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normal fault activity : an integrated model using petrophysical and geochemical datas

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We will present in this paper, results from the southern part of the Corinth gulf. Indeed, this area presents numerous active normal faults, directed E-W and north-dipping, dued to the N-S extension. Pirgaki, Aigion faults, two of the recent active faults, and others, are sampled for petrophysical and geochemical anlysis. From the mineralogical analysis, the repartition of clays in limestones through the section allowed us to distinguish two strain phases: (1)- a ductile phase characterised by a progressive evolution of Chlorite and Illite-Smectite interstratified concentrations from the footwall and hangingwall toward through the gouge zone; (2)- a fragile phase characterised by Illite formation exclusively in the gouge zone. From the structural point of vue, modifications while approching the gouge zone were studied by combining different tools: SEM, AMS; Hg-injections, permeability, and accoustic waves propagation along 3 perpendicular directions. Firstly, in the damage zones, normal stresses induced a reusing of the previous compressive structures, and new structure are developped within the fault core and within few centimeters in the footwal and the hanging wall closed to the core. Secondly, The porosity shows a progressive evolution toward the gouge zone and the porosity geometry and connectivity is clearly anisotrope and controls the anisotropic permeability. Its preferential orientation will be presented and compared to the orientation of larger scale fractures population.Based on isotopic analysis (O, C, Sr), calcite cements formed during fault activities were classed as far as possible by relative geochronology, and divided in three groups. It appears that, in the first group, calcite precipitated from deep water, in he second group from marine water contemned more or less with methane trapped in sediments, in the third group from meteoric water contemned more or less with CO2.The rule of each fault elements, associated to strain and physical properties in one hand, and to specific fluids in the other one, is discussed in a hydro-mechanical model. .