

Goldschmidt 2017 – Field trip

19th to 22nd August 2017

The Variscan Velay migmatite-granite Dome: growth and reworking of the crust through magmatic-metamorphic processes in an orogenic root

Leaders: JF Moyen, O Laurent, C Chelle-Michou, O Vanderhaeghe, V Gardien, A Villaros, S Couzinié, etc.

Capacity: 20 – 30 persons (3 or 4 minibusses, driven by organizers).

Transportation: TGV + minibuses

Cost per participant: 345 € + cost of TGV trip from/to Paris

Date / duration: 4 days, post-conference



Start: Lyon Part-Dieu station, Saturday 19th at ca. 10.30 am.

This means participants can catch an early morning TGV train from Paris (2 hrs ride). Participants can either make own travel arrangements (for instance if they want to fly out of Lyon or to take holidays in southern France after the trip), or we can buy tickets collectively, at cost (ca. 70 € one-way)

End: Lyon Part-Dieu station, Tuesday 22nd at ca. 15.00.

From there participants can take a train (16.00 onwards) to Paris or directly to Charles-de-Gaulle airport (again, we offer the option to buy tickets collectively at cost).

Alternately, we can organize drop-off at Lyon Saint-Exupéry (LYS) airport, or in the Rhône valley (Montélimar, Valence) for people willing to stay in Southern France (actually not a bad idea that time of the year). LYS is well-connected to major hubs in Europe and is a convenient departure point for participants flying abroad, saving the cost of the TGV trip back to Paris.

Depending on individual schedules, cultural activities can be organized on the way back to Lyon (including vineyards of the “Côte du Rhône”, local markets, or a number of scenic towns, castles, churches and more – to be decided with participants).

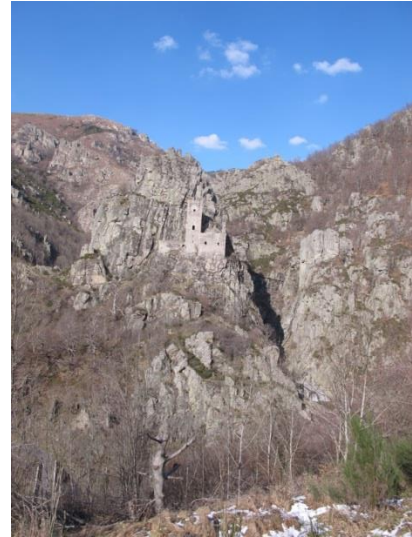
Itinerary:

The field trip will show a series of spectacular outcrops (mostly polished river beds and similar) featuring (i) Ediacaran ortho- and paragneisses, that are the building blocks of the Variscan belt in Central France; (ii) LP/HT migmatites and granites recording partial melting of the Ediacaran crust (ortho and paragneisses); (iii) Mafic Mg-K rocks and associated granites.

We will discuss the origin and evolution of each rock type; their mode of formation, P–T evolution and petro/geochemical signature (based on large data recently

produced by our group); and the respective role of crustal growth vs. recycling in an orogenic root.

The trip will be held in the Ardèche mountains of Southern France and will offer opportunities to sample local pleasures including country food, local wine, great landscapes and beautiful swimming holes in mountain streams.



Detail of stops:

Day 1: Klippen complex on top of the Velay dome in the Doux Valley near Tournon, recording the history of the Variscan belt in a nutshell.

- Upper Gneiss Unit, rifting of the Gondwana in the Ordovician, oceanic remains
- Slivers of Upper gneiss unit and Lower gneiss unit in tectonic contact
- Velay granite
- Tournon granite

Day 2: The building blocks of the Variscan belts: Ediacaran orthogneisses



- Ediacaran orthogneisses near Luc
- Migmatitic orthogneisses at Puylaurent or Borne
- Cévennes schists (métasediments) and their prograde metamorphism in the Beaume Valley.



Day 3: Partial melting and the origin of the Velay dome

- Migmatitic pavement, orthogneisses and mafic melts at Pont de Bayzan near Aubenas
- Three outcrops in the Bourges Valley near Burzet showing two successive melting events (regionally M3 and M4), and spectacular cordierite dendrites
- Ray-Pic waterfall, on a Quaternary alkali-basalt lava flow as a bonus

Day 4: Mixing it all together

- Magma mingling and interaction between MgK mafic melts and granites near Largentière
- And return to civilization...*



Accommodation:

Rural hotel in Southern Ardèche, twin rooms.

Picnic lunches with local products (mostly near rivers, don't forget a swimming costume).



Hotels in Ardèche are quite busy in August. Therefore, if you intend to come we'd appreciate if you could notify us before end of March (the abstract deadline) to allow us to confirm with the hotel, even though the official deadline is only in June (<https://goldschmidt.info/2017/eventTypeView?type=338>)

Recent publications generated from our group:

Chelle-Michou, C., O. Laurent, J. F. Moyen, S. Block, J. L. Paquette, S. Couzinié, V. Gardien, O. Vanderhaeghe, A. Villaros, A. Zeh and F.-X. d'Abzac (in revision). "Pre-Cadomian to late-Variscan odyssey of the eastern Massif Central, France: formation of the West European crust in a nutshell." *Gondwana Res.*

Couzinié, S., J.-F. Moyen, A. Villaros, J. L. Paquette, J. H. Scarrow and C. Marignac (2014). "Temporal relationships between Mg-K mafic magmatism and catastrophic melting of the Variscan crust in the southern part of the Velay Complex (Massif Central, France)." *J. Geosci.* **59**(1-4): 1-18.

Couzinié, S., J. F. Moyen, O. Laurent, A. Zeh, P. Bouilhol, A. Villaros and V. Gardien (2016). "Post-collisional magmatism: Crustal growth not identified by zircon Hf-O isotopes." *Earth Planet. Sci. Lett.* **456**: 182-195 DOI: 10.1016/j.epsl.2016.09.033.

Couzinié, S., O. Laurent, M. Poujol, M. Mintrone, C. Chelle-Michou, J.-F. Moyen, P. Bouilhol, A. Vézinnet, L. Marko, M.J. Mayne and G. Nicoli (submitted). "Cadomian magmatism in the French Massif Central: the building blocks of the Variscan crust." *Lithos.*

Laurent, O., S. Couzinié, A. Zeh, O. Vanderhaeghe, J. F. Moyen, A. Villaros, V. Gardien and C. Chelle-Michou (in press). "Protracted, coeval crust- and mantle melting during Variscan late-orogenic evolution: zircon U-Pb dating in the eastern French Massive Central." *Int. J. Earth Sci.* DOI: 10.1007/s00531-016-1434-9.

Moyen, J. F., O. Laurent, C. Chelle-Michou, S. Couzinié, O. Vanderhaeghe, A. Zeh, A. Villaros and V. Gardien (2016). "Collision vs. subduction-related magmatism: two contrasting ways of granite formation and implications for crustal growth." *Lithos in press* DOI: 10.1016/j.lithos.2016.09.018

Vanderhaeghe, O., V. Gardien, J. F. Moyen, A. Gébelin, O. Laurent, S. Couzinié, C. Chelle-Michou and A. Villaros (submitted). "Flow of partially molten crust controlling construction, growth and collapse of the Variscan orogenic belt in Western Europe." *Int. J. Earth Sci.*