

METERON end-to-end Network for Robotic Experiments: Objectives and first operations at B.USOC.

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Abstract

METERON an international collaboration between ESA, NASA (University of Colorado), Roskosmos and DLR. It intends to use the ISS as a test bed to simulate an orbiter around another heavenly body (for example Mars), under directives from Mission Control on Earth. Astronauts on the orbiter will project their human initiative and instinct, in real-time, onto the surface of the heavenly body (simulated by an analog site on the Earth) through robotic device(s) to perform science or engineering tasks. This type of real-time control is not possible directly from Earth due to the One Way Light Time delay in communications.

METERON operations are managed by B.USOC since December 2011 as Facility Reference Centre.

1. METERON and planetary protection.

The final objective of METERON will be to command robots from orbit or from a base on the planet in order to reduce the risks to astronauts. This satisfies also specific requirements of forward and backward planetary protection especially in the case of Mars. Even when astronauts will be allowed to land, the planetary protection requirements will make this necessary. Any Mars landing on Mars is catalogued by COSPAR as category IV: Lander or probe missions to locations with the potential to host life and for which there is a possibility of contamination by Earth life. Presently, the category excludes human landing before Mars life is characterized or Mars is proved to be definitively sterile. COSPAR policy expanded category IV to three different subcategories and the stricter one (IVc) will probably be defensively off-limit for human explorers. The designation of “special regions” for Mars, pertinent to Category IVc, has been addressed by COSPAR since 2002. COSPAR defined a special region as “a region within which microorganisms from Earth are likely to propagate, or a region which

is interpreted to have a high potential for the existence of extant Martian organisms.” [2].

2. METERON first operations.

The original concept of METERON is its specific structure as a network in which the robot, astronaut and earth operation centre are simultaneously active. This concept is experimented on the ISS with B.USOC as facility reference centre. These early tests began in 2012 and both the operations and their results as well as the involved hardware will be presented.

3. Summary and Conclusions

Current testing of this concept on the ISS constitutes a progress towards new mission architectures for human mission to unknown environments and might reconciles human planetary exploration with the need for planetary protection.

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References

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