LATE EOCENE-OLIGOCENE SHORTENING EPISODE IN EASTERN CORDILLERA OF COLOMBIA VIEWED BY EMERALD DATING

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RESUMÉ: L'étude métallogénique des gisements d'émeraude de Colombie encaissés dans les shales noirs du Crétacé inférieur, conduit à d'intéressantes applications concernant l'évolution tectonique de la Cordillère Orientale et notamment la phase de déformation fini Eocène-Oligocène à laquelle sont attribués les mouvements ascendants de saumures hydrothermales associées à la formation des émeraudes.

KEY WORDS: Eastern Cordillera, Colombia, Emerald, Lower Cretaceous black shale, Eocene-Oligocene, Petroleum exploration.

INTRODUCTION

Recent progress in metallogenetic studies of Colombian emerald deposits (Giuliani et al., 1990a; Cheilletz et al., 1991) have issued important tectonic implications interesting the Eastern Cordillera of Colombian Andes. As suggested by Mégard (1987), the Eastern Cordillera constitutes an inverted sedimentary back-arc basin of Jurassic-Late Cretaceous age filled with thick accumulations of marine sediments. Eocene-Late Oligocene synorogenic non-marine molasse sequences buried the basin as a response to uplift of the Central Cordillera. Inversion of the Eastern Cordillera basin occurred during the Andean compressional episode at Late Miocene-Pliocene time.

The Colombian emerald deposits are grouped within two belts (Fig. 1) situated along the two major polyphased thrust zones that correspond approximatively to the original limits of the Cretaceous basin (Mégard, 1987; Schamel, 1991). The emerald mineralization consists of carbonate-pyrite veins and breccia hosted by Lower Cretaceous black-shales corresponding to Macanal (Berriasian-Valanginian; Eastern belt) and Paja (Hauterivian-Barremian; Western belt) formations. The genesis of the emerald mineralization is undoubtly attributed to epigenetic hydrothermal fluid circulations (Beus and Mineev, 1972); however the age of the tectonic phase responsible for the

In this paper, we attempt to briefly examine the consequences of the age of emerald formation on the regional tectonic-geologic framework.

extrapolation of these complex brines in the $NaCl$-H_2O system lead to a pressure-

et al., 1993).

TECTONIC CONSEQUENCES

The location of the emerald deposits along the original limits of the Cretaceous basin suggests that these limits might constitute deep-seated rejuvenated faults allowing hot-fluid circulations up through the sedimentary pile. Hydro-fracturing and strongly reducing environment conditions highly favoured by the black shale lower Cretaceous horizons, provoked the emerald-pyrite-calcite precipitation. Comparison between thermo-barometric data for emerald generation (290-360° C, 1Kb; Cheilletz et al., 1993) and burial temperature estimations (135° C at 4500 m depth; Hébrard, 1985) requires a 165

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