Characterization of magmas associated with porphyry deposits: Links between petrography and the oxidation state of the magma, Cerro Corona deposit, Peru

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Cu-Au porphyry deposits are associated with the intrusion of oxidized intermediate to felsic magma in subduction contexts. A recent study suggests a link between the degree of oxidation of magmas and the tonnage of deposits in the Central Asian Orogenic Belt. Our project focuses on the evolution of the oxidation state of the granitic intrusions at the Cerro Corona porphyry Cu-Au deposit in the Peruvian Cordillera, and linking these variations with age, petrographical and geochemical data. Cerro Corona deposit owned by Gold Fields La Cima S.A. is in the Hualgayoc mining district of northern Peru, situated 30 km north of the Yanacocha deposit. The host intrusive rocks are of dacitic plagioclase porphyry composition emplaced during five intrusive pulses. Samples show a typical porphyric texture with phenocrysts of plagioclase, biotite and hornblende in a fine-grained groundmass. The primary assemblage is plagioclase + quartz + biotite + hornblende ± magnetite + zircon + apatite. The alteration sequence is composed of a potassic alteration, recorded by the replacement of hornblende by biotite, followed by a propylitic alteration during which chlorite partially replaces biotite. Rare epidote replaces both hornblende and plagioclase and is only observed in one pulse. Whole rock data for the ore-hosting intrusions have similar rare earth element (REE) patterns and are comparable to those of samples from the surrounding (within 10 km) intrusions. REEs show less steep pattern and lesser negative Eu anomalies towards late intrusions. Based on textural evidences and cathodoluminescence (CL) imaging, there is only one population of zircon in individual samples. Zircons are euhedral with typical magmatic oscillatory zoning and almost no inherited cores. They commonly show sector zoning and often contain apatite inclusions. The presence of a U-rich, irregularly-shaped domain in the zircon may suggest short-lived perturbation.