

Proposal for Forming an IAA Study Group

SG 1.6

Title of Study:

PROTECTED ANTIPODE CIRCLE (PAC) ON LUNAR FAR SIDE

Proposer: Claudio Maccone

Primary IAA Commission Preference: Commission 1 (Sp. Physical Sc.)

Secondary IAA Commission Interests: Commission 5 (Sp. Pol. Law & Eco)

Members of Study Team

Chair: Claudio Maccone

Secretary: Paul Shuch (tentative)

Members: Jill Tarter, Seth Shostak (SETI Chair), Bernard Foing, Susan McKenna-Lawlor, Frans Von der Dunk, Leonid Gurvits, Heino Falcke, Alain Leger, Jean Schneider, Andre Brack, Tanja Masson-Zwaan, John Zarnecki, Martin Dominik, Alexander Zaitsev, (and TBD from China).

Short Description of Scope of Study

Overall Goal:

Write the text of a POSITION PAPER of the Academy to Protect the Farside of the Moon for Scientific Purposes. The PAC (Protected Antipode Circle), is a circular piece of Moon land at the center of the Farside tangent to the parallels of +30 and -30 degrees of latitude, respectively. The PAC was described by Claudio Maccone in the paper "Protected Antipode Circle on the Farside of the Moon" published in Acta Astronautica Journal (Volume 63, Issues 1-4, July-August 2008, Pages 110-118). This paper proves mathematically that the PAC is the only safe region shielded from radio waves coming from the Earth as well as coming from future space stations constructed at the Lagrangian points L4 and L5 of the Earth-Moon system. Please see Figure 1 hereafter.

Intermediate Goals:

The draft group should report to Commission 1 before submitting the paper further.

Final goal: after the completion and publication of the PAC Position Paper, the Academy would submit it to the attention of the United Nations COPUOS, which would hopefully include this issue within the new Moon Treatise.

COSPAR would also be informed about the need to have the PAC created.

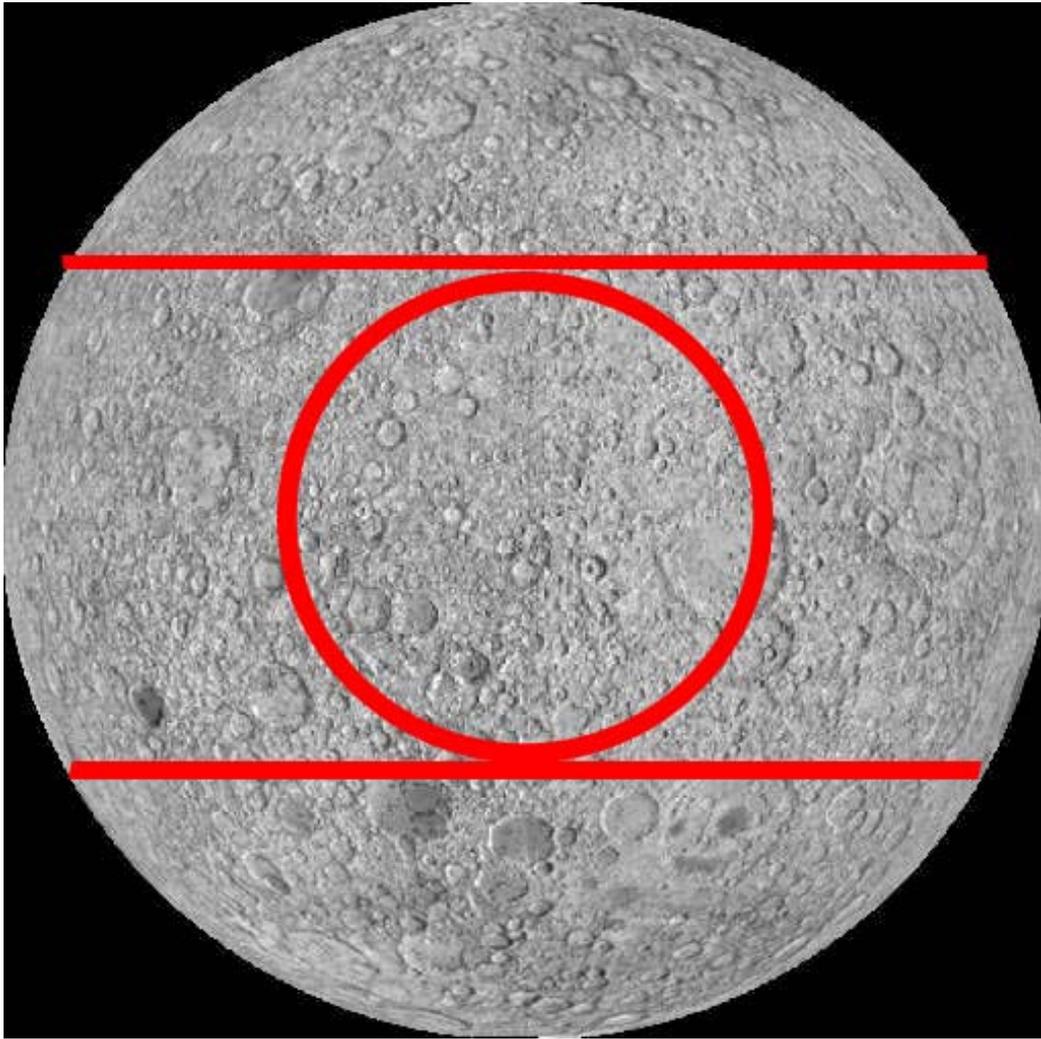


Figure 1. PAC, the PROTECTED ANTIPODE CIRCLE, is the circular piece of land on the Farside of the Moon (1820 km in diameter along the Moon surface) that we propose to be RESERVED FOR SCIENTIFIC PURPOSES ONLY. At the center of PAC is the Antipode of the Earth (on the equator and at 180 deg in longitude, both East and West) and, near to the Antipode, is crater Daedalus, an 80 km crater proposed by Maccone in 2005 as the best location for the future Lunar Farside Radio Lab (please see the paper by Claudio Maccone, "Lunar Farside Radio Lab", *Acta Astronautica*, Vol. 56 (2005), pages 629-639).

Inside Daedalus, the expected ATTENUATION of the man-made RFI (Radio Frequency Interference) coming from the Earth is of the order of 100 dB or higher. In the wake of Maccone's suggestions, crater Daedalus was already selected by the European space company Astrium as one of the possible destinations of their own planned new "Life" space mission to the Moon.

Methodology:

The methodology that Maccone used to make border of the PAC precise is the following:

- 1) The progress of civilization on Earth has witnessed a huge increase in the production of intense radio waves of all frequencies, especially because of military and civilian radars, satellite TVs, cell phones systems, etc. Therefore, the scientific research field of Radioastronomy, i.e. the detection of very weak radio signals arriving on Earth from the Universe, is doomed to end on Earth within this century since the radio telescopes will be "blinded" by the ever increasing Radio Frequency Interference (RFI).
- 2) There is only one place in the solar system that is shielded from this man-made RFI pollution: it is the Farside of the Moon, because the radio waves coming from the Earth are blocked by the Moon itself. The Moon Farside is fortunately close enough to Earth that we can hope to create a radiotelescope (or, better, an interferometric system of phased arrays) inside crater Daedalus within this century. This will be for the benefit of all Humankind.
- 3) Looking ahead some decades in the future, the next future space stations in the Earth-Moon system are likely to be located at the Lagrangian points L1 (shielded from the Farside by the Moon itself) and L4 or L5 (because they are gravitationally stable). Since L4 and L5 make two angles of 60 degrees at the center of the Moon with the Earth-Moon axis, on the Farside the PAC MUST EXTEND BETWEEN +150 DEGREES EAST AND 150 WEST IN LONGITUDE. In other words, the angle spanned by the PAC at the center of the Moon must be of 30 degrees on each side of the Earth-Moon axis, yielding a total angle of 60 degrees.
- 4) Since we REQUIRE A CYLINDRICAL SIMMETRY AROUND THE EARTH-MOON AXIS, THEN THE PAC ON THE FAR SIDE MUST EXTEND BETWEEN +30 AND -30 DEGREES IN LATITUDE TOO, and this completes the PAC definition.

Time Line:

The establishment of the PAC by the United Nations under the aegis of the new Moon Treatise (or of some "ad hoc" RESOLUTION) is VERY URGENT. Popular press and TV news, in fact, reveal that PIECES OF LAND ON THE MOON ARE already BEING "SOLD" by fraud in some countries of the world. We must stop this illegal selling process before it gets too late and before the "space cowboys" can reach the Moon by their own private means. We must explain to the world at large, and especially to both the political decision makers and the space agencies currently rushing towards the Moon, that saving the PAC from future radio pollution will be a benefit for the all of Humankind. It is thus just suggested that the IAA should PROCEED AS FAST AS POSSIBLE in writing down the text of this Position Paper and submit it to the United Nations COPUOS.

Final Product (Report, Publication, etc.):

The Academy Position Paper declaring that the need to establish a Protected Antipode Circle at the Moon Farside Center is URGENT and IN THE BENEFIT OF ALL HUMANKIND.

Target Community:

First of all the United Nations COPUOS, that will hopefully include the issue of "legalizing" the PAC within the new Moon Treaty. Apart from the United Nations, however, it is clear that this issue affects all Nations on Earth. So a wide outreach of the issue should be pursued, not only by technical descriptions, but also by popular and "understandable" descriptions. Serious TV programs about the PAC issue would be welcome.

Support Needed:

Firstly by the President, Secretary General and Commissions 1 and 5 of the Academy. Secondly by the IISL President and Members. Thirdly by the United Nations COPUOS. Fourthly by COSPAR and other space-related organizations. Finally by the "world at large".

Potential Sponsors:

Some enlightened countries might take up this NO-POLLUTION issue and support it through their own space agencies. A larger support might also come from Media corporations around the world. A KEY STEP, however, is necessary for COPUOS to include the PAC issue in the future Moon Treatise: at least one country should officially request so at the United Nations by a DIPLOMATIC ACTION. The proposer of this study is trying to have Italy to do so, but other countries might well join in the effort.

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

Date: January 28, 2010.

Signature: Claudio Maccone

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