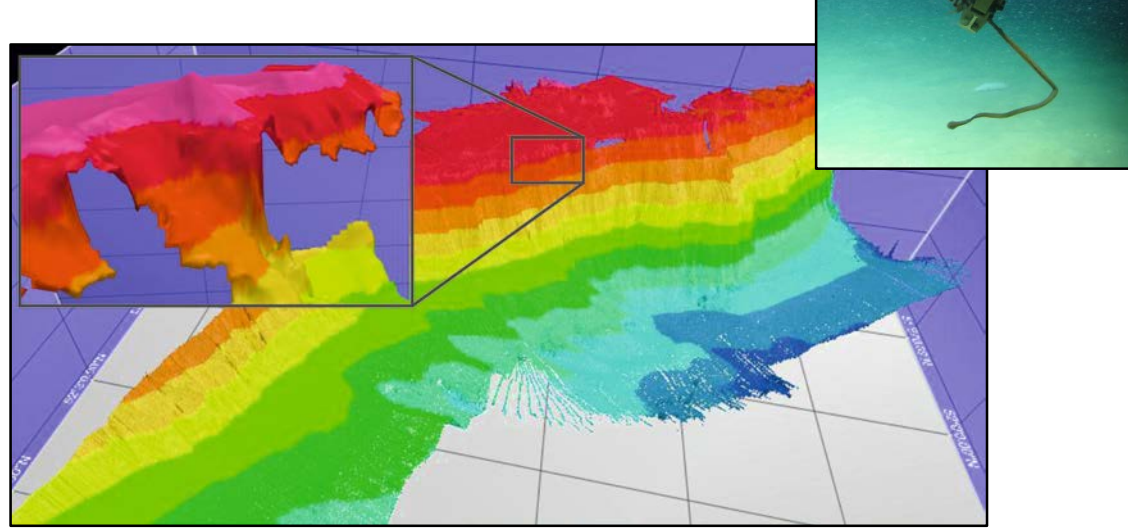
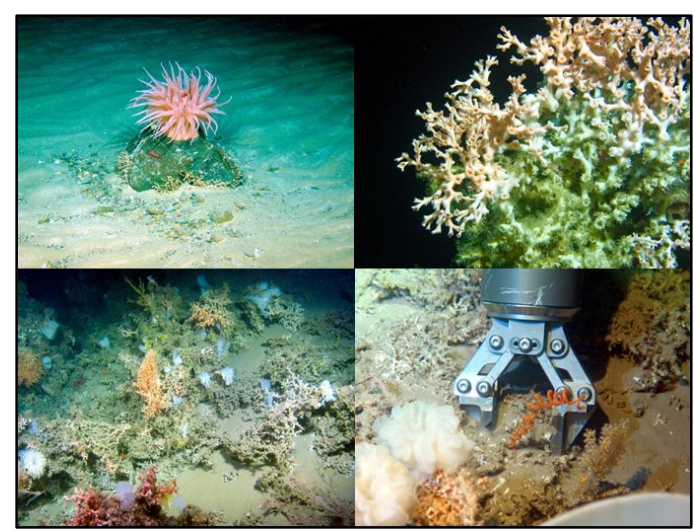


Marine

This includes our marine-related research involving 3 main Targeted Projects: (i) Marine Acoustics, (ii) Enhancing knowledge and understanding of Ireland's seabed and (iii) Marine remote sensing applications. Acoustic methods provide an important means of characterising and studying of the sea bed and it's subsurface. This spoke will form an integrated broad band perspective on the acoustic noise field of the marine, will identify associated impacts of anthropogenic noise and will use the noise field as a subsurface imaging tool. Using associated methods, this spoke will provide strategic evaluations of Ireland's seabed pertinent to industries needs and evaluate seabed geohazards. New remote sensing software tools for industry will be developed which will support the economic development of Ireland's offshore regions and provide baselines for assessing 'Good Environmental Status (GES)'.

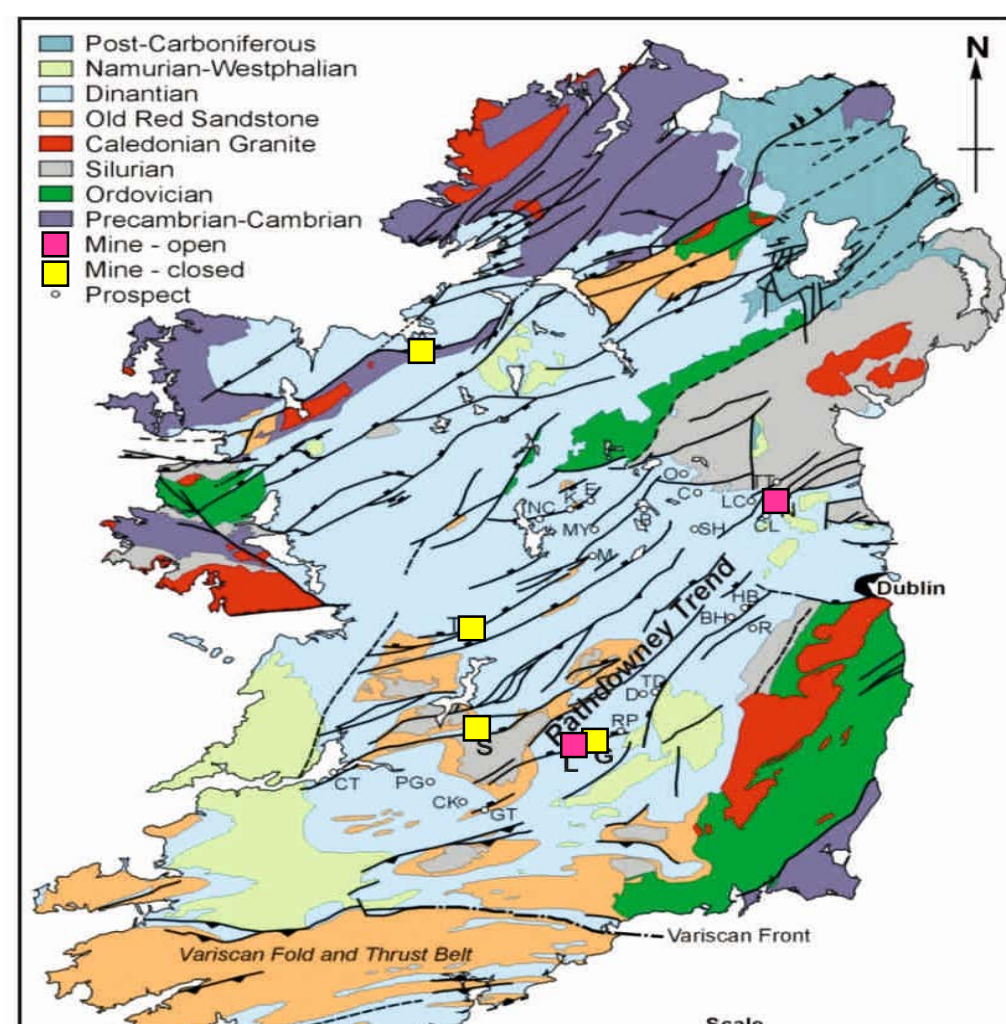


PI	Project title	PhD/PD
Chris Bean (DIAS)	Novel applications of broad band near sea floor pressure/acoustic monitoring for time lapse remote sensing of sea-bed processes	PD
Andy Wheeler (UCC)	Quaternary Seismostratigraphies of Irish Shelf Seas (QuSISS)	PD
Andy Wheeler (UCC)	Coral Carbonate Mound Archives for Submarine Canyon Exchange Processes (CoMA_CoP)	PhD
Timothy McCarthy (NUIM)	Marine Observation Platform & Slick Feature Mapping	PD
Martin White (NUIG)	Evaluating controls of acoustic noise propagation across the continental margin	PhD
Peter Croot (UCC)	Influence of natural biogeochemical controls on primary productivity on the optical properties of surface seawater	PD

Raw Materials

More than 50% of the world's hydrocarbon reservoirs are in limestones. A major component of iCRAG's raw materials research concentrates on the world class Zn-Pb Irish Orefield, in which mineral deposits are entirely hosted by limestones. This spoke therefore provides an excellent basis for examining fluid flow with limestones, with a variety of potential implications for hydrocarbon studies including:

- Fault/fracture controlled fluid flow.
- Regional dolomitisation
- Fault/fracture geometries within limestones.

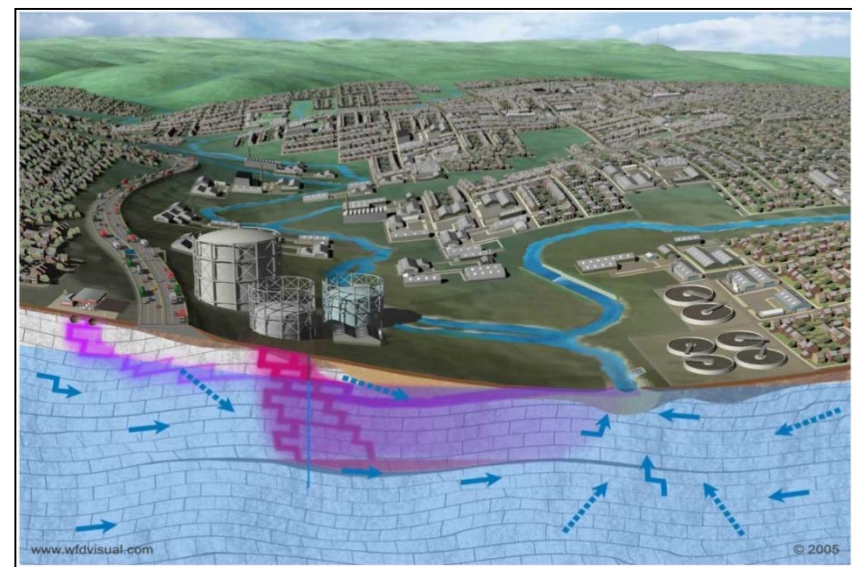


PI	Project title	PhD/PD
John Walsh (UCD)	Structural evolution of Lower Carboniferous faulting and its links to fluid flow and mineralization	PD
Sean McClenaghan (TCD)	Tracing geochemical signatures associated with carbonate-hosted Zn-Pb mineralisation in the Irish Midlands	PhD
Julian Menuge (UCD)	Origin and discovery of Irish-type orebodies: new isotopic methods	PD
Sean McClenaghan (TCD)	Geochemical vectoring for Irish-type Zn-Pb mineralisation along the Rathdowney Trend, Ireland	PhD
Pat Meere (UCC)	Metallogenesis of Cu deposits in Upper Palaeozoic sedimentary rocks, southern Ireland	PhD
Balz Kamber (TCD)	Abundance of the full range of ECE in Cu and Zn ores	PD
Balz Kamber (TCD)	Precious and energy critical metals - from Zn and Cu mines to mill	MSc
Pat Meere (UCC)	Surface Textural Controls of on High PSV Aggregates	PD
Robbie Goodhue (TCD)	Fingerprinting and assessing the reactivity of past and future aggregates	PhD
Julian Menuge (UCD)	Hydrothermal fluid flow in Irish Zn-Pb deposits: a Zn-Cu-S isotope and clumped isotope approach	PhD
Pat Meere (UCC)	Metallogenesis of Cu deposits in Palaeozoic sedimentary rocks, southern Ireland.	PD
Sean McClenaghan (TCD)	Characterizing orogenic vein systems to promote gold exploration across Irish terranes.	PhD
Julian Menuge (UCD)	Rare element enrichment processes in LCT pegmatites and implications for geochemical exploration	PhD
Balz Kamber (TCD)	The distribution of precious and energy critical elements at the scale of a Zn and Cu mineral deposit	PhD

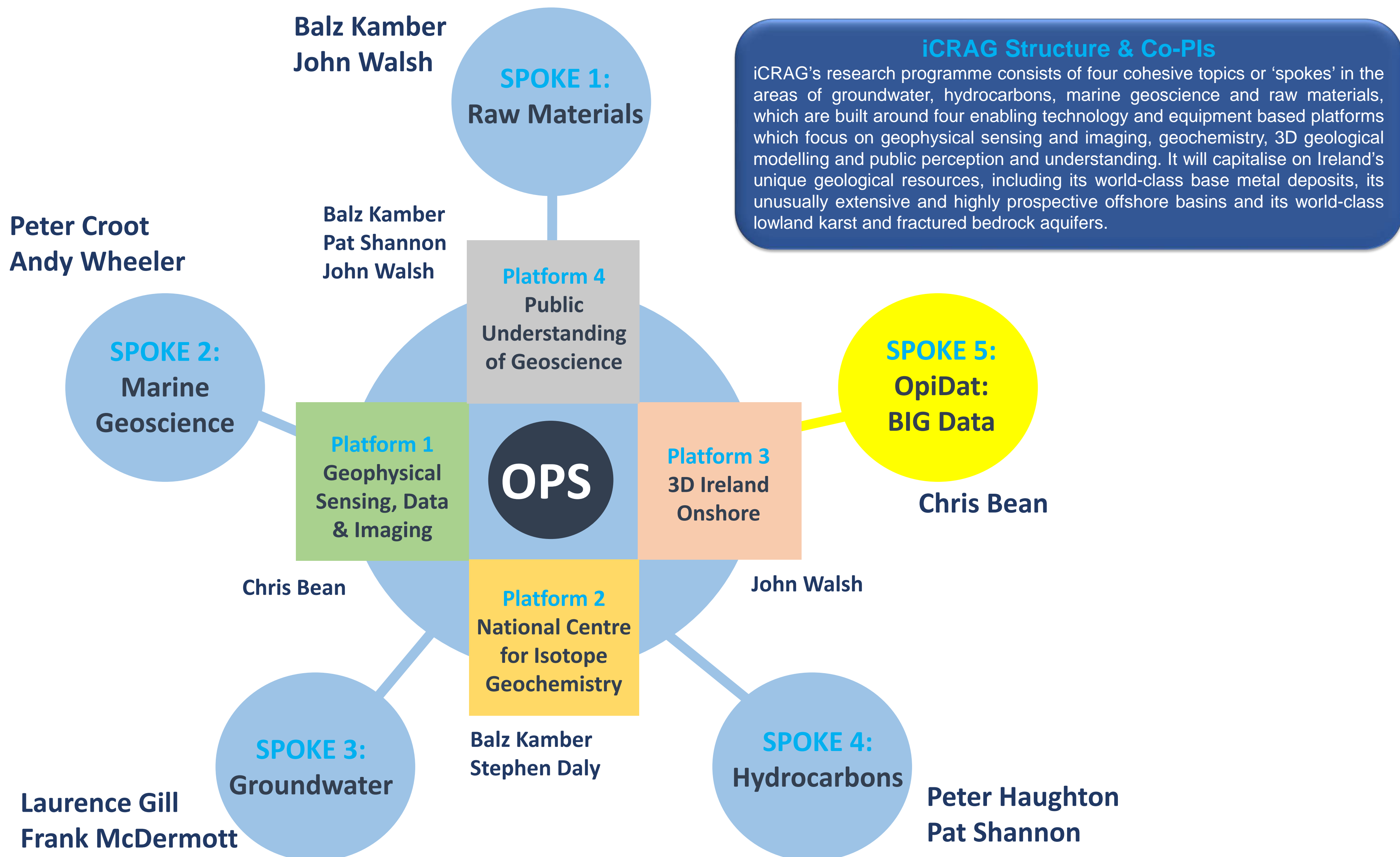
Groundwater

Nearly 20% of Ireland's water requirements are derived from subsurface groundwater. This reflects the predominance of limestone bedrock in Ireland, characterised by strong fracture and karst controlled groundwater flow. This permits investigation of the often-times highly heterogeneous nature of flow within limestones, both from qualitative and quantitative perspective, using methods which are sometimes applied in the hydrocarbon industry. Amongst the issues which will be examined are:

- Quantitative parameterisation of fault/fracture controlled fluid flow within limestones.
- Development of karst within limestones.
- Karst-controlled groundwater flow.



PI	Project title	PhD/PD
Laurence Gill (TCD)	Characterisation of diffuse recharge into karst aquifers using chemical and numerical modelling techniques	PhD
Bruce Misstear (TCD)	Impacts of changing climate on groundwater recharge in low storativity fractured-rock aquifers	PhD
Laurence Gill (TCD)	Visualisation of flow and contaminant transport through karst aquifers	PD
Frank McDermott (UCD)	An investigation of arsenic sources, speciation and mobilization processes in selected Irish aquifers	PhD
Catherine Coxon (TCD)	Emerging organic contaminants arising in rural environments: investigations in karst and fractured bedrock aquifers	PhD
Laurence Gill (TCD)	Ecosystem services provided by turloughs	PhD
Frank McDermott (UCD)	An investigation of uranium occurrence, sources and mobilization processes in selected Irish groundwaters	PhD
Carlos Rocha (TCD)	Effects of Groundwater-Surface water Interactions (GSI) on the biogeochemistry of coastal areas hosting aquaculture activities	PhD
Tiernan Henry (NUIG)	An investigation of metal occurrence, sources and mobilization processes in selected Irish groundwaters associated with mines.	PhD
Laurence Gill (TCD)	The impact of on-site wastewater effluent on karst springs	PhD



iCRAG Structure & Co-PIs

iCRAG's research programme consists of four cohesive topics or 'spokes' in the areas of groundwater, hydrocarbons, marine geoscience and raw materials, which are built around four enabling technology and equipment based platforms which focus on geophysical sensing and imaging, geochemistry, 3D geological modelling and public perception and understanding. It will capitalise on Ireland's unique geological resources, including its world-class base metal deposits, its unusually extensive and highly prospective offshore basins and its world-class lowland karst and fractured bedrock aquifers.

iCRAG Overview

iCRAG is a newly formed national research centre which brings together Ireland's leading geoscience experts focussing on a range of issues all of which underpin economic development - from safe and secure groundwater supplies through to the discovery of mineral/aggregate deposits, and from the de-risking of oil and gas exploration to ensuring that the Irish public is educated and informed on these issues. The principal goal is to embed the outcomes of high quality research within industry practice in Ireland and overseas.

Supported by Science Foundation Ireland and industry partners for the next 5 years (with ca €25M cash funding), iCRAG is one of only 12 SFI Research centres, and the first national geosciences initiative to be supported by SFI's flagship funding scheme. iCRAG is a collaboration between 150 researchers within UCD, TCD, NUIG, UCC, NUIM and DIAS and more than 50 industry partners who will work in partnership with government agencies involved in the geosciences sector.

This poster describes some of the non-hydrocarbon research conducted in iCRAG which is pertinent to technical issues confronted by the petroleum industry – another poster outlines our hydrocarbon-related research.

Geochemistry

Support the geochemical analytical requirements of iCRAG research, and develop analytical methods to support research in the Raw Materials and Hydrocarbon spokes including petrographic/spatial geochemical characterisation of rock and mineral samples (ores, reservoir sandstones etc.).



Public Perception

Since public perception and understanding can be a major challenge to geoscience sector projects, this platform will investigate this issue and provide support and information on geosciences to facilitate decision making by the public and by policy makers.

- Education and training for geoscientists.
- Improved geosciences information to decision makers and the general public.

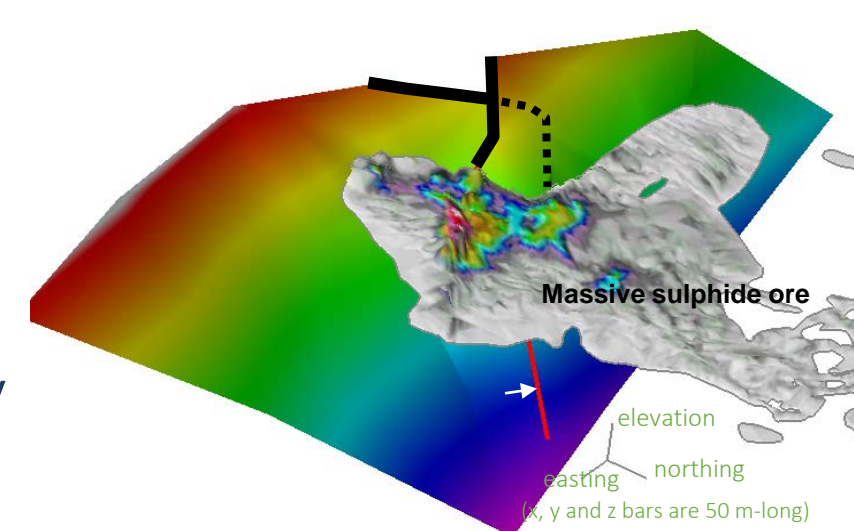
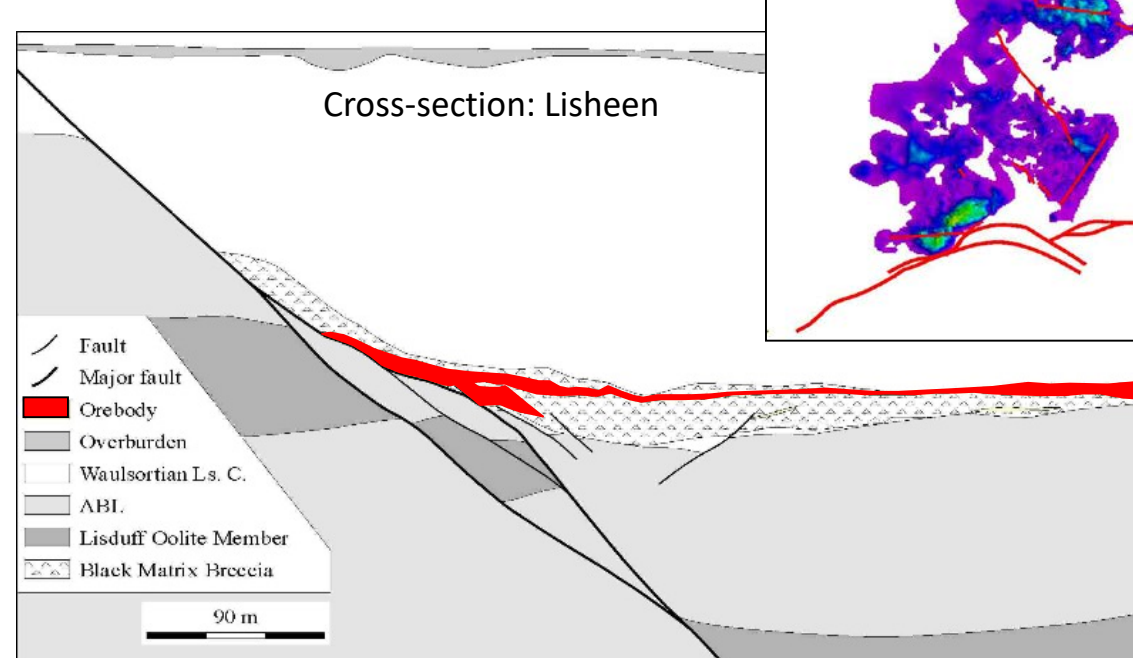


Platform Research

Platform	PI	Project title	PhD/PD
Geophysics Platform	Sergei Lebedev (DIAS)	Seismic imaging with massive datasets using sparsifying transformation methods	PD
Geophysics Platform	Chris Bean (DIAS)	Mapping of noise sources areas and trialling of noise correlation methods in the marine environment, offshore Ireland	PD
Geophysics Platform	John Walsh (UCD)	Provide IT Support for Platform and Spoke projects involving Seismic interpretation and 3D modelling (Geophysics and 3D Modeling)	IT
Geophysics Platform	Chris Bean (DIAS)	Pilot application of passive seismic imagery at Boliden-Tara mine	
Geochemistry Platform	Balz Kamber (TCD)	Method development in chemical fingerprinting and laser-ablation analysis	RA
Geochemistry Platform	Stephen Daly (UCD)	Development of Re-Os and HSE analytical facilities (NCIG Platform)	
Geochemistry Platform	Stephen Daly (UCD)	NCIG Platform	
3D Ireland	John Walsh (UCD)	3D modelling of the NW Irish Carboniferous Basins from regional down to mineral deposit scale	PD
3D Ireland	John Walsh (UCD)	3D modelling of the Irish Carboniferous Basins from regional down to mineral deposit scale	PD
3D Ireland	John Walsh (UCD)	3D modelling of the Irish Carboniferous Basins from regional down to mineral deposit scale	PD

3D Ireland

Common datasets are unique national archives for research in different sectors (e.g. groundwater and mineral deposits are in the same rocks). Using archive mineral exploration/production data, together with geological and geophysical data supplemented by Geological Survey of Ireland (GSI) and Exploration and Mining Division (EMD), we will generate a 3D Geological Model of the Irish Carboniferous on a broad range of scales.



Geophysics

Perform research and provide support on a broad range of geophysical techniques, though specialising in seismic methods in particular.

- Developing new imaging methodologies.
- Yielding Ireland's first ultra high resolution shallow (top 1km) passive seismic images.
- Compare Geological and Geophysical models directly.

