

TransLumen's Deep Space Fluid Stills® Habitat Environments for Long-Term Space Exploration

NASA (National Aeronautics and Space Administration) has long listed sleep deprivation and circadian rhythm changes as important risk factors and challenges for today's astronauts during long-term, deep space flights [1]. In human spaceflight, sleep duration and sleep quality of astronauts have been documented to possess the potential to adversely affect issues concerning microgravity, isolation, and the high vigilance demanded for their workload. Sleep problems ultimately could impair the work performance and health of crewmembers and impact the overall safety of flight missions. TransLumen Technologies has dedicated resources to respond to sleep problems of astronauts, recognizing it as one of the key safety factors for keeping human performance capabilities strong during on-orbit, medium and long-term spaceflight.

Through the innovations and inventions further developed by CEO & CTO, Doug Siefken, TransLumen Technologies has dedicated its focus on countermeasures through patented digital art Fluid Stills® technology to help assist sleep and the sleep routines of astronauts, pursuing a new frontier of space medicine. TransLumen's Deep Space Fluid Stills® combines TransLumen's Sub Threshold Extreme Gradual Change (STEGC) with expertise and collaborative research secured through the Office of Naval Research and the U.S. Naval Research Laboratory to determine the effects of training, boredom, and fatigue.

Based upon initial testing with Fluid Stills® technology, further evaluations are needed to support improving the astronaut's environmental habitat such as resetting the 24-hour bio clock with environmental art imagery to mirror the visual changes for earth-like orientation.

TransLumen's environmental art delivers the look and feel of a still image, framed art; yet constant change at the pixel level creates long-term visual change unnoticed by the naked eye. This temporal art form, employs unobtrusive video, imparting imperceptible change to a series of images in an evolving sub-threshold ultra-slow motion, which can be very fluid yet non-disruptive when used as ambient art. These images are perhaps best viewed as one would "look at a still image" with the occasional glance, gaze or more prolonged perusal rather than "watched like a movie."

Long term applications support the development of a new solid-state, low-power digital art and lighting solution for the International Space Station (ISS) and Deep Space flight travel and is intended to enhance the illumination of the working and living environment of astronauts, improving sleep, circadian entrainment, and daytime alertness.

TransLumen continues to seek In-flight testing opportunities of this synced imagery and timed lighting system to support USA Space Force and NASA spaceflight expeditions. To review research and the application of Fluid Stills® Digital Art provided by TransLumen Technologies to Advocate Condell Medical, please contact Carol Sherman at LinkedIn.

ⁱ [Mil Med Res](#). 2018; 5: 17. Published online 2018 May 30. doi: [10.1186/s40779-018-0165-6](https://doi.org/10.1186/s40779-018-0165-6).

ⁱⁱ [Major Scientific Discoveries Astronaut Health and Performance](#) pg 370 - 407