

# Realizing Tomorrow: The Path to Private Spaceflight

Reviewed by Roger D. Launius

*Realizing Tomorrow: The Path to Private Spaceflight* by Chris Dubbs and Emeline Paat-Dahlstrom. Lincoln: University of Nebraska Press, 2011. 344 pages. ISBN 978-0-8032-1610-5. US \$34.95 (hardcover with dustjacket, illustrations, notes, index).

Should spaceflight in the United States be dominated by government organizations and controlled by the priorities of national policy, or should it be a commercial activity undertaken by private firms engaged in profit making? That is an important question and most assuredly one worthy of exploration. I had hoped this book would treat this theme, but instead it is history written for advocacy about the virtues of private spaceflight versus of the ineffectiveness of government programs. Chris Dubbs and Emeline Paat-Dahlstrom have presented here a rosy, once-over-lightly history of commercial space activities from the earliest days of the space age to the present. Those satisfied with such a work will be rewarded by *Realizing Tomorrow: The Path to Private Spaceflight*.

The authors begin with a discussion of the cult-like activities of Gerard O'Neill and his plans for creating colonies in space. He insisted in the 1970s that possibilities for human colonies in free space seemed limitless, as he calculated the technical issues of energy, land area, size and shape, atmosphere, gravitation, and sunlight necessary to sustain a colony in an artificial living space. Rather than live on the outside of a planet, settlers could live on the inside of gigantic cylinders or spheres of roughly one-half to a few miles in each dimension. These would hold a breathable atmosphere, all the ingredients necessary for sustaining crops and life, and include rotating habitats to provide artificial gravity. While the human race might eventually build millions of these space colonies, each settlement would of necessity be an independent biosphere with trees and lakes and blue skies spotted with clouds along each colony's inner rim where all oxygen, water, waste, and other materials could be recycled end-

lessly. Animals and plants endangered on Earth would thrive on these cosmic arks; insect pests would be left behind. Solar power, directed into each colony by huge mirrors, would provide a constant source of nonpolluting energy. Enthusiasm for this possibility prompted many to embrace spaceflight as something everyone would eventually engage in and lead humanity to settlements throughout the cosmos.

O'Neill was an iconoclast, but no more so than Robert Truax, the rocketeer who believed he could build a commercial rocket that would open the space frontier to everyone. Truax, a career Navy officer, had worked briefly with Robert Goddard during World War II on rocket technology and then went on to lead the American Rocket Society and pursue a succession of rocket development efforts. In 1966 he founded Truax Engineering and pursued design work on a sea launch concept, as well as other rockets over the years. He never got very far with these efforts, although he did build the rocket used by Evel Knievel in his attempted jump of the Snake River Canyon.

These are mere preludes to the bulk of *Realizing Tomorrow*, which focuses on the efforts beginning in the 1990s to advance private space activities. Unlike the stories of O'Neill and Truax, some of those later efforts have proven successful, if only modestly. There is a lot of Sturm und Drang about these efforts, but thus far the accomplishments have been modest. In the remainder of this book, authors Dubbs and Paat-Dahlstrom emphasize the rise of entrepreneurial rocket companies, space tourism organizations, the X-prize and the flight of SpaceShipOne in 2004, and possibilities for the future.

The tone throughout this book is hopeful, suggesting that there is a straight line path from early ideas to the success that they believe is on the verge of being realized. A handful of key events provide the skeleton on which to hang this optimism. The first is the enticing of Russia to support entrepreneurial space activities and selling seats on Soyuz spacecraft to space tourists, the



first of which was Dennis Tito who gained fame in 2001 for flying to the International Space Station over the objection of NASA. Since then, there have been six additional paying space tourists, each contributing more than \$20 million toward their flights. At that price tag the market for this form of tourism is limited. A second hopeful event was the 2004 flight of SpaceShipOne which took the Ansari X-Prize as the first privately developed vehicle to fly into sub-orbital space twice within two weeks. This unleashed a wave of investment to build suborbital space tourism vehicles and Virgin Galactic Inc.'s SpaceShipTwo may fly in the near term, according to the authors. This passenger vehicle would be carried to high altitude by a carrier aircraft, and then launched for a quick ballistic flight above 100 kilometers (the "official" beginning of space). In the next few years, there seems good reason to believe that sub-orbital space tourism will become a reality, according to Dubbs and Paat-Dahlstrom. What also seems clear, but is less well-explored in this book, is that space tourism for the foreseeable future will remain the province of wealthy thrill-seekers, essentially the same class as those who climb Mount Everest, rather than the masses who dominate the current \$600+ billion per year tourism industry. A tiny elite of multimillionaires may continue to fly aboard Soyuz capsules to Earth orbit, but the reality is that orbital space tourism is many decades away absent a major breakthrough in space access. Until that happens, we will be able to count the number of orbital space tourists on our fingers for years to come.

The authors also make much of SpaceX's efforts to develop new launch vehicles that will lower the cost of space access. This company, the creation of Elon Musk, according to the authors, challenges the normative approach to space transportation and may well open the space frontier to many more players. They also emphasize Robert Bigelow's efforts to develop inflatable orbital habitats, two of which have been launched and tested.

*Realizing Tomorrow* makes the case that the United States is on an inevitable path toward greater access to space and a blossoming of activities in Earth orbit. Dubbs and Paat-Dahlstrom offer an overall Panglossian version of what has been taking place, that we live in the best of all possible worlds and that it is getting better all the time, forecasting a bright future for private human spaceflight. This development will increase opportunities for tourism, which takes up the bulk of their book, for research, or for other activities. There is little skepticism recorded in any of this, despite the fact that these efforts are being viewed with considerable skepticism by many in the space community. One may believe that this skepticism is predicated on outmoded thinking and twentieth century norms and is therefore

easily dismissed, but one may just as easily conclude that those skeptical are reflecting their knowledge of just how hard it is to build and operate these space technologies.

Moreover, skeptics will confide that they have seen so much of this before. In addition to O'Neill's stillborn colonies in space or Truax's new rockets, a succession of efforts in the 1990s also failed and has prompted caution in believing hyperbole. During that period initiatives aimed at opening the space frontier to a much broader community included updated versions of existing rockets such as Lockheed Martin's Atlas, Orbital Sciences Corporation's Pegasus XL and Taurus rockets, and The Boeing Company's Delta 3. Those were successful redesigns but they did not open greater opportunities for larger numbers of people to engage in space activities. Private entrepreneurs also emerged. Kelly Space and Technology's Astroliner, Rotary Rocket Company's Roton, Kistler Aerospace Corporation's K-1, and Beal Aerospace's BA-2 rocket all vied to capture a share of the space access market. None proved successful and all folded.

This book provides a reasonable overview of its subject, but one far too optimistic for what has been accomplished thus far. In this sense, it is less a work of history than

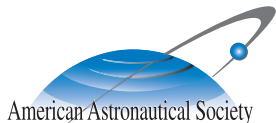
a work of advocacy. It offers usable discussions about some of the key breakthroughs in the latter twentieth and early twenty-first centuries made by a range of American entrepreneurs and engineers with a vision of spaceflight democratized beyond government programs and narrow elites. Even so, the overview offered here is a history of nascent triumphalism. It offers a narrowly linear process of space technology and policy development to the very great exclusion of any social or cultural factors that might be at play. There is little of the obscurity of choices, blind allies of research, or trial and error that might have enriched this story.

No doubt *Realizing Tomorrow* will be satisfying to many within the space community. It is a massively complex, important topic, one that is arguably the most significant transition for spaceflight in America in last twenty years, but this book falls short as a scholarly analysis. The topic deserves more serious investigation.

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