Formation of the Yuanjiang ruby deposit and its relationship with movement of the Red River shear belt, SW China: Evidence from graphite Raman analyses and Ar-Ar phlogopite geochronology

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Central and South East Asia yielded most of valuable marble-hosted ruby deposits, which developed during the continental collision of Indian and Eurasian plate and outcropped in suture zones or extrusion shearing zones. The Yuanjiang marble-hosted ruby deposit, located at the middle of Ailaoshan complex, is the first and only economic ruby deposit in China. In the deposit, graphite was closely coexisted with ruby and potentially provided crucial reduction environment for ruby deposition. The structure of graphite is strongly correlated with peak metamorphic temperature and not sensitive to pressure and retrograde metamorphism. Raman analyses yields graphite forming temperature at 592-608°C, which represented upper forming temperature of ruby. The ruby forming temperature slightly lower than peak metamorphic temperature indicating that ruby formed during retrograde metamorphism as same as other marble-hosted ruby in Central and South East Asia. $^{40}Ar/^{39}Ar$ dating of three ruby coexisted phlogopite samples yield weighted mean average age of 22.26±0.20 Ma (MSWD= 0.49, n=3), which was interpreted as the minimum ore-forming age and genyerally in line with Cenozoic Asia ruby mineralization. The reported data of ore-forming age and temperature of Yuanjiang marble-hosted ruby deposit suggested that ruby mineralization in Yuanjiang area is likely to be part of Central and South East Asia marble-hosted ruby deposit belt. Its formation was linked to Cenozoic large scale left lateral shearing and extrusion of the Indochina block as response to continental collision between the Indian and Eurasian plate.