

Abstract:

Comparison of Observations on the Sodium Abundance of Mercury's Exosphere

Presenter: Alexander Lanzano

School: The University of Chicago

Mentors: Aimee Merkel, Tim Cassidy, Bill McClintock

From years of ground based observations since the mid 1980's we have seen that the chemical composition of Mercury's exosphere is heavily influenced by solar radiation. The MESSENGER mission is the first to analyze Mercury's exosphere from orbit. Given that these data were gathered from a new observation perspective we wish to compare them to the previous ground based studies. We compared the MESSENGER data to ground based data from Sprague et al. 1997 by analyzing how the abundance of sodium in the exosphere changes with the time of day on Mercury and its true anomaly (the planet's angular displacement from its closest point to the Sun). We found that both observations show there is a dependence of sodium abundance on both local time and on true anomaly. There is a greater abundance of sodium at earlier times in Mercury's day with the greatest abundance around dawn and the least abundance around dusk. There is also a greater abundance when Mercury's true anomaly is around  $180^\circ$  (its furthest point from the Sun where radiation pressure which disperses the exosphere is minimal). Although the data from the ground based observations are more scattered, the two show the same order of magnitude sodium abundance at similar local times and true anomalies. These findings from two different methods of data gathering show that that sodium abundance is greatest when the intensity of photons incident on the exosphere is greatest with minimal radiation pressure.