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## **The Politics and Perils of Space Exploration**

Who Will Compete, Who Will Dominate?

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### **The Politics and Perils of Space Exploration**

A wonderful book!

In the introductory chapter the author Linda Dawson predicts: “the future of space exploration is bright.”

In fact the book compiles many books into one: it provides an overview of space history, space politics and the perils of space exploration covering Goddard’s first rocket experiments up to and including NASA’s 2015/2016 science budget as well as the Space Launch System (SLS) and Orion projects currently under development. On the other hand it can be considered to be the latest up-to-date book on space exploration containing authentic, verified accounts by the actual participants, expanding into current politics predicting a new, now more subtle space race between Russia, China, India, Japan, Israel Iran UK Asian Space Agencies and ESA and other countries.

The author Linda Dawson, a former Space Shuttle flight engineer at NASA JSC in Houston , now senior University lecturer in physical science and statistics, has met and talked to many of the key players.

As mentioned, the book provides a tour d’horizon with emphasis on US events but also covering all the important events, developments and contributions and politics of the other spacefaring nations. The author addresses the consequences of the space shuttle decommissioning in 2012 and the ensuing commercialization attempts to deliver supplies and crews to the ISS. The new (US) commercial players, SpaceX, Sierra Nevada, Blue Origin, Bigelow ...etc., are characterized also.

A large chapter is dedicated to the perils of outer space and in particular to the dangers waiting for astronauts and “space settlers”, and of course the Apollo, post-Apollo, space shuttle and ISS eras are covered appropriately. Even a little excursion to the 1967 UN outer space treaty is provided in one of the first chapters recalling the overall governing principle: “.....space belongs to all nations on Earth and should be explored for the benefit of mankind in a cooperative manner.”

Thus, kind of a modern space encyclopedia is created in “wikipedia-style” i.e., disputable occurrences are confirmed by independent sources (footnotes and hyperlinks).

Astonishingly, Linda Dawson was able to compile all this voluminous information on only 195 pages, including all the appropriate high-resolution images, many spectacular ones as they were published worldwide during the particular events.

The most impressive and valuable chapters in my opinion are dealing with:

>>The Spacelab history. “With Spacelab we have transformed the thoughts and dreams of thousands into reality.” (James M. Beggs, NASA administrator, at the ceremony for Spacelab’s arrival from Europe at the Kennedy Space Center in Florida, February 5, 1982).

>> Mars rover Curiosity's complex, delicate and never-tried-before landing maneuver on Mars, called "seven minutes of terror" by the operators because it was combining a parachute descent, powered breaking maneuver, rover separation and lowering the rover via "sky crane" using cables, rover touchdown and flyaway of the sky crane, all within a 7 minute landing sequence. Needless to say, this was an only one shot opportunity – and it was successful!

>> NASA human spaceflight fatal accidents and their legacy as resulting from the included detailed accident analyses.

>> The pros a cons for going to the Moon or Mars, a critical look at NASAs current Mars2020 program and the Asteroid Redirect Mission (ARM): "there is skepticism about ARM and how it relates to putting an astronaut on Mars. Arguments in favor of the mission include the implementation of new technologies that will directly relate to deep space tasks, such as advance solar electric propulsion, new guidance and navigation techniques and a starting point for which astronauts could enter deep space. The manned portion of ARM won't occur until 2025 and will use the Orion crew module atop the SLS. Orion would rendezvous with the boulder and perform crew EVAs to inspect the surface."

Just for the record and for later comparison, the Orion flights shall be listed: EFT-1/ 2014 (exploration test flight, test-1, 4 earth orbits, December 2014, completed), EM-1/2018 (un-crewed, around the Moon + Service Module-SM, could also be crewed to the ISS), EM-2/ 2021-2023 (crewed + SM, Moon flyby), EM-3/ one year later (crewed + SM, destination not determined) [2]. The Service Module is delivered by ESA as barter item for the ISS.

A detailed structured table of contents and an exhaustive index guides you through the book. Having explained what kind of decisions were influenced by what political events in the past the author leads you to the current crossroads in space exploration: Mars or Moon, more NASA or more commercialization, more human spaceflight or more robotic missions, striving for independency or more global cooperation, etc.?

Having digested the history of spaceflight and all the relevant facts of space exploration the reader will be able to follow the discussions about our "future in space" in a neutral, educated way and make up his own opinion.

However, not even the author wants to predict the direction space exploration will take because too many unpredictable unknowns are looming in the ever changing politics which tend to follow the most opportune goals for the current situation being influenced by more variables you ever might be able to think of.

The author characterizes the road to deep space at the end of the book: "...clearly there are places for human beings and high-tech equipment including complex robots in the quest for deep space exploration. The requirements defined for successful missions to outer space and possible colonization of another celestial body include demonstrations of scientific concepts and the use of materials possibly not yet discovered. Many of these efforts will be conducted through a combination of NASA private enterprise and international partnerships. Speaking for space enthusiasts, we are impatient to see the results."

Linda Dawson skillfully connects the sometimes astonishing and unexpected developments of the past in a logical manner leading the reader up to where we stand today, at the end of the year 2016, enabling us to see from an outlook into the next decade(s) and guess where we are going, or should go.

The book is highly recommended for decision makers, but also for taxpayers to judge and understand what “their money” achieved with respect to space exploration, and to keep track of the very complex and difficult decisions we will have to make for our global future.

The book can also be considered as the legacy of the Space 3.0 generation, if you follow the categorization recently introduced by the ESA DG with his “Moon Village” vision: Space 1.0 could be the early astronomical observations, Space 2.0 was the era during the first space race which led to the Apollo Moon landings. Space 3.0 began with the conception of the international space station and our understanding of the valuation of space as the “next frontier”, Space 4.0 would be characterized as the era when space is evolving from being the preserve of the governments to a situation in which an increased number of diverse space actors around the world, like private companies, academia, industry and citizens.

The newly elected US President Donald Trump said in his first address to the US Congress (February 27, 2017): "American footprints on distant worlds are not too big a dream," – which indeed might be the beginning of Space 4.0

#### References

- [1] What is Space 4.0? [http://www.esa.int/About\\_Us/Ministerial\\_Council\\_2016/What\\_is\\_space\\_4.0](http://www.esa.int/About_Us/Ministerial_Council_2016/What_is_space_4.0)
- [2] Orion [https://en.wikipedia.org/wiki/Orion\\_\(spacecraft\)](https://en.wikipedia.org/wiki/Orion_(spacecraft))

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