

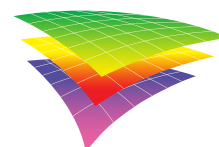


Fractured Zechstein Carbonates of NE England

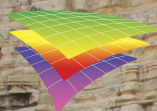
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Field Trip Overview



Overview

GRL in conjunction with GSL offer a 2 day field trip in advance of the Geology of Fractured Reservoir Conference, to visit world class Zechstein carbonate outcrops in the northeast of England. Zechstein carbonate reservoirs are some of the oldest producing reservoirs in Europe, yet the contribution of fracture permeability to production is typically under-appreciated.

This field trip draws upon extensive multi-disciplinary expertise combining sedimentology, sequence stratigraphy, fracture network characterisation and structural analysis, in order to focus on connectivity within Zechstein carbonate reservoirs and enhance understanding of reservoir performance. These outcrops are well understood in terms of depositional environments, sequence stratigraphy and, following a recent fracture study by GRL, are now understood with regard to their fracture behaviour.

Examination of the different fracture characteristics exhibited on the trip will provide insight for producing Zechstein reservoirs, other fractured carbonate reservoirs and carbonate-evaporite systems across the globe. We know that fractured reservoirs have a significant role to play in the future extraction of hydrocarbons, this trip offers an opportunity to understand the fracture behaviour in the context of facies, lithology, diagenetic and tectonic setting. All these aspects will be examined within the field trip.

Dates and Location

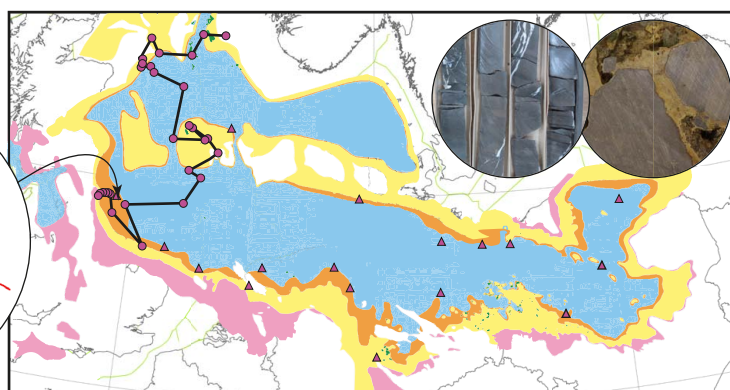
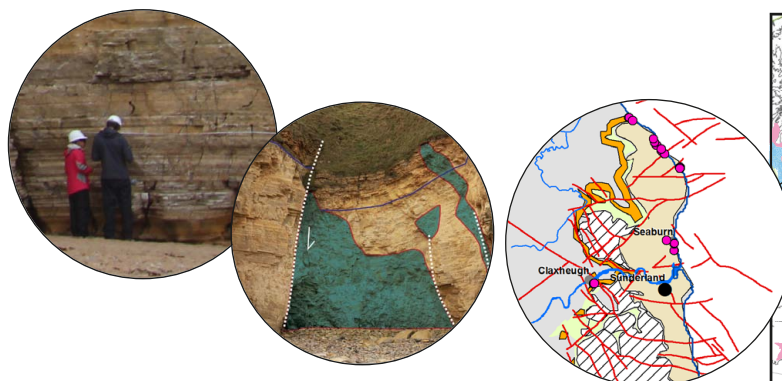
Field days: Monday-Tuesday 22nd-23rd of October 2018.

Aims

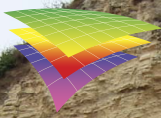
- To observe fracture behaviour in sediments from multiple depositional settings (lagoonal through to upper slope), and note the interplay between fracture behaviour and facies, diagenesis and structural setting.
- To observe the dramatic effects of evaporite dissolution on fracture stratigraphy.

Learning Outcomes

1. Informed discussion and insights into depositional, diagenetic, and structural processes.
2. Extensive cliff exposures allow easy appreciation of the spatial relationship between different factors, including
 - a. Changes in facies and their associated fracture styles.
 - b. The spectacular effects of collapse following evaporite dissolution.
 - c. The effects of dolomitisation and de-dolomitisation on fracture and deformation style.
 - d. Faulting and its impact on background fracturing.
 - e. Varying matrix porosities allow examination of the interaction of fracture and matrix porosities.



Zechstein palaeogeographic map for the Z2 Main Dolomite (Ca2) (after Slowakiewicz et al 2015) with locations of sequence stratigraphic studies (triangles), correlation panel path (black line) and locations of field study sites (inset map). Examples of outcrops and cores are inset.



Field Trip Itinerary



Itinerary

Sunday 21st October 8:30 pm: Meet in Durham

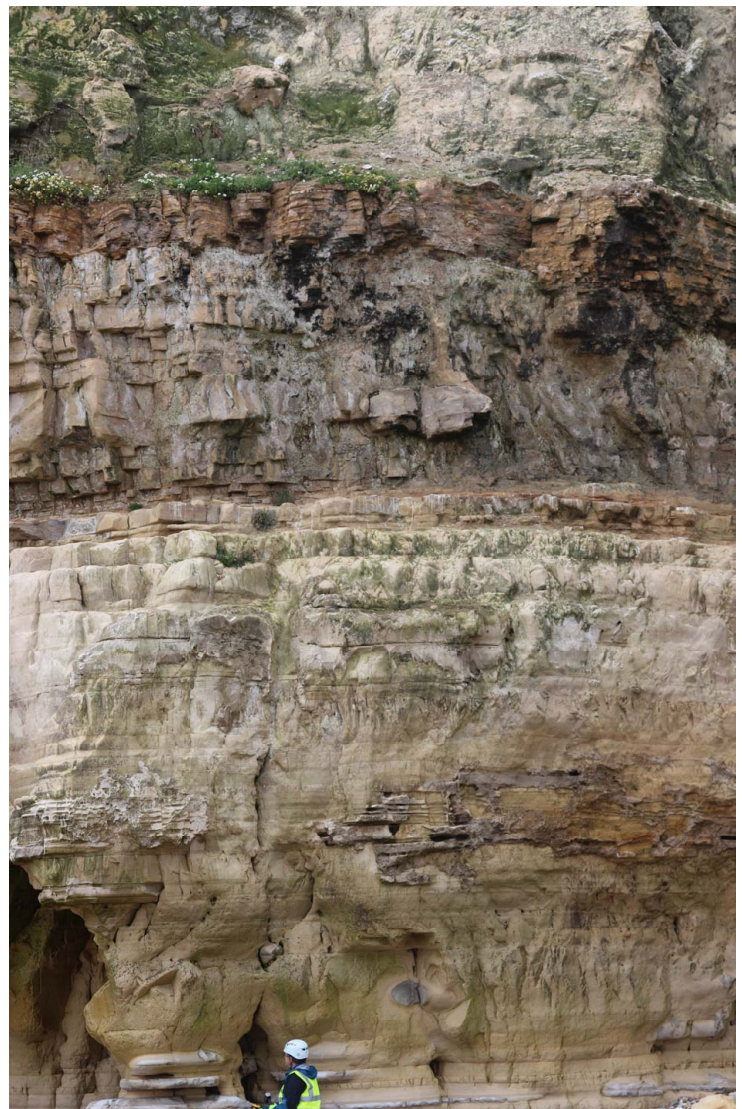
- Introductory evening lecture supplemented with virtual outcrops (1 hour)

Monday 22nd October

- Observations of deformation within well-bedded platformal carbonates (EZ1/ ZS1), fore and back reef deposits (EZ1 / ZS2), and lagoonal to upper slope deposits (EZ2 / ZS3). Different facies with both dolomite and limestone lithologies allow an appreciation of the impact of facies, lithology and diagenesis on fracture behaviour.
- Overnight in Durham City (World Heritage Site)

Tuesday 23rd October

- Walk up section along Marsden Bay (EZ2 / ZS3), viewing collapse brecciation and deformation associated with evaporite dissolution. The deformation styles and mechanical units evolve along section, exhibiting large variations in fracture and matrix properties as the distance from the dissolution front increases. Both dolomites and limestones are present, allowing comparison of deformation styles within each.
- Early afternoon finish (allowing delegates time for travel to London).



Example of the different facies within the cliff section at Marsden Bay, UK. Notice how the fracture system changes between the different facies.

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