PLANETARY SCIENCE RESEARCH DISCOVERIES
CosmoSparks

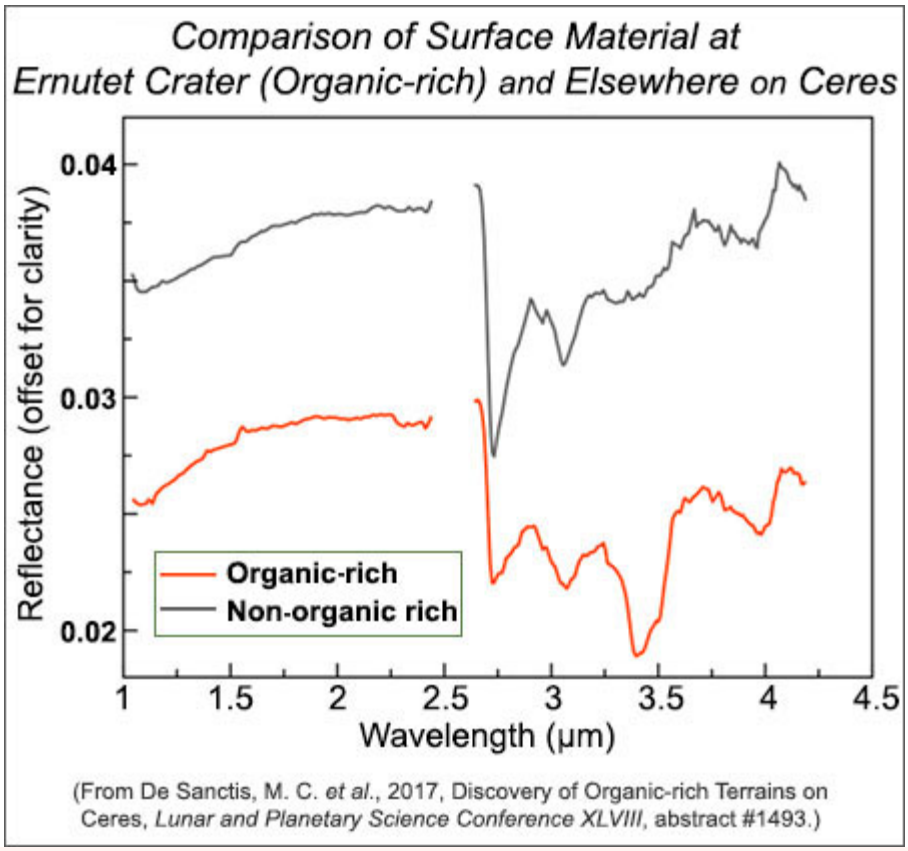
Quick Views of Big Advances

Ceres Has Organics

If you heard that a planetary body had clays and carbonates, evidence of aqueous alteration and hydrothermal activity, you would rightly reckon that liquid water and heat helped create the place. Sounds like Earth or Mars. If remote sensing data also pointed to global icy-rocky surface materials, maybe subsurface liquid water, **and *organic*-rich surface areas,** would you be more intrigued? Welcome to Ceres, the largest body in the main ***asteroid belt*** between Mars and Jupiter!

The first discovery of hydrocarbons on Ceres has been reported by an Italian–US team, led by Maria Cristina De Sanctis (Institute for Space Astrophysics and Planetology–Italian National Institute for Astrophysics, Rome), using data from the ***Dawn*** spacecraft.

Using Dawn's visible and infrared imaging spectrometer, De Sanctis and colleagues identified the 3.3–3.5 µm absorption band (see the red spectrum in the figure below), for which they present evidence for a signature of hydrocarbons rich in aliphatic compounds. They show the similarities of the Ceres spectra to spectra of terrestrial hydrocarbons and the insoluble organic matter found in ***carbonaceous chondrites***.



Spectra from the visible and infrared imaging spectrometer on board the Dawn spacecraft at the Ernutet crater region on Ceres. The red line: spectrum of organic-rich material near the crater rim, which shows the distinctive 3.3–3.5 µm absorption band. The gray line: spectrum of non-organic-rich material in an area several kilometers eastward from Ernutet crater. (Source: LPSC XLVIII abstract #***1493***.)

The organic-rich areas on Ceres are mainly located in and around Ernutet crater (52-kilometers in diameter) in the northern hemisphere of the ***dwarf planet***. The team reports that the largest concentration of organic-rich material drapes discontinuously across the southwest floor and rim of Ernutet crater and onto a neighboring, older crater. These organic-rich areas correspond to surfaces that appear redder than other surfaces on Ceres in visible-wavelength, enhanced ***color images from Dawn's framing camera***.

The team's conclusion that the aliphatic organic matter is likely native to Ceres, and formed during a water-rich past, is pertinent to the grand search for conditions and environments favorable for prebiotic (non-biologic) chemical reactions in the early Solar System. This work ultimately links us to the fascinating search for life elsewhere.

See Reference:
De Sanctis, M. C., Ammannito, E., McSween, H. Y., Raponi, A., Marchi, S., Capaccioni, F., Capria, M. T., Carrozzo, F. G., Ciarniello, M., Fonte, S., Formisano, M., Frigeri, A., Giardino, M., Longobardo, A., Magni, G., McFadden, L. A., Palomba, E., Pieters, C. M., F. Tosi, F., Zambon, F., Raymond, C. A., and Russell, C. T. (2017) Localized Aliphatic Organic Material on the Surface of Ceres, *Science,* v. 355(6326), p. 719-722, doi: 10.1126/science.aaj2305. [***abstract***]

See also:

· Ceres: Features, Composition, and Evolution session at the Lunar and Planetary Science Conference XLVIII (2017) ***LPSC session program with links to abstracts***.

· Dawn Discovers Evidence for Organic Material on Ceres, ***NASA/JPL News Release***.

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