

# **International Academy of Astronautics**

## **Commission 5 Meeting Report**

**Napoli, Italy**

**Saturday 29 September and Sunday 30 September 2012**

### **1/ Introduction**

The Commission meetings were held through two short sessions on Saturday and Sunday, in order to give room for Study presentations during the morning of Academy Day. In the future the Commission meetings shall take place on Saturday afternoon.

This report gathers the discussion of both sessions.

### **2/ Attendance**

There were 10 participants in attendance on Saturday's session (9 members, 1 guest), and 15 participants on Saturday's session (9 members, 6 guest)

#### Saturday 29 September

Max Grimard, Chairman

Corinne Jorgenson, Vice Chairman

Ciro Arevalo, Bernhard Schmidt-Tedd, Elisabeth Back-Impallomeni, Clay Mowry, Jacques Masson, Heiner Klinkrad, Ray Williamson

Nicolas Peter

#### Sunday 30 September

Max Grimard, Chairman

Corinne Jorgenson, Vice Chairman

Sergio Camacho, past Chairman

Elisabeth Back-Impallomeni, Clay Mowry, Jacques Masson, Oleg Ventkovsy,

Heiner Klinkrad, Ray Williamson

Walter Flury, Henry Hertzfeld, Geir Hovmork, Mathias Spude, Sergey Teselkin, David Finkleman

### **2/ Adoption of the agenda**

The agenda was adopted as distributed by e-mail on 19 September 2012.

### **3/ Adoption of the Minutes of Commission 5 Meeting in Paris, March 12, 2012**

The minutes, as distributed by e-mail on 19 September 2012, were adopted.

## **4/ IAA Commission 5 Conferences**

### **4.1 2nd IISL-IAA Space Law and Policy Symposium**

This symposium (following the first one in Washington in 2010) was held in the frame of the Toulouse Space Show on 26 June 2012. It was a one day conference, with 4 sessions and 12 invited papers. It was well attended with good quality papers. The theme was Space Sustainability, with a high focus on space debris issues. M. Grimard presented a summary of highlights from this workshop (see Appendix 1).

C. Mowry proposed to organize the next IISL-IAA Space Law and Policy Symposium in conjunction with Satellite Conference and will investigate this possibility.

### **4.2 Symposium E3 Space Policy, Regulation, and Economics at IAC**

- **Napoli 2012** : 4 sessions are organised, with a good ratio of confirmed papers (80% confirmations)
  - National and International Space Policies and Programmes for socio-economic development (10 planned papers, 6 confirmed, 2 withdrawn)
  - International cooperation : goals, constraints and means (10 planned, 10 confirmed)
  - Space economy valuing the use (10 planned, 7 confirmed, 1 withdrawn)
  - National policies and regional cooperation (10 planned, 9 confirmed, 1 withdrawn)
- **Beijing 2013** : 4 sessions are planned, under the coordination of J. Masson and Elisabeth Back-Impallomeni
  - National Space Policies and Programs, and Regional Cooperation
  - International Space Exploration Policies and Programmes
  - Industrial policies as drivers of the space economy
  - Assuring a Safe, Secure, and Sustainable Space Environment for Space Activities

Regarding the topic of the last session, and its close connection with Space Debris, H. Klinkrad requested a close coordination with A6 Symposium during the paper selection process, in order to prevent any conflict/overlap.

### **4.3 IAA-IISL Scientific Legal Roundtable at IAC**

Held in the frame of the E3 symposium this Roundtable is addressing the topic Optical Communications in Napoli 2012. For Beijing 2013 the topic will be "Space and the Polar Regions".

### **4.4 Symposium A6 Space Debris at IAC**

A detailed report on the Space Debris Committee (see §6.2) activities is given in Appendix 4.

- **Napoli 2012** :
  - Measurements (11 planned papers, 9 confirmed, 1 withdrawn, 11 confirmed posters)
  - Modelling and risk analysis (10 planned papers, 9 confirmed, 6 confirmed posters)
  - Impacts and protection (11 planned papers, 7 confirmed, 1 withdrawn, 2 confirmed posters)
  - Mitigation and standards (11 planned papers, 11 confirmed, 1 confirmed poster)

- Space debris removal issues (10 planned papers, 7 confirmed, 1 withdrawn, 12 confirmed posters)
- Space debris removal concepts (10 planned papers, 10 confirmed)
- Political, economic and institutional aspects of space debris mitigation and removal (joint with IAF Space Security committee) (9 planned papers, 8 confirmed, 1 confirmed posters)

H. Klinkrad reminded that 167 abstracts were submitted (105 for IAC2011). M. Grimard acknowledged the strength of the Space Debris community, as reflected by the dynamism of this symposium.

■ **Beijing 2013** : same structure

- Measurements
- Modelling and risk analysis
- Hypervelocity impacts and protection
- Mitigation and standards
- Space debris removal issues
- Space debris removal concepts
- Operations in space debris environment, situational awareness
- Political, legal, institutional and economical aspects of space debris mitigation and removal (joint with Space Security Committee)

**5/ Commission 5 Study Groups**

5.1 Status of on-going Study Group

SG 5.5 Space Debris Environment Remediation (Klinkrad, Johnson)

H. Klinkrad informed that the Peer Review has been successfully held in September 2012. Comments were generally very positive, with only editorial updates which will be included. There were comments on the lack of deep legal analysis or economical assessment, which will be answered in reminding that this will be the scope of the follow-on Study SG 5.10. Other comments regarding new recent initiatives in debris removal which are not documented, will be answered reminding that the study was concluded nearly 2 years ago and could not include events which have occurred in between.

Regarding the publication, M. Grimard reminded that the single entry point is the IAA Secretary, which shall guarantee that all IAA rules for publication are respected. This does not prevent to propose a publication sponsor if any.

SG 5.9 International Cooperation on Space Weather (Baker, Balogh, Paxton)

The study is suffering a lack of leadership and has not progressed. W. Balogh is looking for new study leaders to revive the study. If not successful, M. Grimard recommended cancelling the study.

S. Camacho declared that the Space Weather topic is very important and that further attempts should be made to save the study. He recommended talking to the members of the members of

Expert Group C of the UNCOPUOS Working Group on Long Term Sustainability. He took the action to discuss that with W. Balogh and P. Martinez, and to facilitate this connection, including during the Napoli IAC week.

#### S5.10 Orbital Debris Removal: Policy, Legal, Political and Economic Considerations (Hobe, Williamson)

The study group shall have its first working meeting during the Napoli IAC week. M. Grimard recommended using this opportunity to draft a first outline of the study, which shall serve as a guideline to allocate the responsibility of contributions to the study members.

### 5.2 Proposal of new Study Groups

#### Comparative assessment of regional cooperation in space : policies, governance and legal tools :

Since the early proposal provided by E. Back-Impallomeni before the Commission Spring meeting, the scope of the study group has been discussed by Commission Members and broadened, in order to guarantee it is multi-discipline, as requested by the Academy rules. The various aspects of regional cooperation (policies, governance, economical, legal) will be addressed.

C. Arevalo accepted to be Chair of the Study Group, and E. Back-Impallomeni to be co-chair. A third co-chair and a secretary will be targeted, possibly from Asia and/or Africa.

The first task shall be to draft an Outline of the Study, in order to show clearly the topics to be addressed, when looking for participants.

#### Taking stocks of the changing space exploration context and potential outlook to 2030 :

This study is proposed by P. Ehrenfreund and N. Peter. The proposal will be forwarded to the SAC, but it is strongly recommended to the proposers to draft an Outline, in order to better define what will be the focused points of their analysis. There is a risk to have a too generic analysis, without real added value, if a list of specific topics is not identified.

## **6/ General information**

### 6.1 Task Force on Study Group Process Improvement

M. Grimard presented the conclusions of the Task Force on Study Group Process Improvement, which he co-chaired with G. Reibaldi (see Appendix 2). The recommendations have been endorsed by the SAC and shall be progressively put in place.

### 6.2 Creation of Space Debris Permanent Committee

H. Klinkrad informed the participants that the Board of Trustees has approved the creation of a Space Debris Permanent Committee, recognizing the importance of the topic. The permanent committee is chaired by C. Bonnal, N. Johnson, and H. Klinkrad (see Appendix 4).

This has been put in the organization part of IAA website, however M. Grimard recommended to make a specific news in order to inform the Academicians about this creation. He will ask the IAA Office to make this announcement.

### 6.3 Reporting to SAC

The Commission 5 report to SAC (meeting on Saturday 29 September evening) is given in Appendix 3.

### 7/ **Date of next meeting**

The next Commission 5 open meeting will be held at the IAA, 6 rue Galilée, 75116 Paris, in **March 2013**.

Being no other business the meeting adjourned.

# Appendix 1



## Feedback IISL/IAA Space Law & Policy Symposium

Toulouse Space Show 2012 – June 26, 2012

M. Grimard

IAA Commission 5 Meeting - Napoli – 29/09/2012



### Symposium program

- **Focal theme = Sustainability of space activities**
- **Keynote speech** : Building-up to a sustainable use of outer space – G. Brachet (ANAE)
- **4 sessions, with 10 papers presented** :
  - Towards a holistic approach to sustainable development for the space sector – K.U. Schrögl (ESA)
  - Measuring responses to the call for sustainable use of and access to outer space – A. Lukaszczyk (SWF)
  - Imposition of space sustainability guidelines on the commercial sector. Can national space law offer solutions ? – Ph. Clerc (CNES)
  - Economical sustainability of the space value chain : roles of government, industry and private investors – M. Grimard (Astrium)
  - WRC-12 results on satellite regulations – A. Mattas (ITU)
  - ESA's contribution to sustainability of outer space through SSA – K.U. Schrögl (ESA)
  - Breaking or creating myths or sustainability of outer space activities ? – Ph. Davies (SSTL)
  - Can space insurance offer workable solutions for outer space sustainability ? – C. Gaubert (Marsh)
  - Liability for space debris revisited – L.J. Smith (Weber-Steinhaus & Smith)
  - Space debris remediation as a next step towards space sustainability – T. Masson-Zwaan (Univ Leiden)



## Highlights (1/2)

- **Long-Term Sustainability of Outer Space Activities has been introduced as an agenda item of UNCOPUOS Scientific and Technical Sub-Committee since 2010, and a specific Working Group created in 2011**
- **Strong focus on the Space Debris issue**
  - Need to get a consensus of experts on decisions for regulations, in order to prevent the politicians to “escape”
  - Regional initiatives like EU Code of Conduct or Treaty on the Prevention of the Placement of Weapons in Outer Space (PPWT) between Russia and China, not fully endorsed or even understood in other regions, ... but the UN machinery is not really efficient
  - National space laws (e.g. France) may transform international principles/recommendations into “technical requirement regime”
  - A lot of questions of liability are still not solved : Should state remain responsible / liable if it can't control the object anymore ? What if a satellite is sold to a foreign company ?
  - Debris removal : What if removal causes damage in space, on earth, in the air ? Is consent or permission of owner needed for removal by third party ? Who pays? Who owns recovered parts?



## Highlights (2/2)

- **The challenge will be to progress in a consistent manner within three parallel and complementary efforts : the Long-Term Sustainability of Space Activities WG of COPUOS, the International Code of Conduct, the UN Government Group of Expert on Outer Space Transparency and Confidence Building Measures (TCBMs)**
- **Frequency regulation : warning on the proliferation of “Cubesat operators” which do not respect really the ITU regulation**
- **Economic sustainability :**
  - There are a lot of potential business models, mixing public and private actors, to guarantee sustainability of the “space value chain”. Need for creative legal frames, for the risk sharing between the various actors
  - Small satellites constellations, including in global partnership (e.g. DMC), are a solution for sustainability of the service, and access to space data for emerging countries

## Appendix 2



# IAA TASK FORCE ON STUDY GROUP PROCESS IMPROVEMENT

## FINAL REPORT

By G.Reibaldi/M.Grimard



## TABLE OF CONTENTS

- Introduction
- Task Force
- Study Group Survey
- Main Recommendations
- Conclusion

Back Up : Detailed Recommendations and Actions





## INTRODUCTION

- 52 Studies produced by IAA, but in the last few years several studies were cancelled by the BoT
- BoT requested revision of Study rules and guidelines
- Secretary General created a Task Force on Study Group Process Improvement
- Task Force goals:
  - Carry out a Study Survey involving Study/Commissions Leadership of last 5 years to gather feedback
  - Consolidate existing Study Group Forms/Procedure, Peer Review Process
  - Identify recommendations to the SAC to improve Study Group processes based on the Survey results and the Task Force experience



## TASK FORCE

- **COMPOSITION:**
  - Co-Chairs: Giuseppe Reibaldi (C3)  
Max Grimard (C5)
  - Members: Susan McKenna-Lawlor (C1)  
Gerhard Schwehm (C1)  
Peter Graef (C2)  
John Mankins (C3)  
Filippo Graziani (C4)  
Michael Ovchinikov (C4)  
Corinne Jorgenson (C5)  
Peter Swan (C6)
  - Ex officio: Jean-Michel Contant
- **SCHEDULE:**
  - Kick-off Teleconference: 1<sup>st</sup> December 2011
  - Final Report : 27 February 2012
  - Updates by SAC Chair and SG : 6 September 2012



## STUDY GROUP SURVEY

- Questionnaire sent to 136 Academicians either in the Study or in the Commission Leadership
- 21 replies were received, i.e. 15% of the poll, with a better statistics for the Commission Leadership
- Questionnaire organised in the following categories:
  - Generalities on the Process, feedback on the Study Form
  - Study initiation and team building
  - Study Management, Communication and Reporting
  - Study Approval, Editing and Publication



## MAIN RECOMMENDATIONS (1)

- Flexibility for the content of an Academy Study : might be different from that of a classical technical or scientific report, and could rely on other tools for its implementation (e.g. surveys, market analyses)
- Reaffirm the role of the Commissions, ... and remind the duties of Commission leadership :
  - foster ideas for new Studies
  - ensure a robust and skilled Study Group team
  - support and coach the Study leaders for the implementation of new Studies
  - report on Study progress, and provide visibility to Academy Members of the status of ongoing studies.
  - speed up the approval steps, both at Commission and Peer Review levels
  - guarantee the quality of the reports from its initiation thru its development and ending with the implementation of the findings of the Academy Peer review process



## MAIN RECOMMENDATIONS (2)

- Optimize interaction and communication between Study leaders, the Commissions, the SAC VC for Studies and the IAA Secretariat :
  - efficient and transparent
  - minimize the duration of the steps involving administrative decision and/or report approval
  - define who is responsible to implement and follow up the action, and who shall be informed
- Academy Secretariat :
  - single entry/exit point for Study Group and Commission leaderships for administrative and logistic matters
  - should establish a capacity for “group phone call” allowing Study Groups and Commissions virtual meetings
- Reinforce means to “advertise” and give visibility to the results of a Study after its approval by the Academy (via space community networks, the web, press releases, press conferences, conferences and symposia, leaflets, paid advertising in specialized and general media , outreach, ...), in compliance with the overall communication policy of the Academy, which requires consolidation



## CONCLUSIONS

- Task Force has concluded its activities within schedule and with the support of Academicians providing feedback to the questionnaire created
- Processes Guidelines and Forms have been consolidated and confirmed by SAC Chair and Secretary General
- The main conclusions are :
  - Commission Leadership need to be more proactive in all steps of the Study such as : start-up, implementation, communication, reviews
  - Active SAC VC Studies shall coordinate and harmonize the end-to-end process of the Study Groups
  - Communication between Study and Commission Leadership, Academy Secretariat and the SAC VC needs improvement especially for approval phase
  - Use of the web should be generalized to improve the information flow :
    - i) towards Study Leadership (concrete guidelines to implement/manage Study)
    - ii) within the Study Groups (shared working environment to progress the Study)
    - iii) towards the Academy (information on study progress and results)
  - IAA Communication policy for the Study needs consolidation

## Appendix 3



# Commission 5 Report to SAC

M. Grimard

Napoli – 29/09/2012



## C5 2-year plan

- **Key words : pro-activity, interactivity, focus on scientific content**
- **Initiate at least one study per year**
- **Focus the open meetings on thematic presentations :**
  - **Results (intermediate, final) of the Study Groups**
  - **Keynote presentations by Commission Members or by external experts**
- **Use the Commission 5 topics of interest from IAA 2010 Space Summit to orient the scientific activities (sessions topics, study groups)**
- **Increase the visibility of Commission 5 activities, inside IAA and outside**



## Study Groups

- **SG 5.5 Space Debris Remediation (H. Klinkrad, N. Johnson)**
  - Final Report passed Commission Review Jan 2012
  - Peer Review implemented August 2012
  - Main results presented at March Plenary Commissions meeting
- **SG 5.9 International Cooperation on Space Weather (D. Baker, W. Balogh, L. Paxton)**
  - Topics has not got interest in IAC2012 call for papers
  - New leadership needed, in close cooperation with Commission 4, ... otherwise cancellation
- **SG 5.10 Orbital Debris Removal : policy, legal, and economic aspects (S. Hobe, R. Williamson)**
  - Just started – initial staffing completed (Japan, USA, Europe)
  - First working meeting at IAC2012 : shall allow to enlarge the staffing
- **Proposal for new studies**
  - Comparative analysis of regional space policies and governance (E. Back-Impallomeni, C. Arevalo, B. Schmidt-Tedd)
  - Space Exploration Strategies and Policies (P. Ehrenfreund, N. Peter)



## Conferences (1/2)

- **2nd IISL-IAA Space Law and Policy Symposium – Toulouse Space Show – 26 June 2012**
  - One day – 4 sessions – 12 invited papers
  - Quite well attended (30 to 50 p) compared to other TSS sessions
- **Symposium E3 Space Policy, Regulation, and Economics at IAC**
  - **Napoli 2012** : 4 sessions
    - National and International Space Policies and Programmes for socio-economic development (10 planned papers, 6 confirmed, 2 withdrawn)
    - International cooperation : goals, constraints and means (10 planned, 10 confirmed)
    - Space economy valuing the use (10 planned, 7 confirmed, 1 withdrawn)
    - National policies and regional cooperation (10 planned, 9 confirmed, 1 withdrawn)
  - **Beijing 2013** : 4 sessions
    - National Space Policies and Programs, and Regional Cooperation
    - International Space Exploration Policies and Programmes
    - Industrial policies as drivers of the space economy
    - Assuring a Safe, Secure, and Sustainable Space Environment for Space Activities



## Conferences (2/2)

- **IAA-IISL Scientific Legal Roundtable at IAC**
  - **Napoli 2012** : topic is "Optical Communications"
  - **Beijing 2013** : "Uses and misuses of space data" or "Space and the Arctic"
  
- **Symposium A6 Space Debris at IAC**
  - **Napoli 2012** :
    - Measurements (11 planned papers, 9 confirmed, 1 withdrawn, 11 confirmed posters)
    - Modelling and risk analysis (10 planned papers, 9 confirmed, 6 confirmed posters)
    - Impacts and protection (11 planned papers, 7 confirmed, 1 withdrawn, 2 confirmed posters)
    - Mitigation and standards (11 planned papers, 11 confirmed, 1 confirmed poster)
    - Space debris removal issues (10 planned papers, 7 confirmed, 1 withdrawn, 12 confirmed posters)
    - Space debris removal concepts (10 planned papers, 10 confirmed)
    - Political, economic and institutional aspects of space debris mitigation and removal (joint with IAF Space Security committee) (9 planned papers, 8 confirmed, 1 confirmed posters)
  - **Beijing 2013** : same structure based on 5-6 "classical" sessions + 1 specific joint session with and other committee

## Appendix 4



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### *International Academy of Astronautics*

#### *IAA Committee on Space Debris Status Report, Naples, Sep.29, 2012*



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### *Topics Addressed*

1. The (new) IAA Committee on Space Debris
2. Status of Space Debris Symposium for Naples 2012
3. Lessons learned from Cape Town 2011
4. Preparation of Space Debris Symposium for Beijing 2013



## 1. Status of IAA Space Debris Committee

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### Context:

- There has always been an IAA Space Debris Meeting just before the IAC discussing ...
    - Status of the upcoming sessions
    - Preparation of the following congress
    - General information of the topic
  - However, IAA rules are strict:
    - Work through specific Study Groups, limited in time
    - Once the Final Report, Position Paper, ... is issued, the Study Group is dismantled
  - Situation was OK since numerous years due to continuing studies:
    - 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 under finalization
    - New SG 5.10 on Orbital Debris Removal: Policy, Legal, Political and Economic considerations
  - However, such a situation was not satisfactory
    - there is a need for a long term continuity, even without dedicated SG activities
- ↳ Request for a IAA Permanent Committee on Space Debris



## 1. Status of IAA Space Debris Committee

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### Terms of Reference:

#### Scope:

The IAA Permanent Committee on Space Debris is in charge of the coordination of all activities related to Space Debris within the Academy, covering the complete span of related topics including but not limited to: measurements, modeling, risk assessment in space and on the ground, reentry, hypervelocity impacts and protection, mitigation and standards, legal and policy, Active Debris Removal and Space Surveillance.

As such, its main tasks are:

- Organization of the IAA Symposium on Space Debris A6 for the International Astronautical Congress, mainly identification of the proposed sessions including scope, chairs and rapporteurs, proposals for joint sessions with other symposia, proposals for Keynote Lectures within the A6 Symposium, or Highlight Lectures in the more general IAC frame,
- Organization of any stand-alone conference on Space Debris on behalf the Academy, including nomination of the Program Committee,





## 1. Status of IAA Space Debris Committee

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### Terms of Reference:

its main tasks are (ctd):

- Coordination of the Academy sponsoring, participation and contribution to selected conferences dedicated to Space Debris, such as for instance the ESA Darmstadt Conference,
- Coordination of the Space Debris contribution in conferences not dedicated to Space Debris, but where some sessions may be devoted to the topic, sponsored by the Academy, Identification of potential studies on Space Debris within Commission V or coordinated with any other Academy Commission, proposal of associated Cosmic Study and proposal for the corresponding Study Group,
- Dissemination of information among the members of the Technical Committee, mainly during regular TC meetings taking place twice a year, before the IAC and during the IAA March meetings in Paris. During these meetings, general information concerning past activities at international level on Space Debris shall be shared among the members, including debriefings from past conferences and major related actions (for instance IADC, COSPAR...). Practical aspects of the preparation of the upcoming Conferences, Symposia, Sessions are also dealt with during these meetings.



## 2. Naples 2012 A6 Symposium

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### Program Committee

Coordinators: Johnson (NASA) –Bonnal (CNES)

A6.1: Measurements:	Seitzer, Agapov, Schildknecht
A6.2: Modeling and Risk Analysis:	Anselmo, Wiedemann, Hanada
A6.3: Hyper Velocity Impacts and Protection:	Francesconi, Rudolph, XXX
A6.4: Mitigation and Standards:	Alby, Hussey, Piergentili
A6.5: Space Debris Removal Issues:	Klinkrad, McKnight, Kibe
A6.6: Political, Economic and Institutional Aspects of Space Debris Mitigation and Removal (Joint with Space Security Committee):	Suzuki, Jah, Mathieu, Sgobba
A6.7: Space Debris Removal Concepts:	Matney, Bonnal, Rudolph

#### A6.P: Posters

- ⇒ **Recall:** the rapporteur writes a synthesis of how the session went, statistics, and makes recommendations for the following congress → Significant role
- ⇒ Status of the chairs and rapporteurs ?
  - . Volunteer as rapporteur for A6.3



## 2. Naples 2012 A6 Symposium

As of Sep.25<sup>th</sup>

### A6.1: Measurements:

11 papers – 1 withdrawn – 7 loaded – 2 confirmed – 0 presentation – 1 ?  
 11 posters – 0 withdrawn – 8 loaded – 3 confirmed

### A6.2: Modeling and Risk Analysis:

10 papers – 0 withdrawn – 9 loaded – 1 confirmed - 1 presentation  
 10 posters – 0 withdrawn – 5 loaded – 4 confirmed – 1 ?

### A6.3: Hyper Velocity Impacts and Protection:

11 papers – 2 withdrawn – 5 loaded – 2 confirmed – 3 presentations – 2 ?  
 7 posters – 3 withdrawn – 2 loaded – 2 ?

### A6.4: Mitigation and Standards:

11 papers – 0 withdrawn – 10 loaded – 1 confirmed – 1 presentation  
 3 posters – 1 withdrawn – 1 loaded – 1 ?

### A6.5: Space Debris Removal Issues:

10 papers – 1 withdrawn – 7 loaded – 0 confirmed – 2 presentations – 2 ?  
 18 posters – 1 withdrawn – 6 loaded – 6 confirmed – 1 presentation – 5 ?

### A6.6: Political, Economic and Institutional Aspects of Space Debris Mitigation and Removal

9 papers – 0 withdrawn – 8 loaded – 0 confirmed – 1 presentation – 1 ?  
 3 posters – 1 withdrawn – 1 loaded – 0 confirmed – 1 presentation – 1 ?

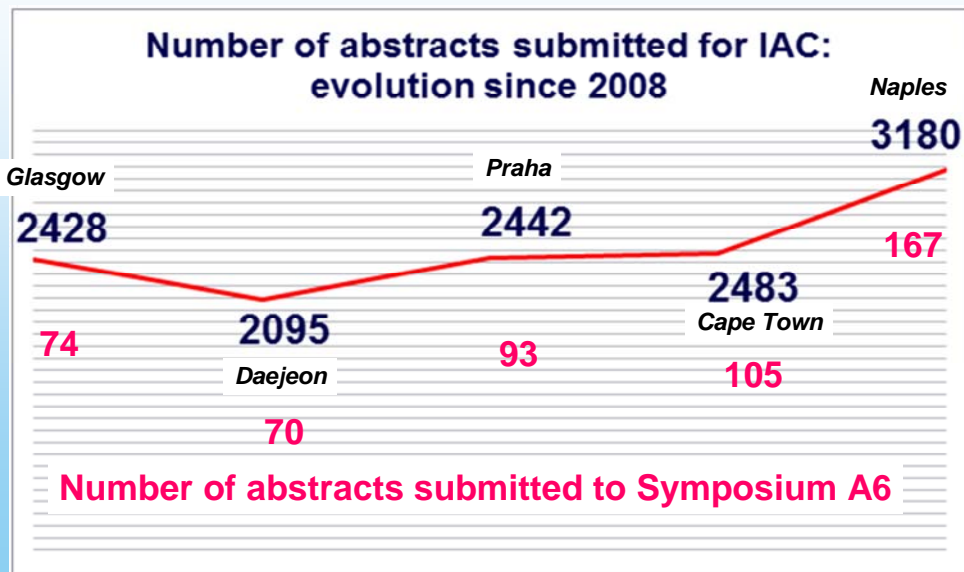
### A6.7: Space Debris Removal Concepts:

10 papers – 0 withdrawn – 8 loaded – 2 confirmed – 1 presentation



## 3. Feedback from Cape Town 2011

Number of abstracts for Naples 2012





### 3. Feedback from Cape Town 2011

#### Figures for the A6 symposium

Session Code	Name session	Abstracts accepted	Papers withdrawn	Papers presented	No shows	Attendance begin	Attendance middle	Attendance end
IAC.II-A6.1	Measurements	9	1	8	0	40	50	35
IAC.II-A6.2	Modelling and Risk Analysis	10	1	8	1	80	70	70
IAC.II-A6.3	Hypervelocity Impacts and Protection	12	2	10	0	25	32	24
IAC.II-A6.4	Mitigation and Standards	9	2	7	0	36	48	38
IAC.II-A6.5	Space Debris Removal Issues	10	2	8	0	80	85	75
IAC.II-A6.6	Space Debris Detection and Characterisation	8	2	6	0	80	45	45

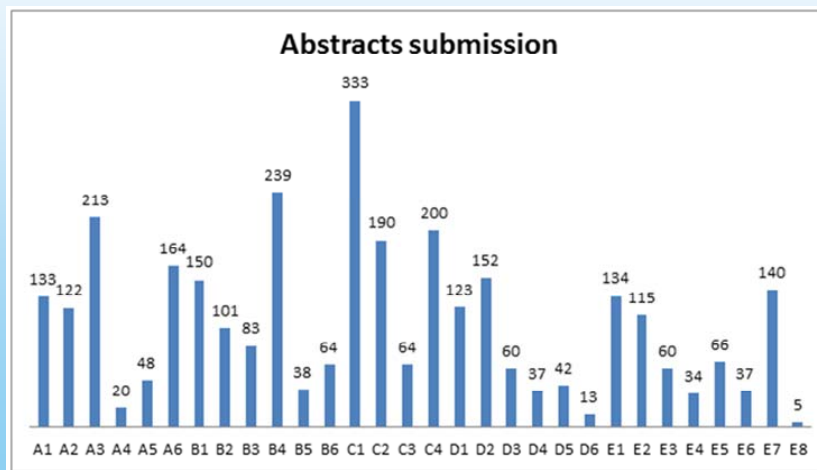
#### Figures for the complete congress

<b>TOTAL</b>	<b>1619</b>	<b>333</b>	<b>1107</b>	<b>189</b>	<b>4232</b>	<b>4854</b>	<b>3766</b>
<b>Average/session</b>	<b>10</b>	<b>2</b>	<b>7</b>	<b>1</b>	<b>26</b>	<b>30</b>	<b>24</b>
	<b>Abstracts accepted</b>	<b>Papers withdrawn</b>	<b>Papers presented</b>	<b>No shows</b>	<b>Attendance begin</b>	<b>Attendance middle</b>	<b>Attendance end</b>



### 3. Feedback from Cape Town 2011

#### Number of abstracts for Naples 2012



Symposium	Abstracts	%
C1	333	10.47
B4	239	7.52
A3	213	6.70
C4	200	6.29
C2	190	5.97
A6	164	5.16
D2	152	4.78
B1	150	4.72
E7	140	4.40
E1	134	4.21
A1	133	4.18
D1	123	3.87
A2	122	3.84
E2	115	3.62
B2	101	3.18



## 4. Beijing 2013 A6 Symposium

### A6: Space Debris Symposium

Johnson – Bonnal

The Symposium will address the complete spectrum of technical issues of space debris: measurements, modelling, risk assessment in space and on the ground, re-entry, hypervelocity impacts and protection, mitigation and standards, and Space Surveillance.

#### **A6.1: Measurements:** Schildknecht – Agapov - Seitzer

This session will address advanced ground and space-based measurement techniques, relating processing methods, and results of space debris characterization.

#### **A6.2: Modelling and Risk Analysis:** Pardini – Krisko – Wiedemann

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 avoidance.

#### **A6.3: Hypervelocity Impacts and Protection:** Schäfer – Meshcheryakov - Francesconi

The session will address passive protection, shielding and damage predictions. Shielding aspects will be supported by experimental and computational results of HVI tests. Use of HVI techniques for debris mitigation.

#### **A6.4: Mitigation and Standards:** Alby – Krag - Yakovlev

This session will focus on the definition and implementation of debris prevention and reduction measures and vehicle passive protection. The session will also address space debris mitigation guidelines and standards that exist already or are in preparation at the national or international level.



## 4. Beijing 2013 A6 Symposium

#### **A6.5: Space Debris Removal Issues:** Piergentili – Adimurthy – Hussey

This session will address active removal techniques “ground and space based”, review potential solutions and identify implementation difficulties.

#### **A6.6: Space Debris Removal Concepts:** Anz-Meador – Kibe – Rudolph

This session will address active removal techniques “ground and space based”, review potential solutions and identify implementation difficulties.

#### **A6.7: Operations in Space Debris Environment, Situational Awareness:**

Kelso – Klinkrad – Mc Knight

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

#### **A6.8 (joint with Space Security Committee): Political, Legal, Institutional and Economic Aspects of Space Debris Mitigation and Removal**

Suzuki – Sgobba – Mathieu - XXX

This session will deal with the non-technical aspect of space debris mitigation and removal. Political, legal and institutional aspects includes role of IADC and UNCOPUOS and other multilateral bodies. Economic issues including insurance, financial incentives and funding for space debris mitigation and removal. The role of international cooperation in addressing these issues will be considered

#### **A6.P: Posters,** depending on experience from Naples 2012

