Regional and Local Temperature Maps of Dwarf Planet Ceres from Dawn/VIR

Tosi, F.; **Zambon, F.**; **Capria, M. T.**; **Carrozzo, F. G.**; **Ciarniello, M.**; **De Sanctis, M. C.**; **Longobardo, A.**; **Raponi, A.**; **Ammannito, E.**; **Combe, J. P.**; **Hiesinger, H.**; **Li, J. Y.**; **McFadden, L. A.**; **Schorghofer, N.**; **Schroeder, S.**; **Stephan, K.**; **Rayman, M.**; **Raymond, C. A.**; **Russell, C. T.**

Since the beginning of 2015, the Visible InfraRed (VIR) mapping spectrometer onboard the NASA Dawn mission has obtained hyperspectral images of Ceres, with improving spatial resolution. VIR operates in the overall spectral range 0.25-5.1 μm, with the main goal of inferring the surface composition of the target in its uppermost layer, as thick as tens of microns. Taking advantage of the wavelength range longward of 3 μm, VIR can be used as a thermal mapper, i.e. as a tool to derive thermal images and spatially-resolved temperature maps. To do this, the VIR team uses a Bayesian approach to nonlinear inversion that was extensively applied to the Vesta dataset earlier. Already in February 2015, VIR had the chance to acquire data with a spatial resolution of ~11 km/px. Those temperature images revealed that a spot of high-albedo (bright) material, highlighted by the Hubble Space Telescope (HST) earlier and recently associated with the crater Haulani, was cooler than sorrounding regions seen under similar solar illumination, whereas the brightest spots on Ceres, in the crater Occator, did not display any thermal contrast. The following Survey phase yielded hyperspectral coverage of Ceres at ~1.3 km/px, and the High Altitude Mapping Orbit (HAMO) phase starting in mid-August 2015 is expected to provide VIR data with a resolution of ~0.4 km/px. These datasets allow derivation of regional and local temperature

is essentially dominated by the instantaneous value of the solar incidence angle. Small values of this angle result in high surface temperatures, and, unlike Vesta, the low obliquity of Ceres (~4°) does not result in observable seasonal effects for a given location on the surface. However, different responses to insolation as observed at the local scale may be indicative of differences in density/porosity and thermal conductivity, which is key to constrain thermo-physical modeling.

Publication:
American Geophysical Union, Fall Meeting 2015, abstract id.P53E-2184

Pub Date:
December 2015

Bibcode:
2015AGUFM.P53E2184T

Keywords:
6020 Ices;
PLANETARY SCIENCES: COMETS AND SMALL BODIES;
6040 Origin and evolution;
PLANETARY SCIENCES: COMETS AND SMALL BODIES;
6063 Volcanism;
PLANETARY SCIENCES: COMETS AND SMALL BODIES;
6205 Asteroids;
PLANETARY SCIENCES: SOLAR SYSTEM OBJECTS