

IAASS Fifteen Years of Activity

By
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IAASS President



Committee on the Peaceful Uses of Outer Space - 62nd Session – June 2019



Mission

Advancing space safety forms the foundation of our endeavour. Compared with the vastness political, financial and intellectual resources that space programs require our forces minute, truly a drop in the ocean. Nevertheless, we want to be that drop and indeed a catalyst drop. We are committed, through the knowledge and dedication of our members, to internationally advance space safety as parents are to their children, to help finally ensure that no accident shall ever happen because of:

- Risk badly measured or willingly underestimated;
- Necessary knowledge not made available to others;
- Lack of management commitment and attention;
- Lack of personal accountability, which makes people negligent.

Goals

1. Advance the science and application of Space Safety
2. Improve the communication, dissemination of knowledge and cooperation between interested groups and individuals in this and related fields
3. Improve understanding and awareness of the Space Safety discipline
4. Promote and improve the development of Space Safety professionals and standards
5. Advocate the establishment of safety laws, rules, and regulatory bodies at national and international levels for the civil use of space

◆ *How far did we go?*

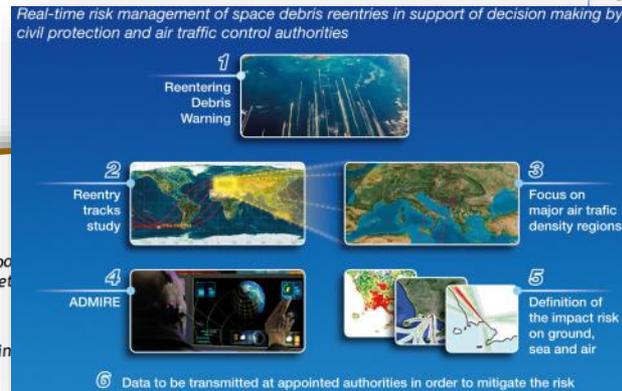
◆ *15 years, time to assess the road covered...*

1 - Advance the science and application of Space Safety

- "Round robin test" of risk assessment tools for launch and reentry
- Space debris mitigation for aviation (ADMIRE project),
- Near-Space Region legal status definition (instead of Karman line delimitation)
- Publication of Manifesto
- Space Safety Institute proposal

MAX - min	SCARAB v3.0	SCARAB v. 3.1	DRAMA/ SESAM	ASTOS/ DARS	DEBRISK	ORSAT	CATNS
Fragmentation altitude	77.2	74.8	78	78	78	78	-74
Number of fragments	6	5	30	15	23	21	159.7
Surviving mass	41	124.5	71.4	73	58.7	47.2	37.7
Surviving mass (%)	10	30	18.2	18.7	14.5	12	29.4
Casualty area (m ²)	5.3	5.28	33.4	14.1	18.2	15.3	3985
Range (min-heel) (km)	4368	4395	3777	3510	3955	4301	3985
Range (max-toe) (km)	4631	4597	4430	4411	4332	4509	4604
Reentry length (km)	263	202	652	438	377	208	619

GENSAT re-entry cases study



MANIFESTO FOR A SAFE AND SUSTAINABLE SPACE

- I. Ensure that citizens of all nations are equally protected from the risks posed by over-flying space systems and objects during launch and re-entry/recovery operations
- II. Ensure that space systems are developed, built and operated according to common minimum ground and flight safety rules
- III. Seek to prevent collisions or interference with other aerospace systems during launch, on-orbit operation, and re-entry
- IV. Ensure the protection of the ground, air and on-orbit environments from chemical, radioactive and debris contamination related to space operations
- V. Ensure that mutual aid provisions for space mission safety emergencies are progressively agreed, developed and made accessible without restriction anywhere on the Earth and in Outer Space



2 - Improve the communication, dissemination of knowledge and cooperation between interested groups and individuals in this and related fields

- **Technical committees and workshops**
- **IAASS Position papers**



Hunstville, 2010



Kourou, 2010

IAASS POSITION PAPERS:

- A Grand Challenge for Active Removal of Space Debris (7-5-2017)
- Applicability of Pressure Suits for Suborbital Flights (7-5-2017)

IAASS REPORTS TO UN COPUOS:

- Suborbital Flights and the Delimitation of Air Space Vis-à-vis Outer Space (9-12-2017)



Wallops, 2012

IAASS-PP-00217-WA



POSITION PAPER

APPLICABILITY OF PRESSURE SUITS FOR SUBORBITAL FLIGHTS

Statement of Position:

The IAASS considers that pressure suits should be worn for suborbital flights due to the risks involved in the event of a loss of cabin atmospheric pressure.

In the case where a suborbital designer/operator decides against the use of pressure suits they should undertake systematic design and safety analysis to justify this position to provide assurance that the residual risk has been mitigated to a tolerable level of risk and inform the flight participants accordingly. This justification should then be presented to the spaceflight participants and flight crew as part of the informed consent process.

- **Technical Director**
Jack Bacon, NASA-JSC, USA
- **Commercial Systems Safety**
Jean-Bruno Marciacq, Belgium
- **Launch & Re-entry Safety**
Tobias Lips, HTG, Germany
- **Space Hazards**
Dr. Bill Ailor, The Aerospace Corporation, USA
- **Space Safety Laws & Regulations**
Taro Kuusiholma, former CAA, Finland
- **Human Factors & Performance for Safety**
Barbara Kanki, NASA-AMES (ret.), USA

- Conferences (IAASS, Manfred Lachs ...)
- Journal of Space Safety Engineering
- Space Safety Magazine



10th IAASS Conference

International Association for the Advancement of Space Safety



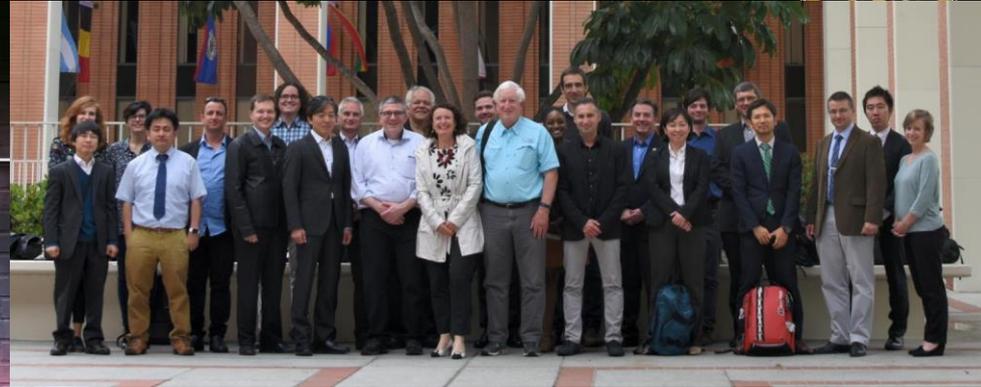
MAKING SAFETY HAPPEN

15-17 May 2019 - The Aerospace Corporation
El Segundo - Los Angeles - California (USA)



*"Home is behind, the world ahead,
and there are many paths to tread
through shadows to the edge of night,
until the stars are all alight."*

J.R.R. Tolkien
The Lord of the Rings



Launch & Reentry Workshop



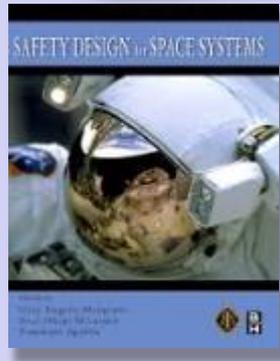
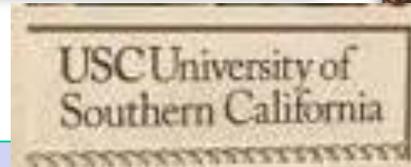
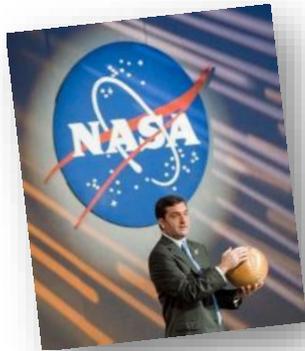
Jeffersonian dinner



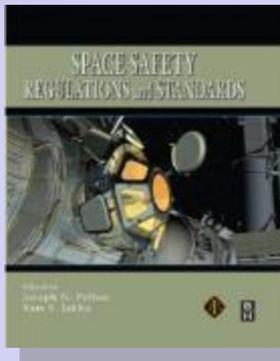
IAASS Conference Chairs

3- Improve understanding and awareness of the Space Safety discipline

- Support to educational programmes (universities...)
- Jeffersonian dinners
- Books



March 2009



August 2010



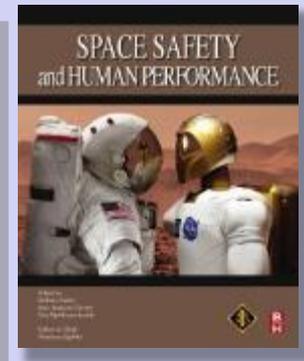
Safety Design in Chinese, 2011



September 2011



May 2013



November 2017

4. Promote and improve the development of Space Safety professionals and standards

- Professional Training Courses
- Standard for commercial human spaceflights



- Upcoming Professional Courses



INTERNATIONAL ASSOCIATION
FOR THE ADVANCEMENT OF
SPACE SAFETY

IAASS Professional Training Course



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IAASS Professional Training Course

**ISS PAYLOADS DESIGN
AND OPERATIONS SAFETY**

9-12 July 2019
Kayser Italia
Livorno (Italy)

Registration:
<http://iaass.space-safety.org/events/courses/>

Course Description

**SPACE DEBRIS:
RISK ANALYSIS AND MITIGATION**

17-18 September 2019
Toulouse - France

Registration:
<https://www.conftool.net/iaass-courses-workshops-2019-EU/index.php?page=login>

Course Description

**COMMERCIAL
HUMAN SPACEFLIGHT
SAFETY**

10-11 September 2019
Noordwijk (The Netherlands)

Registration:
<https://www.conftool.net/iaass-courses-workshops-2019-EU/index.php?page=login>

Course Description

• Memorandum of Understandings



- AND**
- **ISSS (International System Safety Society)**
 - **AICQ (Associazione Italiana Cultura Qualita')**
 - **AAS (American Astronautical Society)**



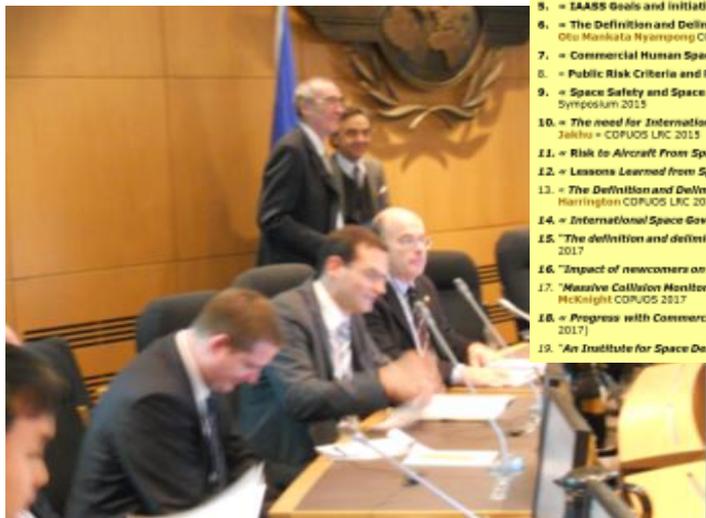
5 - Advocate the establishment of safety laws, rules, and regulatory bodies at national and international levels for the civil use of space

- Presentation to COPUOS Technical Sub-committee
- Report submitted to COPUOS Legal Sub-Committee
- Participation to ICAO Space Learning Group
- Space Safety Institute proposal



1. IAASS General presentation = by Tommaso Sgobba COPUOS 2010
2. Towards Long-term Sustainability of Space Activities: Overcoming the Challenges of Space Debris = by Prof. Dr. Ram Jakhu COPUOS LRC 2011
3. Two Space Debris Issues: Long-Term Cost of Satellite Operations Refining Reentry Disposal Hazards = by William Allen Ph.D. COPUOS STSC 2011
4. Active Debris Removal - An Essential Mechanism for Ensuring the Safety and Sustainability of Outer Space = by Prof. Dr. Ram Jakhu COPUOS STSC 2012
5. IAASS Goals and Initiatives = by Carmen Victoria Felix COPUOS STSC 2013
6. The Definition and Delimitation of Outer Space: The Present Need to Determine Where "Space Activities" = By Yaw Otu Mankata Nyampong COPUOS LRC 2014
7. Commercial Human Spaceflight Safety = By Tommaso Sgobba COPUOS STSC 2014
8. Public Risk Criteria and Rationale for Commercial Launch and Space = by Prof. Dr. A. Wilde, Ph.D. COPUOS 2014 STSC
9. Space Safety and Space Traffic Management = By Isabelle Lapeere and Tommaso Sgobba IISL-BCSL Space Law Symposium 2015
10. The need for International approach and framework for space = by Taro Kuzuhara & Ram Jakhu = COPUOS LRC 2015
11. Risk to Aircraft from Space Vehicles Debris = by Ram Jakhu, Tommaso Sgobba, Tobias Lips COPUOS STSC 2015
12. Lessons Learned from Space Failures = By Eric Wongler COPUOS STSC 2015
13. The Definition and Delimitation of Outer Space and the Safety of Aerospace Operations = by B. S. Zubka and A. Harrington COPUOS LRC 2016
14. International Space Governance = by Tommaso Sgobba COPUOS STSC 2016
15. The definition and delimitation of outer space and the safety of aerospace operations = 2017
16. "Impact of newcomers on space debris risks" by Fernand Alby and Bruno Lazare COPUOS STSC 2017
17. "Massive Collision Monitoring Activity (MOMA) Examining Urgency and Options for Mitigation" COPUOS 2017
18. Progress with Commercial Space Safety Institute = by Tommaso Sgobba ICAO, 2017
19. "An Institute for Space Debris Prevention and Control" by Tommaso Sgobba and

19 presentations to COPUOS



ICAO Council Meeting 2013



Presentations at COPUOS

1. « **IAASS General presentation** » by **Tommaso Sgobba** COPUOS 2010
2. « **Towards Long-term Sustainability of Space Activities: Overcoming the Challenges of Space Debris** » by Prof. Dr. **Ram Jakhu** COPUOS LRC 2011
3. « **Two Space Debris Issues: Long-Term Cost of Satellite Operations Refining Reentry Disposal Hazards** » by **William Ailor** Ph.D COPUOS STSC 2011
4. « **Active Debris Removal - An Essential Mechanism for Ensuring the Safety and Sustainability of Outer Space** » by Prof. Dr. **Ram Jakhu** COPUOS STSC 2012
5. « **IAASS Goals and initiatives** » by **Carmen Victoria Felix** COPUOS STSC 2013
6. « **The Definition and Delimitation of Outer Space: The Present Need to Determine Where "Space Activities"** » By **Yaw Otu Mankata Nyampong** COPUOS LRC 2014
7. « **Commercial Human Spaceflight Safety** » By **Tommaso Sgobba** COPUOS 2014 STSC
8. « **Public Risk Criteria and Rationale for Commercial Launch and Reentry** » by **P. Wilde**, Ph.D. COPUOS 2014 STSC
9. « **Space Safety and Space Traffic Management** » By **Isabelle Rongier and Tommaso Sgobba** IISL-ECSL Space Law Symposium 2015
10. « **The need for International approach and framework for operations in near-space** » by **Taro Kuusiholma & Ram Jakhu** » COPUOS LRC 2015
11. « **Risk to Aircraft From Space Vehicles Debris** » by **Matteo Emanuelli, Tobias Lips** COPUOS STSC 2015
12. « **Lessons Learned from Space Failures** » By **Isabelle Rongier** COPUOS STSC 2015
13. « **The Definition and Delimitation of Outer Space and the Safety of Aerospace Operations** » by **R. S. Jakhu and A. Harrington** COPUOS LRC 2016
14. « **International Space Governance** » by **Tommaso Sgobba** COPUOS STSC 2016
15. "The definition and delimitation of outer space and the safety of aerospace operations" by **Paul Dempsey** COPUOS LRC 2017
16. "Impact of newcomers on space debris risks" by **Fernand Alby and Bruno Lazare** COPUOS STSC 2017
17. "Massive Collision Monitoring Activity (MCMA) Examining Urgency and Options for Debris Remediation" by Dr. **Darren McKnight** COPUOS 2017
18. « **Progress with Commercial Space Safety Institute** » by **Tommaso Sgobba** ICAO/UNOOSA Aerospace Symposium (SPACE 2017)
19. "An Institute for Space Debris Prevention and Control" by **Tommaso Sgobba and Dr. Mark A. Skinner** COPUOS 2018

Good news is we've already walked a long way... but there are new challenges to face!

- Reentry casualty requirement no longer to be based on (rare) events (10^{-4}), but to be computed and allocated on **annual basis**
- **New fields** to be studied:
 - effects of vapors linked to space objects demise, during reentry (pollution of high layers of atmosphere),
 - risk created by small (> 300g) remaining fragments for aviation
- Governance of Space Traffic Management to be agreed at **international level**, including specific case of air-launches from international airspace

OUR STRATEGIC DRIVERS

- Advancing safety is a key element to expand space programs and make them **economically viable**
- Space commercialization and international cooperation in civil space programs is the way ahead. It requires an **international safety culture!**
- Need for an **integrated (airspace/outer space)** international regulations system to cover traffic and safety of aero-space operations (emerging suborbital spaceplanes, space-based safety critical services, etc.)
- Need for uniform international space safety standards to ensure **fair competition** in the global (space) market.



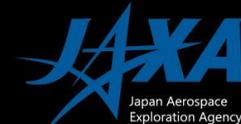
11th IAASS Conference

International Association for the Advancement of Space Safety



MANAGING RISK IN SPACE

17-19 SEPTEMBER 2020
OSAKA - JAPAN



Thank you for your attention!

Credit: Toyota/JAXA

<http://iaassconference2020.space-safety.org>