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Panels (P)
Human Exploration on the Moon, Mars and NEOs (PEX.2)

THE ISS AS A PLATFORM FOR A FULLY SIMULATED MARS VOYAGE

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The ISS can mimic the impact of microgravity, radiation, living and psychological conditions that astronauts will face during a deep space cruise, for example to Mars. This suggests the ISS as the most valuable "analogue" for deep space exploration. NASA has indeed suggested a 'full-up deep space simulation on last available ISS Mission: 6/7 crew for one year duration; full simulation of time delays autonomous operations'. This idea should be pushed further. It is indeed conceivable to use the ISS as the final "analogue", performing a real 'dry-run' of a deep space mission (such as a mission to Mars), as close as reasonably possible to what will be the real voyage. This Mars ISS dry run (ISS4Mars) would last 500-800 days, mimicking most of the challenges which will be undertaken such as length, isolation, food provision, decision making, time delays, health monitoring diagnostic and therapeutic actions and more: not a collection of "single experiments", but a complete exploration simulation were all the pieces will come together for the first in space simulated Mars voyage. Most of these challenges are the same that those that will be encountered during a Moon voyage, with the most evident exceptions being the duration and the communication delay. At the time of the Mars ISS dry run all the science and technological challenges will have to be mostly solved by dedicated works. These solutions will be synergistically deployed in the dry run which will simulate all the different aspects of the voyage, the trip to Mars, the permanence on the planet and the return to Earth. During the dry run i) There will be no arrivals/departure of spacecrafts; 2) Proper communications delay with ground will be simulated; 3) Decision processes will migrate from Ground to ISS; 4) Permanence on Mars will be simulated. Mars ISS dry run will use just a portion of the ISS which will be totally isolated from the rest of the ISS, leaving to the other ISS portions the task to provide the needed operational support for the ISS survival as well as the support for emergency situations. Beside helping in focusing the attention of the many space and space related programs to the quest for Mars, ISS4Mars will maintain a high level of attention of the funding institutions and provide an important focus for the general public. This talk will present the many scientific issues still open to be addressed (see for example the disciplinary reports of the THESEUS project), some example of the challenging tests that could be performed, some of the operational challenges, as well as list some of the issues not likely/possible to be simulated.

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