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Generation and Applications of Extra-Terrestrial Environments on Earth

Daniel A. Beysens and Jack J.W.A. van Loon (Editors)



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**Generation and Applications
of Extra-Terrestrial
Environments on Earth**

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Volume 6

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Generation and Applications of Extra-Terrestrial Environments on Earth

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River Publishers

Published, sold and distributed by:
River Publishers
Niels Jernes Vej 10
9220 Aalborg Ø
Denmark

ISBN: 978-87-93237-53-7 (Hardback)
978-87-93237-54-4 (Ebook)

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Contents

Preface	xv
List of Contributors	xvii
List of Figures	xxiii
List of Tables	xxix
List of Abbreviations	xxxix
Introduction	1
Daniel A. Beysens and Jack J. W. A. van Loon	
1. The Space Environment	
1 The Space Gravity Environment	5
Daniel A. Beysens and Jack J. W. A. van Loon	
1.1 Open Space	5
1.2 Satellites and Rockets	5
1.3 Typical Gravity at Some Celestial Objects	8
1.4 Conclusion	9
2 Cosmos: Violent and Hostile Environment	11
Sébastien Rouquette	
2.1 Introduction	11
2.2 Beliefs and Truths	11
2.3 Where Space Begins	12
2.4 Satellite Environment	12
2.4.1 Temperature	13
2.4.2 Atmospheric Drag	13

2.4.3	Outgassing	13
2.4.4	Atomic Oxygen Oxidation	14
2.5	Conclusions	14
3	Radiation, Space Weather	17
	Marco Durante	
3.1	Facilities for Space Radiation Simulation	19
3.2	Protons	20
3.3	Neutrons	21
3.4	Heavy Ions	22
3.5	Facilities Planned	23
3.6	Conclusions	23
4	Interstellar Chemistry	25
	Pascale Ehrenfreund	
5	Celestial Bodies	31
	Inge Loes ten Kate and Raheleh Motamedi	
5.1	Introduction	31
5.2	General Planetary Simulation Facilities	31
5.2.1	The Centre for Astrobiology Research (CAB), Madrid, Spain	31
5.2.2	Deutsches Zentrum für Luft-und Raumfahrt (DLR), Berlin, Germany	33
5.2.3	The Open University, Milton Keynes, UK	33
5.2.4	Mars Environmental Simulation Chamber (MESCH), Aarhus University, Denmark	33
5.2.5	The Planetary Analogues Laboratory for Light, Atmosphere and Surface Simulations (PALLAS), Utrecht University, The Netherlands	34
5.3	Mars Wind Tunnels	35
5.3.1	The Planetary Aeolian Laboratory (PAL), NASA Ames Research Center, Moffett Field, CA, USA	35
5.3.2	The Arizona State University Vortex Generator (ASUVG), Moffett Field, CA, USA	36
5.3.3	The Aarhus Wind Tunnel Simulator (AWTS), Aarhus, Denmark	37

5.4	Instrument Testing Facilities	38
5.4.1	ChemCam Environmental Chamber	38
5.4.2	SAM Environmental Chamber	38

2. Facilities to Alter Weight

6 Drop Towers 45

Claus Lämmerzahl and Theodore Steinberg		
6.1	Introduction	45
6.2	Drop Tower Technologies	46
6.3	Vacuum (or Drop) Tubes	46
6.4	Experiment Inside Capsule (Drag Shield)	47
6.5	Drop Tower Systems	49
6.5.1	Guided Motion	50
6.6	Enhanced Technologies	51
6.6.1	Free Flyer System	51
6.6.2	Catapult System	51
6.6.3	Next-Generation Drop Towers	52
6.6.3.1	Ground-based facility's typical operational parameters	53
6.7	Research in Ground-Based Reduced Gravity Facilities	55
6.7.1	Cold Atoms	55
6.7.2	Combustion	55
6.7.3	Fluid Mechanics/Dynamics	56
6.7.4	Astrophysics	56
6.7.5	Material Sciences	57
6.7.6	Biology	57
6.7.7	Technology Tests	58

7 Parabolic Flights 61

Vladimir Pletser and Yasuhiro Kumei		
7.1	Introduction	61
7.2	Objectives of Parabolic Flights	62
7.3	Parabolic Flight Maneuvers	63
7.4	Large Airplanes Used for Parabolic Flights	64
7.4.1	Europe: CNES' Caravelle and CNES-ESA's Airbus A300 ZERO-G	64
7.4.2	USA: NASA's KC-135, DC-9 and Zero-G Corporation	66

7.4.3	Russia: Ilyushin IL-76 MDK	66
7.5	Medium-Sized Airplanes Used for Parabolic Flights	67
7.5.1	Europe: TU Delft-NLR Cessna Citation II	67
7.5.2	Canada: CSA Falcon 20	67
7.5.3	Japan: MU-300 and Gulfstream-II	67
7.5.4	Other Aircraft	68
7.6	Small Airplanes and Jets Used for Parabolic Flights	69
7.6.1	Switzerland: Swiss Air Force Jet Fighter F-5E	69
7.6.2	Other Aircraft	70
7.7	Conclusions	70
8	Magnetic Levitation	75
	Clement Lorin, Richard J. A. Hill and Alain Mailfert	
8.1	Introduction	75
8.2	Static Magnetic Forces in a Continuous Medium	76
8.2.1	Magnetic Forces and Gravity, Magneto-Gravitational Potential	76
8.2.2	Magnetic Compensation Homogeneity	77
8.3	Axisymmetric Levitation Facilities	78
8.3.1	Single Solenoids	78
8.3.2	Improvement of Axisymmetric Device Performance	81
8.3.2.1	Ferromagnetic inserts	81
8.3.2.2	Multiple solenoid devices and special windings design	81
8.4	Magnetic Gravity Compensation in Fluids	82
8.5	Magnetic Gravity Compensation in Biology	83
9	Electric Fields	91
	Birgit Futterer, Harunori Yoshikawa, Innocent Mutabazi and Christoph Egbers	
9.1	Convection Analog in Microgravity	91
9.1.1	Conditions of DEP Force Domination	92
9.1.2	Equations Governing DEP-Driven TEHD Convection	93
9.2	Electric Gravity in the Conductive State for Simple Capacitors	94
9.2.1	Linear Stability Equations and Kinetic Energy Equation	96

9.3	Results from Stability Analysis	97
9.3.1	Plane Capacitor	97
9.3.2	Cylindrical Capacitor	98
9.3.3	Spherical Shell	99
9.4	Conclusion	100
10	The Plateau Method	103
	Daniel A. Beysens	
10.1	Introduction	103
10.2	Principle	103
10.3	Temperature Constraint	105
10.4	Other Constraints	106
10.5	Concluding Remarks	106
11	Centrifuges	109
	Jack J. W. A. van Loon	
11.1	Introduction	109
11.2	Artifacts	110
11.2.1	Coriolis	110
11.2.2	Inertial Shear Force	112
11.2.3	Gravity Gradient	112
11.3	The Reduced Gravity Paradigm (RGP)	113
3. Facilities to Mimic Micro-Gravity Effects		
12	Animals: Unloading, Casting	123
	Vasily Gnyubkin and Laurence Vico	
12.1	Introduction	123
12.2	Hindlimb Unloading Methodology	125
12.3	Recommendations for Conducting Hindlimb Unloading Study	127
12.4	Casting, Bandaging, and Denervation	128
12.5	Conclusions	129
13	Human: Bed Rest/Head-Down-Tilt/ Hypokinesia	133
	Marie-Pierre Bareille and Alain Maillet	
13.1	Introduction	133
13.2	Experimental Models to Mimic Weightlessness	134
13.2.1	Bed Rest or Head-Down Bed Rest?	134

13.2.2	Immersion and Dry Immersion	135
13.3	Overall Design of the Studies	136
13.3.1	Duration of the Studies	136
13.3.2	Design of the Bed-Rest Studies	137
13.3.3	Number of Volunteers	137
13.3.4	Number of Protocols	138
13.3.5	Selection Criteria	138
13.4	Directives for Bed Rest (Start and End of Bed Rest, Conditions During Bed Rest)	139
13.4.1	Respect and Control of HDT Position	139
13.4.2	Activity Monitoring of Test Subjects	139
13.4.3	First Day of Bed Rest	139
13.4.4	Physiotherapy	140
13.5	Operational/Environmental Conditions	140
13.5.1	Housing Conditions and Social Environment	140
13.5.2	Sunlight Exposure, Sleep/Wake Cycles	141
13.5.3	Diet	141
13.5.4	Testing Conditions	143
13.5.5	Medications	143
14	Clinostats and Other Rotating Systems—Design, Function, and Limitations	147
	Karl H. Hasenstein and Jack J. W. A. van Loon	
14.1	Introduction	147
14.2	Traditional Use of Clinostats	148
14.3	Direction of Rotation	148
14.4	Rate of Rotation	148
14.5	Fast- and Slow-Rotating Clinostats	149
14.6	The Clinostat Dimension	150
14.7	Configurations of Axes	153
15	Vibrations	157
	Daniel A. Beysens and Valentina Shevtsova	
15.1	Introduction	157
15.2	Thermovibrational Convections	158
15.3	Crystal Growth	158
15.4	Dynamic Interface Equilibrium	159

4. Other Environment Parameters

16 Earth Analogues 165
 Inge Loes ten Kate and Louisa J. Preston
 16.1 Planetary Analogues 165
 16.1.1 The Moon 165
 16.1.2 Mars 166
 16.1.3 Europa and Enceladus 166
 16.1.4 Titan 167
 16.2 Semipermanent Field-Testing Bases 167
 16.3 Field-Testing Campaigns 167

17 Isolated and Confined Environments 173
 Carole Tafforin

5. Current Research in Physical Sciences

18 Fundamental Physics 185
 Greg Morfill
 18.1 Introduction 185
 18.2 The Topics 186
 18.3 Fundamental Physics in Space 187
 18.3.1 Fundamental Issues in Soft Matter and Granular
 Physics 189

19 Fluid Physics 193
 Daniel A. Beysens
 19.1 Introduction 193
 19.2 Supercritical Fluids and Critical Point Phenomena 193
 19.2.1 Testing Universality 194
 19.2.2 Dynamics of Phase Transition 194
 19.2.3 New Process of Thermalization 195
 19.2.4 Supercritical Properties 195
 19.3 Heat Transfer, Boiling and Two-Phase Flow 195
 19.3.1 Two-Phase Flows 195
 19.3.2 Boiling and Boiling Crisis 196
 19.4 Interfaces 196
 19.4.1 Liquid Bridges 196
 19.4.2 Marangoni Thermo-Solutal-Capillary Flows 197

19.4.3	Interfacial Transport	197
19.4.4	Foams	198
19.4.5	Emulsions	198
19.4.6	Giant Fluctuations of Dissolving Interfaces	199
19.5	Measurements of Diffusion Properties	199
19.6	Vibrational and Transient Effects	199
19.6.1	Transient and Sloshing Motions	200
19.6.2	Vibrational Effects	200
19.7	Biofluids: Microfluidics of Biological Materials	201
20	Combustion	205
	Christian Chauveau	
20.1	Introduction	205
20.2	Why Combustion Is Affected by Gravity?	206
20.3	Reduced Gravity Environment for Combustion Studies	207
20.4	Conclusions	208
21	Materials Science	211
	Hans-Jörg Fecht	
21.1	Introduction	211
21.2	Scientific Challenges	212
21.3	Specifics of Low-Gravity Platforms and Facilities for Materials Science	213
21.3.1	Parabolic Flights	214
21.3.2	TEXUS Sounding Rocket Processing	215
21.3.3	Long-Duration Microgravity Experiments on ISS	216
21.4	Materials Alloy Selection	217
6. Current Research in Life Sciences		
22	Microbiology/Astrobiology	221
	Felice Mastroleo and Natalie Leys	
22.1	Radiation Environment	221
22.2	Change in Gravity Environment	222
22.3	Space Flight Experiments and Related Ground Simulations	224

23 Gravitational Cell Biology	233
Cora S. Thiel and Oliver Ullrich	
23.1 Gravitational Cell Biology	233
23.2 Studies Under Simulated Microgravity	233
23.3 Effects of Simulated Microgravity on Algae, Plant Cells, and Whole Plants	234
23.4 Mammalian Cells in Simulated Microgravity	234
24 Growing Plants under Generated Extra-Terrestrial Environments: Effects of Altered Gravity and Radiation	239
F. Javier Medina, Raúl Herranz, Carmen Arena, Giovanna Aronne and Veronica De Micco	
24.1 Introduction: Plants and Space Exploration	239
24.2 Cellular and Molecular Aspects of the Gravity Perception and Response in Real and Simulated Microgravity	241
24.2.1 Gravity Perception in Plant Roots: Gravitropism	241
24.2.2 Effects on Cell Growth and Proliferation	243
24.2.3 Effects of Gravity Alteration on Gene Expression	244
24.3 Morpho-Functional Aspects of the Plant Response to Real and Simulated Microgravity Environments	244
24.3.1 From Cell Metabolism to Organogenesis	244
24.3.2 Indirect Effects of Altered Gravity to Photosynthesis	245
24.3.3 Constraints in the Achievement of the Seed-to-Seed Cycle in Altered Gravity	246
24.4 Plant Response to Real or Ground-Generated Ionizing Radiation	247
24.4.1 Variability of Plant Response to Ionizing Radiation	247
24.4.2 Effects of Ionizing Radiation at Genetic, Structural, and Physiological Levels	247
24.5 Conclusions—Living in a BLSS in Space: An Attainable Challenge	248
25 Human Systems Physiology	255
Nandu Goswami, Jerry Joseph Batzel and Giovanna Valenti	
25.1 Introduction	255

25.2	Complications of Space-Based Physiological Research	255
25.3	Ground-Based Analogs of Spaceflight-Induced Deconditioning: Bed Rest and Immersion	256
25.4	Types of Bed Rest, Durations, and Protocols	257
25.5	Physiological Systems Affected by Spaceflight and Bed Rest	258
25.6	Is Bed Rest a Valid Analog for Microgravity-Induced Changes?	261
25.7	Bed Rest: A Testing Platform for Application of Countermeasures to Alleviate Effects of Microgravity— Induced Deconditioning	262
25.8	Perspectives	263
26	Behavior, Confinement, and Isolation	267
	Carole Tafforin	
	Conclusions	275
	Daniel A. Beysens and Jack J. W. A. van Loon	
	Index	277
	Editor's Biographies	281

Preface



This book has been prepared under the auspice of the European Low Gravity Research Association (ELGRA). As a scientific organization the main task of ELGRA is to foster the scientific community in Europe and beyond in conducting gravity and space related research.

This publication is dedicated to the science community, and especially to the next generation of scientists and engineers interested in space researches. ELGRA provides here a comprehensive description of space conditions and means that have been developed on Earth to perform space environmental and (micro-)gravity related research.

We want to thank all our colleagues who contributed to the interesting and hopefully inspiring content of this book. It is the first in its kind to addressing a comprehensive overview of ground-based technologies and sciences related to (micro-)gravity, radiation and space environment simulation research.

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Generation and Applications of Extra-Terrestrial Environments on Earth

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This book has been prepared under the auspice of the European Low Gravity Research Association (ELGRA). ELGRA's main task is to foster the scientific community in Europe and beyond in conducting gravity- and space-related research.

This publication is dedicated to the science community and especially to the next generation of scientists and engineers who are interested in space researches and in means to reproduce the space environment on Earth. The book provides a comprehensive description of space conditions and the means that have been developed, on Earth, to perform space environmental and (micro-) gravity-related research. In addition, a review of present on-going space related research in physical and life sciences is provided.

The book covers ground-based research instruments and environments for both life and physical sciences' research. It discusses the opportunities and limitations of protocols and instruments to compensate gravity or simulate microgravity (clinostats, random positioning machines, levitating magnets, electric fields, vibrations, tail suspension, or head-down tilt) as well as centrifuges for hyper-g studies. Other space environmental conditions like cosmic radiation or Mars atmospheric and soil properties to be replicated or simulated on Earth are addressed. For future long-duration manned missions, personal well-being and crew interaction are major issues. The book also addresses various ground-based analogues used to explore the best scenarios for future long-duration spaceflights.

ISBN 978-87-93237-53-7



River Publishers