



International Academy of Astronautics
IAA Space Debris Committee
September 30th , 2023



Agenda

1. IAC – Administrative part
 - 1.1. IAA Space Debris Committee
 - 1.2. Lessons learned from Paris 2022
 - 1.3. General statistics concerning Space Debris Symposium A6
 - 1.4. Status of Space Debris Symposium for Baku 2023
 - 1.5. Preparation of Space Debris Symposium for Milano 2024
2. Exchanges
 - 2.1. Past events: workshops, conferences, congresses, ...
 - 2.2. On the Agenda
 - 2.3. General information
 - 2.4. Round table – Open discussion
3. IAA Study Groups
 - 3.1 SG 5.17 IAA Situation Report on Space Debris



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1.1 IAA Space Debris Committee

General frame:

- Officially created within IAA in 2012
 - Independent Committee
 - Permanent Committee
 - Attachment to Commission V. Could be independent if it would present any interest
- Actions of the Committee:
 - Position Paper on Orbital Debris in 1993, revised in 2000
 - Position Paper SG 5.1 on Space Debris Mitigation in 2006
 - Position Paper SG 5.5 on Space Debris Remediation in 2013
 - Participation to SG 5.10 on Orbital Debris Removal: Policy, Legal, Political and Economic considerations
 - Participation to SG 4.23 on Post-Mission Disposal for Micro and Smaller Satellites: Concepts and Trade Studies
 - Review of the SG 5.15 on Space Traffic Management, finished and published
 - Situation Report Paper 2016 SG 5.14 finished and distributed
 - Situation Report Paper 2019 SG 5.17 on going
 - Numerous presentations (UNCOPUOS, ...)



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1. IAA Space Debris Committee

Membership:

No need to be member of IAA !

- Members of the IAA A6 Symposium Program Committee (chairs & rapporteurs)
 - ⇒ Note that the IAC Program Committee is exclusively selected among the IAA SDC members
- Members of the Program Committee of other IAA sponsored conferences with Space Debris concerns
- Members of Space Debris related working groups (IADC, UNCOPUOS, COSPAR, ISO ...)
- Academics, Labs, Universities, Industrials... working on the topic

However, **it is requested to be “active”**:

- Participation to the meetings
- Debriefing of activities during the meetings
- Cross information with other members
- Contribution to studies and reports
- To see the work which is done, visit our web page

<https://iaaspace.org/about/permanent-committees/#SA-PERMCspacedebris>

Two meetings per year:

- One during IAC ⇒ Includes the status of the sessions, workshops, round tables... of the week
- One during IAC March Meeting ⇒ Includes the pre-selection of the abstracts for the following IAC

1. IAA Space Debris Committee

Current membership:

Agapov Vladimir M	Faucher Pascal	Kerr Emma	Nassisi Annamaria	Somma Gian Luigi
Aglietti Guglielmo	Christiansen Eric L	Kibe Seishiro	Oltrogge Daniel L.	Sorge Marlon E.
Agueda Alberto	Cordelli Emiliano	Kitazawa Yukihito	Opromolla Roberto	Spencer David B.
Ailor William H	Crowther Richard	Kim Hae-Dong	Pardini Carmen	Stokes Hedley
Alary Didier	Finkleman David	Krag Holger	Piergentili Fabrizio	Seitzer Patrick
Alby Fernand	Fitz-Coy Norman G.	Jankovic Marko	Plattard Serge	Traineau Jean-Claude
Anilkumar A.K.	Flohrer Tim	Kawamoto Satomi	Rossettini Luca L.	Tung Helen
Anselmo Luciano	Forshaw Jason	Le May Samantha	Rossi Alessandro	Usovik Igor
Anz-Meador Phillip	Francesconi Alessandro	Lemmens Stijn	Sanchez Ortiz Noelia	Yasaka Tetsuo
Auburn John	Francillout Laurent	Letizia Francesca	Santoni Fabio	Wiedemann Carsten
Bastida-Virgili Benjamin	Gong Zizheng	Liou Jer-Chyi	Schaefer Frank	<i>Ysole PREVEREAUD</i>
Berend Nicolas	Grishko Dmitriy	Martinez Peter	Schildknecht Thomas	<i>Adriano AUTINO</i>
Bevilacqua Riccardo	Hanada Toshiya	Martinot Vincent	Shen Lin	<i>Rachit BHATIA</i>
Brachet Gerard	Hyde James	Marzioli Paolo	Siminski Jan	<i>Francesco SANTORO</i>
Colombo Camilla	Howard Diane	Masson-Zwaan Tanja L.	Singh Balbir	
Dasgupta Upasana	Jah Moriba K.	McKnight Darren S.	Smith Lesley-Jane	
Dolado Perez Juan-Carlos	Kelso T. S.	Metz Manuel		

Chairs & Secretary:

Skinner Mark
Bonnal Christophe
Omaly Pierre

Note:

*Members in italics are not yet mentioned on the IAA website...
Complex process...*

To be removed?

New members?

Synthesis:

81 members on the website

See appendix 1 for today's list of participants

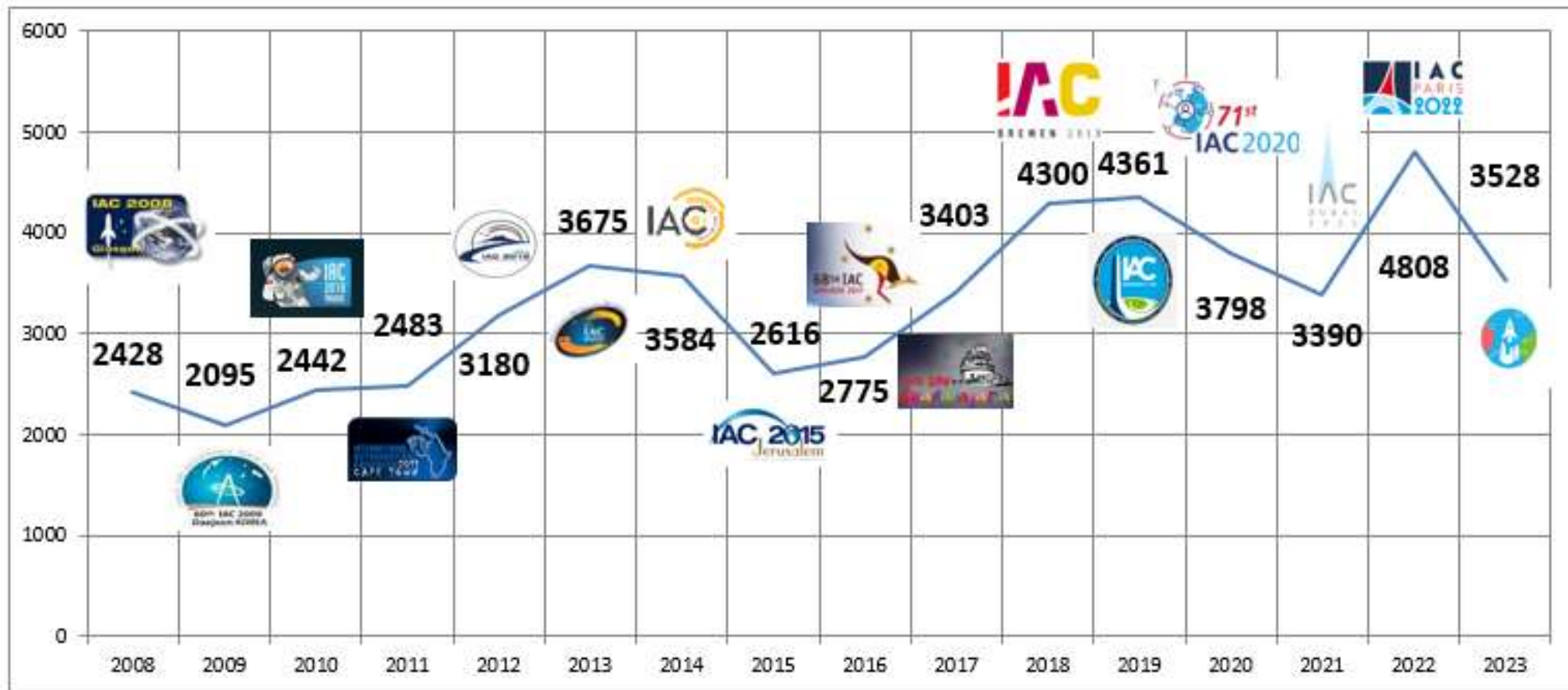
It is reminded that Program Committee (Chairs + Rapporteurs) is selected among members only



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1.2 General evolution of IAC

Number of IAC abstracts since 2008





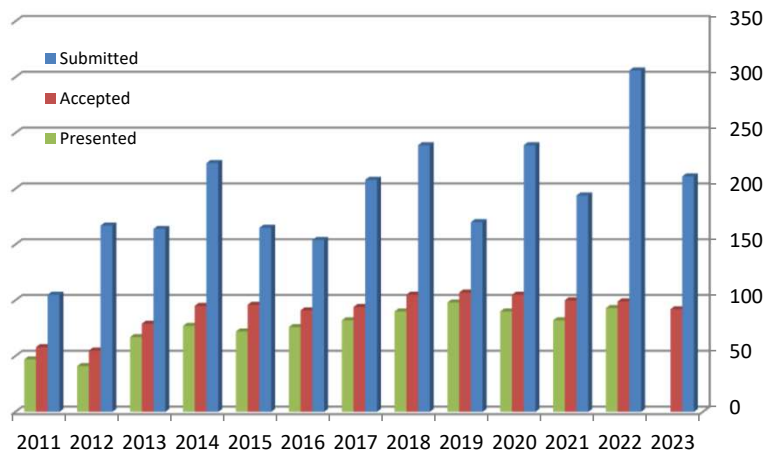
1.3 General statistics concerning A6

Globally healthy symposium:

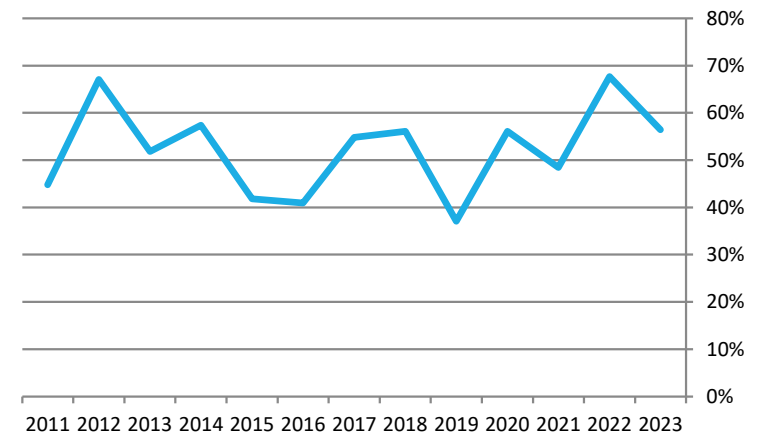
Average 206 papers submitted every year these last 10 years: large variations (standard deviation = 47.2)

Very good rejection rate: average last 10 years 51% \Rightarrow Evolution in 2022 due to the very high number of IPs

Very good presentation rate: average (2012-2019) = 81%

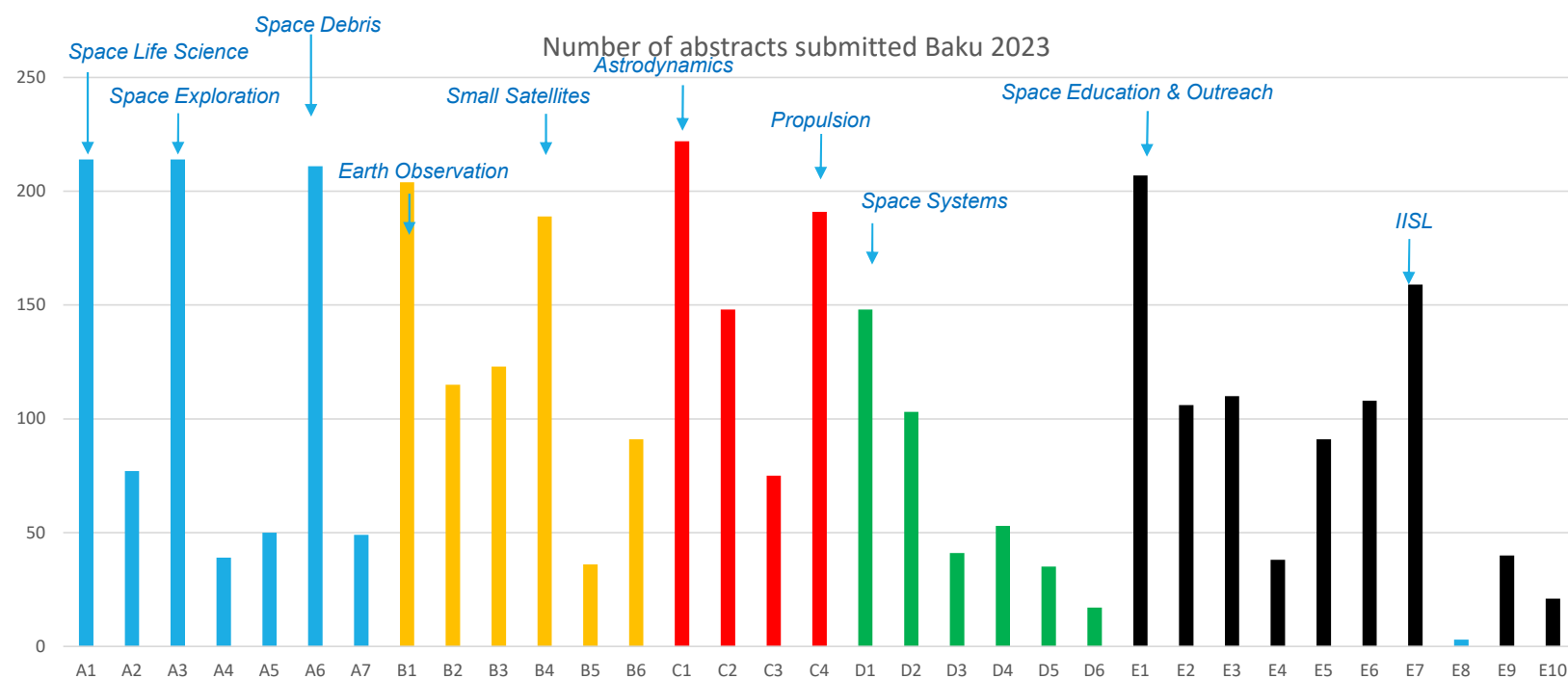


Rejection rate



1.4. Space Debris Symposium for Baku 2023

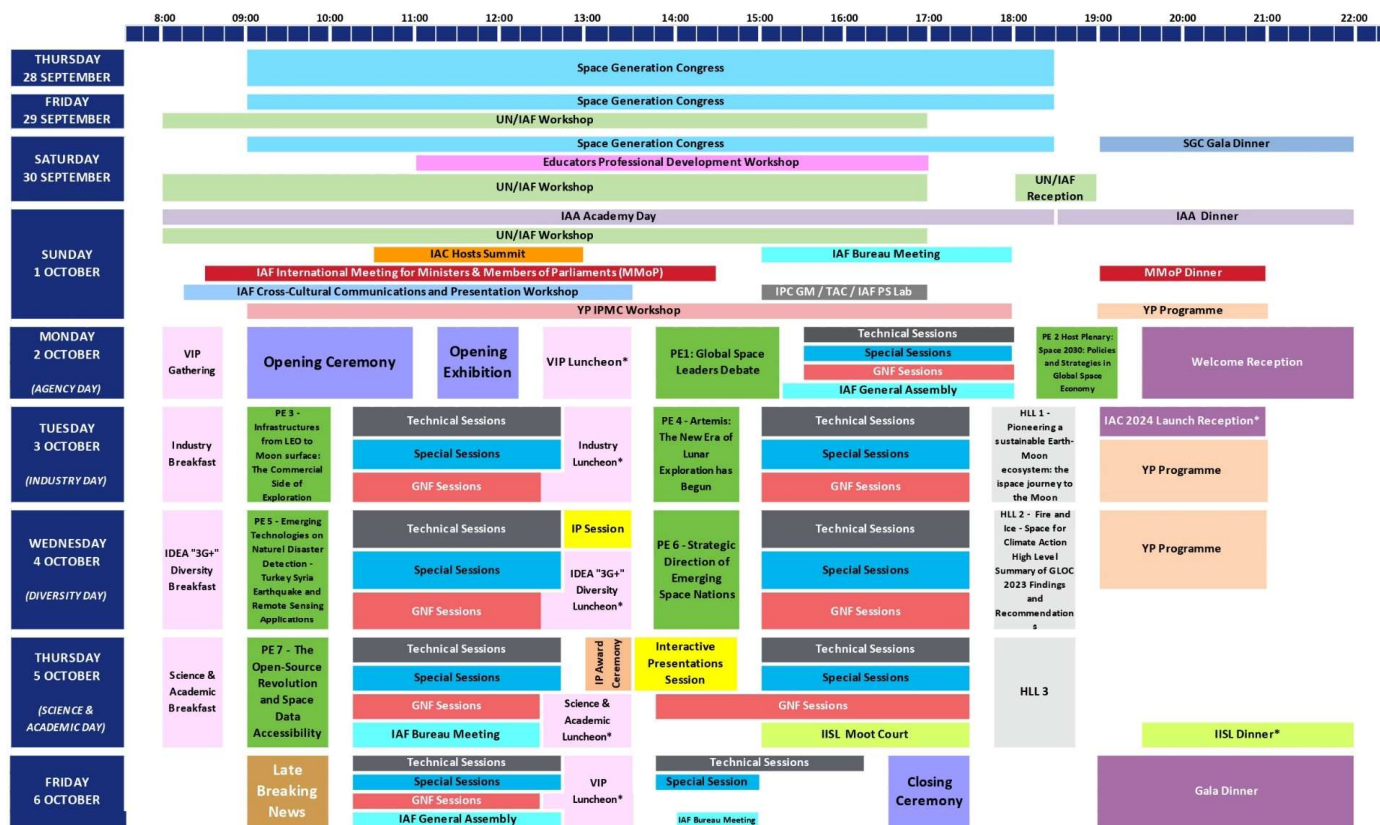
211 abstracts submitted to A6 this year





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1.4. Space Debris Symposium for Baku 2023



Please Note:

*By invitation only; Pre-Congress events as well as the IISL Moot Court are dedicated to the respective participants



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1.4. Space Debris Symposium for Baku 2023

Date	02/10/2023	03/10/2023	03/10/2023	04/10/2023	04/10/2023	05/10/2023	05/10/2023	06/10/2023	06/10/2023
Time / Room Number	15:15-17:45	10:15-12:45	15:00-17:30	10:15-12:45	15:00-17:30	10:15-12:45	15:00-17:30	10:15-12:45	13:45-16:15
BCC B3	A3.1	A3.2A	A3.2B	A3.3A	A3.3B	A3.4A	A3.5	A3.4B	A3.2C
BCC A3	D2.1	D2.3	D2.2	D2.4	D2.5	D2.6	D2.7	D2.8	D2.9/D6.2
BCC B4	C1.8	C1.9	C1.1	C1.2	C1.3	C1.4	C1.5	C1.6	C1.7
BCC A6	A6.7	A6.9	A6.4	A6.3	A6.2	A6.5	A6.6	A6.8/E9.1	A6.1
BCC A7	B3.1	B3.2	B3.3	B3.4/B6.4	B3.5	B3.6/A5.3	B3.7	B3.8	E10.2
BCC A2	B4.2	B4.1	B4.3	B4.4	B4.5	B4.6B	B4.7	B4.8	B4.6A
HAC Hall B	E7.1	E7.2	E7.3	E7.4	E7.5	E9.3	E10.1	E7.6/E3.5	E7.7
BCC A8	C4.1	C4.3	C4.5	C4.2	C4.6	C4.7	C4.8/B4.5A	C4.9	C4.10/C3.5
BCC A1	C2.1	C2.2	C2.3	C2.4	C2.5	C2.6	C2.7	C2.8	C2.9
BCC B6	A1.1	A1.2	A1.3	C4.4	A1.4	A1.5	A1.6	A1.7	A1.8
BCC B7	A2.1	A4.1	A4.2	A2.2	A2.3	A2.4	A2.5	A2.6	A2.7
HAC Hall A	D1.1	D1.2	D1.3	A5.1	A5.2	D1.4A	D1.4B	D1.5	D1.6
BCC B1	B1.1	C3.1	B1.2	B1.3	B1.4	B1.5	B1.6	C3.3	C3.4
BCC Auditorium Balcony	E9.2	E3.1	E3.2	E3.3	E3.4	A7.1	E3.6	A7.2	A7.3
BCC A4	E5.1	D5.1	E5.2	D5.2	E5.3	D5.3	E5.4	E5.5	E5.6
BCC B2	B5.1	B2.7	B2.1	B2.2	B2.3	B2.4	B2.5	B2.6	E8.1
HAC Museum GA	E1.1	E1.2	E1.3	E1.4	E1.5	E1.6	E1.7	B1.7	E1.9
BCC Balcony C2	D4.1	D4.2	D4.3	D3.1	D3.2A	D4.4	D4.5	D3.2B	D3.3
BCC A5	E2.1	E2.2	B6.3	E2.4	B5.2	B5.3	B6.1	B6.2	B6.5
BCC B5	B2.8/GTS.3	D6.1	E2.3/GTS.4	D6.3	E6.5/GTS.1	C3.2	B4.9/GTS.5	D5.4	B3.9/GTS.2
HAC Balcony 2	A5.4	E6.4	E6.3	E6.2	E4.1	E4.2	E6.1	E4.3	
ISZ								E1.8	

BCC: Baku Congress
Center
HAC: Heydar Aliyev Center

Category A:
Science
& Exploration
A1--> A7

Category B:
Applications
& Operations
B1--> B6

Category C:
Technology
C1--> C4

Category D:
Infrastructure
D1--> D6

Category E:
Space
& Society
E1--> E10



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1.4. Space Debris Symposium for Baku 2023

Initial list, as per the website

A6: Space Debris Symposium: Skinner – ~~Bennal~~ – Omaly

The Symposium will address the complete spectrum of issues associated to space debris, including orbital sustainability and operations in debris dominated environment.

It will cover every aspect of Space Environment Management (SEM) including Mitigation and Remediation measures, Space Surveillance and Tracking (SST), Space Situational Awareness (SSA), Space Traffic Management (STM), including all aspects of measurements, modelling, risk assessment in space and on the ground, re-entry, hypervelocity impacts and protection, mitigation and standards, post-mission disposal, remediation, debris removal, Space Surveillance, collision avoidance as well as non-technical topics associated to space debris dominated environment.

A6.1: Space Debris Detection, Tracking and Characterization - SST: Skinner – ~~Agapov~~ – Schildknecht- Piergentili

This session will address every aspect of SST (Space Surveillance and Tracking), advanced ground and space-based measurement techniques, relating processing methods, and results of space debris characterization.

A6.2: Modelling and Risk Analysis: ~~Serge~~ – Oltrogge – Pardini

This session will address the characterization of the current and future debris population and methods for in-orbit and on-ground risk assessments. The in-orbit analysis will cover collision risk estimates based on statistical population models and deterministic catalogues, and active collision avoidance.

A6.3: Impact-Induced Mission Effects and Risk Assessments: Kitazawa – ~~Gong~~ – Traineau

This session addresses disruptions of spacecraft operations induced by hypervelocity impacts including spacecraft anomalies, perturbation of operations, component failures up to mission loss , and spacecraft fragmentations. It includes risk assessments for impact vulnerability studies and corresponding system tools. Further topics are spacecraft impact protection and shielding studies, laboratory impact experiments, numerical simulations, and on-board diagnostics to characterize impacts such as impact sensors, accelerometers, etc.



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1.4. Space Debris Symposium for Baku 2023

Initial list, as per the website

A6.4: Mitigation - Tools, Techniques and Challenges - SEM: Omaly – Kawamoto – Krag (Noelia)

This session will focus on the Mitigation part of the SEM (Space Environment Monitoring), implementation of debris prevention and reduction measures; vehicle passive protection at system level including end of life strategies and tools to verify the efficiency of the implemented measures. The session will also address practical experiences in the planning and verification of measures and issues and lessons learnt in the actual execution of mitigation actions.

A6.5: Post Mission Disposal and Space Debris Removal 1 - SEM: Singh– Opromolla – Francillout–Forshaw

This session will focus on the Remediation part of the SEM, dealing with ADR (Active Debris Removal), JCA (Just in time Collision Avoidance), LDTM (Large Debris Traffic Management) among solutions. It will address post-mission disposal and active removal techniques “ground and space based”, review potential solutions and identify implementation difficulties.

A6.6: Post Mission Disposal and Space Debris Removal 2 - SEM: Jankevie – Grishko – Forshaw

This session will focus on the Remediation part of the SEM, dealing with ADR (Active Debris Removal), JCA (Just in time Collision Avoidance), LDTM (Large Debris Traffic Management) among solutions. It will address post-mission disposal and active removal techniques “ground and space based”, review potential solutions and identify implementation difficulties.

A6.7: Operations in Space Debris Environment, Situational Awareness - SSA: Martinet—Kelso— Sanchez-Ortiz-Skinner- Nayer

This session will address the multiple aspects associated to STM (Space Traffic Management) and SSA (Space Situational Awareness) including safe operations in space dealing with Space Debris, operational observations, orbit determination, catalogue build-up and maintenance, data aggregation from different sources, relevant data exchanges standards and conjunction analyses.



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1.4. Space Debris Symposium for Baku 2023

A6.8 / E9.1 (joint with Space Security Committee): Political, Legal, Institutional and Economic Aspects of Space Debris Mitigation and Removal - STM Security

From SDC: ~~Spencer~~ ~~Masson-Zwaan~~ ~~Kerr~~ From SSC: ~~Plattard~~ ~~Soucek~~ ~~Capurso~~ & David

This session will address all non-technical aspects of Operations and Security in a Debris Dominated Environment. This STM session will mainly include the non-technical aspects of space debris mitigation and removal. Political, legal and institutional aspects include role of IADC and UNCOPUOS and other multilateral bodies. Economic issues include insurance, financial incentives and funding for space debris mitigation and removal. The role of international cooperation in addressing these issues will be considered

A6.9: Orbit Determination and Propagation - SST

~~Siminski~~ ~~Delado-Perez~~ ~~Marzioli~~ - Cordelli

This session will address every aspect of orbit determination coming from the SST (Space Surveillance and Tracking), related to assessment of raw and derived data accuracy, optical measurements processing and modelling and risk analysis of space debris

A6.IP: Interactive Presentations, Kerr – Letizia – Marzioli – Opromolla – Jankovic – Need Volunteers



1.4. Space Debris Symposium for Baku 2023

Evaluation of presentations:

- On the web site, under “Responsibility area”, “2022”, “IAC-22/A6/1”, “Evaluate presentations” – Same for IP and IPB

[Home](#) > [IAC-22/A6/1](#) > [evaluation](#) >

SESSION EVALUATION FORM

A6.1. Space Debris Detection, Tracking and Characterization - SST

Date: 22 September 2022

Time: 13:45

SESSION ATTENDANCE

session	Start	Middle	End
2400	<input type="text"/>	<input type="text"/>	<input type="text"/>

PAPERS

ID	Order	Title	Speaker	Review	Confirmed	Presentation delivered onsite	Manuscript uploaded	Presentation uploaded	Withdrawn	No-Show	Manuscript evaluation	Presentation evaluation	Pre-selected for Acta Astronautica
68152	1	Maneuvering into the Future: Open-Architecture Data Repository (OADR) prototype: towards civil and commercial space traffic coordination	Dr. Mark A. Skinner	accepted	<div>YES</div> <div>NO</div>	<div>YES</div> <div>NO</div>	<div>yes</div>	<div>yes</div>	<div>YES</div> <div>NO</div>	<div>YES</div> <div>NO</div>	<div>5</div> <div>4</div> <div>3</div> <div>2</div> <div>1</div> <div>0</div>	<div>5</div> <div>4</div> <div>3</div> <div>2</div> <div>1</div> <div>0</div>	<div>YES</div> <div>NO</div>



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1.4. Space Debris Symposium for Paris 2022

First Name	Last Name	Poster ID	Publisher	Poster URL	Title	Name	speaker_company	speaker_country
Nijanthan	Vasudevan	80349	VRAI	iac2023-iaf.ipc	Active Space Debris Removal with Artificial Intelligence	A6. 21	Space Generation Adv	United States
Mekhi	Dhesi	79604	VRAI	iac2023-iaf.ipc	Towards In-Orbit Hyperspectral Imaging of Space Debris	A6. 21	Astroscale Ltd	United Kingdom
KaiQi	Cui	76549	VRAI	iac2023-iaf.ipc	Improving the method of assessing the potential of space debris	A6. 21	Purple Mountain Obs	China
Liqiang	Hou	76402	VRAI	iac2023-iaf.ipc	Optimal Low Thrust Debris Removal Using a Tether	A6. 21	Shanghai Jiaotong Uni	China
Xiaowei	WANG	76376	VRAI	iac2023-iaf.ipc	A novel Method of Space Non-cooperative Target Detection	A6. 21	China Academy of Lau	China
Ekaterina	Tverdokhlebova	76123	VRAI	iac2023-iaf.ipc	plasma means of combating technogenic debris in space	A6. 21	TSNIIMASH	Russian Federation
Ricardo	Ferreira	76012	VRAI	iac2023-iaf.ipc	Probability of Collision of satellites and space debris	A6. 21	FCT-UNL	Portugal
Gaia	Lorenzi	79820	VRAI	iac2023-iaf.ipc	Spacecraft reflectance experimental facility for Space Debris	A6. 21	Sapienza University of	Italy
Andreas	Hornig	79444	VRAI	iac2023-iaf.ipc	Time-synchronization and accuracy impact on the detection of	A6. 21	AerospaceResearch.ne	Germany
Shaotian	Gao	78715	VRAI	iac2023-iaf.ipc	Maneuvering detection of space non-cooperative targets	A6. 21	Northwestern Polytec	China
Salihat	Haciyeve	79061	VRAI	iac2023-iaf.ipc	How to make money from space debris?	A6. 21	Azerbaijan State Univ	Azerbaijan
Okchul	Jung	78676	VRAI	iac2023-iaf.ipc	Conjunction Assessment of LEO Satellite for Future Space	A6. 21	Korea Aerospace Rese	Korea, Republic of
Pyanet	Marine	78758	VRAI	iac2023-iaf.ipc	Towards an all-orbit optical data service provision in space	A6. 21	ArianeGroup SAS	France
Mathilde	Leuridan	75232	VRAI	iac2023-iaf.ipc	A Model for Satellite Collisions	A6. 21	1st IAA SYMPOSIUM ON	Germany
Daniel	Lubián Arenillas	79880	VRAI	iac2023-iaf.ipc	The Debris Mitigation Facility for Sustainable Space	A6. 21	OKAPI:Orbits GmbH	Germany
Iosto	Fodde	77482	VRAI	iac2023-iaf.ipc	The LASERS Mission Concept for Active Debris Removal	A6. 21	University of Strathcly	The Netherlands
Marta	Guimaraes	78441	VRAI	iac2023-iaf.ipc	Taxonomy for Resident Space Objects in LEO	A6. 21	Neuraspace	Portugal
Emanuele	Tomassi	77925	VRAI	iac2023-iaf.ipc	The Role of Advanced Software Tools in Ensuring Space	A6. 21	Politecnico di Milano	Italy
Georgy	Shcheglov	77819	VRAI	iac2023-iaf.ipc	Feasibility study of loads reduction in process of launch	A6. 21	Bauman Moscow State	Russian Federation
Zhengyu	Pan	77297	VRAI	iac2023-iaf.ipc	Large-scale Rapid Evaluation for the Collision Risk of Space	A6. 21	School of Aerospace E	China
Al	Gao	77191	VRAI	iac2023-iaf.ipc	spacecraft components detection method based on deep learning	A6. 21	Beijing Institute of Te	China
Fangyuan	Shi	77354	VRAI	iac2023-iaf.ipc	Image-based targets tracking for multiple remote sensing	A6. 21	Beijing Institute of Te	China
Mark A.	Skinner	75761	VRAI	iac2023-iaf.ipc	CubeSat Confusion: CubeSat ID via ground-based observations	A6. 21	The Aerospace Corpor	United States
Eliott	Simon	76035	VRAI	iac2023-iaf.ipc	Resident Space Object Classification from Light Curves	A6. 21	European Space Agen	Belgium
Luigi	De Maria	76273	VRAI	iac2023-iaf.ipc	Numerically Efficient Impulsive and Low-Thrust Control	A6. 21	Politecnico di Milano	Italy
João	Funenga	76700	VRAI	iac2023-iaf.ipc	finding real-world orbital motion laws from data	A6. 21	FCT-UNL	Portugal
Klaus	Merz	77054	VRAI	iac2023-iaf.ipc	The IOAG Working Group on Sustainability of Open Space	A6. 21	European Space Agen	Germany
Klaus	Merz	78918	VRAI	iac2023-iaf.ipc	ESA’s collision risk estimation and automated	A6. 21	European Space Agen	Germany
João	Catulo	78107	VRAI	iac2023-iaf.ipc	Predicting the Probability of Satellite Collisions using	A6. 21	Instituto Superior Téc	Portugal
Anisa	Taggart	78346	VRAI	iac2023-iaf.ipc	Breaking the Cycle: Novel Capture Mechanisms for Space	A6. 21	University of Nottingh	United Kingdom
Emiliano	Cordelli	78859	VRAI	iac2023-iaf.ipc	Technologies paving the way toward space debris removal	A6. 21	GMV, Space Debris Of	Germany
Dmitrii	Petrov	78876	VRAI	iac2023-iaf.ipc	Orbit determination with the help of space-based observations	A6. 21	Moscow Institute of P	Russian Federation
Giacomo	Battaglia	79098	VRAI	iac2023-iaf.ipc	A CubeSat-sized in-situ space debris impact sensor	A6. 21	University of Padova	Italy
Cristina	Pérez Hernández	79120	VRAI	iac2023-iaf.ipc	The EUSST Collision Avoidance Service Ready to Support	A6. 21	CDTI (Centre for the d	Spain
Antonio	D'Anniballe	79136	VRAI	iac2023-iaf.ipc	Quantifying Improvements in Debris Risk Analysis	A6. 21	Cranfield University	United Kingdom
Jodie	Howlett	79292	VRAI	iac2023-iaf.ipc	UK ADR: The UK Space Agency’s Active Debris	A6. 21	UK Space Agency	United Kingdom
Prateesh	Awasthi	80131	VRAI	iac2023-iaf.ipc	Stabilization of Tumbling Spacecraft via Continuous Control	A6. 21	Indian Institute of Tec	India
Pawel	Nowakowski	80142	VRAI	iac2023-iaf.ipc	Engineering Model of the Solid Rocket Motor for Debris	A6. 21	Łukasiewicz Research	Poland
Abdikul	Ashurov	80716	VRAI	iac2023-iaf.ipc	Creation of a service for monitoring satellite maneuvers	A6. 21	L. N. Gumilev Eurasian	Kazakhstan

1.4. Space Debris Symposium for Baku 2023

Interactive Presentations:

Chairs

you will find the screen allocation paper number and time schedule. Same color means side by side screens.

We have at max 8 presentations in the same time Wednesday, so it could be nice to be all here for the first slot. Teel me if it is fine for you and if you have some concern and what screen you will chose ☺.

Thursday 5 October 2023

[illegible]

Wednesday 4 October 2023

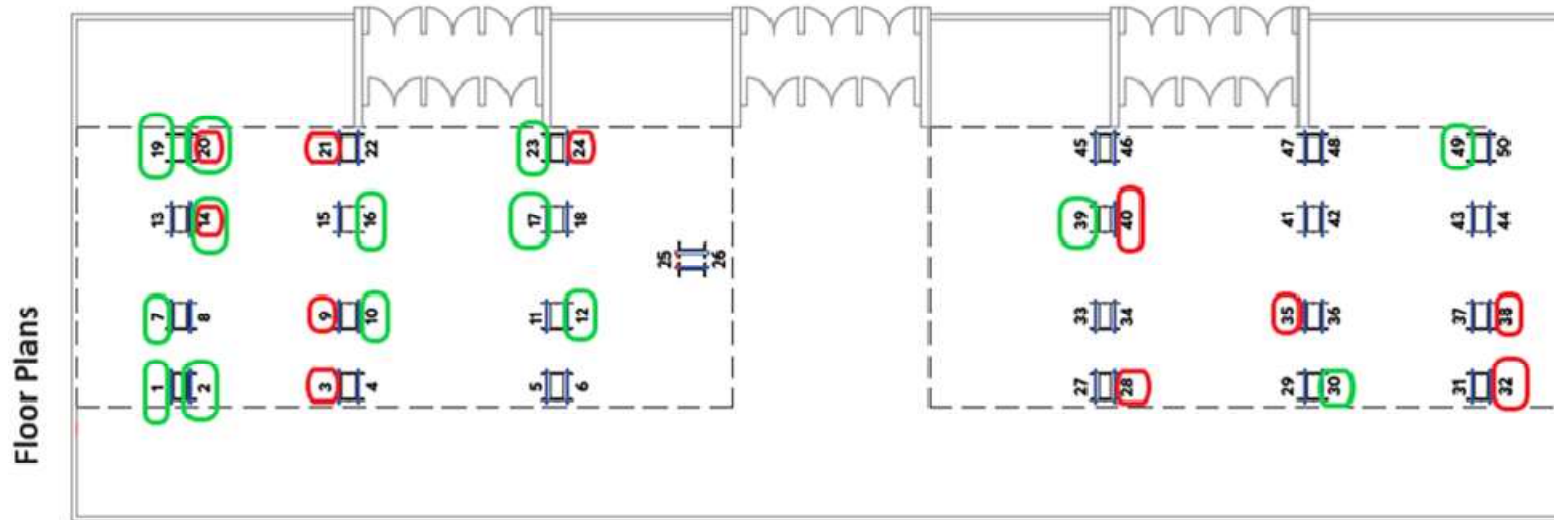
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1.4. Space Debris Symposium for Baku 2023

Chairs : 'jean-claude.traineau@orange.fr'; 'thomas.schildknecht@aiub.unibe.ch'; 'noelia.sanchez.ortiz@gmail.com';
'Holger.Krag@esa.int'; 'mark.a.skinner@aero.org'; 'paolo.marzioli@uniroma1.it'; 'dan@comspoc.com';
'kitazawa@planeta.sci.isas.jaxa.jp'; 'emiliano.cordelli@esa.int'; 'mahhad.nayyer@gmail.com'





1.5. Space Debris Symposium for Milano 2024

IAC	Year	Location	Session 1	Session 2	Session 3	Session 4	Session 5	Session 6	Session 7	Session 8	Session 9	Session 10	Interactive Presentations
67th	2016	Guadalajara	D. Oltrogge [C] T. Schildknecht [C] V. Agapov [R]	C. Pardini [C] M. Sorge [C] B. Bastida-Virgili [R]	N. Fitz Coy [C] F. Schaefer [C] A. Francesconi [R]	H. Krag [C] C. Cazaux [C]	S. Kibe [C] F. Piergentili [C] F. Santoni [R]	N. Berend [C] L. Innocenti [C] G. Haussmann [R]	T.S. Kelso [C] J-C. Dolado-Perez [C] C. Wiedemann [R]	S. Plattard [C] D. Finkleman [R]	M. Jah [C] H. Klinkrad [C]		T. Yasaka D. McKnight C. Bonnal
68th	2017	Adelaide	F. DiPentino [C] T. Schildknecht [C] V. Agapov [R]	C. Pardini [C] D. Oltrogge [C] M. Sorge [R]	F. Schaefer [C] N. Fitz Coy [C] A. Francesconi [R]	C. Cazaux [C] D. Finkleman [C] H. Krag [R]	B. Bastida-Virgili [C] F. Santoni [C] F. Piergentili [R]	N. Berend [C] L. Innocenti [C] B. Singh [R]	T.S. Kelso [C] J-C. Dolado-Perez [C] C. Wiedemann [R]	D. McKnight [C] S. Plattard [C] A. Soucek [R]	H. Klinkrad [C] M. Jah [C] H. Lewis [R]	D. Oltrogge [C] L. Rossetti [C] C. Cazaux [R]	T. Yasaka D. McKnight C. Bonnal
69th	2018	Bremen	F. DiPentino [C] T. Schildknecht [C] V. Agapov [R]	L. Anselmo [C] D. Oltrogge [C] M. Sorge [R]	N. Fitz Coy [C] F. Schaefer [C] D. McKnight [R]	H. Krag [C] P. Omalý [C] Y. Ushevik [R]	F. Piergentili [C] B. Bastida-Virgili [C] F. Santoni [R]	N. Berend [C] B. Singh [C] L. Rossetti [R]	C. Wiedemann [C] T.S. Kelso [C] J-C. Dolado-Perez [R]	D. Spencer [C] S. Lemay [R]	S. Kibe [C] H. Lewis [C] H. Klinkrad [R]	M. Jah [C] Anilkumar [C] Kitazawa [R]	T. Yasaka D. McKnight C. Bonnal
70th	2019	Washington	M. Skinner [C] T. Schildknecht [C] V. Agapov [R]	M. Sorge [C] C. Pardini [C] D. Oltrogge [R]	JC Traineau [C] M. Jah [C] N. Fitz Coy [R]	H. Krag [C] S. Kawamoto [C] P. Omalý [R]	F. Santoni [C] A. Nassisi [C] L. Francillout [R]	L. Rossetti [C] E. Kerr [C] N. Berend [R]	C. Wiedemann [C] N. Sanchez-Ortiz [C] T.S. Kelso [R]	D. Spencer [C] S. Lemay [R]	H. Klinkrad [C] J-C. Dolado-Perez F. Piergentili [R]	U. Dasgupta [C] Y. Ushevik [C]	T. Yasaka D. McKnight C. Bonnal
71st	2020	Cyber	T. Schildknecht [C] M. Skinner [C] V. Agapov [R]	C. Pardini [C] D. Oltrogge [C] M. Sorge [R]	Z. Gong [C] E. Kerre [C] JC Traineau [R]	S. Kawamoto [C] P. Omalý [C] H. Krag [R]	B. Singh [C] L. Francillout [C] R. Oprimolla [R]	J. Auburn [C] N. Berend [C] C. Wiedemann [R]	T.S. Kelso [C] N. Sanchez-Ortiz [C] V. Martinot [R]	S. Plattard [C] S. Lemay [C] A. Soucek [R] D. Spencer [R]	H. Klinkrad [C] J-C. Dolado-Perez F. Santoni [R]	D. McKnight [C] H. Tung [C] A. Anilkumar [R]	T. Yasaka D. McKnight M. Jankovic
72nd	2021	Dubai	M. Skinner [C] M. Jah [C] T. Schildknecht [C]	M. Sorge [C] D. Oltrogge [C] C. Pardini [R]	D. McKnight [C] Z. Gong [C] JC Traineau [R]	P. Omalý [C] S. Kawamoto [C] H. Krag [R]	B. Singh [C] R. Oprimolla [C] L. Francillout [R]	M. Jankovic [C] C. Wiedemann [C] J. Auburn [R]	V. Martinot [C] T.S. Kelso [C] N. Sanchez-Ortiz [R]	D. Spencer [C] T. Masson-Zwaan S. Lemay [R]	H. Klinkrad [C] F. Santoni [C] J-C. Dolado-Perez	V. Agapov [C] H. Tung [C] A. Anilkumar [R]	E. Kerr S. Lemay F. Santoni R. Oprimolla M. Jankovic
73rd	2022	Paris	M. Skinner [C] V. Agapov [C] T. Schildknecht [R]	M. Sorge [C] D. Oltrogge [C] C. Pardini [R]	D. McKnight [C] Z. Gong [C] JC Traineau [R]	P. Omalý [C] S. Kawamoto [C] H. Krag [R]	B. Singh [C] R. Oprimolla [C] L. Francillout [R]	M. Jankovic [C] D. Grishko [C] J. Auburn [R]	V. Martinot [C] T.S. Kelso [C] N. Sanchez-Ortiz [R]	D. Spencer [C] T. Masson-Zwaan E. Kerr [R]	J. Siminski [C] J-C. Dolado-Perez P. Marzioli [R]	T. Schildknecht [C] D. McKnight [C] C. Colombo [R]	E. Kerr F. Letizia F. Santoni R. Oprimolla M. Jankovic P. Marzioli
74th	2023	Baku	M. Skinner [C] F. Piergentili [C] T. Schildknecht [C]	M. Sorge [C] D. Oltrogge [C] C. Pardini [R]	D. McKnight [C] Z. Gong [C] JC Traineau [R]	P. Omalý [C] S. Kawamoto [C] C. Colombo [R]	M. Jankovic [C] R. Oprimolla [C] L. Francillout [R]	M. Jankovic [C] D. Grishko [C] J. Auburn [R]	V. Martinot [C] T.S. Kelso [C] N. Sanchez-Ortiz [R]	D. Spencer [C] T. Masson-Zwaan E. Kerr [R]	E. Cordelli [C] J-C. Dolado-Perez [R] P. Marzioli [R]		E. Kerr F. Letizia R. Oprimolla M. Jankovic P. Marzioli



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1.5. Space Debris Symposium for Milano 2024

Evolutions of the text – Evolutions of the Chairs & Rapporteurs

A6: Space Debris Symposium: Bonnal – Bevilacqua – Omalý

The Symposium will address the complete spectrum of issues associated to space debris, including orbital sustainability and operations in debris dominated environment.

It will cover every aspect of Space Environment Management (SEM) including Mitigation and Remediation measures, Space Surveillance and Tracking (SST), Space Situational Awareness (SSA), Space Traffic Management (STM), including all aspects of measurements, modelling, risk assessment in space and on the ground, re-entry, hypervelocity impacts and protection, mitigation and standards, post-mission disposal, remediation, debris removal, Space Surveillance, collision avoidance as well as non-technical topics associated to space debris dominated environment.

A6.1: Space Debris Detection, Tracking and Characterization - SST: Skinner – Agapov – Schildknecht

This session will address every aspect of SST (Space Surveillance and Tracking), advanced ground and space-based measurement techniques, relating processing methods, and results of space debris characterization.

A6.2: Modelling and Risk Analysis: Sorge – Oltrogge – Pardini

This session will address the characterization of the current and future debris population and methods for in-orbit and on-ground risk assessments. The in-orbit analysis will cover collision risk estimates based on statistical population models and deterministic catalogues, and active collision avoidance.

A6.3: Impact-Induced Mission Effects and Risk Assessments: KITAZAWA – Gong – Prevèreaud?

This session addresses disruptions of spacecraft operations induced by hypervelocity impacts including spacecraft anomalies, perturbation of operations, component failures up to mission loss, and spacecraft fragmentations. It includes risk assessments for impact vulnerability studies and corresponding system tools. Further topics are spacecraft impact protection and shielding studies, laboratory impact experiments, numerical simulations, and on-board diagnostics to characterize impacts such as impact sensors, accelerometers, etc.



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1.5. Space Debris Symposium for Milano 2024

A6.4: Mitigation - Tools, Techniques and Challenges - SEM: Omalý – Kawamoto – Colombo

This session will focus on the Mitigation part of the SEM (Space Environment Monitoring), implementation of debris prevention and reduction measures; vehicle passive protection at system level including end of life strategies and tools to verify the efficiency of the implemented measures. The session will also address practical experiences in the planning and verification of measures and issues and lessons learnt in the actual execution of mitigation actions.

A6.5: Post Mission Disposal and Space Debris Removal 1 - SEM: Singh – Oproimolla – Francillout

This session will focus on the Remediation part of the SEM, dealing with ADR (Active Debris Removal), JCA (Just in time Collision Avoidance), LDTM (Large Debris Traffic Management) among solutions. It will address post-mission disposal and active removal techniques “ground and space based”, review potential solutions and identify implementation difficulties.

A6.6: Post Mission Disposal and Space Debris Removal 2 - SEM: Jankovic – Grishko – Forshaw

This session will focus on the Remediation part of the SEM, dealing with ADR (Active Debris Removal), JCA (Just in time Collision Avoidance), LDTM (Large Debris Traffic Management) among solutions. It will address post-mission disposal and active removal techniques “ground and space based”, review potential solutions and identify implementation difficulties.

A6.7: Operations in Space Debris Environment, Situational Awareness - SSA: Martinot – ~~Kelso~~ – Rachit – Sanchez-Ortiz

This session will address the multiple aspects associated to STM (Space Traffic Management) and SSA (Space Situational Awareness) including safe operations in space dealing with Space Debris, operational observations, orbit determination, catalogue build-up and maintenance, data aggregation from different sources, relevant data exchanges standards and conjunction analyses.



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1.5. Space Debris Symposium for Milano 2024

A6.8 / E9.1 (joint with Space Security Committee): Political, Legal, Institutional and Economic Aspects of Space Debris Mitigation and Removal - STM Security

From SDC: Spencer – Masson-Zwaan – Kerr *From SSC: Plattard – Soucek*

This session will address all non-technical aspects of Operations and Security in a Debris Dominated Environment. This STM session will mainly include the non-technical aspects of space debris mitigation and removal. Political, legal and institutional aspects include role of IADC and UNCOPUOS and other multilateral bodies. Economic issues include insurance, financial incentives and funding for space debris mitigation and removal. The role of international cooperation in addressing these issues will be considered

A6.9: Orbit Determination and Propagation - SST

Siminski – Dolado-Perez – Marzioli

This session will address every aspect of orbit determination coming from the SST (Space Surveillance and Tracking), related to assessment of raw and derived data accuracy, optical measurements processing and modelling and risk analysis of space debris

A6.10 Space Debris: Space carrying capacity assessment and allocation

Possibly joint with E9.4: Peter Martinez (could act as co-chair already spoke to him)

From SDC: Schildknecht – McKnight – Colombo From XXX: **SEE the PDF attached to the email**

A6.IP: Interactive Presentations, Kerr – Letizia – Marzioli - Opromolla – Jankovic – Bonnal



General messages on A6 Space Debris:

What about the Joint Session A6.10?

- 2022: E10.2 NEO 7 abstracts 6 presentations
- 2021: B6.5 Space Operations 13 abstracts, 22 participants
- 2020: B6.5 Space Operations 11 abstracts
- 2019: B4.10 Small Satellites 14 abstracts, 59 participants
- 2018: C1.7 Astrodynamics 12 abstracts, 60 participants
- 2017: B4.10 Small Satellites 12 abstracts, 55 participants
- 2015: YPVF Young Professionals Virtual Forum 7 abstracts, 5 participants (2 presenters + 2 chairs + 1 lost in the room...)
- Good suggestion made during the Spring meeting:
 - Joint Session with E6 “IAF Business Innovation Symposium”; contact point Ken Davidian
 - Topic “How to make money with Space Debris?” or anything similar... “Debris and Economics??”
 - ⇒ First contacts did not lead to any concrete action... May be to late... Maybe just another “regular” debris session...

What shall we do ?

Joseph P. Loftus Jr. IAC A6 lecture

- Not done again in Baku; need first for feedback from Paris
- What should be the selection strategy? Should we write Terms of Reference? **Question is not solved – will come back later**

Invited Keynote Lectures included in Technical Sessions: please propose if relevant



2. Exchanges

2. Exchanges

- 2.1. Past events: workshops, conferences, congresses, ...
- 2.2. On the Agenda
- 2.3. General information
- 2.4. Round table – Open discussion



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2. Exchanges

Save the date

PROGRAMME

FORUM

EVENTS

CHAPTER

TOWARDS A ZERO DEBRIS FUTURE

Day: Monday 2 October
Time: 15:30 - 16:15 AZT (GMT+4)
Location: Heydar Aliyev Center (HAC) Auditorium

This panel is driven by the shared concern about the continuing degradation of the outer space environment which puts space activities evermore at risk and, consequently, the need for more ambitious actions on space debris mitigation and remediation from all stakeholders. Heads of agencies are invited to highlight their views and measures on space safety and sustainability. The goal of the panel would be to identify collective efforts of a community of proactive actors towards jointly defined ambitious, meaningful and measurable targets by 2030. ESA's recently announced zero-debris charter will be introduced and discussed as a vehicle to drive joint ambitions in this field.

Organized by:



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2. Exchanges

The European Space Agency (ESA) is organising the 2023 Clean Space Industry Days. The event will take place from 16th to 20th October 2023 at ESTEC, The Netherlands.





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2. Exchanges



ESA announces the Zero Debris Charter initiative



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2. Exchanges

- ☐ The 7th International Workshop on Modeling & Remediation, CNES HQ, 10th to 12th June 2024
- ☐ The fourth IAA Conference on Space Situational Awareness (ICSSA) to be held in **Daytona Beach, FL, USA**. The conference will take place on **May 08-10, 2024**.
- ☐ 2nd International Orbital Debris Conference (IOC II) December 4-7, 2023 Sugar Land, Texas



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2. Exchanges

2. Exchanges

2.4. Round table – Open discussion

We need to update the **IAA Situation Report on Space Debris**

A plan to update the document will be discuss durinf the next spring meeting

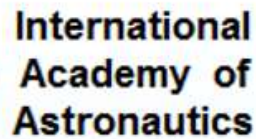


Agenda

3.1 SG 5.17 IAA Situation Report on Space Debris – Update

Initial volunteers and currently available sections

Responded?	Contributor	Email	Contribution offered	Existing draft
Yes	Manuel Metz	Manuel.Metz@dlr.de	summary on European Countries and especially the EUSST Consortium for the Appendix of the Report	Not yet
Yes	Balbir Singh Dr. A K Anilkumar	balbir.s@manipal.edu ak_anilkumar@isro.gov.in	ISRO India	isro_iaa_note.pdf
Yes	Tanya Masson Olga Volynskaya	aorjia88@mail.ru t.l.masson@law.leidenuniv.nl	legal	11. Legal_updated_clean_23 Mar 2022 (CLEAN)
Yes	Roberto Opromolla Marko Jankovic	roberto.opromolla@unina.it marko.jankovic@dfki.de	debris remediation	IAA Space Debris Situation Report 2019 - SG 5_17- Debris Remediation Chapter - ThirdDraft_RO_MJ_03122021
Yes	Christophe Darren	darren@leolabs.space christophe.bonnal@cnes.fr	several sections	Not yet
To be contacted	Nicolas Berend		Remediation (overlap with Opromolla and Jankovic)	Not yet
yes	Juan Carlos Dolado Perez	Juan-Carlos.DoladoPerez@cnes.fr	Future Population	8. Future environment_last_report_working_doc_v4
yes	Frank Schafer	Frank.Schaefer@emi.fraunhofer.de	HVI	Not yet



Agenda

3.1 SG 5.17 IAA Situation Report on Space Debris – Update

Distribution of tasks and sections that came later on

0.	Executive Summary & Table of Contents ⇒ Darren and Christophe		
1.	Introduction ⇒ Darren and Christophe		
2.	Current status (12 pages) ⇒ Need for someone who masters MASTER-ORDEM or equivalent, so	preferably ESOC + NASA + Russia ? Japan ?	
3.	Measurements (13 pages) and 4. SSA (16 pages) Could be merged into a unique chapter explaining the "how it works" Description of the SSA systems themselves placed in an Annex	Noelia Sanchez Ortiz	Thomas Schildknecht
		Dan Oltrogge	
	Strong wish to have extra systems, mainly ESA, EUSST, China, Australia, ... Personal opinion: no significant effort to update, fundamentally structure of the chapter		
5.	Collision Avoidance (6 pages) ⇒ Easy to update, potentially to be completed with new techniques and modern examples	D. Finkleman & Dan Oltrogge	
6.	HVI and Protection (13 pages) ⇒ Only minor points to update		
7.	Reentering Space Objects (16 pages) ⇒ Only some statistics to update	Dr. A K Anilkumar & Marlon E Sorge	
8.	Future Orbital Debris Environment (11 pages) δ Obviously a bit more work to do J Updates of statistics Inclusion of Small-sats and Constellations However, most of the IADC WG2 derived work can be reused, unchanged	ChB and Dmck contributions & Marlon E Sorge	
9.	Mitigation (9 pages) ⇒ Mostly update, ChB and Dmck contributions Well known to members of International Standards Working Groups Important to update the summaries of PMD practices	D. Finkleman	
10.	Debris Remediation (12 pages) δ	Darren and Christophe + Norman I	
11.	Legal (9 pages) ⇒ Update already done last year by Tanja; to be re-read		
12.	International (6 pages) ⇒ To be restructured, easy. Christophe		
13.	Synthesis & Further References (7 pages) ⇒ To be restructured, partially merged with §12, some can be deleted due to duplications...	Christoph D. Finkleman	
	Appendix (3 pages) ⇒ Currently Appendix 1 List of Contributors, Authors and Reviewers Appendix 2 List of Acronyms and Abbreviations		
	Dan Oltrogge Proposal to have one major Appendix with all the SSA systems: we need additional contributions, and colleagues must not complain afterwards if they are not in; if they did not provide anything		