

Exploring the surface of Venus in the laboratory and with VIRTIS on VenusExpress

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The VIRTIS instrument on the ESA mission Venus Express has produced the first in-orbit mapping of the surface of Venus using the atmospheric windows near 1 micron. Based on the data returned by VIRTIS a map of surface brightness variations could be obtained which are indicative of emissivity variations on the surface. The mapping in general indicates three surface types, characterized by average, increased and decreased emissivity. These surface types show a good correlation with geological units identified by radar mapping. In general high emissivity units are found on very fresh lava flows, while tesserae terrain is typically associated with the low emissivity unit. While the latter might be influenced by uncertainties in the Magellan topography for rough surface areas, the first gives important indications on the recent geological activity of Venus.

This completely new dataset, that is highly complementary to the geological mapping based on radar data can provide significant support for the design and planning of future missions to Venus. For the first time there are strong indications for the heterogeneity of the surface composition of Venus. This is not only important for the selection of potential landing sites, but can provide important insights in the evolution of Venus.

To support the mapping activity and the instrument development for future Venus missions we have started to obtain high temperature emissivity spectra of analogue materials at Venus surface temperatures. These laboratory measurements will provide for the first time realistic near infrared spectral data for the surface of Venus. Obtaining data of samples at 500°C and taking emissivity measurements at 1 micron is a very challenging task. After more than 3 years of preparation the setup at the Planetary Emissivity Laboratory in Berlin is near completion and first test measurements have been obtained successfully.