
Prospectivity of the north-east Celtic Sea: new data, new perspectives

Mark Attree
Zyg Sarnowski
Keith Byrne

Solaris Exploration
GeoPartners
Providence Resources

PETEX

16th November 2016

Prospectivity of the north-east Celtic Sea: New data, new perspectives

Mark Attree⁽¹⁾, Zyg Sarnowski⁽²⁾, Keith Byrne⁽³⁾

During the summer of 2015 a consortium headed by GeoPartners acquired a new regional long offset broadband survey in the North Celtic Sea and St Georges Channel.

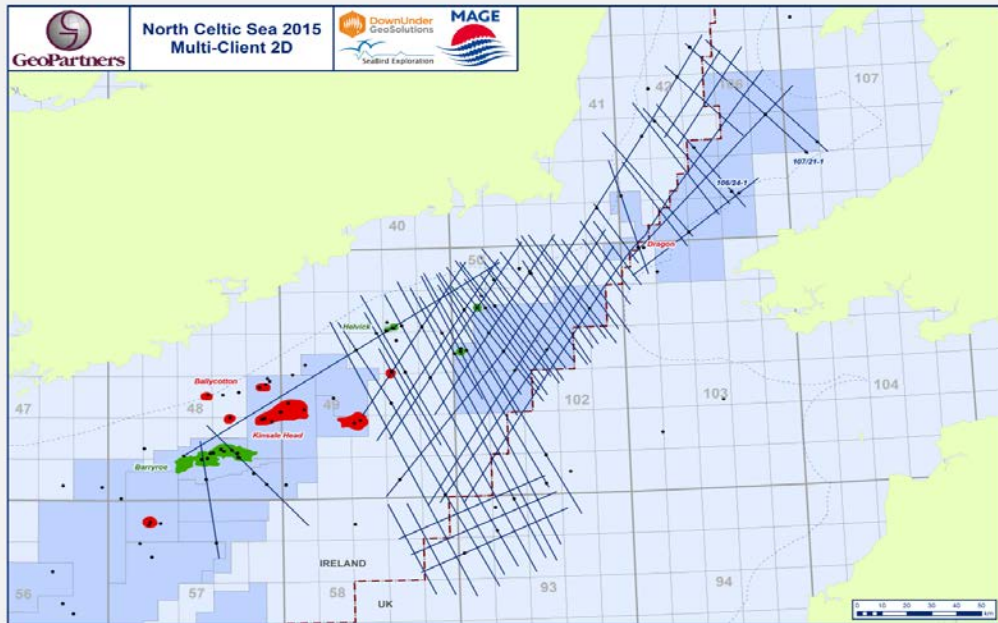
This Ireland/UK cross border survey comprising a total of 5124 km has been fully processed at Down Under Geosolutions and now interpreted. The UK portion of the survey has been supplied to the UK Oil and Gas Authority as part of a regional dataset to be used in future licence rounds.

The imaging problems in this area due largely to outcrop of chalk at sea bed are well known and partially explain why this area is so underexplored. The new data however could prove to be a “Basin Opener” as they provide for the first time a truly regional view and a step change in data quality to take a fresh look at the basin.

The petroleum geology of the North Celtic Sea and St Georges Channel shares many similarities with regard to basin development, structural style, inversion history and sedimentology, including key source and reservoir intervals with other petroliferous basins in the North Atlantic whilst also exhibiting an individual character. This is due to the position adjacent to the underlying Variscan Thrust and also being situated between two long lived high areas, leading to a relatively narrow, silled basin intermittently open to the sea. An extremely thick Jurassic sequence is present, particularly in the St Georges Channel Basin (itself north of the Variscan Front), giving significant potential for the generation and expulsion of hydrocarbons from the Lower Jurassic. The North Celtic Sea Basin, though with a thinner Jurassic section also contains the same sequence, culminating in a thick Upper Jurassic lacustrine sequence that also has proven oil generative capacity. Reservoirs are proven not only in the producing Lower Cretaceous but also in the Upper and Middle Jurassic. The possibility exists for turbiditic reservoirs in the deeper parts of the basin. The Triassic, with few well penetrations, although thinner than in the Irish Sea to the north has demonstrated reservoir potential and juxtaposition against the Lower Jurassic source rock can be seen and inferred in a number of places. Although by no means the only interesting potential objective in the area it captures the romance of the opportunity and this presentation utilises the new data to illustrate aspects of the regional geology and shows how the new data can put the petroleum exploration potential of this area into regional context, utilising analogues and extending these ideas. Particularly, the deep penetration achieved, combined with the retention of shallow detail allows the possibility of predicting new areas for exploration based on both regional and local context.

Thanks to – Geopartners, MAGE, Providence, Lansdowne, Down Under Geosolutions for data and assistance.

1. Solaris Exploration Limited 2. GeoPartners Ltd 3 Providence Resources



Kilometres	5,124 km
Streamer	8.1 km , 648 groups at 12.5 m, solid Sercel streamer
Depth of streamer	12m
Source	Bolt LL, LLX airgun array 4910 cu. in., 133.7 barn peak to peak.
Source depth	7m
Shot interval	25m
Near trace	90m
Nominal fold	164
Record length	9.5 secs, 2msecs samples

Survey acquired in summer 2015 by MAGE vessel Nikolay Trubyatinski equipped with a modern solid streamer and processed by Down Under Geosolutions in London on behalf of GeoPartners

Covers northern part of the North Celtic sea Basin, the St Georges Channel Basin and the northern part of the South Celtic Sea Basin

Imaging problems well known, generally associated with chalk at sea-bed – (processing showed main issue with thin Chalk at sea-bed)

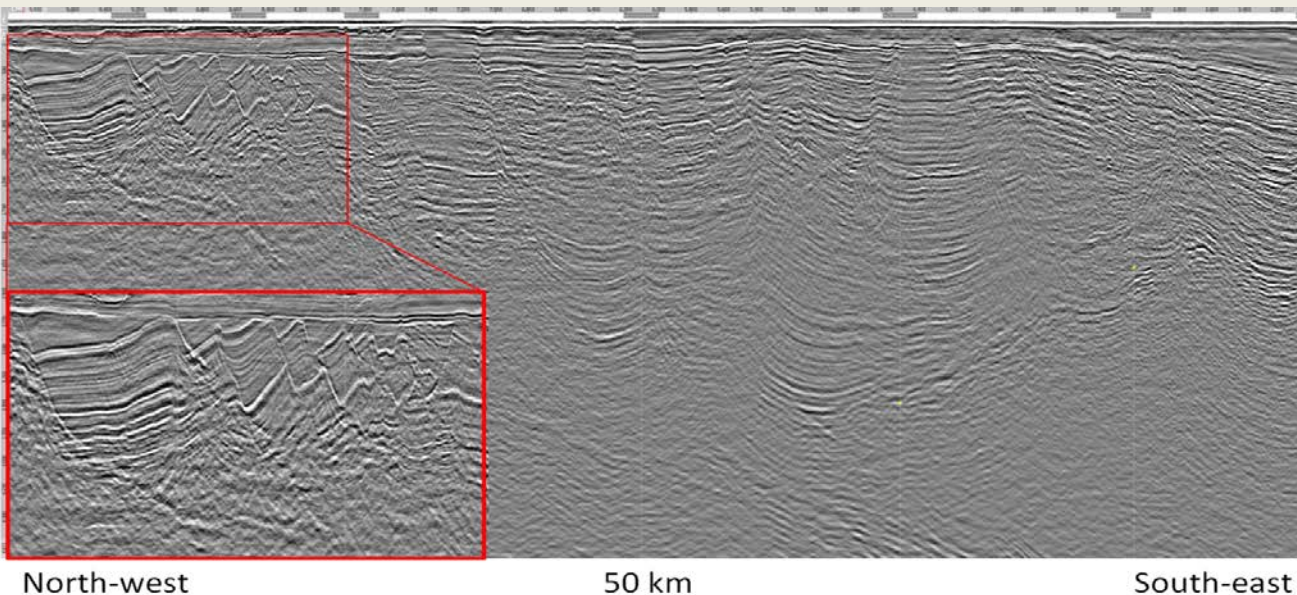
Key points;

- large output source - getting more signal into deeper section

- solid streamer - better depth control, sensitivity, improved signal to noise

- extra long offsets - improved imaging of steep faults, demultiple applications

- broadband source and streamer tow depth - enhancing low frequency acquisition and imaging



Careful processing of the data has been undertaken, it is NOT a one size fits all approach, despite this being a large regional survey

DUG's DUGbroad deghosting processing has been applied to extend bandwidth and to reduce the effects of ringing seen on older datasets

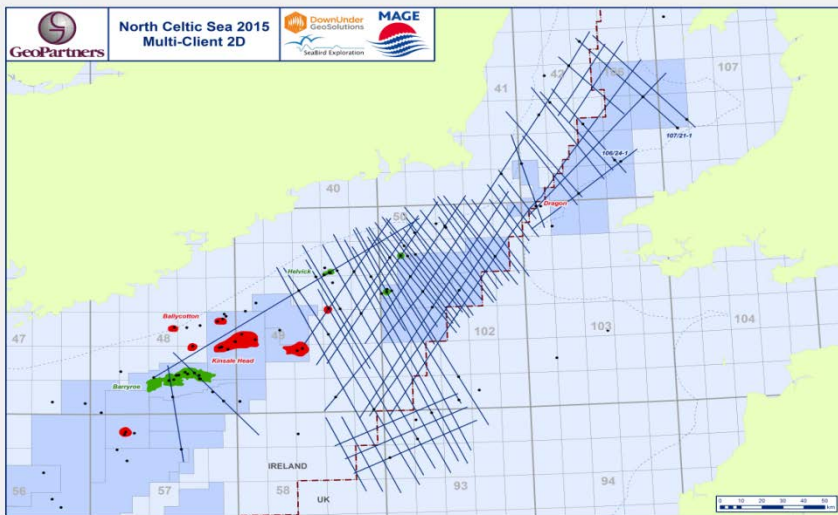
Isotropic Pre Stack Kirchoff fourth order curved ray time migration algorithm used

The processing sequence is extensive...and available from DUG / GeoPartners

Line highlighting the crisp fault imaging in the shallow section whilst retaining deep imaging

Note the base of the post-Carboniferous basin is imaged, the basin fill and the underlying Variscan Thrust

In this location the north-west margin forms a ramp over which shallow structuration is focussed

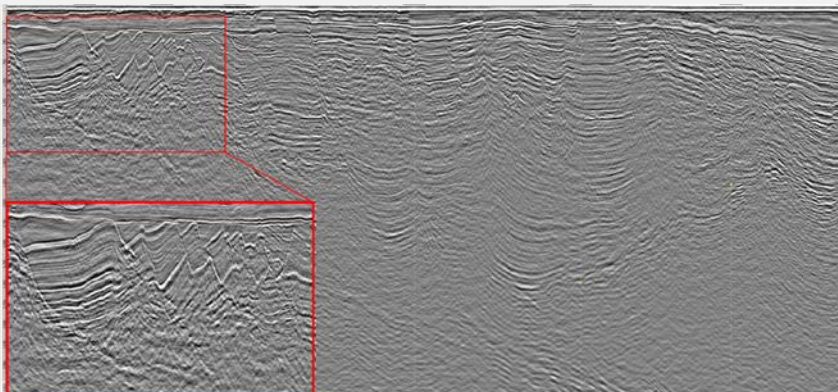


A new basin wide 2-D seismic survey has been acquired in 2015, processed in 2016 and provides a dataset with excellent shallow definition and deep penetration that allows the regional evaluation of both plays and basin development, putting exploration targets in context.

The data have been used in a simple play fairway mapping approach to provide insights into both potential prospectivity and the relationship to deep structure.

Given the significant improvement in data quality this gives what amounts to a first look at large parts of this very underexplored basin.

The data are available to view and license from GeoPartners and Down Under Geosolutions.



North-west

50 km

South-east

Thankyou to PAD, GeoPartners, MAGE, Seabird, DownUnderGeosolutions and particularly to Keith Byrne of Providence and Steve Boldy of Lansdowne for assistance during the interpretation.

mattree@solarisexploration.com
zyg.sarnowski@geopartnersltd.com
kbyrne@providenceresources.com