

32nd IGC - Florence, 2004

Abstract title

K-AR AGES AND REE CHARACTERISTICS OF DIAGENETIC CLAY MINERALS FROM PERMIAN UNITS OF PARANÁ BASIN, SOUTH AMERICA

Authors

SANT'ANNA LUCY GOMES ¹, CLAUER N. ², CORDANI UMBERTO GIUSEPPE ¹, RICCOMINI C. ¹, VELÁZQUEZ V.F. ¹

presenter's e-mail: lsantann@hotmail.com

1 - Institute of Geosciences, University of São Paulo, Brazil

2 - Centre de Géochimie de la Surface (CNRS / ULP), Strasbourg, France

Keywords

Illite

K-Ar

Diagenesis

South America

Permian

Abstract

The depositional history of the Paraná Basin, a large intracratonic basin in central-southeast South America, was interrupted by the Gondwana breakup and the associated flood volcanism in the Early Cretaceous. In order to evaluate the possible influence of the Cretaceous magmatism on diagenetic events recorded in the Permian oil-bearing sequence, this study was focused on the mineralogical, geochemical and isotopic characteristics of authigenic clay minerals from the Rio Bonito and Tatuí formations (Brazil) and the San Miguel Formation (eastern Paraguay). These sedimentary (mainly siliciclastic in nature) units are cemented by different types of diagenetic minerals, such as albite, K-feldspar, calcite, dolomite, zeolite and quartz. Authigenic clay minerals are mainly illitic mineral types (including honeycomb-type mixed-layer illite-smectite, pore bridging fibrous illite-smectite, platy illite and a random mixed-layer illite-smectite) and chlorite. Kaolinite, corrensite and smectite are also locally observed. One measured and several estimated K-Ar ages of the illite-type assemblages indicate that these diagenetic minerals were generated during the Early Cretaceous magmatic event, between 140 and 130 Ma. Three types of rare-earth elemental patterns were recognized, mainly reflecting either the origin of the fluids and/or the prevailing water/rock ratio during the diagenesis of these Permian units. Hydrothermal fluids characterized by depleted LREE and a positive Eu anomaly, promoted the precipitation of monomineralic and high-crystallinity authigenic clays in those sedimentary levels with high water/rock ratios. Oil accumulation in sandstones of the San Miguel Formation in eastern Paraguay probably promoted reducing conditions favouring the Eu²⁺ fractionation. Percolating fluids, perhaps also of hydrothermal origin, but in lesser amounts or in less permeable rocks inducing a lower water/rock ratio, led to flat REE patterns in the authigenic illite assemblages. The mineralogical, geochemical and isotopic results of the present study outline the occurrence of fluid migrations in the Rio Bonito, Tatuí and San Miguel formations, induced by the Cretaceous Serra Geral igneous event that promoted clay authigenesis. The authors thank FAPESP, CGS/CNRS-ULP (France), CPRM, USP and MOPC (Paraguay) for their financial and/or technical support to the study.

ACCEPTED as Oral Presentation

in session: "G21.15 - Diagenesis of clastic and carbonate sediments"