Integrating geology, chemistry and geometry in space and time – a relational database for the Trans-Mexican Volcanic Belt

M.T. OROZCO-ESQUIVEL[1], S. STRAUB[2], L. FERRARI[1]

[1] Centro de Geociencias, UNAM, Campus Juriquilla, 76230 Querétaro, Qro., Mexico; torozco@geociencias.unam.mx; luca@geociencias.unam.mx

[2] Lamont Doherty Earth Observatory, 61 Route 9W, Palisades NY, U.S.A.; smstraub@ldeo.columbia.edu

The Mexican Volcanic Belt, a thick-crusted volcanic arc (15 to 47 km), is characterized by a broad rock spectrum, from mafic alkaline rocks of clear mantle origin to the typical calc-alkaline andesite series of continental arcs. High-resolution geochemical mapping reveals considerable compositional diversity in space and time that must have implications for the various hypotheses proposed for its formation and evolution [1]. Efficient evaluation of such hypotheses requires regional scale investigations of rock geochemistry and geological information linked to subduction parameters. To this purpose, we initiated the construction of a relational database (MexDB).

The MexDB schema builds largely on the EarthChem database schema (http://www.earthchem.org/). However, as being created for submarine mid-ocean ridges, the EarthChem schema cannot take full advantage of information available from subaerial volcanic arcs. Here we propose specific extensions and adaptations of the existing schema and data.

The central feature of the modified schema is a list of eruptive centers (or "vents"), to each of which a single set of geographic coordinates is assigned. To each vent then, the associated geochemical information (e.g. rock samples) and geological information (e.g. ages, volcanic volumes) are allocated regardless of the geographical position of sample or of the volcanic deposit. Because each vent is spatially defined within the geometry of the subduction zone, the chemical and volumetric variability of each vent can be linked to the subduction parameters (such as the composition and thickness of crust, convergence rate, distance to trench, etc.) with a spatial resolution equal to those of the vents. Moreover, the revised MexDB contains more accurate information on sample locations and more extensive data collected from Mexican literature.

References

[1] Gómez-Tuena, A., Orozco-Esquivel, M.T., and Ferrari, L. (2005) *Bol. Soc. Geol. Mex.*, **57**, 227-285.