Composition of Baptistina Asteroid Family: Implications for K-T Impactor Link. V. Reddy[1], M. S. Kelley[2], J. P. Emery[3], M. J. Gaffey[4], W. F. Bottke[5], M. Schaal[6], A. P. Cramer[7], and D. Takir[4], [1]Dept. of ESSP, Univ. of North Dakota (UND), Grand Forks, ND. [2]NASA Headquarters, Washington, D.C., [3]Carl Sagan Center, Mountain View, CA, [4]Dept. of Space Studies, UND, [5]Dept. of Space Studies, SWRI, Boulder, CO, [6]Dept. of Physics, UND. [7]Dept. of Geology, Georgia Southern Univ., Statesboro, GA.

Introduction: Catastrophic impacts have channeled the course of evolution of life on planet Earth. The most recent event took place 65 Myr when a ~10 km object impacted off the present day Yucatan Peninsula, Mexico, resulting in a mass extinction event [1-4]. The identification of a source region for the K-T impactor in the main asteroid belt was recently addressed.

It has been suggested that the K-T impactor originated from the break-up of the parent body of 298 Baptistina 160 Myr ago forming the Baptistina Asteroid Family (BAF) [5]. A key line of evidence linking 298 and the K-T impactor was their similar composition (CM2 carbonaceous chondrites) [5]. The composition of 298 was assumed from its taxonomic classification of C or X [6], which was based on a visible spectrum. That spectrum shows a 0.9-µm feature suggesting an S-type rather than a C or X. The lack of albedo data made it difficult to confirm its taxonomy.

Observation/Data Reduction: In order to better constrain the composition and albedo of BAF members, an observation campaign was launched in Feb.-March, 2008 using the NASA IRTF. Members of the BAF were observed using SpeX on Feb. 28, March 21 and 22 UT in prism (0.7-2.5 µm) and LXD (1.9-4.2 µm) modes. The prism data were reduced using IRAF and SpecPR; the LXD data using IDL routine developed by Emery.

Analysis: The average spectrum of 298 Baptistina from March 21 (0º rotational phase) & 22 (180º rotational phase) shows a well resolved Band I feature at 1.0±0.01 µm with a depth of 7±1% and a weaker (depth 2±1%) Band II feature at 2.0±0.2 µm. Based on the absorption features and the band parameters, the mineralogy of 298 includes olivine and traces of orthopyroxene. The LXD data show a rise in reflectance beyond 3.0 µm due to thermal emission. Using the Standard Thermal Model the estimated albedo is $\sim14^{+2}{}_{/-3}\%$. Based on the mineralogy and the albedo it is evident that 298 Baptistina is not a CM2 assemblage. The spectrum of BAF member 1365 Henyey also shows deep silicate features (Band I center: 1.01±0.01 µm, depth: 15±1%, Band II center: 2.0±0.1 µm, depth 4±1%) suggesting an olivine and OPX dominated S-type taxonomic classification rather than C or X type. While these results weaken the link between the BAF and the K-T impactor, Baptistina's dynamical location does not exclude the possibility of it being a) the remnant core of the original parent body, b) the impactor that destroyed the parent body, c) an interloper from other families. Spectral analyses of other BAF members are currently underway to solve the mystery.

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