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Book Review

Crowded Orbits: Conflict and Cooperation in Space by James Clay Moltz (Columbia University Press, 2014)

Deron Jackson

A popular space primer serves both the policy and academic communities.

Human beings have perceived outer space as infinite for centuries, and since the observations of Edwin Hubble in the 1920s, scientists have studied phenomena that suggest the universe itself is expanding. However, as the title of Clay Moltz's most recent book points out, the region of space most important to the economic and physical security of residents on Earth is increasingly viewed as far from infinite.

In *Crowded Orbits*, the author introduces readers to the many ways in which orbital space around the Earth is in fact distinctly limited by principles of physics as well as politics. This discussion is of value not only to scholars and students of space policy but to those concerned more broadly with questions of international cooperation and conflict in the early 21st Century. Our journal, *Space and Defense*, represents the Eisenhower Center's continuing effort to broaden scholarship on issues of space policy and security. With the publication of *Crowded Orbits*, Clay Moltz again demonstrates his leadership as a scholar and expert in this field, which has already benefitted from his previous books: *Asia's Space Race* (2011) and two editions of *The Politics of Space Security: Strategic Restraint and the Pursuit of National Interests* (2008 and 2011).

The first hurdle encountered in presenting space security issues to a wider audience, to include those in the policy-making community, is dealing with a subject that requires a certain degree of understanding of abstract scientific principles. This challenge is addressed in the first chapter of *Crowded Orbits*. There Moltz surveys characteristics of the orbital domain which make it intrinsically different from land, sea, or air as venues for human activity. Understanding these principles helps explain why orbital space can be considered "crowded," as the title suggests, whether from the perspective of the limits of the

electromagnetic spectrum used to gather and communicate information with satellites or the three distinct orbits they inhabit. Moltz gives his readers just enough of an overview of the scientific principles in order to make sense of the political challenges discussed in greater detail in the chapters that follow. Those interested in more science can consult *The Physics of Space Security* by Wright, Grego, and Gronlund (Cambridge, MA: American Academy of Arts and Sciences, 2005), which is the near perfect complement of Moltz's approach, beginning with one section on policy implications and following up with twelve sections discussing technical operations in space.

While the description of orbital space as "crowded" takes top billing in the title, in reality the book's real emphasis is not so much on what contributes to that congestion but on the political implications of that congestion as evidenced by the subtitle: *Conflict and Cooperation*. Both conflict and cooperation are possible outcomes from operating in a space environment that the United States has called both "congested" and "contested" in its recent space strategy documents. The dual nature of conflict and cooperation in space is not a new development, as outlined in Moltz's second chapter which charts the politics of the space age.

The use of space by the United States and Soviet Union was made possible through development of long-range ballistic missiles primarily intended for delivery of nuclear weapons. However, discovery of the effects of nuclear weapons on the space environment led to the first arms control treaty of the Cold War, the Partial Test Ban Treaty (PTBT) of 1963, which banned further atmospheric testing (p. 40). Although their terrestrial arms race and intense political strategic competition continued throughout the 1960s and 70s, the two superpowers were nonetheless able to establish the basic international legal framework

governing activity in space, in particular the 1967 Outer Space Treaty (OST).

The OST and other agreements which followed it represent a high water mark in the use of formal treaties to regulate space activity, a practice that has declined in recent decades. Although certain aspects of the cooperative paradigm established by the OST have continued, when the Cold War heated up one last time at the end of the 1970s and into the 1980s, the prospect for conflict in space began to rise. Both the U.S. and U.S.S.R. engaged in testing anti-satellite weapons (ASATs) and debated the role of space systems in defending against ballistic missiles (p. 50). Such weapons were never used against the other side, however, and the framework for space established in the first half of the Cold War was still intact when the Berlin Wall was torn down and the Soviet Union passed into the dustbin of history.

It may very well be time to consign the term “post-Cold War” to that same historical dustbin and search for a new label to assign the world of today, which has seen significant changes in the number and nature of the actors and challenges confronting leaders and citizens in the 21st Century. Although the nature of the physical environment of space is inherently the same in 2016 as it was in 1957, 1967, or 1989, the political environment is transforming rapidly. The number of states with the capability to launch objects into orbit has continued to grow, and the number that make use of space for civil, commercial, or military purposes has expanded far beyond the elite club of two space-faring states in the late 1950s. Compounding the problem of crowded orbits is the advance of technology making possible the proliferation of even smaller satellites, down to the size of “picosats” weighing in at only one kilogram (p. 103). While these new systems make it possible to lower the cost of exploring and using space, they simultaneously complicate the political problem of “crowded orbits” by raising the number of objects in play.

A one-kilogram picosat may be viewed as an innovative platform for allowing students or emerging nations to study the uses of space for their first time; this same satellite may be viewed by an established operator as “debris.” Among the questions to be answered is how to ensure the increasing number of small vehicles do not collide with larger (and more expensive) satellites operated by governments or private companies. What degree of responsibility must be borne by any satellite operator to ensure their vehicle does not collide with another while active and is removed from orbit when it reaches the end of its useful life? Although the United States leads the international community in tracking orbital debris and providing data to avoid collisions, America is neither a global policeman nor an orbital garbage collector. Debris mitigation and remediation remain tasks requiring a cooperative response from all spacefaring states, working against the temptation to be a “free rider” and leave the consequences to other nations or future generations.

As Moltz draws toward his concluding chapter on “Trends and Future Options,” a number of questions emerge out of the preceding sections for consideration, which may prompt individual states to work cooperatively to avoid conflict and find their “SALT moment,” as discussed in this issue’s essay by our publisher. Will crowded orbits place pressure or limits on military activity as more states integrate the use of space into their armed forces? Civil space activities have been one area of cooperation among allies and between former adversaries. However, it is possible that the civil sector may see a trend toward re-nationalization, away from collaborative projects and back toward national space programs working alone. It is also possible we will see de-nationalization of space activities with a rise in privately funded ventures aiming at putting humans in orbit and eventually on Mars. The reality is we will probably see more of both, making the urgency for dealing politically with *Crowded Orbits* even more critical.