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Author: Ms. Xing Yi Ang  
United Nations Office for Outer Space Affairs, Austria, xing.ang@un.org

Mr. Luc St-Pierre  
United Nations Office for Outer Space Affairs, Austria, luc.st-pierre@unoosa.org

HEARING THE UNIVERSE: SONIFICATION AS AN INNOVATIVE TOOL FOR SCIENTIFIC  
RESEARCH, OUTREACH AND INCLUSION

**Abstract**

This abstract is about the use of sonification as an innovative, non-traditional method for scientific research, education and outreach, with the aim to open doorways to new discoveries and a more inclusive future for persons with disabilities.

Space-data analysis often relies on visual representations of telescope and satellite data which are inherently digital in nature. The ramifications of this are twofold. Firstly, it limits the possibilities of data analysis to the capabilities of visual perception. Secondly, blind and visually impaired (BVI) people are prevented from fully accessing or engaging in space.

The United Nations Office for Outer Space Affairs (UNOOSA) Space for Persons with Disabilities project conducted interviews with forty space and sound experts, and organized an online panel discussion featuring a sonification projects showcase in 2022. This original research is the first of its kind to explore in-depth the diverse applications of sonification in space and provide a comprehensive overview of sonification in terms of its contribution to space and accessibility, challenges in mainstreaming sonification in research and education, and makes concrete recommendations to address these issues at a global level, in particular with the goal of developing and implementing sonification as a universal tool for space research and education that is accessible to everyone, including the BVI community.

Sonification translates space data into non-verbal sound to facilitate interpretation and communication. The advantages fit into four broad categories: sound perception (the ability of our ears to identify and prioritize sounds in a noisy environment which is highly relevant to leading-edge research using large, noisy datasets; the multi-dimensional nature of sound to communicate spatial, time-dependent and other dynamic phenomena), accessibility (multi-sensory learning improves disability inclusion), engagement (sonification has a ‘wow’ factor that easily engages people of different age, gender, disabilities), and complex data analysis (sonification allows better identification of patterns or signals in large and multi-dimensional datasets which may be obscured by a visual-only approach).

However, sonification faces challenges in design, testing, training, and cultural, funding and perception barriers.

Nevertheless, there are many examples where sonification has been successfully implemented around the world. Many scientific organizations, such as NASA and STScI, and non-profit organizations are promoting it. UNOOSA is committed to disability inclusion and will follow up on the findings and recommendations of this research and foster international collaboration towards an inclusive space for all.