

Listening to invisible, inaudible solar winds passing by NASA satellites

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You are about to listen to...

sounds created from information (data) about the solar wind: invisible solar particles and magnetic fields gathered by two satellites in space, which orbit the Sun near Earth's orbit as part of the NASA STEREO project.

- *These invisible particles and magnetic fields do not make sounds* - we have had to change the information to sounds in order to listen to them, analogous to making sounds from temperature data coming from buoys in the ocean.
- The solar data is sent to Earth and we downloaded the data and changes it to sound.

February 27, 2008

- The movie shows the outermost atmosphere of the Sun (corona) by blocking the light from the Sun with a disk attached to the camera on the satellite.
- It does not change much because the Sun is very quiet.
- A small Coronal Mass Ejection is seen at the end of the movie on the right of the image.

QuickTime™ and a decompressor are needed to see this picture.

There are no sounds in space.

These sounds are created from information about invisible particles and magnetic fields that do not make sounds

Infinite possibilities - how do you decide what sounds to make? ⁽¹⁾

- We keep our goal in mind when choosing the sounds to associate with each data product.
- We want people to walk away with an idea that:
 - The Sun gives off a continuous electric and magnetic wind made up of charged particles traveling with different speeds.
 - The Sun is a dynamic star and can eject large amounts of mass from its upper atmosphere known as the Sun's corona. These ejections are known as Coronal Mass Ejections (CMEs).
 - CMEs can enhance auroras and affect our technological systems, like power grids & satellites.

Infinite possibilities - how do you decide what sounds to make? (2)

The Solar Wind Speed



The speed with which the bulk of the solar wind travels varies, just as wind on Earth varies. We have made the speed of the solar wind sound like wind blowing in gusts outside on Earth. When the solar wind speed increases, these gusty sounds increase. In this way we hope that people will have a vivid experience to help them remember that the Sun has a solar wind and to notice times of stormy wind conditions.

Short example of solar wind speed data turned into sound

Infinite possibilities - how do you decide what sounds to make? ⁽³⁾

The Z Component of the Solar Wind Magnetic Field



Short example of the negative z component of the solar wind magnetic field data turned into sound

When the z component of the magnetic field points South (negative z values) then a coronal mass ejection is more likely to enhance beautiful lights in the sky (auroras) and cause havoc with technology on and around Earth. We have created a sound for this component that aims to represent shimmering auroras but is also ominous - representing danger to technological systems.

Infinite possibilities - how do you decide what sounds to make? (4a)

High Energy (Extremely Fast Moving) Electrons and Protons

Charged particles, electrons and protons, make up most of the solar wind. During stormy times, the number of very fast, high energy electrons and protons will increase. These particles can move near the speed of light, faster than the bulk of the solar wind particles. They can be a harmful radiation source to astronauts. We have made these particles sound like particles (rain) hitting surfaces.

Infinite possibilities - how do you decide what sounds to make? (4b)



Short example of solar wind high energy proton data turned into sound

High Energy (Extremely Fast Moving) Electrons and Protons

Making these particles sound like rain hitting surfaces, we hope to pass along the idea that the detectors on the STEREO satellites count the charged particles as they hit the detectors. We made the electrons have a “tinny” sound, like rain hitting a tin roof, the protons have a “dark” sound, like rain hitting wood. The energy of the particles is separated out by pitch: higher pitch represents higher energy.



Short example of solar wind high energy electron data turned into sound