

Collecting Dust: Heliophysics Delivers New Results and Data on Dust

The part of space we live in, the heliosphere, is filled with tiny grains of dust.

When dust impacts spacecraft, it shatters and ionizes. As these ionized particles pass by a spacecraft's electric field antenna, it creates a voltage spike in the data. In the past, dust impacts were seen in much the same way as many people see dust on Earth, as contamination.

But those voltage spikes were not just noise in the data. Analyses of dust data has helped us learn more about the conditions of the *pre-solar nebula* from which our solar system evolved. Examining dust distribution patterns in deep space can reveal planetary orbits, helping scientists identify exoplanets. And, dust can be observed close to home as Zodiacal light – a faint white light you can see on clear, moonless nights in the direction of the sun during sunrise and sunset. Zodiacal light occurs when sunlight near the sun reflects off dust in the solar environment, revealing the disk of dust particles in orbit close to the sun. *NASA Heliophysics* is studying fundamental properties of our space environment, like dust.

Left Image: Zodiacal light, labeled by the text and cone shape in the image, captured at the site of the Giant Magellan Telescope at Las Campanas Observatory.



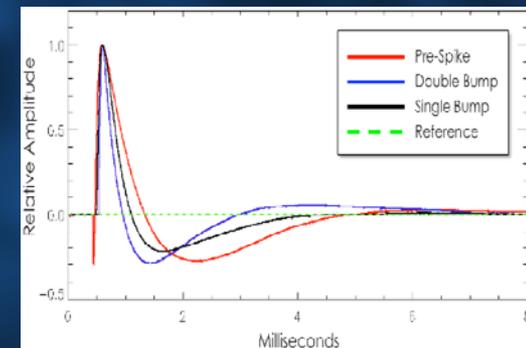
Credit: Yuri Beletsky

The Heliophysics Supporting Research program recently supported dust research at the Laboratory for Astrophysical and Space Physics in Boulder, Colorado that produced a number of new findings on dust and its impacts. The researchers studied dust signals in the solar wind recorded by the **Heliophysics Wind mission** and simulated dust impact conditions in the laboratory, learning to interpret what the size and shape of these voltage spikes tell us about dust type and velocity. As a result of their research, we might not need a dedicated dust detector to collect information on dust and can effectively turn every electric field antenna flown in space into a coarse dust particle detector.

In response to this research, the Wind mission team released [a brand-new 20-year public dataset](#) on dust in November of 2016; allowing a plethora of additional data space scientists and researchers can use to learn more about dust.

NASA Heliophysics specializes in making the invisible, visible. Studying invisible space processes and particles – such as dust – can provide us with information on our local space environment and deep space, teaching us more about what has happened and is happening in space.

Please visit <https://science.nasa.gov/Heliophysics/HelioConnects> to view an interactive version of this PowerPoint with click-able hyperlinks.



Examples of signals seen due to dust impacts. Credit: Thayer, et. al (2016)