

# GEOGRAPHY TECHNICAL SERVICES TEAM

The Geography Technical Services (TS) team are a highly-trained group of professionals from diverse backgrounds, working together to provide a comprehensive service to academic staff and students within the Geography discipline.

Dr Stephen Haley (Environmental Science/Radiometric Dating) – Senior Laboratory Manager, Geography & Archaeology  
Dr Joana Zaragoza-Castells (Ecology) & Angela Elliott (Chemistry) – Laboratory Managers  
Dr Karen Leslie (Geology/Geochemistry) & Natascha Steinberg (Biology) – Laboratory Technicians  
Mandy Lee – Scientific Cleaner

## Subject Diversity

The Geography Technical Team support an extremely diverse range of research, including:

- Climate change and its effects on various habitats of the planet - from the glaciers of the Arctic and Antarctica regions through to the rainforests of South America
- Ancient and modern pollens and the distribution of flora in response to climate change
- Industrial contamination of soils and sediment
- Erosion profiles, sediment source fingerprinting and dating using fallout Radionuclides
- Erosion rates, weathering and surface ages utilising Cosmogenic nuclides
- Identifying the sources and accumulation rates of sediment stores
- Physical modelling of various environments and environmental conditions
- Direct and indirect support for fieldwork and field trips



## Analyses

The Geography laboratories are well equipped to physically and chemically prepare solid and liquid environmental samples in house. The labs contain a wide range of processing and analytical instrumentation to facilitate most environmental research requirements.

Simulation of rainforest gas exchange and research into plant responses due to changes in climatic conditions, can be researched in the CO<sub>2</sub> laboratory, as well as gas release monitoring from warming permafrost soil in our incubator array.

Geochemical analyses of soils, sediments and waters can provide important information on many aspects of the environment. Carbon and nitrogen concentrations of soils can be used to investigate carbon sequestration and storage, whilst nitrogen, phosphorous and potassium are utilised by plants and can provide an indication of nutrient uptake, plant health and growth. Monitoring water and sediment chemistry can indicate quality and the presence of different sources, fertilizers or heavy metal contaminants which may have a major environmental impact. Depending on the concentrations present and the specific elements required samples can be analysed down to ppb concentrations.



Physical modelling in the Experimental Hall, using one of the largest rainfall simulator in the UK, enables researchers to study the effects of increased rainfall, erosion, runoff and the development and behaviour of floodplains and alluvial fans. When coupled with an overhead laser scanner and video recorder this research can be used to modify computer simulations.

The Geography Radiometry Laboratory is a world leading academic research centre for the study of environmental processes & impacts using fallout nuclides. Wherever soil and sediment research is required, particularly in response to human impact and climate change, this facility provides the capacity to determine the sources, study the processes, estimate erosion, transport and depositional rates and provide a chronologies of change.

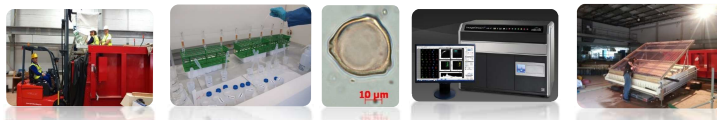
The Exeter Cosmogenic Nuclide Laboratory (ECNL) is a purpose-built ultraclean facility used to prepare rock samples for cosmogenic nuclide analysis and is one of only a few of its kind in the UK. Measuring the abundance of cosmogenic nuclides allows us to determine the age of surfaces on the Earth exposed by glaciers, volcanic eruptions, landslides and meteor impacts. We can also study the rate that rocks weather, sediments erode, the burial history of sediments and how catchments evolve. Cosmogenic nuclides are revolutionising our understanding of Earth surface processes and climate history.



## Fieldwork

Geographers conduct fieldwork in various locations, on every continent throughout the world. The technical team support this work both directly, on location, and indirectly through assistance with planning, equipment supply and maintenance for both teaching and research field studies.

## Internal Collaboration



We collaborate, engage with, and support other disciplines within the University by sharing our facilities and expertise which enables research projects to fulfil their potential.

Utilizing our large rainfall simulator, colleagues from Engineering have developed innovative ideas for sustainable grey water recycling systems.

Colleagues in Biosciences are investigating the effects of industrialisation on water bodies in the North of England using mineral magnetics. We are also collaborating with the development of the Amnis Image StreamX which is an imaging flow cytometer. Large numbers of digital images (around 1000 per sec) (light microscopic as well fluorescent) are taken per sample. This large sample size assures statistical significance.

We have recently supported colleagues in Archaeology to prepare for their undergraduate summer field school and are assisting in the redevelopment of their laboratory resources. Currently, ancient pollens are being prepared and analysed in the Geography Labs, to enable historic reconstruction, investigate human habitation and to study ancient farming practises and the effects of climate change in the past.

## External Collaboration



The members of the team get directly involved with different types of external research work, over and above that which is carried out as a result of Geography academic staff grant funded research projects.

The Geography technical staff form part of a network of monitoring stations across the UK that feed into the Met Office pollen forecast. This forecast is critical in helping those with hay fever prepare for peaks in pollen release from specific species (e.g. grass).

Pollen is collected from the roof of Amory Building for researchers at Bangor University. This research aims to revolutionise the way that grass pollen is measured, model the spatial and temporal deposition of different grass species and identify linkages to human health.

We are providing an important radiometric dating component, for colleagues from Brighton University, who are investigating the impacts of climatic change on carbon sequestration within the Amazon estuary and the impacts of El Niño on coastal wetland geomorphology in Lagoa dos Patos, Brazil.

Recent work, in collaboration with Plymouth University and APEM environmental consultants, has been to provide expert, sediment source fingerprinting to a significant Natural England funded research project. This was determining the sources of sediment ingress, which is damaging rare fresh water pearl mussel beds in the River Clun, Herefordshire.

In conjunction with the Chinese Academy of Sciences – Institute of Geochemistry, we are analysing fallout radioactivity to monitor the fate of valuable agricultural soils which are being severely eroded in the mountainous regions of SE China.

## Outreach



The Geography Technical team run demonstrations, collaborate on Open Days and arrange widening participation events. These are designed to inform colleagues, present and perspective students and the general public about the facilities within Geography, as a discipline, and to promote the University as a whole.

These events can be aimed at encouraging people to attend University (inner city school children from London in conjunction with Biosciences) or to develop interest in Geography as a subject (Exmouth College Geography students, International Summer School, Dartmoor field work). We also attend schools, such as a recent successful presentation to younger children, at Sandford Primary School.