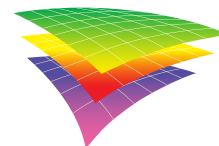




Field Trips and Training for the Hydrocarbon Industry

Integrated Geoscience from Fieldwork,
Satellite and Sub-Surface Data

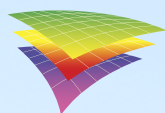


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Limited**

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Field Trips and Training



The GRL Difference

Our clients often tell us how valuable it has been to leave their usual office environment and join us on the outcrop. We notice it too – getting colleagues together, in front of a great outcrop analogue, somehow seems to make it easy for different members of an asset team to share views and discuss work challenges. Come and share our passion for field geology, and let us help facilitate your team's free-flowing discussions. Our expert field-leaders will provide you with irreplaceable, first-hand experience of world-class outcrops that illustrate key aspects of the petroleum system, and leave you with new insight to apply to the sub-surface.

Key concepts are richly illustrated from our large catalogue of field examples, combined with sub-surface data from areas of active exploration and production. All our courses include a range of hands-on exercises to enhance the learning experience. Where feasible we combine classroom sessions with field excursions so that theoretical concepts can be reinforced by direct first-hand observations. Understanding of field examples is supplemented and enhanced with leading-edge geospatial technologies, including 3D visualisation of interpreted virtual outcrop models.

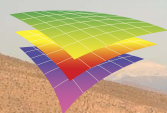
Safety is paramount in all our operations. We have extensive experience in leading clients in challenging environments in the Middle East, Americas, Asia and Europe.



Field Trips: Contents & Logistics

- Our field programme is highly flexible: we design each trip around the specific learning objectives that you require.
- We can arrange all logistics and HSE planning for the trip - or coordinate directly with your support teams.
- All our trips have applied learning objectives with direct relevance for hydrocarbon exploration and production.
- Our fieldtrip leaders are highly skilled in focusing on the aspects of outcrop geology most relevant to understanding interpretation of subsurface geology.
- Active participation is promoted with hands-on outcrop exercises (individually and in small teams) that aid the learning process.
- We make extensive use of 3D virtual outcrops to introduce participants to field locations prior to arrival and to reinforce learning outcomes during and after the trip.
- See our website for more information and a full list of current fieldtrips.

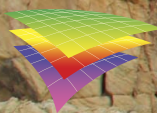
Find out more
geospatial-research.com/fieldtrips



Field Trip Locations

	Lead	Location	Main Purpose	Learning Outcomes	Duration*
1	Ken McCaffrey	Corinth (Greece)	Rift systems.	Understand deformation localisation patterns in active rifts. Sedimentary inputs to rift systems; depositional and erosional patterns. Active tectonics, hazards.	5 days
2	Richard Jones	Oslo Graben (Norway)	Rift systems; transfer zones; oblique tectonics.	Study the relationship between regional rift geometry, graben asymmetry, transfer zones, and the distribution of pre-rift, syn-rift and centres of volcanism. Also see the earlier thin-skinned (Caledonide) fold and thrust belt.	3-5 days
3	Jon Long	Kilve (Bristol Channel, UK)	Extensional faulting; fault relays; fault-related folding; mechanical layering.	Understand the 3D complexity of faults/fracture zones and their appearance in map view and cross sections, in a mechanically layered clastic sequence. Appreciate the lateral variability in viable flow pathways due to fault relays.	1-2 days
4	Max Wilkinson Ken McCaffrey	Apennines (Central Italy)	Extensional faulting; growth, segmentation, and interaction.	Gain insight into fault segmentation and interaction at basin to outcrop scales. See the interrelationship between tectonics and geomorphology in a post-orogenic extensional system, and observe controls on the architecture of intramontane basins.	3-5 days
5	Jon Long	Whitby (NE England)	Fault control on deposition.	Appreciate in 3D how fault movement creates accommodation space and controls the location of fluvial drainage and the stacking patterns of channel sands.	1 day
6	Richard Jones Jon Long	Moab (Utah, USA)	Extensional faulting & fault relays; fault damage zones; deformation bands; halokinesis.	Understand the relationship between fault relay geometry and fluid migration paths. See vertical and lateral variation in fault damage and fault zone geometry on a seismic scale. See the effect of deformation bands on poroperm in high porosity sandstone reservoirs. Gain insights into the effects of salt withdrawal on the overlying sequence.	2-3 days
7	Richard Jones	Ninety-Fathom Fault (Newcastle, UK)	Deformation bands; fault damage zones.	Understand the effect of deformation bands (granulation seams) on poroperm in high porosity sandstone reservoirs. Appreciate the complexity of fault architecture, fault zone damage, and shale smear, and how they can effect fault seal.	1 day
8	Bob Holdsworth Richard Jones	Northumberland Basin (NE England)	Transtensional rifting and basin inversion processes; fractured reservoirs.	Understand the relevance of characterisation of fold and fracture systems from regional to core-scale for reservoir modelling. See the importance of faults, fractures and fracture infill to reservoir permeability. Understand the role and importance of structural reactivation and oblique tectonics.	1-3 days
9	Ken McCaffrey Bob Holdsworth	Northern Scotland	Basement inheritance, oblique tectonics.	Understand the control on basin architectures by pre-existing structures. Study basement-cover interactions, and ways in which transtensional and transpressional deformation patterns are controlled by oblique tectonics.	4-5 days
10	Bob Holdsworth	Moray Firth Basin (NE Scotland)	Structural control on basin margins.	Understand the factors that control the complexity of fault controlled basin margins, and the importance of reactivation processes in the development of the basin.	3 days
11	Bob Holdsworth	Moine Thrust Belt (NW Scotland)	Thrust and fold tectonics.	Study a classical thrust belt to understand thrust geometries and their relationship to reservoir modelling, with relevance to understanding structural geometries worldwide.	3-5 days
12	Richard Jones Jon Long	Zagros (Kurdistan Region of Iraq)	Large-scale anticline traps; fractured carbonate reservoirs; mechanical stratigraphy; oblique tectonics	Study a wide variety of trap geometries, and a range of factors that represent risk to trap integrity. Understand the relationship between mechanical stratigraphy and the stacked reservoir/seal sequence. Appreciate the multiscale nature of fracture systems. Study direct analogues for nearby producing reservoirs (incl. Kirkuk field and many others).	4-12 days

*Duration of trips is approximate; we are happy to customise the content and duration of any of our field-trips to meet your exact requirements. We routinely tailor our trips in response to requests from clients, and can combine individual trips within a region. Contact us for more information on these or other trips you would like us to organise.



Field Trip Locations

	Lead	Location	Main Purpose	Learning Outcomes	Duration*
13	Richard Jones & colleagues	Zagros (Iran)	Large-scale anticline traps; fractured carbonate reservoirs; mechanical stratigraphy; oblique tectonics	We can provide customised trips tailored to meet specific learning objectives, spanning regional tectonics & geodynamics, fold geometry and trap integrity, fractured reservoirs, hydrocarbon systems, and more. <i>Contact us for further information.</i>	
14	Richard Jones	SW England	Folding & fracturing	Study variation in fold geometry in 3D, and understand this in relation to trap geometry and trap integrity. Gain insight into the relationship between folds and fracturing, and the use of outcrop analogues for fracture modelling.	1-2 days
15	Richard Jones Jon Long & Petroleum Institute, UAE	Jebel Hafeet (United Arab Emirates)	Fold complexity and fracture systems	See the relationship between folding and syn-deformational deposition. Appreciate the complexity in fault and fracture systems caused by multiple phases of deformation. Understand the uncertainty and problems in building fracture models in folded stratigraphy.	2 days
16	Richard Jones	Oman	Fracturing and four-way closing anticlines	Study natural fracture systems (including prominent fracture corridors), their relationship to large-scale four-way closing anticlines, and implications for modelling of fractured reservoirs.	2 days
17	Richard Jones Jon Long & Petroleum Institute, UAE	Ras al Khaimah (United Arab Emirates)	Fractured reservoirs; mechanical stratigraphy	Appreciate the effect of mechanical layering on fracture systems. Understand multi-layered carbonate reservoirs and how to build geologically realistic discrete fracture network (DFN) models. Study fault damage zones in carbonates.	2-3 days
18	Susie Daniels Maurice Tucker Michael Mawson	Zechstein (NE England)	Fracture systems, facies, evaporite dissolution & margin collapse	Understand the depositional sequences, diagenesis, faulting and fracturing affecting Zechstein (Z1 - Z3) carbonate reservoir facies in the Permian basin of NW Europe. Appreciate the impact of evaporite dissolution and collapse breccias on flow pathways. Gain insights from an important global analogue for carbonate/evaporite systems.	2-3 days
19	Bob Holdsworth Ken McCaffrey	Orcadian basin and basement (North Scotland)	Fractured reservoirs; fractured basement	Understand the relevance of characterisation of fracture systems from regional to core-scale in relation to modelling of fractured reservoirs. See the importance of faults, fractures and fracture infill to reservoir permeability. Understand the role and importance of structural reactivation and basement-cover relationships.	2-5 days
20	Bob Holdsworth Ken McCaffrey	Outer Hebrides Lewisian Complex (NW Scotland)	Fractured reservoirs; fractured basement	Understand the relevance of characterisation of fracture systems from regional to core-scale in relation to modelling of fractured reservoirs. See the importance of faults, fractures and fracture infill to reservoir permeability.	3-5 days
21	Susie Daniels Jonny Imber	Cleveland Basin (NE England)	Natural fracture systems in unconventional plays	Gain insight into fracturing in shales. Study background and fault-related fractures, and learn methods to constrain relative timing and range of key spatial properties. Understand the strengths and weaknesses in methods of characterisation of fractures.	1-2 days
22	Richard Jones	Flamborough head (East England)	Fracture systems in chalk	Study fracture and fault systems in chalk. See the effects of Alpine shortening on earlier extensional structures.	1 day

Find out more
geospatial-research.com/fieldtrips

Discuss your needs
susie@geospatial-research.com