# Contents

- List of figures xi
- List of tables xii
- List of contributors xiii
- Foreword xx
- Preface xxiv
- List of abbreviations xxxi

1. The background and history of space law 1  
   Peter Jankowitsch  
   1.1 A political overview 1  
   1.2 Space law and the new majority in the United Nations 9  
   1.3 Space law and the United Nations 10  
   1.4 Space law and space arms control 14  
   1.5 New branches of space law: An unfinished history 20  
   1.6 The future of space law 26

2. International space law 29  
   Frans von der Dunk  
   2.1 Introduction 29  
   2.2 The key characteristics of international space law 37  
   2.3 The core substance of international space law: The UN space treaties 49  
   2.4 Beyond the core of international space law 106  
   2.5 Concluding remarks 125

3. National space law 127  
   Irmgard Marboe  
   3.1 Introduction 127  
   3.2 International law requirements 130  
   3.3 Examples of national space laws 139  
   3.4 International initiatives 179  
   3.5 Conclusion 184
vi  Handbook of space law

4. European space law  205
   Frans von der Dunk
   4.1 Introduction  205
   4.2 Operational integration of space activities: The European
      space organizations  208
   4.3 Regulatory integration of space activities: The European
      Community/Union  239
   4.4 The convergence of the European Space Agency and
      European Union  251
   4.5 Concluding remarks  267

5. International organizations in space law  269
   Frans von der Dunk
   5.1 Introduction: Intergovernmental organizations and outer
      space  269
   5.2 Regulatory intergovernmental organizations and outer
      space: A survey  271
   5.3 Operational intergovernmental organizations and outer
      space: An introduction  282
   5.4 INTELSAT  283
   5.5 INMARSAT  290
   5.6 EUTELSAT  295
   5.7 INTERSPUTNIK  301
   5.8 ARABSAT  305
   5.9 IGO involvement in space law: A legal assessment  307
   5.10 Satellite communication IGO privatization: A legal
      assessment  317
   5.11 Concluding remarks  329

6. Legal aspects of the military uses of outer space  331
   Fabio Tronchetti
   6.1 Introduction  331
   6.2 Militarization versus weaponization of outer space  333
   6.3 The legal framework regulating military uses of outer
      space: The UN space treaties  334
   6.4 The legal framework regulating military uses of outer
      space: Other relevant international regimes  342
   6.5 The legal framework regulating military uses of outer
      space: General public international law  350
   6.6 Other legal regimes affecting military activities in outer
      space  359
Contents

6.7 Recent developments 377
6.8 Conclusion 381

7. Legal aspects of launch services and space transportation 382
Peter van Fenema

7.1 Introduction 382
7.2 The main categories of actors and their relevance from a legal perspective 384
7.3 The existing regulatory framework 403
7.4 Legal aspects of launch safety and space traffic management 405
7.5 Legal aspects of market access and competition issues 417
7.6 Conclusion 452

8. Legal aspects of satellite communications 456
Frans von der Dunk

8.1 Introduction: The definitional issues 456
8.2 The ITU regime and satellite communications 458
8.3 The UN ‘regime’ on direct broadcasting by satellite 493
8.4 Concluding remarks 500

9. Legal aspects of satellite remote sensing 501
Fabio Tronchetti

9.1 Introduction 501
9.2 Remote sensing from space: Characteristics and applications 502
9.3 The evolution of remote sensing activities 505
9.4 The legal framework for remote sensing activities 513
9.5 Conclusion 553

10. Legal aspects of satellite navigation 554
Lesley Jane Smith

10.1 Introduction 554
10.2 The current GNSS systems 556
10.3 Legal aspects of the use of GNSS in the transport sector 577
10.4 Regional and national GNSS: Legal aspects 594
10.5 Alternative heads of liability: Certification and augmentation 599
10.6 Civil aviation: Liability for navigational aids and development of CNS/ATM systems 602
10.7 GNSS and the maritime transport sector 607
10.8 The road sector and autonomous driving systems 610
10.9 GNSS in the context of the rail transport sector 613
viii  *Handbook of space law*

10.10 Feasibility of a UNIDROIT GNSS Convention 614
10.11 Conclusion 615

11. Legal aspects of public manned spaceflight and space station operations 618
*Carla Sharpe and Fabio Tronchetti*
11.1 Introduction 618
11.2 From single-state space stations to the International Space Station 620
11.3 The legal framework regulating ISS activities 626
11.4 The legal framework regulating ISS activities 638
11.5 Military uses of the International Space Station 653
11.6 The future of the International Space Station 657
11.7 Conclusion: The International Space Station as a model for future cooperation in space activities? 659

12. Legal aspects of private manned spaceflight 662
*Frans von der Dunk*
12.1 Introduction 662
12.2 The key definitional issues 666
12.3 Legal issues of private sub-orbital manned spaceflight 672
12.4 Legal issues of private orbital manned spaceflight 697
12.5 Legal issues of both sub-orbital and orbital private manned spaceflight 708
12.6 Concluding remarks 715

13. Environmental aspects of space activities 717
*Lotta Vikari*
13.1 Introduction 717
13.2 Environmental hazards 719
13.3 Space law from an environmental perspective 725
13.4 The way forward 756
13.5 Conclusion 765

14. Legal aspects of space resource utilization 769
*Fabio Tronchetti*
14.1 Introduction 769
14.2 The (natural) resources of the moon and other celestial bodies 771
14.3 Extraterrestrial mining: Where do we stand now? 772
14.4 The legal status of celestial bodies and extraterrestrial natural resources 777
14.5 International seabed mining 792
14.6 The use of the geostationary orbit 798
14.7 Mineral activities in Antarctica 803
14.8 A legal regime for the exploitation of extraterrestrial natural resources 809
14.9 Conclusion 812

15. International trade aspects of space services 814
Frans von der Dunk
15.1 Introduction: The development of an international trade regime 814
15.2 The general aspects of the GATT, GATS and WTO regimes 818
15.3 Launch services: International trade regime issues 836
15.4 The international trade regime for satellite communications 843
15.5 Prospective candidates for application of the GATS/WTO regime? 853
15.6 Concluding remarks 872

16. Financing space ventures 874
Mark Sundahl
16.1 Introduction 874
16.2 The nature and challenges of financing space ventures 876
16.3 Secured transactions under Article 9 of the Uniform Commercial Code 882
16.4 The UNIDROIT Convention on International Interests in Mobile Equipment and the Space Assets Protocol 887

17. Insurance in the context of space activities 910
Cécile Gaubert
17.1 Introduction 910
17.2 Third-party liability insurance 912
17.3 Property damage insurance 930
17.4 Space debris in the context of insurance 937
17.5 Astronauts’ insurance 941
17.6 The role of the insurance broker 943
17.7 Conclusion 944

18. Intellectual property rights in the context of space activities 949
Catherine Doldirina
18.1 Introduction 949
x  *Handbook of space law*

18.2 Copyright  952  
18.3 Patent  972  
18.4 Conclusions  989  

19. Dispute resolution regarding space activities  995  

*Maureen Williams*

19.1 The background – the law in force: Public international law/space law  995  
19.2 The landmarks and precedents for progressive development of the law  1014  
19.3 Redesigning the system: The indispensable reform  1031  
19.4 The conclusions so far: Sparkles of hope  1045  

*Index*  1047