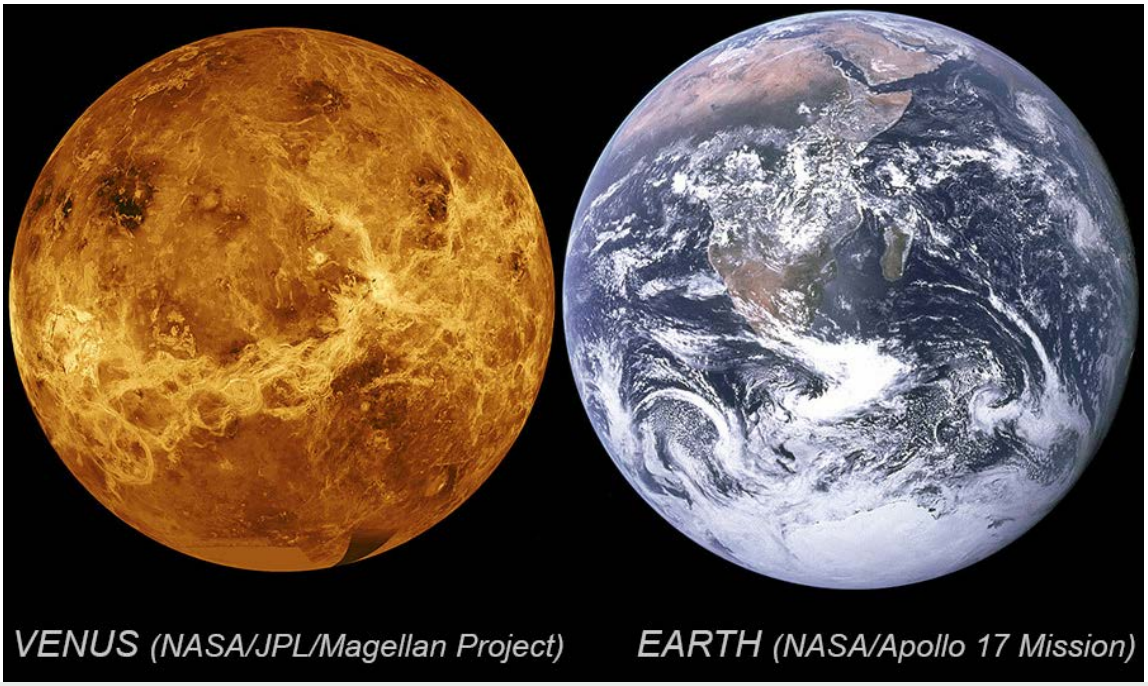
PLANETARY SCIENCE RESEARCH DISCOVERIES
CosmoSparks

Quick Views of Big Advances

Looking Up to Understand Down: Studying Other Planets to Learn about Earth



Venus and Earth to the same scale. Venus image was obtained by radar (NASA/JPL/Magellan Project) and colorized to match its typical surface color. Earth is a natural color image taken from space (NASA Apollo 17 Mission). Click for more information.

Comparative planetary science is the art of learning about all the planets so we can understand what processes operated during their formation and geologic evolution. For example, Venus and Earth are close to the same size, both have cores, and both have volcanoes. But Venus does not have ***plate tectonics*** or oceans of water. To understand why the two planets differ so much despite being the same size requires understanding what drives plate tectonics, a vitally important geologic process on Earth, and figuring out how volcanism shapes the landscape on Venus without developing huge tectonic plates. We learn about both planets by trying to figure it all out. This and other planetary problems that inform us about Earth are discussed in a paper by Mathieu Lapôrtre (Stanford University) and colleagues at Stanford, Arizona State University, Yale University, and Harvard University. Their work explains the importance of using planetary bodies as analogues for comparison with Earth, giving fascinating examples: core formation and the beginning and longevity of magnetic fields, atmospheric changes and dynamics through time, initiation of plate tectonics, the nature of biogeochemical processes on planetary surfaces before life began, and even finding pieces of the ancient Earth on other planets, especially the Moon. A particularly intriguing type of investigation is to use geologic products on all the planets to understand the role gravity plays in geologic processing. We can simulate the high pressures and temperatures in the interior of planets, but we cannot easily do experiments on Earth at lower gravity than that at Earth's surface.

See Reference:

· Lapôrtre, Mathieu, O'Rouke, Joseph G., Shaefer, Laura K., Siebach, Kristen L., Spalding, Christopher, Tikoo, Sonia M., and Wordsworth, Robin D. (2020) Probling Space to Understand Earth, *Nature Reviews Earth & Environment,* v. 1, p. 170-181,

doi.org/10.1038/s43017-020-0029-y. [*open access article*]

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March 2020

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