



A Comparison of Autoclass and Principal Component Analysis as Applied to Asteroid Families

T. Harvell (1), J. Ziffer (1), H. Campins(2), D. Arel(1), R. Desfosses(1), and M. Reuillard(1)

(1) University Of Southern Maine, Portland Maine, USA, (2) University of Central Florida, Orlando FL, USA

(thomas.harvell@maine.edu)

Abstract

We present and compare the Sloan Digital Sky Survey (SDSS) colors of the Themis family, an older (2.5 Gya) outer-belt asteroid family, with that of the Beagle family (15 Mya), Themis's younger second-generation family. Comparing Beagle family colors with that of its older progenitor's family's colors allows a direct test of space weathering effects on C-complex asteroids. The question of space weathering among C-Complex asteroids is an unsettled one. Nesvorný et al[1] found clear color differences between C-complex asteroids of different ages, which could be explained by space weathering processes. The trend with age that they determined based upon Principal Component Analysis (PCA) was anchored with the older Themis family at one extreme. Critical to the weathering hypothesis is the assumption that these asteroids would have similar un-weathered compositions. The catastrophic disruption of the Beagle family eliminates this question since its composition is that of its progenitor Themis member. The size of the SDSS dataset allows us to analyze these families using two statistical methods, PCA and Autoclass. Combined, these powerful methods provide a detailed picture of the role of space weathering among these asteroids

Acknowledgements

We would like to give special thanks to the University of Southern Maine Undergraduate Research Opportunities Program. Without their financial support this research would not have been possible. We would also like to thank the Heartmann Grant for providing some of the funding required for the international journey to present this work.

References

- [1] Nesvorný, D. and Jedicke, R. and Whiteley, R. J. and Ivezić, Ž.: Evidence for asteroid space weathering from the Sloan Digital Sky Survey, *Icarus*, Vol. 173, pp. 132-152, 2005.