# Successive geotherms, Granitic production and evolution of the lower crust in a post collisional context

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Post-collisional context is commonly associated with production of large amount of peraluminous granitic magmas produced from the melting of crustal material. The variability of the produced granite commonly varies from leucogranitic to granodioritic and are mostly peraluminous. The South-Eastern French Massif Central (EFMC) region record several evidence for crustal melting revealed by migmatitic and granitic bodies providing ~30 Ma history of peraluminous granite production. Previous thermobarometric studies provides records for two successivves melting event: 1) a biotite stable event at ~314Ma (720°C and 5 kb) 2) a bitotite breakdown melting event constrained at ~301Ma (850°C 4kb) This suggests geotherms evolution from 45 °C/km to 70°C/km in 13Ma.

A thermodynamic modelling approach considering a 20km thick pile of crustal material undergoing successive geotherm evolving from 25°C/km to 70°C/km with starting conditions between 3 and 10 kb. Along this evolution our approach allows successive melt extraction and the monitoring of melt compositional variability, residuum evolution and mineral phases modal and compositional variabities according to depth, geotherm and composition of the source.

Over the 5 crustal sources used as starting composition for the model, 305 individual partial melting reactions are triggered. Melt and peritectic phases produced provide a variability that suggest the importance of source composition in matter of granite production for some element and ratios (K/Na, $X_{Mg}$). Compared to regional granites (EMCF). Most of the granites produced in the post collisional context of the EFMC can be reproduced by either melt only (leucogranite) or melt in addition to peritectic material produced along with melt (granite to granodiorite). In the same way, the relative-time constrain provided by the approach shows that it is possible to produce simultaneously heterogeneous granitic magmas in respect to source protolith and depth. Identically, the residual crust undergo an very variable evolution depending on protolith leading to an heterogeneous granulitic lower crust.

# Phosphorous Speciation in Atmospheric Deposition Samples in the East Mediteranean

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The interactions between phosphorus-carbon cycles and climate are expected to become an increasingly important determinant of the Earth biogeochemical cycles. The oceans generally act as an important sink of atmospheric $CO_2$. P limitation of marine primary productivity could play a key-role in this natural process, affecting indirectly the global warming. East Mediterranean Sea (EMS) is P-limited and new knowledge could be arisen by defining the role of organic and inorganic forms of atmospheric P deposition into the marine environment.

This study aims to investigate the sources, the forms and the biogeochemical significance of soluble and insoluble atmospheric P over the EMS. Wet (n=55) and bulk deposition samples (n=76) have been collected during four-year period (2008-2009 and 2011-2012) and analyzed for P speciation. Following the analytical protocol referred in Standard Methods for the Examination of Water and Wastewater (20th Edition), Total Dissolved acid hydrolized Inorganic Phosphorous (TDIP) was determined after mild oxidation of sample. Total Dissolved Phosphorus (TDP) was measured after the acid digestion of samples according to Persulfate Digestion Method. Dissolved organically bound phosphates (DOP) were determined by subtracting TDIP from TDP. Disolved Reactive Phosphorous (DRP) was determined as $HPO_4^2$ with Ion Chromatography (IC).

To investigate the role of air mass origin in the P speciation in rainwater, rain samples have been classified in two classes (N/NW and S/SW) corresponding to the main wind sectors influencing the area. DOP is associated with S/SW winds that enrich the atmosphere over the EMS with African dust. N/NW winds transport anthropogenic pollution from N/NW Europe and are associated mainly with DRP. In addition, P solubility changes have been observed and are analysed.

Dry deposition of P is found to be higher than the wet one and is dominated by DRP that is so far known as the most bioavailable form of P and thus is expected to have singifiincat impact on the marine ecosystems.

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