Large Structural Controls of Mineral Deposits of Peru

Víctor Carlotto[†]

INGEMMET, Av. Canada 1470, San Borja, Lima, Peru

[†]E-mail, vcarlotto@ingemmet.gob.pe

The geotectonic domains of Peru are controlled by major fault systems, which have controlled the major mineral deposits and the variety of metals (Fig. 1). Many of these faults correspond to the limits of allochthonous or parautochthonous blocks accreted to Amazonia in different geologic times. In the south, the Limbani-La Rinconada fault system situated in the Eastern Cordillera (Fig. 1) is the main suture of the accretion of the Arequipa Massif to Amazonia, 1,000 m.y. ago. This suture controlled the back-arc magmatism and the different mineralization times of Au, Sn, W, Mo, U, Ni, Co, Pt, Cu, Pb, and Zn of the Ananea-La Rinconada, Carabaya, Crucero, San Rafael-Palca XI, Macusani, Vilcabamba, and Lares districts.

The Cusco-Lagunillas-Mañazo fault system controlled the emplacement of the Andahuaylas-Yauri batholith, which formed the Cu-Au and Cu-Mo porphyry deposits of the Las Bambas, Tintaya, Los Chancas, Cotabambas, etc. (Fig. 1), between 43 and 30 Ma. To the south, the Condoroma-Caylloma High (Fig. 1) is related to Miocene Au-Ag epithermal deposits such as Canahuire, Tucari, Santa Rosa, Caylloma, Orcopampa, Arcata, and Selene, among others. The Cincha-Lluta-Incapuquio fault system controlled the formation of the Cordillera Occidental and the large deposits of Paleocene-Eocene Cu-Mo porphyry, such as Cuajone, Toquepala, Cerro Verde, and Quellaveco (Fig. 1). Farther north, this system joins the Iquipi Fault, where Cu porphyry mineralization such as Zafranal and Au-Pb-Zn-Cu deposits such as Orion or Ishihuinca are from the Late Cretaceous age.

In the north and center, the Western Cordillera is in contact with the Eastern Cordillera through the Río Marañón Fault (Fig. 1), which is a suture of the accretion of the Paracas block to Amazonia. In this suture, ophiolites crop out with chromite of the Neoproterozic age (Tapo deposit). The Pataz batholith (Carboniferous), which formed the orogenic Au deposits of Pataz (Fig. 1), was also emplaced in this suture. The suture passes through Cerro de Pasco and controlled the mineralization of Quicay Eocene epithermal Au, Atacocha and Milpo Oligocene Pb-Zn skarn, and Cerro de Pasco Miocene Cu-Ag-(Au-Zn-Pb) epithermal deposits (Fig. 1).

The Tapacocha Fault separates the Mesozoic western basin. To the west, the Casma basin contains iron oxide copper-gold (IOCG) deposits of the Lower Cretaceous, such as Mina Justa. To the east, the later Cretaceous-Paleocene basin has Pb-Zn-Cu massive sulfide. Farther east, in the Cenozoic Marañón fault and fold belt (MBTF, Fig. 1), a large number of subvolcanic intrusive bodies are responsible the Miocene Cu-Mo-Au porphyry deposits and skarn Pb-Zn-Cu deposits, most notably Antamina, Toromocho, Michiquillay, or Minas Conga. To the west of the Marañón fault and fold belt, the volcanic Calipuy formed large Miocene Au-Ag epithermal deposits, notably Yanacocha, Pierina, and Alto Chicama (Fig. 1). In northwest Peru, the Huancabamba Fault is the parautochthonous suture of the Amotape Tahuín block accreted to South America in the Early Cretaceous. This suture controlled the Albian Tambogrande Cu-Zn-Au-Ag massive sulfide deposits (Fig. 1).

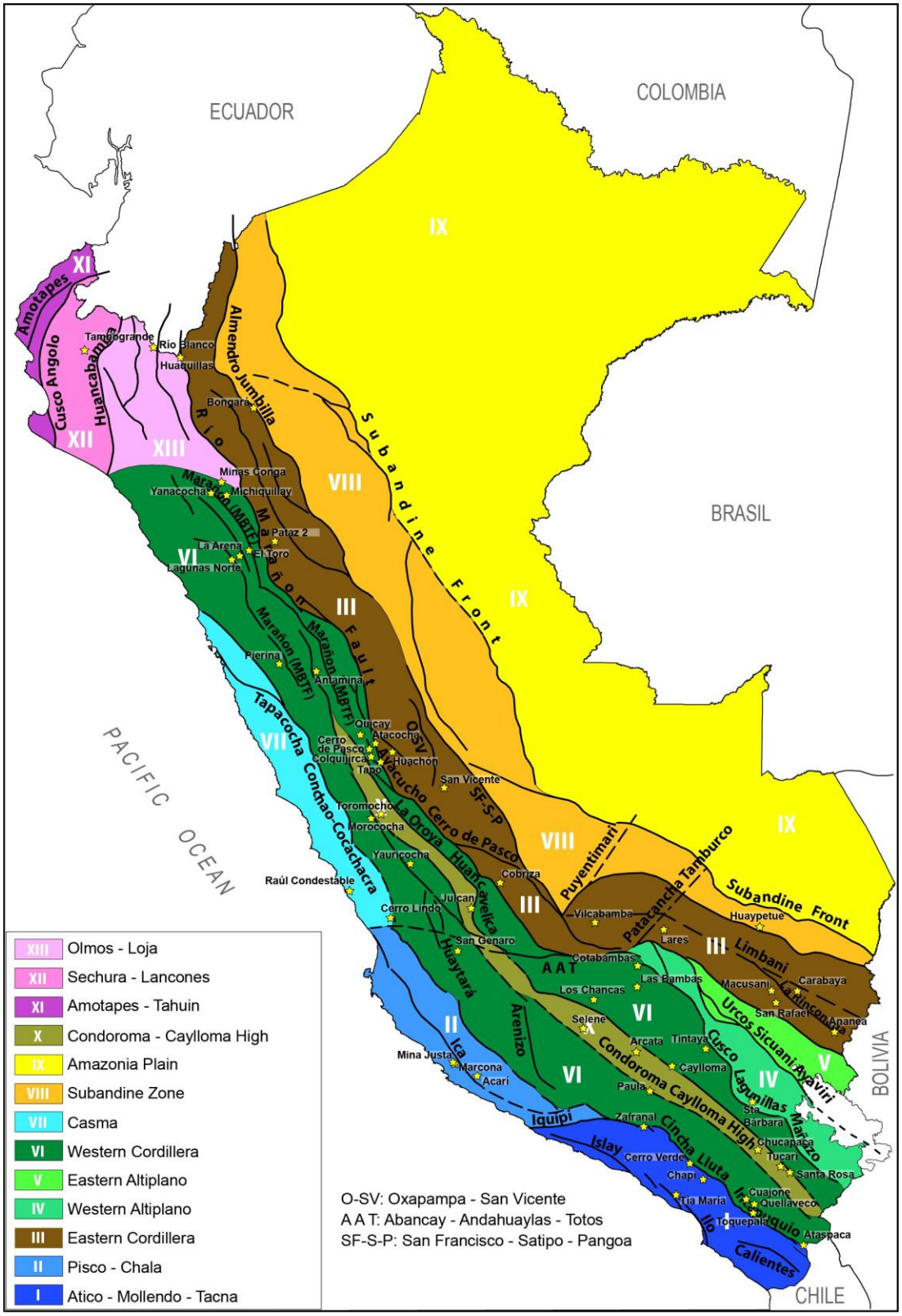

Fig. 1. The geotectonic domains of Peru, the major fault systems, and the main mineral deposits.