

IAA Commission 1 'Space Physical Sciences' Meeting
Tuesday, 20 March 2007, 8:30 am, 6 rue Galilee, Paris, France

Minutes of the meeting

Meeting Attendance:

Gerhard Haerendel (chair), Nickolay Smirnov (secretary), Stamatios Krimigis, Bernard Foing, Susan McKenna-Lawlor, Claudio Maccone, Peter Wenzel, Antonio Viviani.

Agenda:

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| 1. Welcome and adoption of agenda | Chair |
| 2. Minutes from Valencia meeting | Secretary |
| 3. Action Items from Valencia meeting | |
| a. Report on lunar farside protection | Claudio Maccone |
| b. Posting information on IAA website | Study Chairs |
| c. Suggestions on young members for IAA | All |
| 4. Study Group activities | |
| a. SETI (S1.3) report | SETI representative |
| b. Next Steps...Alternatives (S1.4) report | Bob Farquhar |
| c. Hazards...Mars (S1.5) report | Susan McKenna -Lawlor |
| d. Any new proposals? | |
| 5. Program for 58 th IAC, Hyderabad, September 2007 | |
| a. Proposals for Highlight Lectures/Plenary | Bob Farquhar, others? |
| 6. Discussion of contributions to IAC meetings | All |
| a. Hyderabad, September 2007 | |
| b. Glasgow, 2008 | |
| 7. Discussion of Commission Membership 2007-2009 | |
| 8. Any other business | |

1. Welcome

Gerhard Haerendel, Commission 1 Vice-Chair, was chairing the meeting. He warmly welcomed the attendees. Participants introduced themselves.

2. Minutes from Valencia meeting in October 2006

These were approved. Gerhard Haerendel highly appreciated the job done by secretary on assembling the Minutes.

3. Action items from Valencia meeting.

- a. Report on lunar far side protection Claudio Maccone

Claudio Maccone informed the Commission members that during the Congress having taken place in Valencia in October 2006 he had a meeting with Ed Stone and Jean Michel Contant, during which the participants agreed to have a position paper of the Academy on protecting the far side of the Moon for Scientific purposes. In fact, the antipode circle should be protected, because it is the only safe region shielded from radio waves coming from the Earth and Lagrange points L4 and L5.

Gerhard Haerendel asked if it should be worth to pose the question of protecting the polar zones from Human activities. Tom Krimigis despite of importance of both issues suggested to treat them separately. Bernard Foing suggested to select specific areas to be protected.

The Commission members discussed the proposals.

1) After having prepared position paper it could be worth to address the UN Commission COPUOS, which should be informed of position paper and, maybe, include this item into Moon Treaty.

2) A good first step will be also to inform COSPAR.

The drafting group involvement: Claudio Maccone, Wes Huntress, Bernard Foing, Seth Shostak (SETI Chair), Leonid Gourvitz, Heino Falcke. The draft group should report to C1 before submitting the paper further.

b. Posting information on IAA website Study Chairs

Secretary informed of the current state of the web: SETI permanent study group (SG 1.3) has a lot of documents placed on the web, the Study group “The Next Steps for Human Space Exploration: What are the Alternatives?” has 1 document placed on the web, the Study group ‘Particle Radiation Hazards en route to, and in orbit about, Mars’ (SG 1.5) has no documents placed on the web. Susan McKenna was asked to place some information on her study group. Susan McKenna said, that people from her study group were waiting for official invitation letters sent to their organizations on behalf of IAA to join the Group.

Gerhard Haerendel informed that was not the rule of IAA: normally the study group becomes effective after being adopted by the Commission.

Tom Krimigis informed that the Commission invites individual experts to join the study group but not representatives of organizations.

Decision: Susan will prepare letters of invitation and send to Wes Huntress (action item 1). The data on the SG 1.5 will be placed on the web by Susan McKenna (action item 2).

Peter Wenzel suggested that Secretary should take care of posting on the web the agenda of the Commission meeting as early as possible, but not later than 1 week prior to the meeting. (action item 3).

c. Suggestions on young members for IAA All

Commission 1 has fewer new members elected each year than Commission 2, for example. Tom Krimigis made two suggestions. First, he reported the suggestion of the Board of Trustees to look for people actively working in IAA supported conferences. Second, he promised to send all Commission 1 members invitations to nominate new members for the Academy.

4. Study group activities

4.a. Ongoing studies: SETI (S1.3) Permanent Study Group.

Claudio Maccone reported that since the last meeting in Valencia, when the problem of a suggested protocol for active SETI was discussed, there has been additional activity. A message was sent from the Evpatoria (Crimea) telescope without any preliminary discussions by two scientists Alexander Zaitsev (Ukraine) and Ivan Dutil (Canada). That marked the beginning of a new age of active SETI.

In addition, at least one new radio telescope (SKAR) has been claimed to be sensitive enough to detect non-focused, extraterrestrial signals (radio, TV, etc.), although these would have to be of far greater power than terrestrial broadcasts.

The IAA SETI Permanent Study Group has voted – both at the Fukuoka and Valencia meetings – to modify a proposed draft document on SETI protocol to remove the statement that no transmissions should be made without international consultation. This was because of the

unrestricted and unenforceable tenor of this statement. The Study Group also wishes to approach COPUOS to change the relevant protocol in accordance with this decision.

Comments from Gerhard Haerendel: 1) I think we should send signals. If we expect to receive signals, then we need to send. 2) The real point is the following: which signal and logic should be incorporated into the message in order that potential recipients will have the possibility to decipher it. 3) Mankind should discuss if we should embark on so-called “active SETI” (i.e., transmit deliberate signals) in the course of the coming years.

Action item: Claudio Maccone will invite Seth Shostak to the Commission 1 meeting to discuss the problem of who works on the concept of messages which would be sent in an active SETI effort.

4.b. Study group SG 1.4 “The Next Steps for Human Space Exploration: What are the Alternatives?” Bob Farquhar was not present at the meeting.

Bob Farquhar sent a proposal to have a special technical session at the **59th International Astronautical Congress**

Venue: Glasgow, Scotland

Appropriate Timing: October 2008

Anticipated Size of Audience: 200

Target Community: Planning groups for human space activities in national space agencies (e.g., NASA, ESA, JAXA,...) and in academia and industry.

Session Co-Chairs: Robert Farquhar, Ernst Messerschmid

Rapporteur: Gerhard Schwehm

Primary results of IAA Cosmic Study Group 1.4 will be presented by members of the Study Team.

The suggestion was approved by Commission 1 members. It was also suggested to have a plenary event on the topic during one of successive Congresses.

4.c. Study Group on ‘Particle Radiation Hazards en route to, and in orbit about, Mars’ (SG 1.5) was presented by Susan McKenna. The team is very strong involving well known scientists. The goal is to collect all existing documents in one place relevant to investigation of interplanetary protons, interplanetary gradients between Earth and Mars.

The **Overall Goal** and the **Intermediate Goals** of the study were defined to be as follows.

Overall Goal: To provide an up-to-date assessment, based on modeling and on *in-situ* measurements, of the particle radiation hazard *en route* to and at Mars against the background of global aspirations to send various unmanned, and ultimately manned, missions to the planet

Intermediate Goals;

1. To bring together an interdisciplinary team (scientists, engineers, spacecraft manufactures, component manufacturers, radiation modelers and medical personnel) that can provide expertise necessary to underpinning a manned mission to Mars.
2. To collect all relevant documentation/reports in one place as a resource for the mission planners.
3. To provide an assessment of the particle radiation to be expected while *en route* to Mars/in orbit about Mars at different phases of the sunspot cycle.
4. To provide an estimate of the particle radiation to be expected at the surface of the planet based on modeling and on existing measured data.
5. To determine consequences for spacecraft design/component selection.
6. To determine strategies for hazard mitigation
- 7, To determine dosage and medical hazards pertaining to astronauts/ cosmonauts

Progress in past six months:

- An inter-disciplinary team of world class scientists (see the attached list) has been assembled as per **Intermediate Goal 1** of the project .
- A start has been made by S. McKenna-Lawlor with regard to assembling an archive of relevant refereed papers as per **Intermediate Goal 2**.
- Practical work is already in train among some members of the Study Group to predict the particle radiation hazard at Mars (Intermediate Goal 3). In this regard, S McKenna-Lawlor was lead author in presenting a paper at the recent SECCHI Meeting at LAL, Orsay Ville France (5-8 March,2007) in which the Hakamada Akasofu Fry, version 2 (HAFv.2) model was successfully used to predict, in near real time, the arrival of shocks at the Earth and at Mars during the disk passage of a highly active region in December 2006. This result will also be presented later this year at COSPAR (Vienna) and at the AOGS Meeting (Bangkok). It is noted that, while the Academy study was not mentioned at Orsay Ville, the result reported on is relevant to the present study. Other work using a different technique to simulate the response stimulated at the Earth and at Mars to extreme solar events is also in train co-operatively among certain of the study group members.

Also, Thomas P. Armstrong (a nominee of the Academy) proposed the following: *At Fundamental Technologies we have various resources to bring to bear on this problem—most notably the entirety of the IMP 8 CPME data set from 1973 to present. There are a few years before that available from earlier IMPs and OGOs to extend the time coverage.*

Interestingly enough, for interplanetary energetic protons up to several MeV, studies of the interplanetary gradient between Earths and Mars strongly suggests that fluxes increase in intensity (presumable owing to interplanetary acceleration). Teasing out how this might affect the expected SPE fluences vs energy would be an interesting little challenge for Mars environments.

It is planned to follow up this suggestion by recruiting interested team members to work on the data sets.

Personnel with the expertise to address **Intermediate Goals 4-7** are in place but it is not excluded that additional experts will later be recruited as the themes concerned are addressed in depth.

Ongoing Discussions are being carried out to establish a good topic/topics for each group pursuing the Intermediate Goals of the Study. Later each group will be expected to prepare a Review Chapter for the final report. This can either be jointly written or individuals within a group can choose to write a review on a particular topic so that the group output is composed of more than one chapter. These reviews will be peer refereed by members of the Academy of Astronautics before they appear in Acta Astronautica.

Also, it is anticipated that the collection of chapters in the report will be distributed internationally by the Academy, which acts in a prestigious leadership role in astronautical matters.

Gerhard Haerendel said that to determine the medical allowable dosage of radiation specialists in Space Biology and Medicine should be involved. Nickolay Smirnov suggested Dr. Inessa Kozlovskaya from the Institute of biological Problems Russian Academy of science, which was definitely supported by Gerhard Haerendel.

Action items: Nickolay Smirnov should bring together Susan McKenna-Lawlor and Inessa Kozlovskaya.

Susan McKenna-Lawlor should present an interim report to the Commission 1 in one year by the next Commission 1 meeting in Paris.

Finalizing the discussions Gerhard Haerendel summarized that as a result of the study group research we should provide an answer to Gene Parker, who wrote in his paper that human flight

to Mars was impossible because the shields from radiation needed to be 5 meters thick following his estimates.

4.d. No new proposals were suggested.

5. Program for 58th IAC, Hyderabad, September 2007

Having discussed the plans for Hyderabad Congress, the new system for abstract collection, the web page organization and the IPC meeting to be held the next day Commission 1 members agreed that it is worth to suggest IAF to return to an old practice for authors to send electronic copies of their submissions to session chairs and rapporteur.

6. Discussion of contributions to IAC meetings

All

- a. Gerhard Haerendale will take care of organizing Academy Day in COSPAR meeting
- b. It was proposed that at 59-th IAC in Glasgow, 2008 Bob Farquhar will organize a Plenary event based on the results of SG 1.4 efforts: "The Next Steps for Human Space Exploration: What are the Alternatives?"

Anticipated Size of Audience: 200 persons.

Target Community: Planning groups for human space activities in national space agencies (e.g., NASA, ESA, JAXA,...) and in academia and industry.

7. Commission Membership 2007 – 2009

The new Commission 1 membership was discussed. Gerhard Haerendel will replace Wes Huntress as Commission 1 Chair. Nickolay Smirnov was suggested to keep his position as Commission 1 Secretary. Peter Wenzel, Claudio Maccone and Antonio Viviani (Microgravity Science and Processes IAF Committee Chair) were suggested to join the Commission 1.

8. Any Other Business

Gerhard Haerendel thanked all participants for their participation and wished fruitful work in preparation of the 58th IAC Program.

Action items:

1. Susan McKenna-Lawlor will prepare drafts of letters of invitation to join the SG 1.5 and send to Wes Huntress for approval and signing.
2. The data on the SG 1.5 will be placed on the web by Susan McKenna-Lawlor.
3. Secretary will take care of posting on the web the agenda of the Commission meeting as early as possible, but not later than 1 week prior to the meeting.
4. Claudio Maccone will invite Seth Shostack to the Commission 1 meeting to give the coverage for the problem, who works on the concept of messages, which are supposed to be sent in active SETI.
5. Nickolay Smirnov will bring together Susan McKenna-Lawlor and Inessa Kozlovskaya to discuss joint efforts within SG 1.5 team.
6. Susan McKenna-Lawlor will present an interim report to the Commission 1 in one year by the next Commission 1 meeting in Paris in March 2008.
7. Bob Farquhar will organize at 59-th IAC in Glasgow, 2008 a technical session based on the results of SG 1.4 efforts: "The Next Steps for Human Space Exploration: What are the Alternatives?"