

Commercial uses of space and space tourism: setting the scene

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Space applications have become indispensable in our modern society, as they account for an ever-expanding number of facilities of a very diverse nature all over the world. Whereas space services used to be, for a long time, primarily scientific or military in nature, commercial applications of spacefaring are rapidly accounting for the most exciting developments in the fields of space sciences, technology and law. Satellite applications facilitate the provision of such diverse services as global communication, remote sensing, climate observation, data collection, resource exploitation, transportation and space tourism.

The astonishing scientific and technological progress in this respect has been made possible in large part by the enabling and, some would argue, ambiguous legal framework that has been put in place at the international level to govern space activities. The fundamental principles underpinning this legal regime are the free exploration and use of outer space, including the Moon and other celestial bodies, by all States, including their nationals, and the corollary prohibition of national appropriation of outer space, by any means whatsoever, including sovereignty.¹ These principles stand in stark contrast to those of the legal regime governing the airspace above the territory of States, who have complete and exclusive sovereignty over the areas directly superjacent to their land and territorial sea.²

¹ See Articles I and II of the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, 27 January 1967, 610 *U.N.T.S.* 205 (hereinafter: 'Outer Space Treaty' or 'OST'); Article 11(2) of the Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, 18 December 1979, 1363 *U.N.T.S.* 21 (hereinafter: 'Moon Agreement' or 'MA').

² See Article I of the Convention Relating to the Regulation of Aerial Navigation, 13 October 1919, 11 *L.N.T.S.* 174; Article I of the Convention on

It is clear that the application of the rules of two legal regimes, outer space and airspace, which are guided by fundamental concepts and principles standing in such apparent opposition to each other, cannot be reconciled without determining the scope of their respective fields of application. The benefits of drawing a clear boundary between airspace and outer space seem self-evident, for this appears to limit the amount of international legal disputes between competing users of outer space while assuring a continued, secure and predictable development of space activities. While legal certainty should hence be served by a clear demarcation, the question of a dividing line between airspace and outer space itself has resulted in significant legal turmoil that is yet to abate, even after more than half a century of heated discussions.

Intergovernmental discussions on the lower limit of outer space started as soon as the first colloquium on the law of outer space was held in 1958, barely a year after the launch of the first satellite. The related matter of the upper limit of state sovereignty had already been a topic of some contention in the years prior to this landmark event, without a clear outcome. In 1967 the question of the definition and delimitation of outer space was formally placed on the agenda of the main organ of the United Nations tasked with the development of space law, the Committee on the Peaceful Uses of Outer Space (UNCOPUOS). Over the course of the following decades, both the Legal Subcommittee (LSC) and its counterpart, the Scientific and Technical Subcommittee (STSC), of the UNCOPUOS have kept the item on the agenda.

At these forums, many different views, opinions and proposals have been put forward regarding the need, timeliness and criteria for determining a dividing line between airspace and outer space that would be, at the same time, accurate, universal and easy to control. However, no consensus on any of these issues has been reached to this point.³ The most recent discussions in the LSC have been moving toward a boiling point where the very methodology of the Working Group on the Definition and Delimitation of Outer Space has been questioned as sub-optimal and perhaps even as a factor actively contributing to the persisting deadlock in the discussions on the demarcation issue at intergovernmental level.

International Civil Aviation, 7 December 1944, 15 *U.N.T.S.* 294 (hereinafter: 'Chicago Convention').

³ For an overview of the different opinions expressed by delegates at the UNCOPUOS, see in general Historical summary on the consideration of the question on the definition and delimitation of outer space, 18 January 2002, UN Doc. A/AC.105/769.

Indeed, views that have traditionally centred on the need for a definition of outer space as the means of clarifying the application of the air and outer space legal regimes have equally traditionally been countered by declarations that the current framework should be retained 'until such time as there was a demonstrated need and a practical basis for developing a definition or delimitation of outer space'.⁴ The view is therefore increasingly being expressed that, rather than trying to find a consensus on where airspace ends and outer space begins, analysis should start from the legal questions that are raised by the recent developments in various fields of spacefaring, and to then move forward by looking at possible convergences in the replies to these varied questions.

This book, one of the scientific outputs of an interdisciplinary research project on the governance of space and the air–space distinction, led by Professor Jan Wouters, Professor Dirk Vandepitte and Professor Christoffel Waelkens at KU Leuven, aligns itself firmly with this practical view, and argues for an inductive approach to the demarcation question as a practical means of breaking down the highly contentious issues underlying the overarching controversies surrounding the applicability of the legal regimes of airspace and outer space. For if there is one thing that the ongoing discussions at UNCOPUOS have made clear, it is that the delimitation issue is inextricably linked with other long-standing points of discussion that are of major practical importance. Any analysis of the vexed problem of delimitating airspace and outer space should therefore pay considerable attention to related issues compounding the regulation of specific space activities.

Areas in which legal, political and technological developments have taken flight in recent years are mainly related to the (in)direct militarization of outer space, the industrial exploitation of natural resources of outer space, including the Moon and other celestial bodies, and, most importantly, the commercial uses of outer space and the development of hybrid craft for these purposes, with particular attention devoted to liability for space objects. Our research in each of these areas has proceeded along parallel lines, successively covering the relevance of the relevant area with regard to the demarcation issue; the implications of the adoption *viz.* absence of a demarcation line for the case at hand; and

⁴ UNCOPUOS, Report of the Chair of the Working Group on the Definition and Delimitation of Outer Space, Annex II to the Report of the Legal Subcommittee on its fifty-fifth session, held in Vienna from 4 to 15 April 2016, 27 April 2016, UN Doc. A/AC.105/1113, para. 7.

the inferences that can be drawn from the specific requirements of the case for the establishment of a general criterion of demarcation.⁵

Although our research at the Leuven Centre for Global Governance Studies covers each of the above areas and related space activities, as well as other key issues of international and European space law, the present book focuses solely on the implications of the legal and policy challenges posed by ongoing commercial spacefaring developments to the demarcation question.

The greatest contemporary challenge in space law is adapting the ageing treaty framework to today's very different realities, spurred by these developments. Whereas the practical and ideological context at the time of drafting the space treaties resulted in very little attention being paid to the possibility of private space activities, history has shown this belief to be erroneous. More than ever before, private initiatives are the driving force for the development of new space technologies and activities. The applications are manifold, as are the legal questions they raise. The multiplication of actors and activities in space has left the legal framework in dire need of reinterpretation and perhaps adaptation. Acting as a catalyst for this debate is the task which this volume sets itself.

The volume is structured in three parts of comparable size and equal importance, each dealing with a separate yet related aspect of the regulatory realities of commercial spacefaring driven by private investment and technological innovation. Each chapter also raises its own questions about the applicability of the law of outer space and its interaction with air law, and the implications thereof on the boundary between the scope of application of these legal regimes.

Part I introduces the main international legal challenges posed by the changes to the spacefaring landscape in terms of both actors and types of space activities, in light of the notoriously immutable outer space legal framework comprising a limited set of treaties and instruments put to paper almost half a century ago. The chapters in this part discuss the implications of the current foray by private actors into commercial spacefaring on the 'launching State' notion as a central concept in modern space law (Chapter 1); the impact of emerging sub-orbital flight activities on the existing air and space transport liability regimes (Chapter 2); the eligibility of space tourists to receive rescue assistance in outer

⁵ For the specific topic of the militarization of outer space, see R. Hansen, J. Wouters and P. De Man (eds), 'Focus Section: Military Use of Outer Space: International Legal Perspectives', 40 *Annals of Air and Space Law*, 2015, 1–218.

space as per the applicable international treaties, which focus on government astronauts and spacecraft personnel (Chapter 3); and the regulatory implications for a sustainable and effective application of existing international space law and governance structures of the increasing implementation of small satellite technology, and its application in proposed large constellations of small satellites in low Earth orbit (Chapter 4).

The chapters in this first part call for a firm but controlled approach to adapting the current international space law framework to accommodate the developments in commercial spacefaring. On the one hand, one must be heedful not to upset the carefully crafted balance of the existing international space treaty framework, where the activities of private actors are regulated through their connection with one or more States. As a result, we may prefer to integrate solutions to the challenges posed by commercial spacefaring operations into the existing space law treaties, for these new developments do not change the fact that, in an international legal environment, it remains crucial to maintain strong and predictable links with identifiable States. In this respect, some issues may simply be resolved by adopting an evolutive interpretation to the reading of key concepts and provisions in the existing treaties. Nevertheless, we must be careful not to let inaction at the international level be used as an opportunity for national regulators to turn back the clock on many hard-fought and sensible regulations, as evidenced in the current developments in some sub-orbital flight regimes.

Hence, a comprehensive analysis of the challenges posed by commercial spacefaring developments should complement the international legal appreciation with an overview of legal and regulatory responses at the national level. Part II of this volume aims to do just that, and to that effect collects contributions on a variety of topics, including the trend in national space law of the United States exempting commercial spaceflight entities from liability for a participant injury through a series of Spaceflight Liability and Immunity Acts (Chapter 5); the lessons learned and challenges exposed by the practice of the US Office of Commercial Space Transportation in regulating commercial space operations within an already existing national legal framework (Chapter 6); the development of a new safety regulatory system for commercial sub-orbital spaceplanes in the United Kingdom (Chapter 7); and the impact of commercial spacefaring pioneers such as Bigelow Aerospace on the reform of national export control restrictions on space technologies (Chapter 8).

The example of Bigelow Aerospace and the international traffic in arms regulations shows that commercial space actors are already changing the legal landscape at the national level, regardless of international efforts to comprehensively regulate commercial spacefaring. It also shows that regulatory evolution is closely connected with demands from the industry. Indeed, States are more prone to act at the national level than in the context of an international organization or committee given the close link between the space industry and the country in which it operates. National governments should therefore step up the dialogue with industry. Subsequently, such regulatory advances at the national level may be distributed to other States through the sharing of best practices and lessons learned. Such informal inter-State practices cannot replace regulatory efforts at the global international level, however. National regimes may be tempted to offer enticing regimes that may not be transposable to other countries, and may not even be sustainable in the long term. Moreover, it is clear that solutions at the national level thrive best when supported by an enabling international framework. Hence, when the sector of commercial spacefaring matures, it may be advisable to adopt a comprehensive international regime that replaces – or at least coordinates – the patchwork of national space regulations.

The means through which to do so can be of a varying nature, all of which, taken together, make up the subject of Part III of this volume, which deals with questions of space governance. In this part, a selection of authors contemplate how modern evolutions of commercial spacefaring by non-governmental actors challenge the contours and structure of a governance framework that is still predominantly tailored to governmental spacefaring actors. The ensuing analysis touches upon a variety of topics, including the elements that should be taken into consideration when making legal and policy choices for regulating sub-orbital flights carrying humans (Chapter 9); the role of the European Aviation Safety Agency in establishing a regulatory framework for the development and operations of sub-orbital and orbital aircraft in the European Union (Chapter 10); the role of UNCOPUOS in the international regulation of non-governmental space activities (Chapter 11); and the emergence of self-regulation as a possible mode of governance for a new spacefaring environment characterized by the need for specific rules in a commercial context (Chapter 12).

A targeted governance framework for addressing the challenges posed by commercial, private spacefaring may take many forms and can range from the simple extension of existing aviation regimes and institutions, over the gradual and evolutive adaptation of one or more such regimes, to the development of an entirely novel framework, either by existing or

new mechanisms and actors. Whether such options will be pursued at the domestic, regional or global level depends on the ability of States to agree on the objective of such an undertaking. This future commercial space governance framework may incorporate existing actors with extended functions or altogether new institutions, replacing current organizations that are exclusively intergovernmental in nature. As such, the difficulties encountered by UNCOPUOS in maintaining its position as the central international space law-making body appear to be due, at least in part, to the lack of provision for participation by private actors. As a result, aspects of commercial spacefaring are often regulated through the actions of other institutions, typically operating in the field of aviation and telecommunication.

In the meantime, the existing governance gaps in commercial spacefaring may also be filled by self-regulation. However, the dynamics of cooperation between private actors are fundamentally different from the environment of international cooperation that characterized the initial development of the space treaties, as private self-regulation is often only considered in relation to a possible trade-off with State-sanctioned regulation. Whether the increasingly proliferating commercial spacefaring activities by private actors will ultimately benefit from such a move away from governmental regulation is doubtful, given the legal uncertainty it is likely to cause. Hence, concerted efforts must continue to work towards establishing a system of international governance that respects the role and position of private actors in the elaboration of industry-friendly regulations, while retaining the elements of the existing regime that has so far contributed to a predictable and secure international legal framework.