A COMPARATIVE STUDY OF "LAYER SILICATE" INTERPLANETARY DUST PARTICLES (IDPs) AND CI/CM CARBONACEOUS CHONDRITES; M.S. Germani[1], J.P. Bradley[1], and D.E. Brownlee[2]. [1]McCrone Associates, Inc., Westmont, IL 60559, [2]Department of Astronomy FM-20, University of Washington, Seattle, WA 98195

A major goal of interplanetary dust research is determination of the source(s) of IDPs. The "layer silicate" (LS) IDPs are similar to CI and CM carbonaceous chondrites in that they are low porosity objects that contain matrix layer silicates and carbonates [1,2]. Because of these properties and evidence of aqueous alteration, it is likely that LS IDPs are asteroidal in origin. We have recently completed a study of thin-sections of eight LS IDPs and two carbonaceous chondrites using an automated analytical electron microscope, where large data sets of individual point count analyses can be obtained with spatial resolution better than 100 nanometers. These procedures have already been applied to a group of eight anhydrous IDPs from the "olivine" and "pyroxene" classes [3]. The aims of the present study were 1) to obtain detailed mineralogical information about a group of LS IDPs, and 2) to use this information to further explore the relationship between LS IDPs and CI and CM chondrites.

The LS IDPs studied were U222C29, W7029J10, U230A34, r21-m4-8a, U230A11A, U230A39, U2022F4, and U2022G20. Classification of each particle as an LS IDP was made on the basis of the following criteria: a) observation of basal lattice fringes and a chemical composition characteristic of layer silicates, b) measurement of -OH and CO_3^{2-} IR absorption bands [4], c) low porosity and smooth surface morphology characteristic of LS IDPs [1,5].

In thin section, the eight IDPs were found to be mineralogically diverse, in contrast to the meteorites which are mineralogically uniform on a micrometer scale. U222C29 (Fig. 1a) contained saponite (1.2 nm basal spacing) and several large Mg-rich carbonate grains. W7029J10 contained serpentine-like material and basal spacings of 0.7 nm were observed within some regions of the matrix. U230A34 (Fig. 1b) was an unusual IDP in that half of its volume was a single crystal of pyroxene, while the other half was chondritic matrix containing Fe-rich glass, Fe-rich smectite, and Fe-rich carbonates. r21-m4-8a was dominated by Mg-Fe pyroxenes and glassy Fe-rich matrix. Although IR measurements indicated that r21-m4-8a is hydrated [4], no crystalline layer silicates were observed. Ca-Mg and Ca-Mg-Fe carbonates were common in the matrix. U230A11A contained abundant, well crystallized serpentine (0.7 nm basal spacing). Pentlandite and magnetite were the most common "accessory" constituents. U230A39, U2022F4, and U2022G20 all contained conspicuously large amounts of magnetite on their outer surfaces as a rim (reminiscent of a fusion crust) and within their matrices. Smectite (1.2-1.4 nm basal spacing) was found in U230A39 but the matrices of U2022F4 and U2022G20 were glass-like with a vesicular texture.

Automated thin-film analyses of the eight IDPs, and Murchison (CM), and Orgueil (CI) provide insight into the relationship between LS IDPs, CI, and CM carbonaceous chondrites. The distribution of data points for the meteorites (Figs. 1c & 1d) shows little variation from one thin-section to another, but each of the eight LS IDPs appears to have a "unique" distribution of data points (Figs. 1a & 1b). If Murchison and Orgueil are representative of two distinct types of parent body, then it might be argued that the LS IDPs represent a broad range of parent bodies in which aqueous alteration has occurred. The thin-film data may also provide information about atmospheric

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entry heating (magnetite rims on three particles may have resulted from pulse heating) and contamination during IDP collection (r21-m4-8a was contaminated with cadmium, a common contaminant on collection "flags").

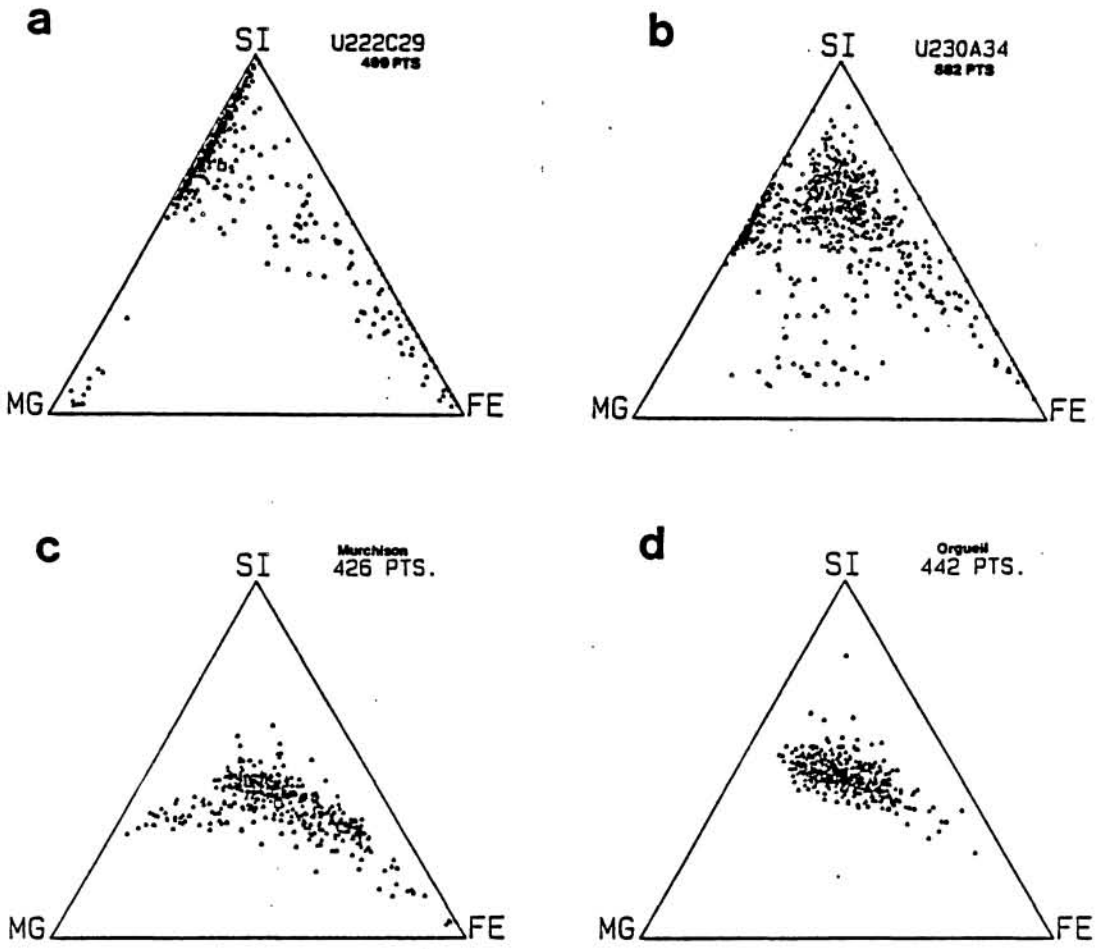

FIGURE 1 Mg-Si-Fe ternary plots for two LS IDPs and a CI and CM carbonaceous chondrite.

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