Geochemical and mineralogical features of Late Pliocene to Quaternary clayey sediments of the Lower Guadalquivir Basin

M.P. Mata[1], F.J. Valdepeñas Polo[2], J.M. Salvany[3], E. Bellido[1], M. Castillo[1], C. Mediavilla[4]

(1) Instituto Geológico y Minero de España (IGME), C/ La Calera, 1, 28760 - Tres Cantos (Spain)
(2) Univ. Complutense de Madrid (UCM), C/ José Antonio Novais, 2, Ciudad Universitaria – Madrid (Spain)
(3) Departament Enginyeria del Terreny, Univ. Politècnica de Catalunya, 08034 - Barcelona (Spain)
(4) Instituto Geológico y Minero de España (IGME), Unidad de Sevilla, Pl. de España, Torre Norte, 41013 - Sevilla (Spain)

The Guadalquivir Basin (GB) in southern Spain is an ENE-WSW elongated foreland basin developed during the Neogene and Quaternary between the external units of the Betic Cordillera and the Iberian Massif. It is located at a strategic position for studying the role of tectonic and climatic processes in the functioning of the connection between the Mediterranean Sea and the Atlantic Ocean, which has played an important role on the Earth´s climate since the Late Neogene. Previous data obtained on 23 exploratory boreholes drilled on the Lower Guadalquivir described the lithostratigraphy, chronology and magnetostratigraphy, showing the tectono-sedimentary evolution for this area. Lithology of the studied cores showed marly, clayey and sandy deposits for the lower part of the sequence and the predominance of sands, gravels and clays for the upper continental part of the sequence. In this study 60 fine-grained samples, Pliocene to Holocene in age, corresponding to 10 boreholes of the lower Guadalquivir basin have been analyzed at the IGME laboratory by means of XRF analysis (major and traces) on bulk sample and bulk and <2 micron, clay mineralogy, by X-Ray diffraction. In addition, a petrographical study on marly and coarser-grained samples and a statistical analysis integrating all data have also been made in order to compare and discriminate the compositional characteristics of different units regarding their origin or sediment supply, and also in order to detect main environmental changes along the sequence from Pliocene to Holocene. Bulk mineralogy and elemental geochemistry is fairly constant along all the studied clayey samples showing no significant differences in major minerals and geochemical composition. Results of bulk mineralogy show that quartz, calcite, K-feldspars are the main minerals, dolomite, albite are present as minor minerals and gypsum and halite are sporadic. Clay mineralogy is made of abundant smectite, interstrafied illite/smectite, illite, kaolinite and sporadic palygorskite. In addition to the clay minerals as determined by XRD, glauconite has been identified on thin section as grains and pellets. A significative change in smectite vs illite/smectite contents has been observed between the different formations and specially into Lebrija formation sediments. Therefore, clay mineralogy seems to be a sensitive proxy of environmental and source areas changes to be used on this area. This abstract is a contribution to Guadaltyc project: CGL- 2012-30875

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Corresponding author: p.mata@igme.es