Sedimentary Geochemistry and Provenance of Late Cretaceous to early Tertiary Sandstones in the La Popa basin, Nuevo Leon, Mexico.

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Previous workers have suggested multiple sources for provenance of the sandstones in La Popa basin such as basement, volcanic, and sedimentary source regions (Hon, 2001; Shelley, 2001; Weislogel, 2001). However, the volcanic source terrane has been identified as the largest contributor (Lawton and Giles, 2001). Discerning the sediment source and its tectonic setting will provide greater constraint on the evolution of the basin. Two hypotheses are proposed in order to do this: 1) Determine the origin of the volcanic lithic component; 2) Changes in provenance related to Hidalgoan (~ Laramide) uplift are reflected in sandstone chemistry.

A petrological study of the five major sandstone-bearing formations using petrography and whole rock geochemistry will pinpoint their source terranes. Previous studies of these units have shown provenance to change upsection. The basal formation was derived from a fold and thrust belt and the associated volcanic arc (Hon, 2001). These source localities correspond to the Upper Jurassic-Lower Cretaceous Guerrero/Arperos composite terrane and the Late Cretaceous Alisitos continental magmatic arc, 650 km SW of La Popa basin (Weislogel, 2001). Sands in the middle of the section are eroded continental arc detritus with some recycled continental block material (Shelley, 2001). The upper two formations have yet to be studied in detail.

Samples will be collected at regular stratigraphic intervals (10 m to 50 m, depending on the unit thickness) from the Muerto Formation, Delgado Sandstone Tongue, Upper Sandstone Member, Viento Formation and Carroza Formation. Petrographic analyses will be compared to whole-rock major and trace element XRF analyses to determine changes in provenance. The ratios of immobile incompatible elements (Ti, Nb, Zr, Y, Ta) will distinguish between the arc and ocean island basalt sources, of the volcanic lithic component. For instance, volcanic arcs will have low Nb and high Y/Nb ratios; conversely, oceanic island basalts will have high Nb and low Y/Nb ratios. Similarly, changes in element abundance throughout a formation will serve to indicate if any basement provenance changes occurred.

Preliminary data show chemical differences between the units based on both major and trace element XRF analyses. A calcite trend line, rather than a gypsum trend line best describes the CaO content of the rocks. The oldest units show higher Sr and Rb concentrations, which decrease upsection. These data will be used to describe changes in provenance within the area during Laramide time. Concurrently, the data will be used to delineate any changes in sediment source, based on variations in element concentration, from the base to the top of a unit.