



## GWL Cluster Meeting 20<sup>th</sup> April 2017

The use of chemostratigraphy and provenance studies to provide an integrated geological interpretation of the volcanoclastic and igneous intrusive sediments of the UK Atlantic margin.

This presentation will take place in the Royal Cambrian Academy, Crown Lane, Conwy, LL32 8AN (located behind Plas Mawr) at 6:30pm. Refreshments from 6:00pm.

**Abstract :** Chemostratigraphy involves the characterisation, correlation or differentiation of sedimentary rock successions based on stratigraphic variations in their elemental geochemical data. This geochemical data is controlled by changes in the mineralogical and organic content of the rock. These changes in clay mineralogy, heavy mineral content and organic material, can be linked to changes in palaeoclimate and palaeoenvironment, sediment provenance and any weathering or diagenesis that may have occurred. The mineralogical/lithological controls on chemostratigraphy means that it is a technique that can be used on any lithology, including those barren of biostratigraphy, for example clean sands, red beds, barren shales and carbonates.

In addition to providing a correlation, the geochemical data can be assessed in terms of lateral variations which can be mapped to produce isochron maps that can provide a wide variety of geological information. For example, mapping the concentrations of elements such as Zr, Nb and Ti can display changes in heavy mineral abundance, which can provide some insights into sediment dispersal patterns and changes in provenance. Mapping elements like U and Mo reflect the presence and abundance of organic matter that, together with biostratigraphic information, enable the reconstruction of depositional environments. Furthermore, Chemostrat are able to model the geochemical data to produce information such as chemical gamma, mineralogy and lithology.

Provenance analysis provides information on the sediment enabling the reconstruction of the origin of the sediment, in terms of lithology and age of the geological terrains. This data can then be applied to studies ranging from sub field scale sand differentiation, correlation and reservoir quality studies through to mega-regional palaeogeographic reconstructions, source to sink and tectonic reconstruction studies. Chemostrat regularly integrate provenance studies with the stratigraphic framework of the study area and other contextual information available and provide a succinct provenance interpretation for each individual study.

Provenance studies have traditionally been carried out on sands, however, Chemostrat have developed a new range of analytical techniques enabling provenance studies on silts to be undertaken. Provenance studies can be undertaken using a single analytical technique or, ideally, the integration of multiple tools. For example, studies based on heavy mineral analysis use the evidence that many heavy minerals occur only in a limited number of metamorphic and igneous rocks. Thus, the occurrence of these heavy minerals directly points to provenance from the corresponding parent rocks. However, heavy mineral abundancies within a sedimentary rock can be affected by processes such as hydraulic sorting and weathering, masking the original provenance signal. Therefore, the addition of other techniques (e.g. detrital zircon geochronology to identify the age of the source of the sediments) can confirm if the heavy mineral data.”

**Bio :** Dr Alex Finlay has been with Chemostrat for 5 years having completed a PhD and postdoctoral research at the university of Durham in Re-OS geochronology of oil generation. He is now Chemostrat’s Research and BD manager focusing on Europe and central Asia.

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