



Pumping Iron from a Metamorphic Aureole into an Steeply Inclined Dyke-like Intrusion; a New Model for the Formation of the Panzihua Fe-Ti-V Deposit

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The Panzihua intrusion in southwest China is part of the Emeishan large igneous province and host of a large Fe-Ti-V ore deposit. In previous interpretations it was considered to be a layered, differentiated sill with the ore deposits at its base. New structural and petrological data provide a new interpretation: the intrusion has an open S-shape, with two near-concordant segments joined by a steeply dipping discordant dyke-like segment. Well-developed magmatic layering is oriented oblique to the walls of the intrusion, even in the central dyke-like segment. This layering cannot have formed by crystal settling or in-situ growth on the floor of the intrusion; instead we propose that it formed by inward solidification of multiple, individually operating, convection cells. During emplacement of the main intrusion, multiple generations of mafic dykes invaded the marbles of the lower metamorphic aureole. These dykes reacted extensively with the marble, and the addition of elements such as Si, Al and Fe, combined with decarbonatization, converting them to calc-silicate rocks. At the border of the intrusion, the calc-silicate minerals were destabilized by high-temperature reactions and transferred in fluids into the main intrusion. The addition of Fe, accompanied by oxidization of the magma, was instrumental in the formation of the ore deposits.