Andrew whitham CASP Fieldwork Award - 2021-22 Winner

Applicant: Marshall Neill
Project title: Assessing the role of active tectonics in Turkmenistan on the development of the South Caspian Basin.

Award: £3,000

Scientific question and rationale:

The Miocene to recent tectonics of the South Caspian Basin controls basin structure, topographic development, sediment supply and influences the development of structural traps along the basin margins. The South Caspian Basin moves independently of its surroundings, but with directions and rates that are not well resolved. This limits our understanding of the tectonic influence on the stratigraphy and basin evolution, and on the styles and rates of faulting around its margins. Understanding these structural and tectonic features at the basin margins is key to building a wider tectonic framework for the South Caspian Basin as a whole.

The Main Kopetdag Fault (MKDF) in Turkmenistan forms the northeast margin of the South Caspian Basin and is one of the major strike-slip faults in the world. It accommodates the relative motion between the South Caspian Basin and the Asian interior, and is exposed onshore, allowing direct field access and measurement. Determining the rates and directions of slip on the MKDF zone is hence important for determining the motion of the South Caspian Basin, which in turn is important for seismic hazard assessment, for global tectonic studies, and also for economic geology (as the South Caspian Basin is an important source of oil and gas). I aim to use a combination of detailed field observation, remote-sensing and seismotectonic analysis of earthquakes to assess the role of the active tectonics in Turkmenistan on the South Caspian Basin.

Specific objectives and deliverables:

The purpose of this proposal is to seek funding to support detailed field observation of the recent tectonic evolution of the north-eastern margin of the South Caspian Basin. This will focus on:

1) Paleoseismic trenching and sample collection along the Main Kopetdag Fault to determine rates of slip and shortening;

2) Field mapping of major structural features combined with satellite photogrammetry to build a detailed digital elevation model (DEM) of the region;

3) The deployment of the first GPS stations within Turkmenistan that will help build a detailed understanding of the active tectonics at the north-eastern margin of the South Caspian Basin by measuring plate motion and crustal strain.

Proposed work plan:

Spring 2021: Produce DEMs of the MKDF and map geomorphology and active faulting. Identify sites for paleoseismic trenching.

Summer 2021: Complete seismotectonic analysis of earthquakes in the region over the last 100 years. Send requests for trench site access.

Autumn 2021: Field campaign in Turkmenistan. Paleoseismic trenching along the MKDF, collection of sediment samples for Quaternary dating, field mapping of major structural features at the basin margin. Deployment of GPS stations in Turkmenistan.

Winter 2021: Prepare samples for dating.

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

20 days of fieldwork is budgeted for in the following figures. Return flight to Ashgabat £900, Visa £100, Accommodation and living expenses (£80x20) £1600, Vehicle hire: (£40x20) £800.
Total: £3400.