

V INTERNATIONAL SYMPOSIUM ON KARST

MALAGA, SPAIN 14TH - 16TH OCTOBER 2014

Annual meeting of IGCP 598 Project of UNESCO

PRE-SYMPOSIUM FIELD TRIP

**El Chorro, Ronda Mountain Ranges and
Grazalema Karst areas**

12TH - 13TH October 2014



Pre-conference 2-day field trip to El Chorro, Ronda and Grazalema Karst systems

Key features

Departure: Sunday 12th October (8.30 am) from Malaga city

Return: Monday 13th October (8:30 pm approx.)

Number of places: 12 (minimum) - 30 (maximum), by rigorous order of inscription

Registration deadline: 1st September 2014

Price: 160€/person

[Click here for registration](#)

General description

The pre-conference field trip will be held from the 12th to the 13th October 2014, prior to the 5th International Symposium on Karst (ISKA). Guided by hydrogeologists from the Centre of Hydrogeology of the University of Málaga (CEHIUMA), the participants will have the opportunity to visit some of the most interesting Karst Systems in Western Betic Cordillera (Andalusia, S Spain):

- El Chorro and *Gorge of the Gaitanes*
- Ronda Mountain Range
- Grazalema Mountain Range



Panoramic view of Endrinal and Pinar mountains (Grazalema Mountain Range)

The area is constituted of Jurassic limestones and dolostones in which karstic processes have developed, giving rise to a great variety of karstic features such as springs with different hydrogeological functioning, karrenfields, sinkholes, dolines, uvalas and estavelles. During the visit to Grazalema Mountain Range area, the equipment recently installed to monitor the main discharge points of the aquifers will be shown.



Doline at the contact between limestones and Flysch-type clays



Weather station recently installed in Grazalema area to monitor rainfall



Conductivity and temperature sensor for continuous monitoring



Water autosampler installed at Cornicabra spring (Ubrique, Grazalema Mountain Range)



Capacitance water level probe for continuous flow discharge monitoring

The trip will include lunch and dinner of the first day, one night in a three/four-star hotel in Ronda or Grazalema and breakfast and lunch of the second day. The details regarding accommodation will be confirmed in the following weeks.



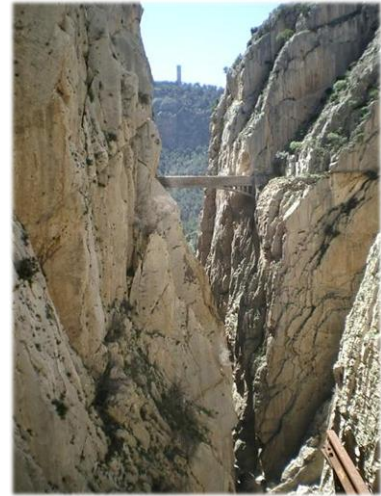
Panoramic view of Grazalema and Endrinal mountains from the Palomas pass (1350 m a.s.l.)

Provisional list of visits

- ✓ **El Chorro and Gorge of the Gaitanes:** the first stop of the field trip will be this spectacular area of high geological interest since it is located at the contact between the internal and external zones of the Betic Cordillera. Vertical Jurassic limestone layers overlaid with Miocene sandstones, water quality problems related to intense karstification on evaporite rocks, drainage of the Valle de Abdalajís karst aquifer because of the drilling of rail tunnels and the outstanding 700 m deep Gorge of the Gaitanes are just some of the features we will enjoy.



Vertical layers of limestone at El Chorro



Gorge of the Gaitanes



Brine-water discharge area related to Triassic evaporite dissolution at the Guadalhorca reservoir's tail



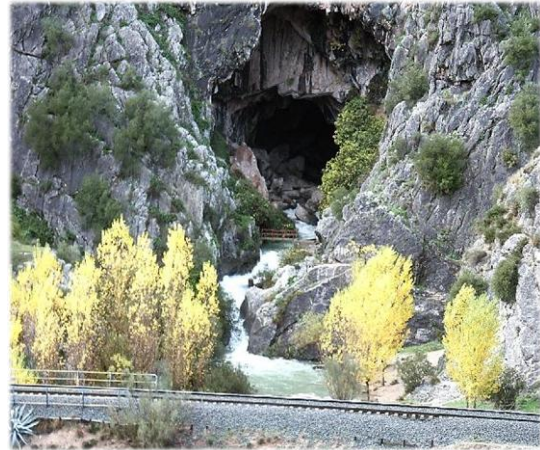
Contact between the internal and external zones of the Betic Cordillera (El Chorro)

Carrizal spring: located at the edge of a nice travertine deposit where Cuevas del Becerro town settles down, this spring constitutes one of the main discharge points of the Merinos-Colorado-Carrasco carbonate aquifer system (Eastern Ronda mountains).



Carrizal spring

- ✓ **Hundidero-Gato Karstic system:** it is a complex karstic system which comprises the infiltration of surface water (River Gaduares) into the Sierra de Líbar aquifer through the Hundidero sinkhole, rapid underground flow by large-scale fractures and drainage by the Gato spring.



Hundidero sinkhole (left) and Cueva del Gato spring (right)

- ✓ **Palomas pass viewpoint:** after a gentle 10 minutes' walk, we will reach the Palomas pass at 1.350 m above sea level, from which we will enjoy one of the most beautiful views of Grazalema Mountain-Range at dusk.

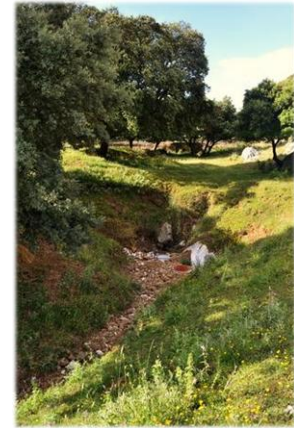


- ✓ **View and geological description from the Boyar pass:** taking advantage of the nice view from this site, the major geological and hydrogeological characteristics of Sierra de Grazalema aquifer will be introduced. It will also be explained why despite being situated in Spain's Southernmost province, Grazalema receives the most rainfall quantity in all of Spain.



Palomas pass (above) and general view of the Boyar pass and the Pinar mountains (below)

- ✓ **Villaluenga del Rosario:** this small town located at the eastern limit of Grazalema Mountain-Range, with the typical white houses of the area, hosts the 237 m deep 3.600 m long Villaluenga swallow hole. We will walk into the entrance of the swallow hole and also visit the nearby Villaluenga Estavelle, located at the contact between the permeable Jurassic limestones and the impervious Miocene sandstones.



Villaluenga swallow hole (left) and estavelle (right)

- ✓ **Ubrique karst springs:** Ubrique springs drain most of the Southeastern Grazalema aquifer resources ($40 \text{ hm}^3/\text{year}$) and they are being monitored at the moment (flow rate, electrical conductivity, temperature and turbidity records). Temporal evolutions of the main physico-chemical parameters show that, despite draining the same aquifer sector, these springs have very different hydrogeological functioning.



Algarrobal spring (Ubrique)



Nueve Caños spring (Ubrique)

- ✓ **Benamahoma spring:** this spring, together with the nearby Cachones overflow spring, constitute the main discharge points of Sierra de Grazalema aquifer, with a joint drainage of 31 hm^3 from November 2012 to September 2013.



Benamahoma spring

Cultural visits

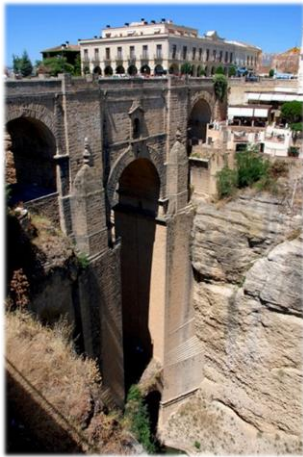
The field trip will permit the visit to some of the most beautiful Andalusian towns of the region: Ronda, Grazalema and Villaluenga del Rosario.

Perched on an inland plateau riven by the 100 m fissure of El Tajo gorge, the elegant old town of Ronda holds a stunning architectural heritage as well as the history of bullfighting. Its *plaza*

de toros, in existence for more than 200 years, is one of the oldest and most revered bullrings in Spain.



Ronda city



"El Tajo" of Ronda



Ronda's bullring

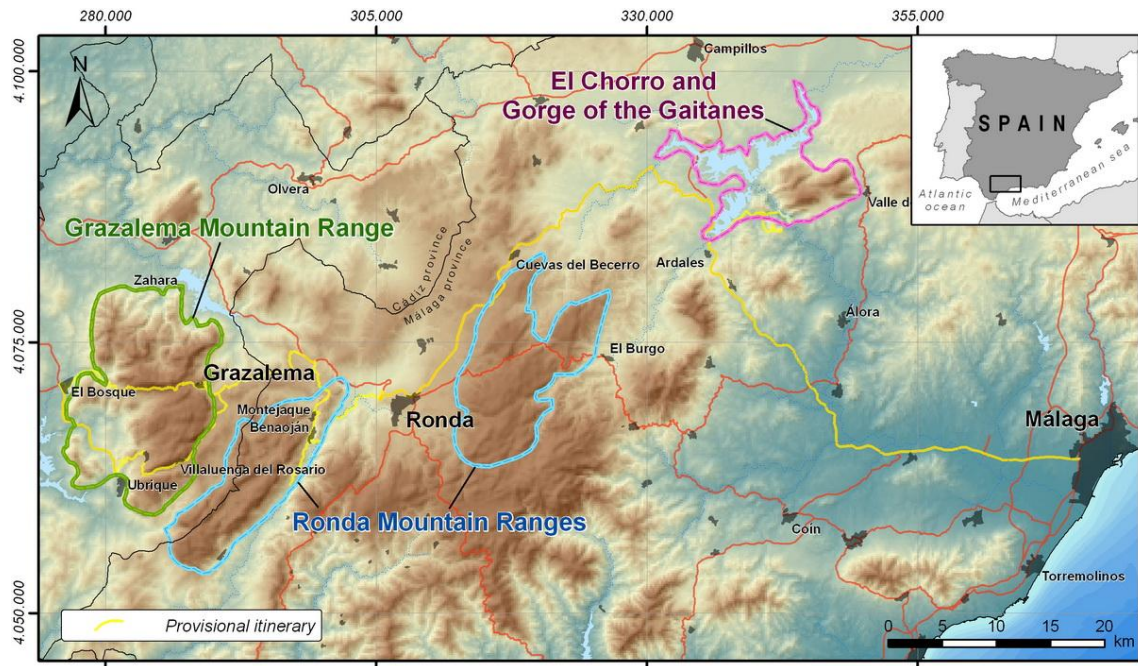
Grazalema is a picture-postcard, red-tile-roofed village tucked into a corner of beautiful mountain country beneath the rock-climbers' crag Peñón Grande. Local products include pure wool blankets and rugs, whose production follows centuries-old traditions.



Grazalema town

Finally, Villaluenga del Rosario is a picturesque white village of the interior of the Cádiz province well known for the production of craft goat's cheese called *Payoyo*.

Location map



All pictures by Centre of Hydrogeology of the University of Málaga except Ronda (Luis Marín), Ronda's bullring (www.andalucia.org) and Grazalema (Karan Jain).