# Contents

*List of contributors* ix  
*Commercial uses of space and space tourism: setting the scene* xiv  

## PART I LEGAL CHALLENGES

1. The concept of the ‘launching State’ in commercial launch ventures 3  
   *Armel Kerrest*  
   1. Introduction 3  
   2. The importance of the notion of the ‘launching State’ 4  
   3. The nature of the liability of the ‘launching State(s)’ 7  
   4. Liability of the ‘launching State(s)’ and activities of private entities 9  
   5. Who will bear the burden of risk in the case of private activity in outer space? 11  
   6. Conclusion 18  

2. Taking a stance: managing liability for commercial space activities 19  
   *Lesley Jane Smith*  
   1. Introduction: technology drive and regulation 19  
   2. Liability regimes: from fault to strict liability 22  
   3. Liability for aerospace activities 25  
   4. Out of scope: delimitation and definitions 29  
   5. Paradigm shift: the approach of international advisory bodies 32  
   6. Facilitating market entry through national law 33  
   7. Similar or distinct patterns of liability: what about aerospace? 35  
   8. Legal tools and legal culture: informed consent and exclusion of risk 37  
   9. The cuckoo’s egg: creating common denominators for liability 41
3. The scope of international obligations to extend rescue assistance to ‘astronauts’ and ‘personnel’ under the Outer Space Treaty and the Return and Rescue Agreement

Steven Wood
1. Introduction
2. Historical contexts of the Outer Space Treaty and Return and Rescue Agreement
3. Interpretation of treaties under the Vienna Convention on the Law of Treaties
4. Humanitarian underpinnings of the rescue provisions under the OST and ARRA
5. Who qualifies as an astronaut under OST Article V?
6. Article V OST: what assistance is required in outer space?
7. Who qualifies as personnel of a spacecraft under ARRA Article 3?
8. Article 3 ARRA: what assistance is required?
9. Conclusions

4. Small satellites, large constellations and space debris: in dubio pro LEO?

Ward Munters
1. Introduction
2. Small satellite technology and large constellations: a practical overview
3. Increased awareness in international forums
4. Legal considerations relating to large constellations and the long-term sustainability of space activities
5. Conclusion

PART II REGULATORY RESPONSES

5. US State Spaceflight Liability and Immunity Acts in context

Andrea J. Harrington
1. Introduction
2. Definitions
3. Orbital and sub-orbital travel
4. Safety issues
5. US federal space law
6. Liability in US federal space law
7. US State space law
8. Conclusion
6. Commercial space operations within an existing national legal framework: some lessons learned and the challenges ahead
   Daniel P. Murray
   1. Introduction 134
   2. Overview of the AST’s regulatory approach 135
   3. Challenges 139
   4. The way forward 141
   5. Conclusion 141

7. Developing a new safety regulatory system for commercial sub-orbital spaceplanes in the UK – the challenge!
   Jeremy Stubbs
   1. Introduction 143
   2. Government task 144
   3. Scope of the review 145
   4. Education and consultation 147
   5. Barriers 148
   6. Legal considerations 150
   7. Risk 154
   8. The ‘certification’ word 156
   9. A proposed UK solution 157
   10. Conclusions 158
   11. Thoughts for the future 160

8. Red tape in the final frontier: Bigelow Aerospace’s adventures in export control
   Mike N. Gold and Christopher M. Hearsey
   1. Introduction 162
   2. A brief history of the evolution of United States export control laws 165
   3. Bigelow’s space-related export control reforms 191
   4. Conclusions and observations 200

PART III SPACE GOVERNANCE

9. Regulatory choices for sub-orbital flights carrying humans: elements for consideration
   Thierry Herman and Alexander Soucek
   1. Introduction 205
   2. Identifying sub-orbital flights 206
   3. Fostering the development of commercial public air transport in its early days: the equation to be solved 207
   4. Ingredients for securing legal certainty 208
viii

Commercial uses of space and space tourism

5. Elements for consideration under air law 209
6. Elements for consideration under space law 213
7. Two examples of regulatory choices offering additional elements for consideration 220
8. Concluding remarks 226

10. Establishing a regulatory framework for the development and operation of sub-orbital and orbital aircraft in the EU: the role of the EASA 227
Jean-Bruno Marciacq
1. Introduction 227
2. The SOA industry 228
3. The international legal context 229
4. Objectives/variable configuration 237
5. Proposed options 239
6. Proposed requirements 243
7. Conclusions 245
Appendix: Why are sub-orbital aircraft indeed aircraft, and not rockets? 247

11. The role of UNCOPUOS in the international regulation of non-governmental space activities 254
Jean-François Mayence
1. The role of UNCOPUOS in the regulation of space activities from the historical perspective 254
2. The role of UNCOPUOS in the regulation of space activities: the methodological perspective 257
3. The role of UNCOPUOS in the regulation of space activities: conclusion and proposals for a way forward 264

12. National and international regulatory aspects of commercial space activities: self-regulation as the way forward? 266
Katrin Nyman-Metcalf
1. Introduction 266
2. What is self-regulation? 268
3. Forms of regulation of outer space activities 270
4. Self-regulation: from cyberspace to outer space? 274
5. Issues for self-regulation of outer space activities 276
6. Some concluding remarks 280

Index 283