The Mercury Atmospheric and Surface Composition Spectrometer (MASCS) on the MERCURY Surface, Environment, Geochemistry, and Ranging (MESSENGER) spacecraft has mapped the surface of Mercury on a global basis during its one-year primary orbital mission and the first thir of its extended mission, producing more than three million spectra [1-3].

To analyze this large dataset we apply our recently developed advanced database management system. This system allows the extraction and simultaneous analysis of large amounts of data, transparent to the underlying data structure. As a test case we analyze here the statistical distribution of MASCS normalized reflectance at a few selected wavelengths. We obtain a separation of Mercury's surface into spectral classes that follow the MASCS global unsupervised classification on Mercury.

Data access:
1. Parameter selection in seconds
2. GIS direct interface
3. Spectra reading from target
4. Database feeding (Polygon/CT)

Data Queries over > 3 M points

The intersection table is automatically updated on data table or user polygon tables change.

Data Distribution: 450nm normalize reflectance

The areas \([-4\sigma, \sigma]\) and \([\sigma, 4\sigma]\) deviate substantially and asymmetrically from the normal distribution. The residual could be reasonably well fitted by normal distribution as well.

The intervals defined above have a coherent spatial distribution...\n\[\cdot\cdot\cdot, [-4\sigma, \sigma] : \text{red}\]
\([\sigma, 4\sigma] : \text{yellow}\]
\([4\sigma, 6\sigma] : \text{blue}\]

...that follow the MASCS global unsupervised classification on Mercury.

References