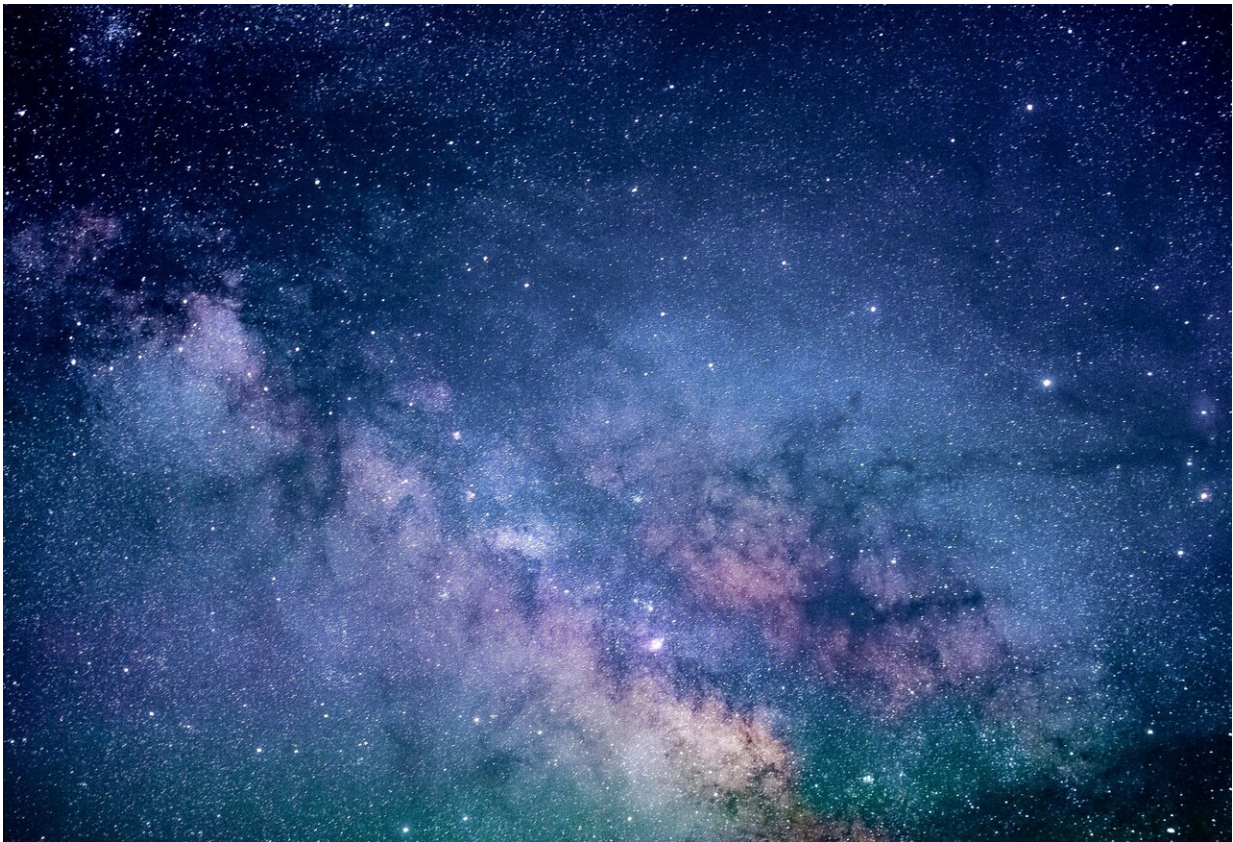


Do increased extraterrestrial ambitions threaten the future of space?

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As the number of nations and businesses across sectors look outward to space for new opportunities—and commercial space activities grow—the sustainability of space exploration is more important than

ever.

According to Mark Meaney, scholar-in-residence for the [Division of Social Responsibility and Sustainability \(SRS\)](#), as more private sector entities get involved in commercial space activities, the more important it becomes for stakeholders to agree on norms and rules if we are to coordinate space activities to the benefit of everyone.

Contrary to popular belief, "Outer space is not infinite as a resource," says Meaney. "Therefore, the [space industry](#) must develop agreed upon rules to coordinate the use of space."

Meaney, principal investigator (PI) of the project and Co-PIs; Zack Donohew of SRS and Lewis Groswald, program director at Smead Aerospace Engineering Sciences; are currently working on new research to determine how to accomplish that. Their working paper, "Space and Sustainability: Norms of Behavior for the Sustainable Development of Commercial Space Activities," explores the ways in which space sustainability is threatened—from debris in orbital space to satellite congestion—and offers ideas for facilitating the development of sustainable norms, rules and business models. By tackling these problems early, we can collectively ensure that space remains accessible to future generations.

The team received one of CU Boulder's 2020 Research & Innovation Seed Grants to support the work. Their submission was accepted under the Grand Challenge: Our Space. Our Future. category. The Grand Challenge is a strategic initiative dedicated to spanning and connecting disciplines across campus.

Research & Innovation Seed Grants seek to "stimulate inter- and multidisciplinary work on research, scholarship and creative activity projects that either: explore new areas of research with high impact and

future funding potential or pursue research, scholarship, or creative activity of high value to arts and humanities disciplines."

Because space exploration by private corporations is still relatively new, establishing norms and behaviors that promote sustainability early-on is important. Finding a balance between [private companies](#)' and nations' use of orbital space for satellites is critical, as creating too much debris early on can make space launches impossible.

We had the opportunity to speak with Dr. Meaney to learn more about this important work:

What inspired you to study space and sustainability?

Mark Meaney: From the perspective of sustainability, the project team is interested in applying the concept of the "tragedy of the commons" to commercial space activities. Individuals acting independently can deplete a finite resource absent coordination. Zack Donohew and I also saw the project as an opportunity to advance the partnership between Leeds and the School of Engineering and Applied Sciences.

What are you hoping to learn from this project?

MM: Advances in reusable rockets, lowered per-launch costs and miniaturization of satellites are opening up new business opportunities for a burgeoning commercial space industry. As more private sector entities develop extraterrestrial ambitions, the sustainability of space activities is increasingly at risk. We will explore the extent of the problem of orbital debris, facilitate in the development of norms and rules, and develop sustainable business models in support of space entrepreneurship.

How do you foresee space exploration evolving in the future? And do you see the Space Force playing a role in the norms/behaviors of space activities?

MM: We are reaching a critical inflection point in space security as more nation-states develop counterspace technologies. Unfortunately, I see Space Force as an escalation of the proliferation of new offensive counterspace capabilities. An increasing number of nation-states are testing space weapons, or so-called anti-satellite weapons (ASATs). This has the unintended consequence of the proliferation of orbital or "fragmentation" and "mission-related" debris. Naturally, orbital debris is the enemy of commercial space activity. So, in short, I see Space Force as counterproductive to space entrepreneurship.

On the other hand, I see aerospace companies as playing a leading role in the development norms of behavior to moderate the military use of space. It's obviously in the best interests of the private sector to secure the peaceful access and use of [outer space](#).

What companies do you see emerging as leaders in charting this new territory?

MM: The burgeoning commercial space industry includes a number of sectors, e.g., communication and navigation, habitation, robotics, tourism, transportation, as well as exploration and extraction. We even just learned that Tom Cruise is set to partner with Elon Musk to develop the first action movie filmed in [space](#). The "big three" continue to be Boeing, Lockheed and Northrup Grumman. In addition, there are a number of Colorado-based companies that lead the pack, such as Ball Aerospace, Harris Corp., Raytheon, Sierra Nevada Corp, and United Launch Alliance. In fact, Colorado has become known as "Aerospace Alley."

Provided by University of Colorado at Boulder

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