

How Human Space Travel Influences Space Tourism: A Critical Review about *Astronautical Space Travel - Beginning of a new era* by Prof. Dr. Rupert Gerzer

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As space tourism gains popularity, the importance of educational works to shed light on this topic is also increasing. For this reason, the book *Astronautical Space Travel - Beginning of a new era* by Prof. Dr. Rupert Gerzer is examined in this book review. All in all, this book offers valuable information regarding all space enthusiasts and future space travelers. Therefore, this review is focused especially on the needs of future space tourists and private astronauts as it contains an introduction to the book as well as a summary of the most significant arguments, a critical analysis of the arguments presented in the context of space tourism and lastly a short summary of identified strengths and limitations of this book. Especially, the connection between this work and space tourism is examined and analyzed. Finally further research in this area is presented at the end.

The book *Astronautical Space Travel - Beginning of a new era* by Prof. Dr. Rupert Gerzer gives an overview of today's astronautical space travel. The book is written in German language and the book was published 2022 by Springer publishing house. For this review, the first edition of the book is used. Overall, the book is split into ten subchapters which are covered in 201 pages. The author Prof. Dr. Rupert Gerzer who is an expert in the field of space medicine has worked in the field of astronautical space travel for more than 35 years. Due to his extensive work experience for the German Center for Aeronautics and Space Travel (DLR) as well as being the head of the German Center for Aeronautics and Space Travel in Cologne, he is one of the few experts who can describe the transition from agency based human space flight to commercial human space flight in particular which is crucial when educating about space tourism today.

In Germany, Prof. Dr. Gerzer is particularly known for his implementation of the German research facility envihab: at the German Center for Aeronautics and Space Travel (DLR) site in Cologne which is known as one of the most remarkable research facilities regarding space medicine. The author has also worked with innumerable different international collaborations over the years, which is why his expertise in this area can be presented very noticeably for readers in this book. Therefore, the purpose of this book review is to give an overview about astronautical space travel regarding to space tourism. In particular, the author's personal experiences are brought into the book and anecdotes make it exiting to read. In connection with space tourism, it should be noted that the book is the first German work to present and reproduce the various topics on one complete work that are also relevant to space tourism.

In the following paragraph the main arguments and chapter contents related to space tourism are presented. The book deals with the following ten chapters: research in history of astronautical space travel, physical framework conditions, staying in weightlessness, technical system in space, actors in astronautical space travel, astronauts, medical and life science space, as well as a spin-off and public relations chapter, the need for action in Germany and Europe and lastly an outlook into the future. The book also contains a foreword by the astronaut Reinhold Ewald, a foreword and an acknowledgment by the author itself, as well as a list of abbreviations, a statement about the authors background, an epilogue and a keyword index.

Starting at the beginning the chapter History of astronautical space travel gives a detailed overview of the beginning of human space travel, from the first man in space Yuri Gagarin (p.11), to the first woman in space Valentina Tereshkova (p.12) and various human space flight missions over the years (pp.13-21) to explanations of catastrophic flights, such as the two failed space shuttle

missions of Challenger in 1986 and of Columbia in 2003 (pp.21-22). In particular, the beginnings of human space travel, but also the dangers modelled by the demonstration of missions that have been fatal for the crew, are particularly remarkable for space tourists, as they explain in detail the possible negative consequences of space tourism as a leisure activity.

In the second chapter Physical framework conditions in space are explained. From a tourism perspective, the clarification about the definition of space is particularly important, as in the past there have been several disputes between companies in space tourism as to whether the tourists have been able to officially reach space or not (p. 27-28). Therefore, the book helps to understand the terms and definitions that are critical for space tourism in this context.

In the third chapter, Staying in Weightlessness, the use of parabolic flights in astronautical space travel is explained, which is significant for space tourists since these flights have so far been included in the training of space travelers. In addition, the difference between suborbital and orbital tourism is shown in detail, which makes it easier for tourists to understand and classify the differentiations for tourists regarding this matter (pp.38-43).

In the fourth chapter, technical systems in space, various types of aircrafts for space are presented (p.45 ff.). From a touristic perspective, it is from interest to be presented with the two currently possible aircrafts for orbital space tourism, which consist of the Soyuz rocket and the Soyuz capsule on the Russian side (p.47) and of the Falcon 9 rocket with the Dragon crew capsule on the American side (p.49). In addition, reference is made to the reusable Starship rocket from the company SpaceX (p.49), which has now also completed successful tests since 2024. Starship will later be used to allow tourists to travel to destinations such as the Moon or the Mars. Finally, the existing spacesuits are presented (p.56 ff.). Another essential aspect is the explanation of life support systems in the subchapter space stations (p.63 ff.), which describes the basic needs of tourists, such as sleeping as well as using a toilet in weightlessness. The chapter also provides a perspective on planned space stations and space hotels, like Gateway which will then play a particularly key role for lunar space tourism opportunities (pp. 69-76). For space tourists who read the book, the list of private players in space travel, which is described (p. 98 ff.), is especially interesting, including suborbital providers such as Virgin Galactic and Blue Origin as well as orbital providers such as SpaceX, Space Adventures or AXIOM space (p. 98-104).

In particular, the chapters five actors in astronautical space travel and six astronauts are crucial for future space tourists and private astronauts because, among other things, they give an overview of the private space industry, e.g. commercial companies in human spaceflight and topics such as the effects of space travel on humans (p. 116 ff.). Therefore, one of the most thought-provoking illustrations of this book is the overview of the most common health problems during flights, which reflect the frequency and cause of health problems in space (p.116). This is particularly significant for space tourists because space is a hostile environment, and tourists will have to adapt to these inconveniences. Also, the influence of space missions on mental health is shown (pp.129-131) as well as the danger of space debris for human missions (pp.131-132). Next for space tourists is the subchapter food, which explains, among other things, why food tastes different in space and which nutritional supplements are necessary during a mission (p.133). Lastly, the chapter sex in space with sex being a topic that astronauts have not had to deal with so far, will play a more decisive role for future space tourists (p.134). Concluding this, in chapter 6, the possibilities for fitness in space are shown, as well as the intensive care after landing, which will play a role for space tourists in the future, especially for long-term stays (pp.136-144).

The chapter medical and life science research is primarily about the research that can be carried out in space, which is of secondary prominence for tourists, as the specialty of trained space researchers (astronauts) is highlighted here (pp.145-176). However, since tourists have conceded smaller experiments in space, this topic could increase in importance in the future. The final three chapters deal with spin-off and public relations, the need for action in Germany and Europe, as well as an outlook on future developments (pp.177-192). Interesting from a tourism perspective is the subchapter space tourism, space mining and industrial production in space (pp.188-190),

which explains, among other things, why space tourism can be seen as the next milestone in the development of near-Earth space for the use of humankind in the future (p.190). The end credits and keyword list round off the end of the book (pp.193-201).

Strengths of this work are the sharp and detailed explanations of space for readers who are not familiar with astronautical space travel, the detailed history of the transformation regarding human space flight becoming more privately based than agency based and being the first book that also describes the private industry of commercial space travel. Another help is the explanation of abbreviations in the abbreviation list, which makes it easier for non-professionals to understand the topic. Furthermore, the author's various anecdotes make this book exiting for future generations and interesting to read. The key target group for this book should be space enthusiasts and future space tourists.

Another plus of the book is the chapter on the need for action in Germany and Europe, which calls for a clear strategy for the future of astronautic space travel (p.183). The area of spin-off and public relations work, in which the author describes, among other things, the school lab of the German Aerospace Center, in which topics from space can be explained and illustrated to students, is also one of the critical aspects of this book, as it aims to promote young talent in the field of astronautical space travel, which will be even more crucial in the future.

The only limitation of this book is its actuality, as it was published in 2022 and space travel, especially in the commercial sector, is a constantly changing sector. Therefore, a second edition with updated information in this area would be desirable. Since there are currently no comparable works in German-speaking countries, the book cannot be compared with other works of this type. However, the non-fiction book *Star ward - the future of space travel* by Guido Meyer will be published on November 27th, 2024, in Springer publishing house which is intended to provide an overview of the future of space travel. Still further research in this area is necessary and required.

References

Gerzer, R. (2022). *Astronautische Raumfahrt: Beginn eines neuen Zeitalters* (pp. 1-201). Berlin, Heidelberg: Springer Berlin Heidelberg.



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