

**Geological Survey of Ireland Research Programme
- Postdoctoral Fellowship Awards 2018 -**

Postdoctoral Fellow: Dr Seamus Coveney

Host Institute: Dublin City University

Mentor: Prof. Brian Kelleher

Project start: October 2019

Novel use of satellite and remotely sensed data for geoscience mapping and Monitoring

Earth Observation data sets deriving from satellite, airborne and unmanned sensor platforms offer complementary opportunities in terms of mapping coastal, intertidal and nearshore environments. The EO-Intertide project will utilise a range of currently-available earth observation data sets to implement new analytical approaches for monitoring changes and evolution in the dynamic intertidal zone. The project will place emphasis on maximising the potential to extract useful 3D and spectral information from European Space Agency (ESA) Sentinel satellite imagery and existing GSI data. EO-Intertide will build upon simple working prototype approaches recently developed and tested in a GSI Short Call project set in Dublin Bay. The project will generate new intertidal 3D mapping from tidal-shorelines extracted from ESA satellite image data series, attributed with tide-heights derived from tide gauges and the VORF tidal model. Intertidal DTM data will be generated from these inputs, providing the basis for analysis of intertidal processes that are vulnerable to climate change. Anticipated outcomes include: the development of a new approach (and desktop software toolbox) for shoreline extraction from Sentinel-2 imagery, tidal attribution (including the use of high accuracy tide model data), the generation of new intertidal 3D map products for GSI / INFOMAR, accuracy-validated using existing GSI survey data. This resulting intertidal mapping data (including new DTM-derived waterline information) will be used to assess intertidal sedimentary change in Dublin bay and other east coast estuarine carbon-sink environments, assessing relationships between volumetric change and in-situ water column turbidity observations and measurements generated within the SFI / GSI PREDICT project.

Postdoctoral Fellow: Dr Lingli Zhou

Host Institute: University College Dublin

Mentor: Prof. Murray Hitzman

Project start: October 2019

The application of machine learning techniques in the mineral exploration

Raw materials, and in particular critical elements, are needed to sustain Ireland's (2040 National Planning Framework) and the European Union's growth particularly with regard to renewable energy development. Critical metals such as cobalt, indium and germanium have not been targeted for exploration and extraction in Ireland. However, many studies have shown that these metals are present in some Irish Zn-Pb mineral systems (e.g. Wilkinson, 2005). Ascertaining whether such elements are present in mineralogical forms and quantities in ores and/or mine waste sufficient to support extraction is thus of importance nationally and in a European context. Trinity College possesses the microanalytical infrastructure (laser-ablation inductively-coupled plasma mass spectrometry-LA-ICPMS) to precisely constrain the distribution of critical metals and the total amounts down to sub-part-per-million level. The now possible visualisation of critical metal distribution at the micrometre-scale spatial resolution provides crucial data to determine if extraction may be economically feasible. This project aims to quantify the critical metal abundance and distribution in a wide range of samples from the Irish ore field of both ores or potential ores as well as historic mine waste through LA-ICPMS spot and element mapping analyses. Such data are necessary to assess the feasibility of processing or re-processing such materials for critical metals.