities of the space age of the 1960's to modern day space programs. I will also highlight the evidence Dr. Cordell provides in regards to the three questions he states in the article.

Dick, Steven J. "Societal Impact of the Space Age." NASA. 4 Apr. 2005.

[www.nasa.gov/exploration/whyweexplore/Why\\_We\\_09.html](http://www.nasa.gov/exploration/whyweexplore/Why_We_09.html). Accessed 25 Sept. 2016.

This article begins by addressing the fact that there are controversies surrounding the motives, resources, and funding of space exploration. As described in the article,

there are commercial, educational, and scientific applications that stem from space exploration. The author then makes reference to the book *Rocket Dreams: How the Space Age Shaped Our Vision of a World Beyond*, written by Marina Benjamin. The conversation then focuses on the implications of satellites and how integral they are to our society. After the details regarding satellites, the author goes on to state: “Important as they are, applications satellites pale in significance to what space may represent for the future of humanity. While some argue that robotic spacecraft are cheaper and less risky than human spaceflight, it is my belief that humans will nevertheless follow robotic reconnaissance as night follows day.”

The information that is presented in the article is reliable because it is written by Steven J. Dick, who was the Chief Historian for NASA from 2003-2009. This is a secondary source because it is written about events of the past and present, while also making reference to other pieces of literature related to space exploration. The author also manages to remain unbiased by highlighting the fact there are many controversies behind the topic of space exploration. However, I plan on using this article as a way of showcasing specific, modern applications that space exploration provides for our society. I could also use this article as a way to link the past to the future impacts of this topic.

Harrison, Roger G. "Manned Space Exploration: America's Folly." *Space & Defense* 8.1 (2015): 72-73. *Academic Search Complete*. Accessed 25 Sept. 2016.

The first statement of this article is: “Advocates of manned space exploration have some explaining to do.” The article makes references to MIT and Neil deGrasse Tyson in order to establish credibility to its argument. The major themes included within this argument deal with purpose as well as the costs involved with space exploration. The

author of this piece makes it very clear that the cons of space exploration out-weigh the pros. This is evident from the author's particular point of view on the idea that investments in space exploration could be allocated to better defense programs rather than minimal gains in scientific knowledge.

This is a reliable, secondary source excerpt from the eighth volume of *Space and Defense*. *Space and Defense* is an academic journal written by various authors from the Eisenhower Center for Space and Defense Studies. Although the information provided in this article can be considered reliable, I found the author and ambassador, Roger G. Harrison, displayed biased in his writing. For this reason, this is an article that actually goes against my thesis and the overall argument of my research. However, I feel it is important to include this article in order to showcase the opposing viewpoints on space exploration. I plan to utilize this article to as a source of my rebuttal.

Kalam, A.P.J. Abdul, Dr. "The Future of Space Exploration and Human Development. "*The Pardee Papers* (2008): 1-14. Boston University. Accessed 25 Sept. 2016.

The speaker begins this article by discussing their credibility and the importance of continued investment in space exploration. Being involved with the Indian space program, the speaker goes on to highlight the many positive impacts on Indian society that have stemmed from space accomplishments of the last 50 years. The focus then turns to the idea of space exploration as a source of generating new and innovative technologies. This quote wraps up this section of the article: "What better vision can there be for the future of space exploration than participating in a global mission for perennial supply of renewable energy from space?" The article concludes talking about the need the world population has on future space missions and exploration.

This article is a primary source because it is adapted from a speech given by Dr. A.P.J. Abdul Kalam, the president of India at the time, at Boston University in 2007. Even though the speaker makes sure to establish his credibility in the introduction of this article, there is no question in the reliability of the information provided. Even though this article is a few years out of date, I feel the evidence provided is related to my thesis and I can use it to strengthen my argument. I will use the argument Dr. Abdul Kalam presents as a way to connect many of the other sources I have for my research. There are also useful statistics and figures provided in the article.

Turner, Martin J. L. *Expedition Mars*. Springer, 2004.

This section of the source focused on the reasons for humans to go to Mars. It opened up the discussion by stating the primary focus for this expedition is: “because it is there.” The section then transitioned into human nature and our urge to explore. “Some people believe that migration into space is the destiny of the human race.” It is this urge that drives the idea for an expedition to Mars. The author then focuses on the benefits that would come from a human expedition to Mars. One key point is that humans are able to more effectively conduct research and adapt to the environment of Mars in comparison to robots. For this reason, gathering scientific data and searching for possible microbial life on Mars could be done faster than ever before. In accordance with the author, back on Earth, we could expect significant advances in technology—both in industry and the academic world. These advances would be the product of solving the difficult challenges that a mission of this scale beholds.

This is the secondary print source that I will be using from the Grainger Library. It is written by Martin Turner, who has written two other novels relating to the space



exploration industry. I feel this is a reliable, scholarly source because it has been peer reviewed and is written by someone with knowledge in the topic of my research. This source is quite lengthy and for that reason, I chose to focus on a specific section. This way I only include necessary information that both provides evidence and supports my thesis. I will use this source to state the specifics of colonizing Mars as well as highlight the importance and benefits of an expedition like this.