Geophysical Research Abstracts, Vol. 8, 05556, 2006
SRef-ID: 1607-7962/gra/EGU06-A-05556

A multidisciplinary study on the Carboniferous (Namurian) Montmarault granitic pluton and its tectonic bearings on the activity of the Sillon Houiller Fault (Variscan Massif Central, France)

A. Joly (1, 2), Y. Chen (1), M. Faure (1), G. Martelet (2), and C. Truffert (2)

(1) Institut des Sciences de la Terre d'Orléans, UMR CNRS 6113, Université d'Orléans, F45067, Cedex 2, France, (2) Bureau de Recherches Géologiques et Minières, Orléans, F45060, Cedex 2, France (aurore.joly@univ-orleans.fr)

In the Variscan French Massif Central, the Sillon Houiller Fault (SHF) is a major sub meridian discontinuity which kinematics, timing and evolution remain poorly understood. The spatial relationship of this accident with the surrounding granitic plutons suggests a genetic link between the SHF activity and pluton emplacement. The SHF is classically interpreted as a Late Carboniferous left-lateral wrench fault that might have accommodated a NW-SE and NE-SW extensional tectonics to the West and East, respectively. However, this model disagrees with structural and geochronologic data that clearly show two successive and distinct extensional strain fields. Thus, in order to better understand the faulting process, the Montmarault granitic pluton, located along the western side of the Sillon Houiller fault, has been chosen as target for a multidisciplinary study. Monazite yields a chemical U-Th/Pb age of 321$\pm$ 2Ma (i.e. Namurian) interpreted as the age of pluton emplacement. Thirty-seven sites of 214 drilling cores have been collected for the study of the Anisotropy of Magnetic Susceptibility (AMS). The biotite is identified as the main magnetic susceptibility carrier with an average of 150 μSI. However, few sites show very high magnetic susceptibility carried by magnetite which is suspected to be secondary mineral because these sites are located along on the contact with three Late Carboniferous coal basins. More than 39 % sites show well defined principal anisotropic axes. To constrain the structure of the granitic massif at depth, aeromagnetic and gravity data were interpreted. A complete Bouguer anomaly map of the Montmarault granite including existing data,

supplemented by 525 new gravity stations, provides an average coverage of the area with about 1 station per km^2. Based on rock density and magnetic susceptibility measurements, direct 2D joint gravity and magnetic modelling has been performed along several cross-sections.

These studies allow us to draw the following conclusions. The Montmarault pluton exhibits a magnetic foliation dipping at high angle towards to the fault for those sites close to the fault and flat lying or gently dipping for other sites. The majority of sampled sites shows a consistently NW-SE trending magnetic lineation which is perpendicular to the Sillon Houiller fault. The important negative gravity anomaly along the fault and a weak anomaly to the west suggest that the Montmarault pluton is rooted along the SHF and spreads out northwestwards. Therefore, for the Namurian, the SHF cannot be considered as a transfer fault during but rather as a normal fault. These geometry and kinematics comply well with the overall late-orogenic regional extensional pattern at the scale of the whole Variscan French Massif Central. A preliminary 3D modelling of the pluton combining our new structural, AMS, gravity and aeromagnetic data, is also presented.

Keywords: Granitic pluton, Anisotropy of Magnetic Susceptibility (AMS), European Variscan belt, Gravity and magnetic modelling, French Massif Central.