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THE ASTRONAUT JOB CHALLENGES AND THEIR RESPECTIVE ASSOCIATED RISKS

**Abstract**

To be an astronaut implies several challenges which are each associated with their specific risks characteristics. Some aspects such as the sense of engagement for the mission, the isolation, the confinement, the physiological impact of long weightlessness exposure, are managed through an adapted selection process. Others such as technical and operational complexity, procedures validation, real time flight plan redefinition, are taken care of through an appropriate level of training of crew and flight controllers in high fidelity simulations. One but not least, the capability to work as a team in a stressful environment at various level (flight crew, ground crew, program management, industry) requires probably the most important, although least programmable, interpersonal and intergroup skills for each actor involved in a mission. It is known in aviation that the vast majority of accidents are primarily due to one or several human errors among a series of contributing factors. This human factor can stand at the top management level as seen in the Soyuz 1, Challenger and Columbia accidents. It can stand at the flight or ground control center level as seen during the Progress cargo vehicle collision with the Space station Mir. It can also stand upstream at the design stage as seen in the Apollo13 tank explosion event, the Mir fire, or more recently the crewed Soyuz launch abort. Despite all these identified risks incurred by astronauts during their mission, one can notice that all 4 fatal accidents in the human space flight history took place during the high energetic transition atmospheric phases - ascent or entry – but no fatalities were counted during the orbital phase although major dramatic incidents occurred. This paper will review and detail the nature of these different type of risks, how they are mitigated, and what new risks might be faced by astronauts when they travel longer distances for longer durations in the future.