

THE NOT SO SILENT WORLD OF LIVING AND WORKING IN SPACE: THE CHALLENGES OF ISS NOISE

*L'ATMOSPHÈRE N'EST PAS AUSSI SILENCIEUX DE VIVRE ET DE TRAVAILLER DANS L'ESPACE:
LES DÉFIS BRUYANT DE L'ISS*

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Introduction: The acoustic environment of human space flight is often portrayed in movies as equivalent to terrestrial home or office environments, but it is not. During the historical development and operation of the International Space Station (ISS), noise levels were initially high, but have subsequently decreased over time due to the addition of quieter modules and crew quarters, and through deliberately quiet designs and modifications. However, controlling acoustic levels continues to be challenging, due to additional research and exercise equipment, as well as aging hardware. These challenges could potentially affect astronauts and cosmonauts. This presentation will discuss the noise challenges of space flight, past and present; efforts to monitor and control the noise levels; effects of spacecraft noise on hearing and communication; and how hearing is monitored in space.

Background: Noise levels during launch can be high, but they are experienced for short durations. Once on orbit noise levels are far below those considered by OSHA to be hazardous in typical occupational environments. However, space environments are not typical. Noise is present 24 hours a day, every day. The levels can have both auditory and non-auditory effects, reduce habitability, interfere with communication, and reduce a crew member's ability to detect caution and warning alarms. The ISS Multilateral Medical Operations Panel Acoustics Subgroup established standards and requirements to protect crew members. However, these standards are not always met, prompting needs for engineering solutions, including acoustical blankets, quiet fans, and vibration isolators. Sound levels are monitored throughout ISS. Crew member hearing sensitivity is assessed routinely.

Summary: While some temporary mission-related hearing threshold shifts have been measured, no permanent hearing shifts have been reported to date. This presentation will describe efforts to overcome these challenges, and share reports from two crew members on their perspectives about noise on their ISS missions.