

IAF Symposium on Commercial Spaceflight Safety Issues

Held at the 74th International Astronautical Congress
(IAC 2023)

Baku, Azerbaijan
2 – 6 October 2023

ISBN: 978-1-7138-8566-5

Printed from e-media with permission by:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571



Some format issues inherent in the e-media version may also appear in this print version.

Copyright© (2023) by International Astronautical Federation
All rights reserved.

Printed with permission by Curran Associates, Inc. (2024)

For permission requests, please contact International Astronautical Federation
at the address below.

International Astronautical Federation
100 Avenue de Suffren
75015 Paris
France

Phone: +33 1 45 67 42 60
Fax: +33 1 42 73 21 20

www.iafastro.org

Additional copies of this publication are available from:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: 845-758-0400
Fax: 845-758-2633
Email: curran@proceedings.com
Web: www.proceedings.com

TABLE OF CONTENTS

COMMERCIAL SPACEFLIGHT SAFETY AND EMERGING ISSUES

| | |
|---|----|
| Airspace Integration of U.S. Commercial Space Launches and Reentries | 1 |
| <i>Kelvin Coleman, Timothy Arel, Hannah Browne, Brooke Teferra, Emily Sisneros@faa. Gov, John Sloan</i> | |
| Commercial Spaceflight: Regulatory Framework Assessment and Safety Perspectives | 9 |
| <i>Gianpiero Buzzo, Lidia Travascio, Angela Vozella</i> | |
| Overcoming Licensing Challenges for Space Companies: The Role of a Third-Party Intermediary | 22 |
| <i>Souitat Naoufal, Said Hamouch</i> | |
| Space Safety and Rescue in Human Spaceflight: Where Are the Gaps? | 23 |
| <i>Shawna Pandya</i> | |
| The Path to Mission Success: The UK's Mission Assurance Framework for Commercial Launch Services | 33 |
| <i>Mauro Augelli, Tristan Stindt</i> | |
| Unreach for the Stars- The Use Case of a Satellite Launch Failure and Its Safety of Commercial Flights Implications | 45 |
| <i>Katarzyna Malinowska, Aleksandra Bukala, Marta Balcer</i> | |
| Hand Signals for Multinational Space Travelers | 51 |
| <i>Chikako Murayama</i> | |

EMERGING SPACE VENTURES, INCLUDING SPACE LOGISTICS AND SPACE SAFETY FOR SUSTAINABILITY

| | |
|--|----|
| OPALS Advanced Kick Stage and Space Logistics Vehicle Architecture and Innovative Technologies..... | 52 |
| <i>Arturs Jasjukevics</i> | |
| Comparison of the Environmental Impact of Production and Launch Emissions of Different Common Launcher Architectures | 61 |
| <i>Jan-Steffen Fischer, Stefanos Fasoulas, Céline Brun-Buisson, Encarna Del Olmo</i> | |
| Cost Estimation for Innovative Space Systems: A Methodology for Microlaunchers and Inflatable Heatshields | 76 |
| <i>Giuseppe Governale, Nicole Viola</i> | |
| Large Scale Leo Constellation Deployment Optimization Method Based on Nsga II | 85 |
| <i>Wen Xue</i> | |
| The Role of Small Launch Vehicles in Democratizing Access to Space | 92 |
| <i>Zahra Gasimova</i> | |
| Current Status and Emerging Trends in Launch Vehicle Technology: A Comprehensive Review of Operational and Short-Term Development Vehicles | 98 |
| <i>Prakash Kumar</i> | |

ENABLING SAFE COMMERCIAL SPACEFLIGHT: VEHICLES AND SPACEPORTS

| | |
|---|-----|
| Building a 21st Century Spaceport: Development and Application of the Spaceport Readiness Level Scale | 99 |
| <i>Ryan Babb, Janet Tinoco, Patrick McCarthy</i> | |
| Spaceport Feasibility Analysis for Dubai: Logistics, Safety and Space Tourism | 114 |
| <i>Ugur Guven</i> | |
| Analogy Between Air Traffic Management and Space Traffic Management from Operational Aspects | 119 |
| <i>Rania Toukebri</i> | |
| Improving Flight Safety During Spacecraft Launch Operations: A Study on Trajectory Optimization from the Alcântara Launch Center..... | 125 |
| <i>Nicolle Lucena, Rafael Lobo</i> | |
| Study on the Evaluation of the Competitiveness of Spaceports | 126 |
| <i>Jungho Yang, Jung Ho Park</i> | |
| New Perspectives for Rocket Launching in Brazil: The Rise of Alcântara | 136 |
| <i>Luciana Gonçalves, Rene Gonçalves, Sueli Custódio</i> | |

Author Index