

Evidence-Based Recommendations for Optimizing Light in Day-to-Day Spaceflight Operations

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NASA Behavioral Health and Performance Element (BHP) personnel have previously reported on efforts to transition evidence-based recommendations for a flexible lighting system on the International Space Station (ISS). Based on these recommendations, beginning in 2016 the ISS will replace the current fluorescent-based lights with an LED-based system to optimize visual performance, facilitate circadian alignment, promote sleep, and hasten schedule shifting. Additional efforts related to lighting countermeasures in spaceflight operations have also been underway. As an example, a recent BHP research study led by investigators at Harvard Medical School and Brigham and Women's Hospital, evaluated the acceptability, feasibility, and effectiveness of blue-enriched light exposure during exercise breaks for flight controllers working the overnight shift in the Mission Control Center (MCC) at NASA Johnson Space Center. This effort, along with published laboratory studies that have demonstrated the effectiveness of appropriately timed light for promoting alertness, served as an impetus for new light options, and educational protocols for flight controllers. In addition, a separate set of guidelines related to the light emitted from electronic devices, were provided to the Astronaut Office this past year. These guidelines were based on an assessment led by NASA's Lighting Environment Test Facility that included measuring the spectral power distribution, irradiance, and radiance of light emitted from ISS-grade laptops and I-Pads, as well as Android devices. Evaluations were conducted with and without the use of off-the-shelf screen filters as well as a software application that touts minimizing the short-wave length of the visible light spectrum.

This presentation will focus on the transition for operations process related to lighting countermeasures in the MCC, as well as the evidence to support recommendations for optimal use of laptops, I-Pads, and Android devices during all phases of spaceflight operations.