

S. Spain 9th IKC Field Trip: Murican Lamproites & Ronda Peridotite – Aug. 16th to Aug. 24th 2008.

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Day 1: Saturday – Number of stops will depend on how smoothly the flight transfers from Frankfurt to Murcia operate.

STOP 1, *Fortuna*: Cabecitos Negro lamproite hypabyssal body with minor flows.



Fig. 1 Fortuna – Flow structure in lamproite, Cabecitos Negro
STOP 2 (if time) , *Fortuna*: El Tale lamproite dyke. Cabecitos Negro is a ~0.5 km body comprised of massive flows, thin flows and dykes that are well exposed in a road cut and in outcrop. The El Tale dyke is a 3 to 5 meters in width and intermittently well exposed along a strike length of ~1 km. This area

is the type locality of 'fortunite', a glassy enstatite phlogopite sanidine lamproite with olivine and richterite that contains small mantle xenoliths/xenocrysts.

Day 2: Sunday



STOP 3, *Salmeron*: Cerro de Monagrillo lamproite volcanic centre

Fig. 2 Cerro de Monagrillo lamproite centre

Phreatomagmatic deposits, dykes and lava lake/dome

STOP 4, *Cancarix*: Sierra de las Cabras lamproite volcanic centre



Fig. 3 Cancarix - Sierra de las Cabras lamproite volcanic center

At these two large (~ 1 km diameter) lamproite volcanic centers we will compare and contrast early stage 'wetter' and 'drier' phreatomagmatic deposits, and later stage vent filling columnar jointed lava lake rocks. Cancarix is the type locality of 'cancalite', a glassy sanidine richterite

enstatite lamproite with phlogopite and olivine.

Day 3: Monday

STOP 5, *Calasparra*: Calasparra lamproite.



Fig. 4 Calasparra – columnar jointed lamproite lava plus surrounding Volcaniclastics.

At the 0.5 km diameter Calasparra tuff ring/lava lake, the theme from Day 2 is continued regarding 'wet' versus 'dry' phreatomagmatic deposits and later stage lava lake rocks

STOP 6, *Jumilla*: Las Minas north, road cut showing country rock contact.

STOP 7, *Jumilla*: Las Minas south

The Las Minas locality is an irregularly shaped ~1.5 km by 0.5 km lamproite body comprised of intrusive and extrusive (flows, agglomerate) units. At this locality, apatite and haematite were historically mined from late stage apatite - calcite - dolomite -

haematite veins that cut the lamproite body. Jumilla is the type locality of 'jumillite', a diopside richterite olivine lamproite with phlogopite and sanidine.

Wine tasting – we will try to arrange a tasting session for some of the now excellent wines produced in the Jumilla region.

Day 4: Tuesday

STOP 8, *Barqueros*: Barqueros lamproite volcanic center.

Barqueros is a large 1.5 km by 2.5 km lamproite volcanic center that consists of early phreatomagmatic deposits that are very well exposed, plus proximal vent agglomerates and their distal equivalents, together with substantial lava flows.



Fig. 5 Barqueros – base surge deposit

STOP 9, *Mula*: Mula lamproite dykes



Fig. 6 Mula dyke-country rock & Pueblo de Mula in background

Composite dykes - excellent exposures of multiple injections of very fresh phlogopite richterite lamproite in two separate dykes that also exhibits en echelon offsets.

Day 5: Wednesday – check out of hotel

STOP 10, **Tallante**: spinel peridotite xenoliths in alkali basalt
Abundant spinel peridotite xenoliths, some with amphibole and Si-rich melt veining, in alkali basalt pyroclastic agglomerate unit sandwiched between alkali basalt flows.
Mantle xenoliths up to 25 cm max. diameter can be collected.



Fig. 7 Tallante – spinel peridotites in cored bombs. Cm scale marked on pen.

Drive southwest to Vera

STOP 11, **Garrucha**: lamproite ('verite') lava flow/peperite (this stop is provisional, depending on the time spent at Tallante).

STOP 12, **Vera**: Cabezo Maria lamproite ('verite') tuff cone

Fig. 8 Cabezo Maria lamproite ('verite') tuff cone



At Vera, the style of volcanism is quite different than previously observed at Salmeron, Cancarix and Barqueros. There is limited if any evidence for phreatomagmatic deposits, and the majority of the ~1 km diameter Cabezo Maria tuff cone is comprised of pyroclastic agglomerate deposits and lava flows. The flows extend discontinuously to the south and east of the Cabezo

Maria vent for ~10 km to Garrucha, where lamproite pepperites can be observed at the base of some of the flows. This is the type locality for 'verite' a glassy olivine phlogopite diopside lamproite.

Drive to Grenada for overnight stay.

Day 6: Thursday – check out of hotel

Fig. 9 Am – Cultural visit to Alhambra Palace



Pm – Drive to Estepona, check into Hotel Altamarina. Opportunity to arrange shipment of some rock samples.

Day 7: Friday – Ronda massif part 1

STOP 13, *Ronda massif - Los Reales view point*: Overview of Ronda geology, view of Gibraltar and the Rif Mountains (on a good day..).



Fig. 10 Ronda peridotite massif looking N

STOP 14, *Ronda massif - La Plazoleta track section*:

A series of stops encompassing typical spinel tectonite, garnet pyroxenite veins intruded by undeformed Cr-rich pyroxenites, ultra-mylonite and “garnet peridotites”, plus thick “granulite facies” garnet pyroxenite layer.



Fig. 11. Spinel peridotite “tectonite”. Camera bag is 12 cm long.

STOP 15, **Ronda massif**: Cr-pyroxenites intruding spinel peridotites – very opx-rich peridotite at pyroxenite margin.

STOP 16, **Ronda massif**: Ultra-coarse Cr-pyroxenites

STOP 17, **Ronda massif**: Coarse recrystallised spinel peridotite

STOP 18, **Ronda massif**: Folds in pyroxenites

STOP 19, **Ronda massif**: Ti-rich websterites grading transitionally into lherzolites and harzburgites

STOP 20, **Ronda massif- Chromitite body**: Chromitite veins in dunite/harzburgites host. Observe “sub-solidus” plagioclase lherzolites with

ultra-mylonite textures developed.

Day 8: Saturday – Ronda massif part 2

STOP 21, **Ronda massif – Graphite pseudomorphs after diamond**: Collect graphite-bearing and graphite-free pyroxenites in coarse spinel peridotites.

STOP 22, **Ronda massif – Garnet clinopyroxenite**: Ultra-coarse, very fresh garnet clinopyroxenite with garnet exsolving from clinopyroxenite.

STOP 23 - Pm – **Estepona - The Beach !!**

Day 9: Sunday – Malaga Airport.

Trip Departs

N.B. at Estepona or Malaga you will be ideally placed to explore more of southern Spain such as the town of Ronda itself and the white andalusian towns such as Casares.

Notes – Delegates are responsible for booking their own flights from Frankfurt to Murcia and return. Early booking is highly recommended. Late august in S. Spain is very hot. All delegates must ensure that they have adequate sun screen (factor 30 or more) and sun hats. Long trousers for field work and stout boots are recommended because of the tough vegetation and lengthy walks on some days. Eye protection for hammering rocks is also essential – many of these rock types are extremely durable and sampling can be a dangerous pursuit!