

The Andrew Whitham CASP Fieldwork Award – 2019 Winner

Applicant: MAGÁN LOBO, Marta

Project title: Kinematic and mechanical analysis of geological structures developed in Jurassic rocks of the western part of Asturian Basin (NW Spain): Implications on geological resources prospection and regional geology

Award: £2,100

Specific objectives and deliverables: Fieldwork is part of ongoing PhD project whose general objective is the understanding of structure and evolution of the western part of the Asturian Basin, a Permian-Mesozoic extensional basin that was partially inverted during the Cenozoic contraction. Some previous studies were completed in the area. There are, however, considerable uncertainties from the structural point of view. The coastline in the area contains exceptional exposures of Jurassic rocks by the Cantabrian Sea that are hydrocarbon source rock and are affected by extensional and contractional folds and faults. The main objectives of the fieldwork are:

- Build up a geological map and geological sections across the studied area.
- Geometrical, kinematic and mechanical analysis of selected geological structures.
- Fracturing analysis to determinate paleostress and fracture relationships with folding.
- Examine distinct modes of inversion tectonics and the influence of mechanical stratigraphy and previous structures.
- Back stripping studies to establish the tectonic subsidence.
- Unravel P-T conditions of structure formation from fluid inclusions in veins or fault fillings.

This project will intend to analyse the implications of the results achieved on the geological resources prospection, especially hydrocarbons. The area was suggested for fracking, although it was never performed due to government restrictions. In addition, some oil companies explored the offshore part of the basin. Thus, structural studies may be important tools to determinate whether exploitation is viable in the future.

Proposed work plan:

Fieldwork will be carried out in two phases, although outcrops can be visited at any time during the progress of the project, as they are drive distance (around 30 – 40 km).

The first phase includes field mapping based on bedding and structural features orientation. We will also identify key structures for subsequent detailed structural and paleostress analyses. Since some studied areas are not accessible, we propose to use drone imagery and a ship. There are three types of outcrops along the coastline: 1) up to 100 m steep cliffs that cannot be climbed due to the fall of rocks, 2) beaches not accessible by land, 3) beaches and coastal platform where no ortophotos are available at an appropriate scale. Hence, a drone will take pictures of 1) the top of the cliffs, 2) cliffs and beaches not accessible by land and 3) beaches and coastal platform. The ship will allow us to land in no accessible areas to take pictures and geological data. With all these data, we will get an almost 3D perspective of the studied area. Fieldwork will be carried out on single days in spring/summer 2019 depending on tides, weather and project progress.

Once geological mapping is completed, during a second phase, we will carry out fracture sampling and sample collection of calcite filling in faults on selected areas (spring 2020).

Proposed expenditure, including details of any other sources of funding:

- Fuel: (30 days field work) 300 €
- Drone imagery and data processing: 1700 €
- Ship: (2 days) 700 €
- Total: 2700 €

Pre-doctoral 4 years contract “*Severo Ochoa*” funded by the Asturias Government (Spain) started in January 2019 that covers stipend. This scholarship does not however provide funding for any fieldwork, laboratory work or any other expenses incurred during the PhD.