GEOTECTONIC POSITION AND METAL SOURCES OF STRATABOUND ORES IN THE CENTRAL ANDES - LEAD ISOTOPIC CONSTRAINTS

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Resumen

La composición isotópica de plomo de menas de yacimientos estratoligados en los Andes Centrales muestra una clara interrelación con la posición geotectónica de los yacimientos considerados. Diferentes grados de mezcla de tres reservorios principales (manto, orógeno y corteza continental superior antigua) explican los datos obtenidos. No es necesario involucrar la participación de sedimentos pelágicos subducidos.

Key words: lead isotope, stratabound ore deposit, geotectonic position, Central Andes

[redacted] original and published ore lead isotope data (Figs. 1 and 2). Stratabound ore deposits can be classified according to their geotectonic position into the following metallogenetic Stages (Fontboté, 1990; ore deposits with available lead isotope data are indicated).

STAGE I (TRIASSIC-LIASSIC) Ore deposits in a carbonate platform without apparent relation to a pair magmatic arc - back-arc basin (Pucará basin, Peru).

Ia) Volcanic-associated polymetallic deposits (in part massive sulfides) (Carahuacra, Huaripampa, Machcán)

Ib) MVT deposits at the base of the carbonate sequence (Shalipayco)

Ic) MVT deposits within the carbonate sequence (San Vicente)

STAGE II (LIASSIC ALBIAN) Ore deposits in the ensialic paleogeographic pair magmatic arc - back-arc basin, and in the platform at the continent edge.

IIa) In volcanic sequences at the magmatic arc (Susana, Buena Esperanza, Mantos Blancos).

IIb) In volcanoclastic basins near the volcanic arc (in part developed as intra-arc basins) (Caleta Coloso, Talcuna, Mantos de Catemu, Sierra la Bandera, La Negra).

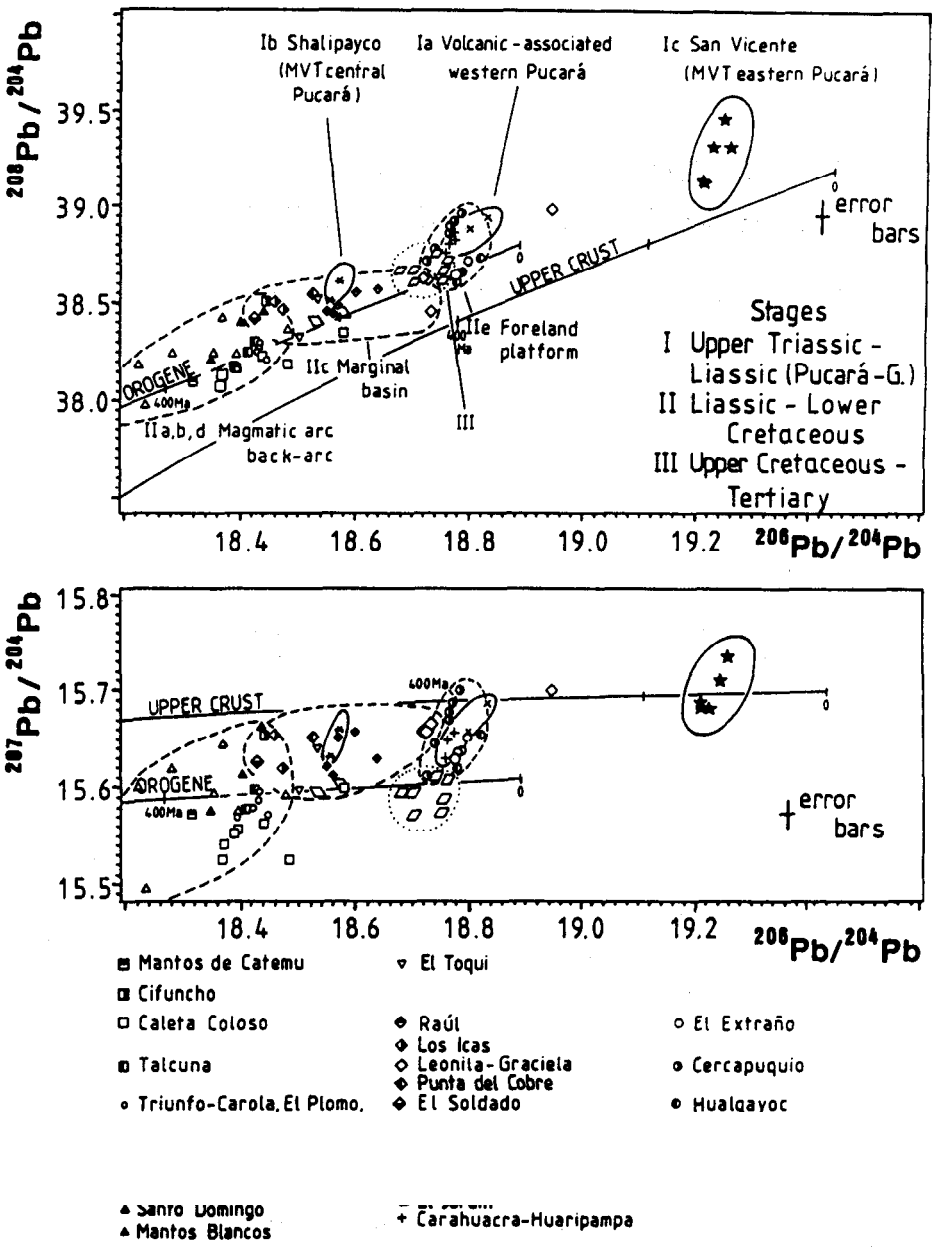

Fig. 1 Compilation of lead isotopic compositions of ore minerals from stratabound ore deposits in the Central Andes. Mantos de Catemu, Cifuncho, Carolina de Michilla,

Gunnesch et al. (in press), Macfarlane (1989), Mukasa (1984), and Puig (1988).

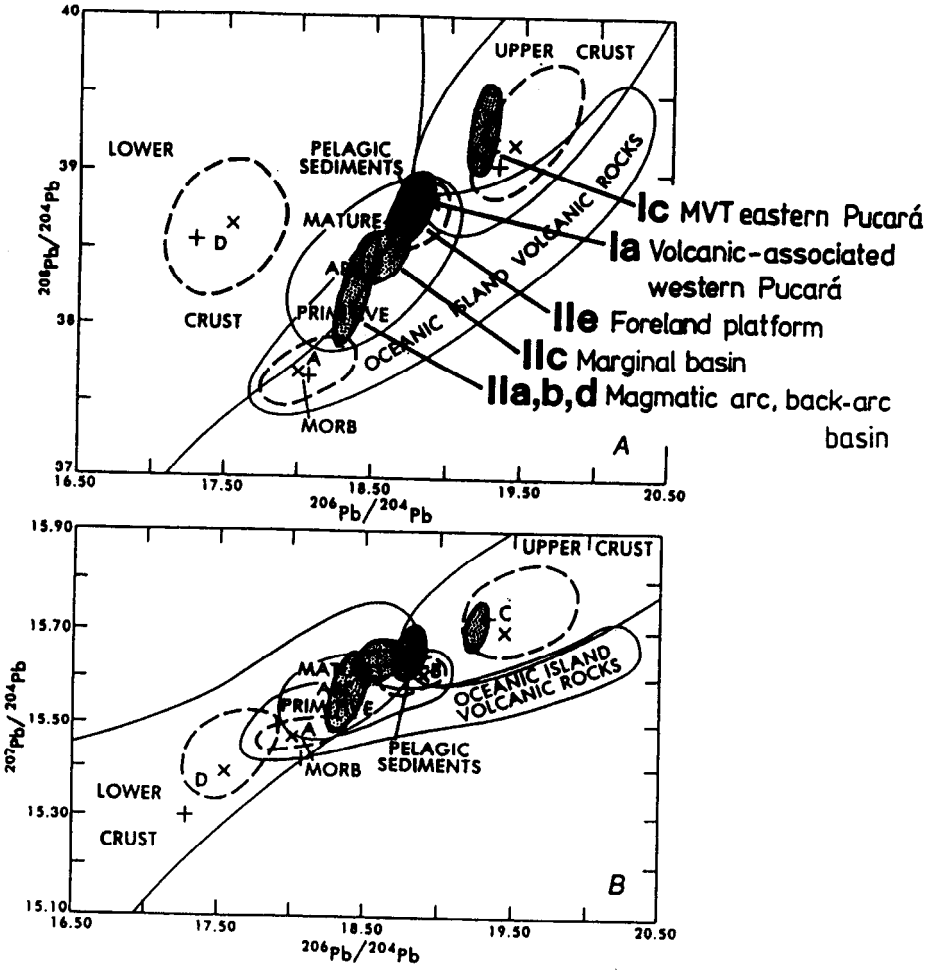

Fig. 2 Main fields of stratabound ore deposits in the Central Andes compared to the modern field for mantle, upper crust, orogene, and pelagic sediments according to Zartman and Doe (1981). A mantle; B orogene; C upper crust; D lower crust. Modified from Fontboté et al. (1990).

IIc) In volcano-sedimentary sequences in back-arc basins (in part developed as marginal basins) (Los Icas, Raúl, Leonila-Graciela, El Soldado).

IId) Ore deposits in marine sedimentary sequences in back-arc position (Triunfo-Carola, El Plomo, Jaula, Las Cañas, Cifuncho).

IIe) In platform sediments attached to the foreland (El Extraño, Huanzalá, Cercapuquio, Hualgayoc).

STAGE III (UPPER CRETACEOUS-CENOZOIC) Ore deposits in continental intra-arc and foreland basins.

IIIa) Fluvial-lacustrine basins in intermediate to acid volcanic environment (El Jardín).

IIIb) Molasse sequences in intermontane basins (S. Bartolo).

IIIc) Deposits related to Cenozoic alkaline volcanics.

The lead isotopic investigations indicate that mixing of different sources was involved relative to the geotectonic position. The observed lead isotopic ratios are consistent with a model which in a simplified form is based on the different degree of mixing of three "end members". They are a mantle component (ore deposits of stage II located near the magmatic arc), an "orogene" component (mainly represented in deposits in the platform basin of stage IIe but also in intramontane basins of stage IIIa, and in stage Ia), and old upper continental crust (in MVT deposits of stage Ic in the carbonate platform at the margin of the Brazilian Shield). In particular in stage II a clear trend towards more radiogenic lead isotopic ratios moving from the magmatic arc to the ore deposits on platform sediments attached to the foreland is observed. The participation of subducted pelagic sediments is not necessary to explain the lead isotope ratios in the investigated stratabound ore deposits. These isotopic results are coherent with tectonic, paleogeographic, and paragenetic evidences, which indicate that ore genesis is directly related to immediate geologic environment. The latter may or may not be, in turn, a result of the subduction process.

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