Red spots are anomalous volcanic features in the lunar maria that are suggested to result from non-mare volcanism. One prominent example is the Gruithuizen Domes (above), which are the landing site for a future CLPS mission. Red spots are spectrally red (as seen in the WAC 3-color mosaic above) and a number of them show signatures consistent with the presence of silicic material (e.g., short Christiansen Feature wavelength). Some red spots are also associated with Thorium anomalies, and GRAIL data suggest that they have lower density than both mare basalts and felsic material.

If the red spots have lower density than typical lunar materials, then that may manifest in the Diviner thermal channel data. We analyze the Diviner nighttime data from channels 6-8 using the method of Hayne et al. (2017), who used a thermal model in conjunction with the Diviner thermal channel data to create maps of the lunar regolith H-parameter. H-parameter controls the change in density and conductivity with depth according to the following regolith density profile:

\[ \rho(z) = \rho_s e^{-(\rho_d - \rho_s)e^{-z/H}} \]

We follow the same method, fitting the Diviner nighttime temperature curves to a thermal model with H as the free parameter (see figure on the right). We make use of additional data collected since the previous study to create local area Rock Abundance and H-parameter maps for a number of lunar red spots.

**Interpretation**

Most red spots have lower rock abundance than surrounding maria, and localized regions within a number of red spots display slightly higher H-parameter. For a section of the Darney feature, the H-parameter is ~20% higher than it is for the surrounding maria. The effects of this on the Diviner data are best seen in the regolith temperature curve figure on the left. Some of the regions within red spots reach cooler temperatures (~2-3 K) than typical regolith, and can be fit with a higher H-parameter in the model. Because H-parameter depends on the way density and conductivity change with depth, a higher H-parameter generally corresponds with a lower thermal inertia. Low thermal inertia material on the Moon typically results from the regolith being finer-grained (i.e., fewer small rocks), less compact (more porous), or possibly containing grains that are more vesicular than typical regolith. This is potentially consistent with the GRAIL results that suggested red spots contain low density and vesicular material. It is unclear why the low thermal inertia material is only found at certain regions within some red spots, however.

**Conclusions**

Red Spots generally have lower rock abundance than surrounding mare regions

A number of red spots contain regions of high H-parameter (low thermal inertia)

Low thermal inertia is consistent with the presence of finer-grained or less compact regolith

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