



Global Friendship Through Space Education

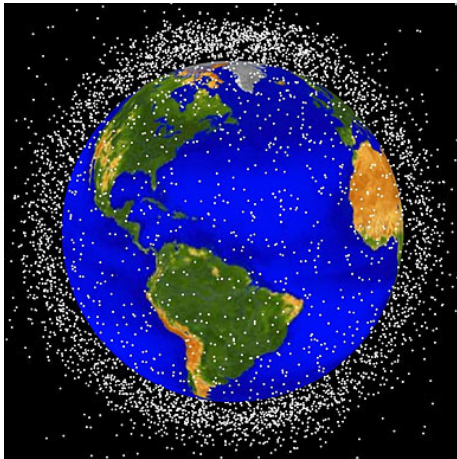
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The Solar System's Biggest Junkyard



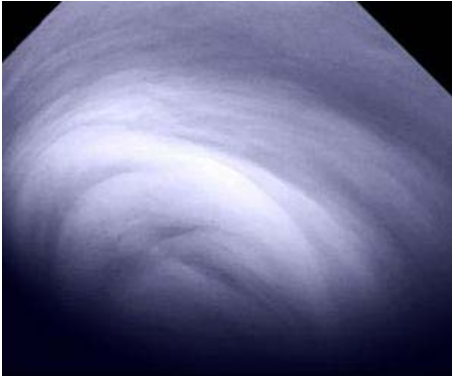
On a clear night, you can look in the sky and see the moon and stars. And, even though you cannot see it, you are also looking at the largest junkyard in the solar system.

Higher than the highest clouds but much closer than the moon, the bulk of the junkyard stretches from the Earth's surface to 20,000 miles overhead. Together, all the space junk would weigh about 11 million pounds on Earth, or more than 3,000 cars.

Space junk races around the Earth at breakneck speeds. Most pieces fly through space at more than 20 times the speed that sound travels on Earth. Going that fast, even the smallest pieces mean big trouble for spacecraft. For example, a tiny marble in orbit around the Earth can have as much energy as a bowling ball going 500 miles per hour, or a car going 30 miles per hour. In 1983, a small gouge appeared in one window of the space shuttle *Challenger* while it was in space. When the shuttle returned to Earth and scientists analyzed the window, they found that the crack was caused by a tiny, orbiting fleck of paint. If the shuttle had been struck by a larger piece of junk, the astronauts may have been in danger.

A solution to this problem will require international cooperation. Last year, the United Nations General Assembly approved guidelines for how to reduce the risk of space junk. If countries work together to control the amount of trash we send into space, we can keep the problem under control. In the future, perhaps we can even clean up the mess.

Venus Holds Warning for Earth



A mysterious high-altitude layer of sulphur dioxide discovered by ESA's Venus Express has been explained. As well as telling us more about Venus, it could be a warning against injecting our atmosphere with sulphur droplets to decrease climate change.

Venus is blanketed in sulphuric acid clouds that block our view of the surface. The clouds form at altitudes of 50-70 km when sulphur dioxide from volcanoes combines with water vapour to make sulphuric acid droplets. Any remaining sulphur dioxide should be destroyed rapidly by the intense solar radiation above 70 km. So the detection of a sulphur dioxide layer at 90-110 km by ESA's Venus Express orbiter in 2008 posed a complete mystery. Where did that sulphur dioxide come from?

Now, computer simulations show that some sulphuric acid droplets may evaporate at high altitude, freeing gaseous sulphuric acid that is then broken apart by sunlight, releasing sulphur dioxide gas. As well as adding to our knowledge of Venus, this new understanding may be warning us that proposed ways of decreasing climate change on Earth may not be as effective as originally thought.

Nobel prize winner Paul Crutzen has recently advocated injecting artificially large quantities of sulphur dioxide into Earth's atmosphere at around 20 km to counteract the global warming resulting from increased greenhouse gases. The proposal stems from observations of powerful volcanic eruptions, in particular the 1991 eruption of Mount Pinatubo in the Philippines that shot sulphur dioxide up into Earth's atmosphere. Reaching 20 km in altitude, the gas formed small droplets of concentrated sulphuric acid, like those found in Venus' clouds, which then spread around Earth. The droplets created a haze layer that reflected some of the Sun's rays back into space, cooling the whole planet by about 0.5 degrees C.

However, the new work on the evaporation of sulphuric acid on Venus suggests that such attempts at cooling our planet may not be as successful as first thought, because we do not know how quickly the initially protective haze will be converted back into gaseous sulphuric acid: this is transparent and so allows all the Sun's rays through. We must study in great detail the potential consequences of such an artificial sulphur layer in the atmosphere of Earth. Venus has an enormous layer of such droplets, so anything that we learn about those clouds is likely to be relevant to any geo-engineering of our own planet.

In effect, nature is doing the experiment for us and Venus Express allows us to learn the lessons before experimenting with our own world.

IMAGE OF THE DAY - Andromeda is So Hot 'n' Cold

This mosaic of the Andromeda spiral galaxy highlights explosive stars in its interior, and cooler, dusty stars forming in its many rings.

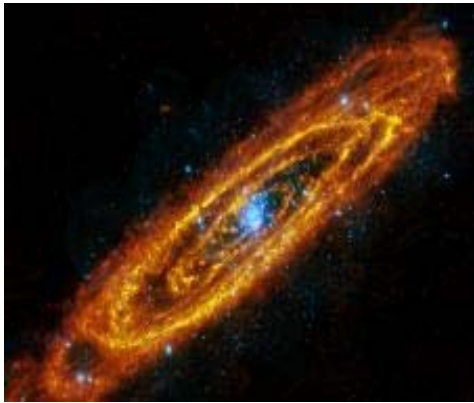


Image Credit: ESA

Herschel Space Observatory provides a detailed look at the cool clouds of star birth that line the galaxy's five rings. Massive young stars are heating blankets of dust that surround them, causing them to glow in the longer-wavelength infrared light, known as far-infrared, that Herschel sees.

In contrast, XMM-Newton is capturing what happens at the end of the lives of massive stars. It shows the high-energy X-rays that come from, among other objects, supernova explosions and massive dead stars rotating around companions. These X-ray sources are clustered in the center of the galaxy, where the most massive stars tend to form.

Andromeda is our Milky Way galaxy's nearest large neighbor. It is located about 2.5 million light-years away and holds up to an estimated trillion stars. Our Milky Way is thought to contain about 200 billion to 400 billion stars.

Note: Image of The Day section's aim is to create curiosity in your mind and make you want to search about the image or topic, rather than us giving full details about the image. We are expecting you to ask yourself questions and to search for information about the image of the day to get answers and learn more.