

IAA. Commission III

PARIS MEETING MINUTE

meeting date: March 17 th , 2009 <i>date de la réunion</i>	ref./réf.	page/page 1 / 3
meeting place <i>lieu de la réunion</i>	Paris, France	chairman T Yasaka <i>président</i>
minute's date March 19 th , 2009 <i>dates de compte rendu de réunion</i>	participants <i>participants</i> P. Bescond C. Bonnal C. Bruno A. Dupas H. Hoffmann P. Jukola J. Mankins J. Onoda M. Perino V. Prisniakov H. Rauck G. Reibaldi W. Siegfried T. Yasaka	
subject/ <i>objet</i>	Progress meeting, according to the proposed agenda.	copy/ <i>copie</i>

Agenda:

- I - Review of actions from previous minutes of meeting
- II - Composition of Commission III
- III - SG 3.5, SG 3.6 publication status
- IV - Study Groups Status
 - SG 3.1
 - SG 3.8
 - SG 3.9
 - SG 3.10
 - SG 3.11
- New Study Group about Exploration
- V -Symposia Status
 - IAC 2009
- VI - Proposals for next IAA Conference
- VII - Actions
- VIII - AOB

IAA Commission III

PARIS MEETING MINUTE

meeting date March 17th, 2009

ref./réf.

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date de la réunion

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description/description	action/action	due date /date butoir
<p>The Chairman welcomes the members present.</p> <p>Commission III deplores the choice made by IAA of the room where the meeting takes place and shall inform the IAA secretary</p> <p>I - Review of actions from previous minutes of meeting</p> <p>One action from John Mankins is outstanding, all other actions are closed.</p> <p>II - Composition of Commission III (see annex 1) T. Yasaka will leave his position as Chairman in October 2009, at this time John Mankins shall become Chairman. Following a recommendation by John Mankins, the Commission approves unanimously the appointment of Giuseppe Reibaldi as co-Chairman, also as of October 2009. A new Secretary will be appointed in October 2009.</p> <p>III / IV - Study Groups Status (see annex 2)</p> <p><u>SG 3.1, Advanced Propulsion Prospective</u> Presentation is attached (Annex 3); Draft report should be produced by IAC 2009 The Commission expressed concern about the feasibility of this schedule. A final decision on the future of this study shall be taken in October 2009</p> <p><u>SG 3.8, Space Elevators</u> The Commission expressed some concern about the feasibility of the Space Elevator and therefore the need for this Commission to support a session on this topic. P. Swan shall be requested to provide a status report of the session D4.2 and of his assessment on the feasibility of the concept. Hans Hoffmann shall send G Reibaldi a paper of Heinz Stower on the Space Elevators the conclusions of which are negative. The Commission shall evaluate both papers and decide at the next meeting on the validity of the space elevator concept and the need for the Commission to deal with this development.</p> <p><u>SG 3.9 , Private Human Access to Space</u> Status presentation is attached (Annex 4) First Draft to be produced by IAC in Daejeon. Peer review report by <u>March 2010</u>. Christophe Bonnal suggested writing an appointment letter to the list of people presented. 2nd IAA symposium planned in 2011.</p> <p><u>SG 3.10, Technologies to enable near term Interstellar Precursor Mission</u> Report is attached (Annex 5) Final report Draft to be produced by IAC in Daejeon</p> <p><u>SG 3.11, Solar Energy from Space</u> Status report is attached (Annex 6) Draft Report to be distributed to the Commission prior to the Peer Review in Daejeon.</p>	<p>G. Reibaldi to inform IAA sec.</p> <p>J.Mankins to send paper to Acta Astronautica</p> <p>>P Swan, >H Hoffman to send paper > GR to distribute both papers (Swan, Stower)</p> <p>GR to request IAA to send an appointment letter</p>	<p>31 March</p> <p>30 April</p> <p>15 April</p> <p>15 April</p> <p>30 April</p> <p>30 April</p> <p>Peer review: March 2010</p>

meeting date March 17th, 2009

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description/description	action/action	due date /date butoir
<p><u>New Study Group about Exploration</u></p> <p>The importance of such a study was outlined by the Commission. The outline of this Study Group is to be provided by W. Mendell together with M. Perino at IAC 2009, including a formal proposal for this new study.</p> <p>V - IAA Symposia Status (see Annex 7; it has been updated with the post-paper selection information from the IAC website on 1st April, 2009) All the Symposium coordinators and Session chairmen are present. - Symposium A5 is complete for the IAC 2009 New focus on the session in order to complement the study groups ongoing - Symposium D3 is fine, but it should be reduced by 1 session - Symposium D4 is fine, but it should be reduced by 1 session, merging D4.1 and D4.3. For 2010, it is proposed to have two sessions dedicated to Access to Space in the Symposium D4, this would bring its number of sessions to 4.</p> <p>VI - Proposals for next IAA Conferences April 2009 : Space Defence, in Grenade September 2009: Space Power, in Toronto 2011: Private Human Access to Space, in Arcachon, TBC</p> <p>VIII - AOB</p> <p>50th Anniversary of IAA in 2010: plan for special event to be discussed at IAA level</p> <p>Next meeting to take place in Daejeon, Korea, on Sunday, October 11th, 2009</p>		

IAA Commission III Members

- **Tetsuo Yasaka (J), Chairman**
- **John C. Mankins (US), Deputy Chairman**
- **Giuseppe Reibaldi (IT), Secretary**
- **Christophe Bonnal (F), Member**
- **Hans E. W. Hoffmann (D), Member**
- **Lin Jin (C), Member**
- **Wendell Mendell (US), Member**
- **Junjiro Onoda (J), Member**
- **Volodymyr Prisnyakov (Ukr), Member**
- **Horst Rauck (D), Member**

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IAA Study Group #3.1

Propulsion Prospective

Max Calabro

Sub-Groups Work

- Solids coordinator J-F Guéry SNPE paper presented in Glasgow
- Liquids coordinator P. Caisso Snecma paper presented in Glasgow
- Electric coordinator Richard Blott Space Entr paper presented in Glasgow
- Advanced NC-NN coordinator N. Berend Onera
A paper will be presented in Korea
- Hybrids a working paper is under writing
- Nuclear: book under publication

- **IAC-09-C4.6.X**
- **NON-CHEMICAL, NON-NUCLEAR ADVANCED PROPULSION FOR SPACE APPLICATIONS : PANORAMA AND ROADMAP**
- Mr. Nicolas Bérend
- Onera, Châtillon, France, nicolas.berend@onera.fr
- Mr. Max Calabro
- The Inner Arch, Villennes sur Seine, France, Max.calabro@innerarch.eu
- Dr. Gregory L. Matloff
- New York City College of Technology, Brooklyn, NY, United States, gregmat@hotmail.com



Progress report on IAA Study Group 3.9 “Private Human Access to Space”

Proposer(s): H. Rauck – G. Brachet **Chair:** Ch. Bonnal
Primary IAA Commission Preference: Commission 3
Secondary IAA Commission Interests: Commission 5

Overall Goal:

Identify and quantify the key topics associated to Manned Private Access to Space for both Orbital and Sub-orbital missions.

Key words:

- Technical aspects
- Legal and regulatory aspects, safety aspects
- Financial aspects, market analyses, associated business plans
- Motivations of potential customers
- Physiological and Psychological requirements, ergonomic constraints

Expected outcome of the study:

IAA Position Paper giving the keys to the topic and potentially including recommendations. Subdivision of the study into key chapters, with one “book captain” per chapter ; 7 or 8 members per chapter covering a wide range of origins (countries, agencies, industrials, searchers, operators...)

Time line:

Initially: 3 years following the initial proposal (March 2007)

Revised timeline:

1 st IAA symposium on Private Human Access to Space (Arcachon)	⇒	28-30 May 2008
Publication of the full CD with all the papers, most of the presentations, pictures, ... Distribution to all participants	⇒	End of September 2008
Report during IAC Glasgow	⇒	October 2008
Publication in Acta Astronautica of the 15-20 best papers out of the 68 presented in Arcachon		
Process just started, following problems of understanding of the editing constraints.		
Coordination with potential reviewers on-going		
Special issue of Acta to be formalized.		
Co-editors: Dr. Gerzer and Ch. Bonnal		
Tentative date was March 2009,	⇒	Revised to September 2009
Drafting of the Position Paper	⇒	Daejeon, October 2009
Re-work within the SG3.9 working group	⇒	IPC, Paris March 2010
Draft release for Peer Review within IAA	⇒	IPC, Paris March 2010
Final publication	⇒	IAC, October 2010.

IAA Position Paper on Private Human Access to Space
Tentative table of contents, sub-chapters, length and chapter responsables:

1. Introduction:
 - a. context, history,
 - b. general overview,
 - c. IAA action description

(4 pages – Bonnal)
2. Societal motivations :
 - a. New transportation culture, Space age
 - b. Effects on society
 - c. Outreach

(6 pages – Peeters, Eymar)
3. Market analysis
 - a. Current analyses and forecast
 - b. Phased approach to public access to space

(6 pages – Salt)
4. Medical, Physiological and Ergonomics
 - a. Risk factors for the crew and passengers
 - b. Medical selection, dedicated ground infrastructures
 - c. Habitability requirements, flight suits
 - d. Applicable and similar experiences

(7 pages – Gerzer, Antuñano, Winisdoerffer)
5. Legal, Insurance and Regulatory aspects
 - a. General legal frame
 - b. Risks and Insurances
 - c. Regime and Users status
 - d. Specific national regimes

(11 pages – Couston, Crowther, Masson-Zwaan (TBC), Clerc (TBC))
6. Technical aspects:
 - a. Potential solutions, variants at system level, shape, number of passengers, single or dual stages
 - b. Main sub-systems, aerodynamics, propulsion, thermal protections, TRL
 - c. Growth potential: P2P, hypersonic passenger travels

(12 pages – Calabro, Bultel, Bernard-Lépine (TBC))
7. Ground Infrastructures
 - a. Space tourism and Grand public
 - b. Spaceports : criteria, proposals

(8 pages – Droneau, Webber)
8. Reliability, Safety, Risk
 - a. Reliability requirements
 - Safety requirements

(4 pages – Romero (TBC))
9. Conclusions:
 - a. Key hurdles to overcome
 - b. Recommendations, role of Agencies

(4 pages – Bonnal)

Grand total : 62 pages (for comparison : Space Debris = 64 pages)

Key members of the study group:

Dr. Melchor J. ANTUÑANO, Director, Civil Aerospace Medical Institute, FAA

Max CALABRO The Inner Arch, former head of propulsion department
in Astrium Space Transportation, IAA

Pr. Mireille COUSTON University of Lyon 3, Head of Space Laws Center

Pr. Richard CROWTHER Rutherford Appleton Laboratory

Philippe DRONEAU, Deputy Director, Toulouse Cité de l'Espace

Patrick EYMAR, N4E, former head of future projects at Astrium ST

Prof. Dr. Med. Rupert GERZER, Head, Institute of Aerospace Medicine
German Aerospace Center DLR

Walter PEETERS, Dean of ISU, International Space University

Manola ROMERO, ONERA, IAA

Dave SALT, Vega Group, European Space Agency

Garrett SMITH, Airbus, Chairman of the 3AF Space Tourism Commission

Derek WEBBER, Spaceport Associates

Francis WINISDOERFER, Airbus, Professor at Strate College

“Recall of invitation” recently sent: two enthusiastic answers so far.

Additional members are welcome, but may lead to problems of coherence and homogeneity (lack of efficiency; depends on the definition of a Working Group !)

Not much work so far (with the exceptions of Pr. Couston and Dave Salt) despite clear marks of interest.

Probable lack of motivation, time, and/or understanding of the rationale for the IAA Position Paper (Status? Proposals? To whom? Are they expecting it?...)

⇒ Official appointment from IAA would greatly help!

Next symposia:

Current activity on the subject at world level is very low:

- No news at all from Space Ship 2: good progress at White Knight 2 level, due to synergies, but nothing on the “passenger” side; potential problems with propulsion
- Astrium SpacePlane TBN is frozen
- No news at all from Goddard – New Shepard – Blue Origin (Jeff Bezos)
- No significant progress on Rocketplane XP development
- Hardly any news from X-Cor since Arcachon
- VSH is frozen
- Space Dev Dreamchaser Benson heritage ?
- Progress on ISAS side ?
- Orbospace Infinity re-scoped for sub-systems
- Numerous concepts apparently stuck nowhere: Armadillo, Da Vinci, Masten, Starchaser, Interorbital Systems Neptune,
- ...

↳ Considering the general lack of activity at world level on this subject, and despite the strong support of Avantage Aquitaine (thanks!), the 2nd IAA Symposium on Private Human Access to Space is postponed to May – July 2011

→ Location and local organizer to be discussed, but same as 2008 seems a good idea.

IAA Study Group 3.10 Interstellar Precursor Missions

IAA Meeting, Paris, 16-18 March 2009

C.Bruno reporting with G. Matloff

Contents

Original proposal to IAA

Update: Contributors

Status

Perspectives

Proposal for Forming an IAA Study Group

Title of Study: *Technologies to enable near-term interstellar precursor missions*

Proposer(s): *Dr David G Fearn, Dr Gregory Matloff*

Primary IAA Commission Preference: *Commission 3*

(From Commission 1 to Commission 6)

Secondary IAA Commission Interests: *Commissions 1 and 4*

(From Commission 1 to Commission 6)

Members of Study Team

Chairs: *Dr David G Fearn (UK) replaced by C. Bruno (I), Dr Gregory Matloff (USA)*

Secretary: *To be appointed (if needed)*

Other Members: *Tentative list of possible contributors (most remain to be contacted):*

Claudio Bruno

Brice Cassenti

Giancarlo Genta

Mike Gruntman

Anders Hansson

Les Johnson

Junichiro Kawaguchi

Roger Lenard

Claudio Maccone

Colin McInnes

Ralph McNutt

Ed Stone

Giovanni Vulpetti

Short Description of Scope of Study: *The aim of the study is to establish which are the critical technologies required to enable interstellar precursor missions to take place within the next 10 to 15 years. In this context, such missions are defined as those reaching to at least 200 astronomical units (AU) from the sun, preferably 400 AU, within a period of no more than 30 years. The study will also establish the status of these technologies and will recommend the research programmes needed to permit such missions to be undertaken successfully.*

Overall Goal: *To provide in a Final Report the information required to persuade funding agencies to consider seriously near-term interstellar precursor missions.*

Intermediate Goals: *To provide the individual contributions necessary to enable the compilation of the Final Report. To hold such technical meetings as are necessary to expedite the overall programme.*

IAA, Paris, October 2000

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Study Group Form (comments and form available on <http://www.iaanet.org/news>)

Methodology: *The study has been broken down into clearly defined individual sections. These will be allocated to lead writers, who have the necessary acknowledged expertise to produce authoritative texts. They will produce an initial draft in each case, consulting as widely as appropriate. The supporting experts will then provide additional text as necessary, and will also act as editors where required, so that a consensus view is obtained. These individual contributions will then be compiled into the Final Report by the Chairs of the Study Team. Meetings will be held at intervals to co-ordinate the overall study (eg: in association with the IAA Spring Meetings in Paris).*

Time Line: *It is proposed to complete the study within 2 years, ending in June 2009.*

Final Product (Report, Publication, etc.): *A Final Report, which will be published by a recognised publisher, such as the AIAA, BIS, Praxis/Springer, etc. It is likely that conference and journal papers will also be written using this material.*

Target Community:

- i. That part of the scientific community who wish to study in situ the interaction between the solar system and the interstellar medium, and also the physical properties of that medium.*
- ii. Funding agencies who may be interested in mounting missions of this kind.*

Support Needed: *Experts from the IAA to carry out the required peer review of the Final Report.*

Potential Sponsors: *Possible publishers.*

To be returned to IAA Secretariat Paris fax: 33 1 47 23 82 16 email: sgeneral@iaanet.org

Date: 25 March 2007 **Signature:**

For IAA Use Only:

Update: Contributors

New contributors: Wolfgang Seboldt, DLR
Solar sails

Claudio Maccone, AleniaSpace
Focal mission; TLC; Science

Roman Kezerashvili (CUNY)
Solar sails

Kelvin Long (in contact with G. Matloff)

Present contributors also include C. Bruno, G. Matloff, G. Vulpetti, L. Johnson.
Contributions expected from R. Lenard, A. Hansson and K. Long

Status

So far: contributions **received** from Matloff (solar sails and science), Bruno (NEP), Kezerashvili (solar sails), Maccone (TLC and FOCAL mission), Vulpetti (solar sails and science)

Grand total: **about 50 pages** of text, some very synthetic.
Could be expanded to maybe 70.

Greg has summary of work by Maccone, Kezerashvili and himself

Some unexpected results using NEP

Perspectives

Draft FR to be **ready by the Korea IAF** in October 2009 (with some effort)

Topic: some overlap with chapter by Frisbee in Millis & Davis 2009 AIAA book

Material covered **could be expanded** beyond a IAA Study: no other single reference available

Could become a book or special issue

IAC-08-C3.1.1

**Solar Energy from Space: the First International Assessment of
Opportunities, Issues and Potential Pathways Forward**

STATUS REPORT

International Academy of Astronautics - IAA Commission 3

**John C. Mankins, Chair
Nobuyuki Kaya, Co-Chair**

17 March 2009





AGENDA

- Introduction
- Overview of the IAA Solar Energy from Space SG
- Status Review for the SG
- Working Discussion
- Conclusion



INTRODUCTION (cont.)

- A new study group addressing solar energy from space has been started
- Title of Study:
 - Solar Energy from Space: the First International Assessment of Opportunities, Issues and Potential Pathways Forward
- Chairs of the Study:
 - [J. Mankins](#)
 - [N. Kaya](#)
- Members:
 - See later page



GOALS

- **Primary Goals...**

- Determine what role solar energy from space might play in meeting the rapidly growing need for abundant and sustainable energy during the coming decades,
- Assess the technological readiness and risks associated with the SSPS concept, and (if appropriate)
- Frame a notional international roadmap that might lead the realization of this visionary concept.

- *In addition...*

- Identify and evaluate opportunities for synergies (if any) between the prospective benefits of SSP technology and systems for space missions and SSPS for terrestrial markets.
- Identify the opportunities to introduced extraterrestrial materials into an SSPS industry and assess potential connections between international lunar exploration programs now being undertaken and SSPS.



DETAILED OBJECTIVES (1)

- Identification of relevant markets and applications for new energy sources—including both ultimate applications in terrestrial markets, as well as interim applications in space programs.
- Identification and evaluation of the technical options that may exist for solar energy from space to contribute to meeting global energy needs.
- Identification and evaluation of the technical options that may exist for space solar power to contribute to ambitious government and commercial space mission concepts and markets
- Identification and evaluation of options for the utilization of extraterrestrial resources, in particular lunar resources in future space solar power systems
- Preliminary determination of appropriate SSPS architecture level figures-of-merit, and values of these that must be achieved in order for solar energy from space is to become economically viable for a range of terrestrial market opportunities and space applications.



DETAILED OBJECTIVES (2)

- Preliminary identification of other issues and policy questions that would require resolution for SSPS to become a reality (e.g., spectrum allocation).
- Assessment of the technical feasibility, technological maturity and degree of difficulty in the above space solar power options.
- Formulation of a strategic approach to realizing the potential of energy from space—and one or more technical / programmatic roadmaps implementing this strategy.
- Development of a summary report, documenting the results of the study and articulating the prospects for Energy from Space to make a substantial contribution to satisfying future global needs.
- These initial intermediate goals will be updated during the course of the study.



STATUS

- The new IAA Solar Energy from Space Study Group has been formed
 - Various additional members have agreed to participate since the the study was initiated by the IAA in March 2008
- A web-based group has been formed and many of the study group members have been registered
- Three working meetings were implemented in 2008
 - Japan - at or near the ISTS Conference at Hamamatsu in June 2008 (not a formal IAA workshop...)
 - US - at or near the AIAA / IECEC Conference in Cleveland, Ohio USA in July 2008 (not a formal IAA workshop)
 - A meeting of the overall study group at the Glasgow Congress in September 2008



STATUS (2)

- Participated in a Meeting held at the 2008 USRI Conference in Chicago, IL USA (August 2008)
 - “Robust” technical discussion on this subject
 - Invited identification of Study Group Members
- Work Breakdown Structure for the study group has been composed, and draft final report outline developed...
- Joint Session with the IAF organized for the 2008 IAC Congress in Glasgow
 - Discussion of the organization of report and working groups was started at the Glasgow meeting
- Joint Session with the IAF organized for the 2009 IAC Congress in Daejeon, ROK
 - Preliminary discussion held with 2009 LOC/IAF Co-Chair for Korea IAC (Energy is a focus area for this IAC/LOC)



IAA Study: Solar Energy from Space WBS

IAA Commission 3
Solar Energy from
Space

Study Integration

Strategic
RoadMap

Systems Analysis
(Cost Estimation)

Market
Assessments and
Economic Studies

Technology
Readiness and
Risk Assessment

Technology
Demonstrations

SSPS
Systems Concepts

SSPS
Supporting Systems

SSPS
Major Technologies

SSPS
Policy & Benefits
Considerations

Ref. Systems

1990s Concepts

Sandwich Concepts

Updated Reference Concepts

Other Concepts

SSPS Policy
Considerations

Space Applications
(Space Science, Earth
Science, Others)

Other Benefits
(e.g, Education,
Commercial, Qual of Life)

Wireless Power
Transmission

Solar Power
Generation

Power & Thermal
Management

Platform
Technologies

Earth-to-Orbit
Transportation

In-Space
Transportation

In-Space Assy,
Maintenance &
Servicing

Ground Energy &
Interface Systems

In-Space
Resources &
Manufacturing



17-March-09

IAC-08-C3.1.1 / Solar Energy from Space

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IAA Study Group Membership as of 27 September 2008

- [James Armor \(US\)](#)
- [Ivan Bekey \(US\)](#)
- [Henry Brandhorst, Ph.D.](#)
- [A.C. Charania \(SEI\)](#)
- [Ron Clark \(Lockheed Martin\)](#)
- [Lt. Col. Paul Damphousse \(USMC/NSSO\)](#)
- [Paul Eckert \(Boeing\)](#)
- [Peter Glaser \(US; ex officio\)](#)
- [Jerry Grey \(AIAA\)](#)
- [Raghavan Gopalaswami \(India\)](#)
- [Joe T. Howell \(US\)](#)
- [Koichi Ijichi \(USEF\)](#)
- [Frank Little \(TAMU\)](#)
- [Gregg Maryniak \(US\)](#)
- [Shoichiro Mihara \(USEF\)](#)
- [Neville I. Marzwell, Ph.D.](#)
- [Guy Pignolet \(Science Sainte Rose\)](#)
- [Joseph Rouge \(NSSO\)](#)
- [Susumu Sasaki, Ph.D. \(JAXA\)](#)
- [Col. Michael Smith \(USAF\)](#)
- [Leopold Summerer \(ESA\)](#)
- [Didier Vasseaux \(CNES\)](#)
- [Robert Wegeng \(US/PNNL\)](#)
- [Prof. Dr. Kai-Uwe Schrogl \(representing IAA Commission V\)](#)
- [Peter Swan \(IAA Commission VI\)](#)
- [Janet Verro \(Space Power Assoc.\)](#)
- *Additional members, to be identified*

CONFIRMED AT THIS TIME



Schedule of Major Milestones (March 2009)

- SG Initially Proposed – March 2007
- SG started – March 2008
- Working Meetings – 2008-2009
- Sessions at IAC
 - 2008 (Glasgow)
 - 2009 (Korea)
 - 2010 (Prague)
- Relevant Sessions @ AIAA IECEC 2009 → 2010
- Focused Conference “SPS 2009” – September 2009
 - Has been Planned for Toronto, Canada
- Project Final Report for Peer Review – March 2010

IAC 2009 IAA Symposia

ref	Symposium Title / Session Title	Coordinator (Symp.) /Chairman (session)	Status 05/03/09 (upload deadline)	Status 01/04/09
A.5.	Human Exploration of the Moon and Mars Symposium	W. Mendell, C. Sallaberger		
	A.5.1 Strategies to establish Lunar and Mars Colonies	U.Apel, W.H. Siegfried, G <i>Morgenthaler (R)</i>	12 abstracts posted	7 accepted, 1 pending, 1 duplicate, 4 rejected
	A.5.2 Human and Robotic partnerships to realize space exploration goals	B.C. Clarck, C Sallenberger <i>M Reichert (R)</i>	13 abstracts posted	9 accepted, 1 pending, 7 rejected
	A.5.3 The next steps for Human Space Exploration: What are the alternatives ?	R.W. Farquhar, E. Messer- schmid, G.Schwehm (R)	5 abstracts posted	1 left, rejected
C.3.1	Space Power Symposium	J. C. Mankins		
	Joint Session with IAA Commission 3 (Space Technology & System Development) on "Solar Energy From Space"	N. Kaya, J. Mankins, J.T. <i>Howell (R), L. Summerer (R)</i>	7 abstracts posted	7 accepted
D.3	Symposium on Stepping Stones for the Future: Strategies, Architectures, Concepts and Technologies	J. C. Mankins, A.Pradier		
	D.3.1: Strategies, Architectures to Establish a "Stepping Stone" Approach to our Future in Space	J.C.Mankins, A.PradierW. H. <i>Siegfried(R)</i>	7 abstracts posted	6 accepted, 1 rejected
	D.3.2: Novel Concepts and Technologies for the Exploration and Utilization of Space	J T. Howell, L. Suchet, M.A. <i>Perino (R) N.Suzuki, (R)</i>	9 abstracts posted	9 accepted
	D.3.3 Infrastructures and Systems to Enable Ambitious Future Exploration and Utilization of Space	W. H. Siegfried, Y.Takizawa, <i>S Hovland (R), G. Woodcock (R)</i>	8 abstracts posted	8 accepted,
	D.3.4 / E.5.4 Joint session on Space Technology and System Management Practices and tools part 1	J.C.Mankins, P.A. Swan, C. <i>Moore (R) ,P. Jukola (R)</i>	8 abstracts posted	11 accepted
	D3.5/ E5.5 Joint session on Space Technology and System Management Practices and tools part 2	J.C.Mankins, P.A. Swan, C. <i>Moore (R), P. Jukola (R)</i>	1 abstract posted	0 left
D4	Symposium on Far Futures	Hans E.W. Hoffmann, G.Reibaldi		
	D.4.1 Human exploration beyond Mars	H. Rauck, P. Jukola, O. de <i>Weck(R)</i>	3 abstracts posted	4 accepted
	D.4.2 Space Elevator and Tethers	D. Raitt, P. A. Swan, R. E <i>Penny (R)</i>	9 abstracts posted	10 accepted
	D.4.3 Interstellar Precursor Missions	R. X. Lenard, C. Bruno, D. <i>Andrews (R)</i>	5 abstracts posted	4 left, accepted