

## Meeting of IAA Commission 1 on 'Space Physical Sciences'

27 September, 2014, (Saturday) 13.00-1600, Metro Toronto Convention Centre,

Toronto, Canada

---

### Agenda

The agenda of the meeting is contained in *Appendix 1*

### Minutes

This agenda was adopted and the minutes of the meeting are as follows

#### **1. Welcome:**

The Chairman of Commission-1, J. N. Goswami, welcomed Commission-1 officials and other members of Commission-1.

#### **2. Self-Introduction of Commission 1 members and all attendees - All**

Present at the meeting were: [Commission Chair: J. N. Goswami, India), Commission Secretary: S. McKenna-Lawlor, Ireland). Commission Members; T. Krimigis, (USA); G. Schwehm (Germany); R. McNutt (USA); A. Viviani (Italy); M. Othman (Malaysia).

All of these persons introduced themselves and described their scientific areas of current interest. Ventskovsky Oleg (Russia) & Yasushi Horikawa (Japan) also attended during part of the meet.

**Breaking news** presented during this period included;

- An account by T. Krimigis of the successful entry into Mars orbit on 21 September, 2014 of NASA's *Mars Atmosphere and Volatile Evolution* (MAVEN) spacecraft. MAVEN is the first spacecraft dedicated to exploring the tenuous upper atmosphere of Mars.
- An account by J. N. Goswami of the successful entry into Mars orbit on 24 September of India's *Mars Orbiter Mission* (MOM) spacecraft. It was noted that the Prime Minister of India (Narendra Modi) attended the launch of MOM on 5 November 2013 and received the first photographs obtained at Mars on the same day (one of these, a spectacular image of a richly cratered part of the Martian surface was presented to the commission)
- An account by G. Schwehm of the current status of ESA's Rosetta Mission to comet 67P/ **Cheryumov-Gerasimenko** and of ongoing preparations for the deployment of a Lander (Philae) to the surface of the comet on 12 November, 2014.

- S. McKenna-Lawlor reported that the mission critical *Electrical Support System/ESS* which will send commands from Rosetta to the 10 experiments aboard Philae on the cometary surface, and also handle the data streams forwarded to the Lander from the individual experiments, was built by her group in Ireland.

### **3. Minutes from the Paris Meeting: S. McKenna-Lawlor (S.McKL)**

The Minutes of the previous meeting of Commission I which was held in Paris, France at Academy Head Quarters on 17 March, 2014, were presented by S. McKL (copy attached, **Appendix-2**). The members discussed the many points contained in these minutes, several of which were tabled in the Agenda as individual items. The gist of these discussions is provided below under the relevant agenda items. The minutes were adopted without change.

### **4. Study Group Activities: finalized studies; publication of results (S.McKL)**

#### Study Group: 1.5

It was reported by SMcKL that a camera ready version of SG 1.5 “*The energetic particle radiation hazard en route to and at Mars*” was submitted to the Academy shortly after the Spring Meeting. Several issues of style were then raised, which entail inter alia, as a condition of publication: changing all of the references to numbers; providing a list of acronyms and providing an Executive Summary. These changes are currently being made and publication will take place immediately after the requested changes have been implemented. An account of the book is scheduled for presentation by SMcKL on Academy Day (28 September, 2014) at the Metro Toronto Convention Centre.

### **5. Study Group activities: status, progress reports (Study group Chairs/members)**

J N Goswami reported that the Academy had contacted the leaders of all the study groups under the jurisdiction of Commission-1, requesting a formal report on the status/membership of the study with, if possible, an oral presentation at Toronto to the Commission. Progress reports were received from ALL but one study group and presentation was made by several study group leaders/members.

#### **Study Group 1.6**

The topic “*Protected antipode circle on Lunar Farside*”(C. Macone) was discussed by Commission-1 and it was recommended to receive from the study group chair the final draft in order to start the review process before publication.

It was not foreseen that the Academy would formally pursue the issue, raised in the study, of seeking radio protection from the UN Committee on the Peaceful Uses of Outer Space/COPUOS from man-made interference for the Daedalus Crater on the lunar farside.

### **Study Group 1.8 & 1.9**

Presentations were made on progress so far on the Two Study Groups:

1.8 *Global Satellite System for monitoring and forecasting of the Earth seismic activity*

1.9 *Satellite remote sensing of aerosols in the Earth atmosphere*

Significant progress has been made in both studies and outline of further work was also presented. However, the Committee voiced its concern about *lack of participation from any scientist/technical persons from outside the host country* and suggested possible countries where people may be interested in joining in these study groups.

### **Study Group 1.10/3.19:**

The topic “*Feasibility Study of Astronaut Standardized Career Dose Limits in LEO and the outlook for BLEO*” was approved by the Board of Trustees in February, 2013 as a Cosmic Study and assigned jointly to Commissions III and I of the Academy under the designation SG 3.19/1.10. In March 2013 the Human Space Flight Co-ordinating Group/HSFCG recommended that the study be extended to consider also “the biological responses of humans to the impingement of high energy particle radiation” and this extension was duly implemented. Reports on this study have thus far been made to Commission III by the Study Chair S.McKL.

On 18 September, 2014, SMcKL was informed by the Academy that this study could only be carried out under the aegis of one commission and should therefore be, henceforth, titled SG 3.19. She informed the Chair of Commission 1 of this change lest he wished to discuss the change with the Academy.

### **Study Group 1.11**

In view of lack of progress in assembling a study group team as proposed originally and also lack of response from the study group leader, *this study may be withdrawn* if no input is received from study group leader about constitution of a study team and a schedule of activities to meet a set timeline for completing the study.

### **Study Group 1.13**

A study on “*Small satellites for extremely low cost planetary missions*” was initially proposed as a Commission-1 study in view of its focus on the planetary science that is enabled by the new generation of Cube-Sats and Cube-Sat-compatible scientific instruments. It was later argued that a Commission-4 study focussed on spacecraft technology and engineering aspects would be a more appropriate environment for the implementation of this work (which would in this circumstance be carried out under the title Study Group 4.16). These discussions are in progress.

#### **Study Group 4.19 (former study group 1.14)**

The activities of this study group on “*Promoting Global Space Knowledge and Expertise for Developing Countries*” were presented. Several informal discussions on the nature of the database and the method for acquiring data were held at the Beijing IAC (September 2013) and at the UNCOPUOS Scientific and Technical Subcommittee meeting (February 2014 in Vienna). The “Database” is to be founded on IAA membership and an agreement on where the database of experts would be located was reached. *The study group will like IAA Secretariat to agree to maintain the database on the IAA website.*

#### **Proposal for new Study Groups. (J. Gowami)**

It was stated by the Chair that, in view of the several active study groups currently being handled by Commission 1, no further studies were being solicited at this time. However, during the meeting of all the study group Chairs later in the day, President of IAA urged all the Commissions to solicit proposals for study and Commission-1 Chair will send intimation to all Commission-1 members for submission of study proposals for consideration by IAA.

#### **6. Academy Day Program (Moscow) Summary**

G. Vane (past Chair of Commission-1) in collaboration with Lev Zelenyi, prepared the Moscow IAA-COSPAR Academy Day program that covered a wide spectrum of topics. The programme was attended by close to hundred academy members and the event received very favourable comments. The program (provided by G. Vane) is attached (**Appendix 3**).

#### **8. Report on First IAA Symposium on “Space Flight Safety” N Smirnov**

An IAA Symposium on SPACE FLIGHT SAFETY, was held in Saint Petersburg from 28-31 July, just prior to the COSPAR meeting in Moscow (2-10 August). An account of this event, prepared by N. Smirnov, who was unable to come to Toronto, is in **Appendix-4**.

SMcKL who was responsible for a Session on ‘*Radiation Hazards and Safety*’ reported that her session was very well attended with “standing room only” during her keynote address on “Recommendations to mitigate against human health risks incurred due to energetic particle irradiation Beyond Low Earth Orbit /BLEO”. A successful session on “Fire safety of Space vehicles” was chaired by G. Jomaas, from the Technical University of Denmark, Lyngby, Denmark. Other sessions were chaired by Russian experts. Preparations to publish the papers presented at this Symposium in a special (refereed) issue of Acta Astronautica are in train.

## **9. Report on Fifth IAA Symposium on “Search for Life Signatures (C. Macone).**

The fifth IAA Symposium on ‘*Search for Life Signatures*’ was held at the UNESCO Building in Paris from 20-21, March 2014. The goal (see the Paris Minutes of 2014) was to discuss the strategies of both Passive and Active SETI with communities that would include experts involved in the search for terrestrial type exo-planets; recognition of probable bio-signatures and other related disciplines in order to enhance the possibility of SETI signal detection success. An account of this meeting was provided by C. Macone.

## **10. 12<sup>th</sup>. Low-Cost Planetary Mission (LCPM-11)– Conference update;**

The next LCPM-11 is scheduled for *9-11 June in Berlin Germany*. Conference organizers are trying to hold the meeting at the “Einstein Saal” at the Archenhold Sternwarte in Berlin.

*Primary Organizers are: Tilman Spohn (Berlin) and Gregg Vane (JPL)*

A proposed (tentative) agenda includes the following themes:

*Session 1: Agency Programs and Plans for Future Low-Cost Planetary Missions*

*Session 2: Latest Science Results from On-Going Missions*

*Session 3: Missions Currently Under Development for Launch in the Near Future*

*Session 4: Science Instruments Enabling the Next Generation of Low-Cost Planetary Exploration*

*Session 5: Advanced Concepts for the Next Generation of Low-Cost Missions*

*Session 6 : Low Cost Launchers*

## **11. Any Other Items**

The Chair opened discussion on “other items”, if any, from the Commission-1 members.

He then commended the attendance of Commission-1 members and the many items of special relevance to Commission 1 to be presented during the 65<sup>th</sup> IAC.

He thanked those present for their attendance and contributions in the deliberation and closed the meeting.

---

*Minutes prepared by*

*Susan McKenna-Lawlor; Secy. & Jitendra N. Goswami, Chair*

*Commission-1; Space Physical Sciences*

## **Appendix-1**

IAA Commission 1 'Space Physical Sciences' Meeting  
27 September, 2014, (Saturday) 13h00-16h00  
Metro Toronto Convention Center  
Toronto, Canada

### **Agenda**

1. Welcome – J. Goswami
2. Self-introduction of Commission 1 members and all attendees – All
3. Minutes from Paris meeting – Susan McKenna-Lawlor.
4. Study Group activities: finalized studies, publication of results -  
Susan McKenna-Lawlor
5. Study Group activities: status, progress reports – Study group  
Chairs/members.
6. Proposals for new Study Groups - J. Goswami
7. Academy Day Programme (Moscow): A Summary – Gregg Vane
8. Report on First IAA Symposium on “Space Flight Safety” –  
Nickolay Smirnov.
9. Report on Fifth IAA Symposium on “Search for Life Signatures” –  
Claudio Maccone
10. 12th Low-Cost Planetary Mission -- Conference update
11. Any other item

## **Appendix-2**

### **Meeting of IAA Commission 1 on ‘Space Physical Sciences’**

**17 March 2014, (Monday) 13h30-16h00, 6 rue Galilee (Metro Boissière)**

**IAA Headquarters**

**Paris, France**

#### **Agenda**

The agenda is contained in Appendix 1

#### **Minutes**

This agenda was adopted and the minutes of the meeting are as follows

##### **1. Welcome:**

The Chairman of Commission-1, J. N. Goswami, welcomed Commission-1 officials and other members of Commission-1 that were present and requested that everyone would participate in the deliberations of the meeting.

##### **2. Self-Introduction:**

All the officials of Commission-1 were present [i.e. J. N. Goswami (Chair, India), N. Smirnov (Vice-Chair, Russia), G. Vane (immediate past Chair, USA), S. McKenna-Lawlor (Secy., Ireland)], Other Commission-I members present were: T. Krimigis, (USA); G. Schwehm (Germany); R. McNutt (USA); M. Nakamura (Japan); A. Viviani (Italy); S. Schindler (Germany); R. Ramachandran (India); C. Maccone (Italy).

All of these persons introduced themselves and described their scientific areas of current interest.

##### **3 Minutes of Beijing Meeting**

A brief account of the discussion that took place at the Beijing meeting in September 2013 was presented by the Commission Chair. He noted that only **four** Commission members (including the Chairman and Secretary.) were present and that two other Academy members joined in the deliberations. The full minutes of the meeting were presented by the Secretary and approved by those present.

#### **4 Study Group Activities (finalized studies, publication of Results)**

S McKenna-Lawlor reported that her book arising from Study Group 1.5 on “*The energetic particle radiation hazard en route to and at Mars*” had been fully completed and submitted to the Academy in 2013 for approval for publication. No information was available as to when publication would take place. An action was taken by J. N. Goswami and G. Vane to raise the question of publication status with Jean-Michel Contant and the SAC later in the day. *It was subsequently learned from G. Vane that the book has been fully approved for publication and congratulations forwarded to SMcKL.*

#### **5 Study Group Activities (Status, progress reports )**

An in-depth discussion on the current status of the approved study reports (SG1.5, 1.6, 1.8, 1.9, 1.10, 1.11, 1.12 and 1.14) followed and the committee made the following observations during these discussions with back-up recommendations.

##### **Observations:**

- (i) *The Study Group report SG 1.5, on “Particle radiation hazards en route to and at Mars” is now awaiting BOT approval, prior to publication.*
- (ii) *The current status of two Study Groups proposals (SG-1.6 & SG-1.11) were presented by the proposers of these studies (C. Maccone and R. Ramachandran). The absence of corresponding reports on the current status of the other study groups (as had been requested to be provided before the meeting by both the IAA office and the Chairman of Commission-1), was deemed to be a cause for worry.*
- (iii) *The separation of Commission-1 Study Group 1.13 from Commission-4 Study Group 4.16 (“Small satellites for extremely low cost planetary missions”) was discussed. Study Group 1.13 was initially proposed as a Commission-1 study with the focus on the planetary science that is enabled by the new generation of Cube-Sats and Cube-Sat-compatible scientific instruments. It was felt that a Commission-4 study focussed on spacecraft technology and engineering aspects would be more appropriate for Study Group 4.16. In subsequent discussions at the SAC and later, it was decided by IAA leadership to restore Study Group 1.13 to Commission 1 as originally proposed.*
- (iv) *A clear statement regarding publication policy with regard to study reports from an IAA perspective needs to be put in place - in particular for study SG 1.5.*
- (v) *Congratulations were offered to C. Maccone on the successful completion of the study he had led on the topic “Protected antipode circle on the Lunar far side”.*



### **Recommendations:**

- (i) *The IAA office should be requested to send out a further request for a status report from each of the individual leaders of Study Groups 1.8, 1.9, 1.10, 1.12 and 1.14 since, for the Spring Meeting, they have neither submitted a report on the progress of their studies nor updated earlier information concerning study group membership.*
- (ii) *The IAA should issue guidelines concerning the time frame within which particular Study Group activities should be completed following the approval of a particular study group, as well as formulate the steps to be taken (including discontinuation) if there is an unreasonable delay in meeting the allocated milestones.*
- (iii) *The study group SG 1.5 book, on “Particle radiation hazards en route to and at Mars”, should be published at an early date (unanimous declaration).*
- (iv) *An IAA publication policy for study group reports should be formulated which takes into account both current day expertise and the availability of modern methods of dissemination of information via the media, which techniques are now supplemental to printed documentation. The policy thus formulated should be circulated to all Commission Chairs and conveyed to Study Group Leaders and Members at the time of acceptance of a study proposal.*

### **6. Proposals for new Study Groups**

The Chairman recommended that, in view of its already approved SEVEN study groups, Commission-1 should await the formal publication policy of the IAA before proposing any further study groups.

### **7. COSPAR (Moscow) Academy Day Technical Programme**

G. Vane (past Chair of Commission-1) is organizing, in collaboration with Lev Zelenyi, the Moscow IAA COSPAR Academy Day program. He presented to Commission 1 the preliminary program (Appendix 2) and noted that all of the invited speakers listed had already confirmed their attendance. Other items may yet be added to this program.

### **8. 11<sup>th</sup>. IAA Conference on Low Cost Planetary Missions**

It was confirmed by G. Vane that the next (11<sup>th</sup>) LCPM Conference will be hosted by the DLR in Berlin, Germany, from 9-11 June 2015. *Tilman Spohn* and Gregg Vane will act as co-chairmen. As previously reported at Beijing, *the International Planetary Probe Workshop (IPPW)* plans to hold its 2015 IPPW meeting at DLR in Koln, Germany during the following

week, 15-19 June 2015, to avoid conflicting dates. Gregg and Tilman plan to meet in Washington in May, 2014, to put together a draft international program committee and top-level agenda for LCPM-11.

### ***9 Fifth IAA Symposium on Search for Life Signatures***

The fifth IAA Symposium on 'Search for Life Signatures' was scheduled to be held at the UNESCO Building in Paris from 20-21, March 2014. C. Macone, in his capacity of Conference Organizer, provided Commission 1 with an historical account of SETI. Since 1960 radio telescopes have been employed to detect extraterrestrial signals near 1420 MHz (the emission line of neutral hydrogen) while optical searches have been pursued since 1990 (Passive SETI). In recent years signals had been deliberately transmitted into space to enhance the probability of contacting distant technological civilizations (Active SETI)

The goals of the Paris Symposium in 2014, against a background of the discovery since 1995 of, in excess of, 2000 extra-solar planets, is to discuss the strategies of both Passive and Active SETI with communities that will include experts: in the search for terrestrial type exoplanets; in the recognition of bio-signatures; and in other related disciplines in order to enhance the possibility of SETI signal detection success.

### **10 First IAA Symposium on Space Flight Safety**

N. Smirnov reported that an IAA Conference on SPACE FLIGHT SAFETY, will be held in Saint Petersburg this Summer from 28-31 July, just prior to the COSPAR meeting in Moscow (2-10 August). The conference program is contained in Appendix 3. The Commission 1 Secretary will take responsibility for Topic 4.

Prof. Smirnov provided information on how to reach the venue on the Gulf of Finland and noted that the recommended hotel has on show two remarkable portraits.

### **11 Information on Acta Astronautica Special Issues Policy**

N. Smirnov presented an account of his recent discussions with the Editor of Acta Astronautica concerning the policy of the journal regarding Special Issues. The privilege of publishing Special Issues is granted to Conferences and Symposia organized under the auspices of the IAA. The guidelines for arranging IAA meetings are published on the web site of the Academy.

As there were no items in AOB the Chairman thanked those present for their participation and closed the Meeting.

Susan McKenna-Lawlor

Susan McKenna-Lawlor; Secy.

## Appendix-3

# Academy Day

## International Academy of Astronautics (IAA) On the occasion of the 40th COSPAR Scientific Assembly *Moscow, Russia, Saturday August 2<sup>nd</sup> 2014*

*Venue: Moscow State University Shukulovsky Building, room S1 04*

Chairs: Lev Zeleny, Gregg Vane

- 09h00 Program Presentation, by Lev Zelenyi, and Gregg Vane
- 09h05 Welcome Address, Anatoly Perminov, Vice President, Scientific Programs
- 09h15 IAA Heads of Space Agencies Summits by Jean-Michel Contant, Secretary General
- 09h45 Quantifying Space – Quantitative Models for Space Weather, by Maria Kuznetsova, GSFC, USA
- 10h30 Coffee Break
- 10h45 Remote Sensing of CO<sub>2</sub> and CH<sub>4</sub> in the Earth's Atmosphere: From Missions to Science—  
Remote Sensing of Carbon Cycle Science, by Charles Miller, Caltech/JPL
- 11h30 Following the Water in the Solar System – Mars, Europa, Moon, Mercury and beyond, by  
Igor Mitrofanov, IKI, Russia
- 12h15 Induction of newly elected Corresponding and Full Members
- 12:30 Lunch (optional-individual payment for each participant at the Moscow State University canteen)
- 13h30 Rosetta: First Results from 67P/ Churyumov–Gerasimenko, by Gerhard Schwehm, ESA
- 14h15 Europa as an Abode for Life: Investigating Habitability with the Europa Clipper Mission  
Concept, by Robert Pappalardo, Caltech/JPL, USA
- 15h15 Russia's Space Science Program: Current Activities and Plans for the Coming Decade, by  
Lev Zelenyi, IKI, Russia
- 16h00 ROSCOSMOS: The Current Status and Future Plans for Human and Robotic Exploration,  
by TBD, ROSCOSMOS, Russia
- 16:45 A brief preview of COSPAR Scientific Event S.4, entitled "Path to Intelligent Life in the Universe,"  
by Claudio Maccone, INAF, Italy
- 17h00 Adjourn Plenary Session
- 19h30 IAA Dinner (optional-individual payment for each participant at the Durdin)
- 22h00 End

## **Appendix-4**

*Technical report  
On the 1-st IAA Symposium  
Space Flight Safety*

The Symposium was held in Saint Petersburg, July 28-31, 2014. Symposium was a great success. The number of registered participants exceeded the expectations and was equal to 50 full paying persons. There were 6 plenary lectures and around 35 oral presentations. The organizing committee will select best presentations for a special issue of Acta Astronautica. There is a Special Issue Space Flight Safety label in a drop down menu in the Elsevier submission system for Acta Astronautica. The submissions should be done in September 2014. Reviewing procedure will be performed in October, in November the papers would be delivered to production office.

*Program Chair:* Nickolay Smirnov, Prof., Dr.Sc.-Hab., IAA Com.1 Vice Chair, Moscow M.V.Lomonosov State University, Russia

*Scientific organizing committee members:*

Igor V. Barmin, General Designer, Federal State Enterprize “TsENKI”, Russian Space Agency, Russia

Vladimir Betelin, Academician RAS, Director of Scientific Research Institute for System Studies, Russia

Christophe Bonnal, CNES, Paris, France

Jean Michel Contant, IAA Secretary General, Paris, France

Grunde Jomaas, Technical University of Denmark, Kgs. Lyngby, Denmark

Susan McKenna-Lawlor, Academician, Prof. D.Sc., Sec. IAA Com.1, Ireland

Vyacheslav Nosikov, Adviser to General director “NPO “Technomash”, Russian Space Agency,

Vitalii Panov, Vice-president of Russian Engineering Academy,

Igor Rubtsov, director of scientific Analytic Centre “NPO “Technomash”, Russian Space Agency,

Mikhail Silnikov, Prof., Dr.Sc.-Hab., Director General Scientific and Production Enterprise “Special Materials” Russia

### **Symposium structure:**

– Sessions

1. Fire safety of Space vehicles
2. Protection of Space structures from space debris collisions and micrometeoroids
3. Safety at launch place and during takeoff
4. Radiation hazards and safety
5. Supercomputer predictive modeling for ensuring Space program safety

Each session incorporated plenary lectures and oral presentations. Accommodation for all participants was provided in Lancaster Court Hotel within a walking distance from the Conference site. The participant kit along with symposium program and badge included Saint Petersburg photo album, Symposium marked shirt and umbrella with a sky star map.

The cultural program included an evening excursion along the rivers and channels of Saint Petersburg and a full-day tour to Peterhof park, fountains and palace.

Symposium Program Chair  
Academician Nickolay Smirnov.