Below the Frozen Surface of Europa

Using the powerful resolution of the giant Keck II telescope in Hawaii, astronomers have discovered chemicals on the frozen surface of Europa, one of Jupiter’s four Galilean moons. These chemicals give us a glimpse 62 miles below Europa’s frozen surface, into its liquid ocean.

Cal Tech astronomer Mike Brown, and JPL scientist Kevin Hand, performed a spectrographic analysis of the surface of Europa. Spectrographic analysis allows astronomers to determine the chemical composition, temperature and other properties of stars, planets, nebulae and other objects in space. The analysis revealed the presence of a magnesium sulphate salt, called epsomite and other chloride salts on Europa’s surface. The scientists also uncovered further clues to where the chemicals came from by studying the powerful tidal forces that Jupiter imposes on Europa.

"Magnesium should not be on the surface of Europa unless it’s coming from the ocean," Brown said. The discovery of epsomite indicates that Europa’s ocean is similar to oceans on Earth. “Perhaps Europa’s salty ocean is also a wonderful place for life," said Kevin Hand.

Mike Brown, by the way, is best known for the controversial “demotion” of Pluto and the discovery of several dwarf planets in the Kuiper Belt, including Makemake and Haumea. Kevin Hand is a planetary scientist at JPL and was featured in James Cameron’s IMAX documentary, "Aliens of the Deep."

New Radiation Belt Discovered

On January 31, 1958, the United States launched Explorer 1, its first satellite into orbit. Previously, the United State’s Cold War rival, the Soviet Union, had launched two satellites, Sputnik 1 and 2. The United States was playing a game of catch-up, sending up scientific instrumentation designed by Dr James Van Allen of the University of Iowa. Explorer 1 and later Explorer 3 detected bands of radiation, called belts, of charged particles that are emitted by the Sun. These particles are trapped by the Earth’s magnetic field. The discovery revealed that sensitive electronic components need to be shielded in spacecraft that pass through the belts. The belts became known as the Van Allen Belts. They also help define a “safe zone” between the two belts.

Space still holds surprises for the scientific community, as once again evidenced in the recent discovery of a third Van Allen belt, more than fifty years after the findings of the first Explorer spacecraft. NASA launched twin Van Allen probes last summer to further study the dangers of radiation to satellites. Surprisingly, they discovered a temporary third belt that lasted a month. Just beyond the outer band, the probes detected super high-energy particles, most likely created by a solar disturbance.

The Van Allen probes will continue to study the radiation belts around the Earth to find out whether or not these temporary belts are common or rare.

Go to:  http://solarsystem.nasa.gov/planets/profile.cfm?Object=Jup_Europa
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