Geophysical Research Abstracts
Vol. 18, EGU2016-8972, 2016
EGU General Assembly 2016

Experimental constraints on the Qitianling granite in south China: phase equilibria and petrogenetic implications

Fangfang Huang (1,2), Bruno Scaillet (2), Rucheng Wang (1), Saskia Erdmann (1), Yan Chen (2), Michel Faure (2), Hongsheng Liu (1,2), Lei Xie (1), Bo Wang (1), and Jinchu Zhu (1)

(1) State Key Laboratory for Mineral Deposits Research, School of Earth Sciences and Engineering, Nanjing University, Nanjing 210046, China (huangfangfang.nju@gmail.com), (2) Institut des Sciences de la Terre d'Orléans (ISTO), Université d'Orléans - CNRS - BRGM, UMR 7327 1A Rue de la Férollerie, 45071 Orléans, France

In South China, the huge distribution of the Mesozoic metallogenic province reflects the abundant magmatism and associated mineralizations which occurred during that period. Building up the phase equilibrium diagrams of representative Mesozoic granites allows us to better understand Mesozoic magmatic events, an approach so far little applied to granites of South China. The Qitianling ganite is a representative Jurassic A-type metaluminous pluton which is associated with tin mineralization in South China. The dominant rock-types are hornblende-biotite monzonitic granites, biotite±hornblende bearing granites and fine-grained biotite-bearing granites. Three metaluminous granite samples (QTL38C, QTL14A and QTL13), of varying mafic character but all bearing hornblende, were chosen for constraining crystallization and magma generation conditions of the Qitianling composite batholith. Crystallization experiments were performed in the 100-700 MPa range, albeit mainly at 200 MPa, at an fO_2 at NNO-1 or NNO +2.5, in a temperature range 700°C to 900°C. At 200 MPa, the water content in melt varies between 3 wt% and 6.5 wt% (water-saturated). Experimental results show that under H_2O-saturated conditions and at NNO-1, ilmenite, magnetite and pyroxene are the liquidus phases, followed by hornblende, biotite and plagioclase. Hornblende is present only in the most mafic sample (QTL38C), below 900°C and above 5 wt% H_2O. In contrast, for H_2O-saturated conditions and at NNO+2.5, magnetite, pyroxene crystallize first, followed by biotite while ilmenite is rarely observed. Petrographic observations of natural samples show that magnetite and ilmenite coexist, whereas pyroxene is never observed. The Fe# value (Fe/Mg+Fe) of natural amphibole goes up to 0.69, being on average at 0.67. Experiments indicate that the crystallization of pyroxene occurs at early magmatic stages, but it breaks down to hornblende and biotite at low temperatures, explaining its absence in natural assemblages. The comparison between experimental and natural samples suggests a minimum temperature of 800°C for Qitianling granite, which is consistent with the zircon saturation temperature of 816°C. The Fe# values of amphibole and biotite both suggest a fO_2 between NNO-1 and NNO. The initial water content in the melt is constrained by plagioclase and hornblende to be between 5-6.5 wt.%.