

## Mercury's Surface Reflectance at Ultraviolet to Near-Infrared Wavelengths: Characteristics and Variations

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Systematic mapping of the surface reflectance of Mercury by MESSENGER's Mercury Atmospheric and Surface Composition Spectrometer (MASCS) has now sampled all major geologic units. The Visible and Infrared Spectrograph (VIRS) channel on MASCS, which covers the wavelength range 300-1450 nm, has acquired a global data set that currently exceeds 1.5 million spectra. VIRS reflectance spectra show little evidence of any absorption band centered near a wavelength of 1000 nm associated with the presence of ferrous iron in silicates. The absence of this band and a variable absorption shoulder at 300-400 nm in younger materials are together consistent with a low but potentially spatially varying iron content. Combined with elemental constraints from other MESSENGER instruments, iron content of most Mercury materials is equivalent to less than about 3-4 wt% FeO. Very slight absorption-band-like features at wavelengths near 600 nm seen at some hollows and in areas of fresh crater materials hint at the presence of sulfur or other volatile compounds on Mercury's youngest surfaces.

All MASCS spectra have the characteristic of increasing reflectance with increasing wavelength, or "red" spectral slope. For most plains units, spectra resemble the absorption-free planetary mean spectrum. Mercury's northern plains and the interior plains of the Caloris basin have slightly higher albedo and steeper spectral slope than the planetary mean. Spectra in areas of low-reflectance material (LRM) are both darker than the planetary mean and less red-sloped or "bluer." Materials interpreted to be of pyroclastic origin have steeper ultraviolet-to-visible slopes than the planetary mean, whereas most LRM materials have shallower slopes in the ultraviolet. Fresh craters and hollows have variable ultraviolet-visible slopes and tend to show visible-infrared slopes that are more "blue" than the planetary mean. Variations in the ultraviolet-visible and visible-infrared slopes are consistent with spectral variations seen in laboratory measurements of very-low-iron glasses and pyroxenes.