

What Mercury's extreme environment tells us about early crust formation and volatiles in the inner solar system

FRIDAY APRIL 18

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12 PM PDT/AZ

3 pm Eastern

Mercury is extremely enriched in metals, which may have resulted from the nature of its building blocks or from mantle stripping by impacts. Despite its energetic accretion, data from NASA's MESSENGER spacecraft revealed a volatile-rich surface with high sulfur and carbon contents, indicating volatile retention in an oxygen-poor environment. Among primitive meteorites, enstatite chondrites formed under similarly reducing conditions and are hence the closest meteoritic analogs to Mercury. Experimental data will be combined with spacecraft observations to assess whether Mercury's mantle aligns in chemistry with enstatite chondrites. The role of Ca- and Mg-bearing sulfides on Mercury's mantle melting properties will be discussed. We will also explore the effects of low oxygen fugacity and sulfur enrichment on the distribution of radioactive heat-producing elements (U, Th, K) within the planet's interior. These findings provide insights into Mercury's geodynamic evolution and broader chemical trends within the solar system.



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