# Porcupine Basin Ireland – Prospectivity identified on new data heightens interest

APPEX, 27<sup>th</sup> February, 2018



Clare Morgan
Head of Technical Section,
Petroleum Affairs Division

#### Porcupine Basin- Prospectivity identified on new data heightens interest

#### **Porcupine Basin**

#### **Presentation outline:**

- Location
- New Data Seismic
  - Well
  - Interpretation
  - Research
- Current interest licence status
- Conclusions

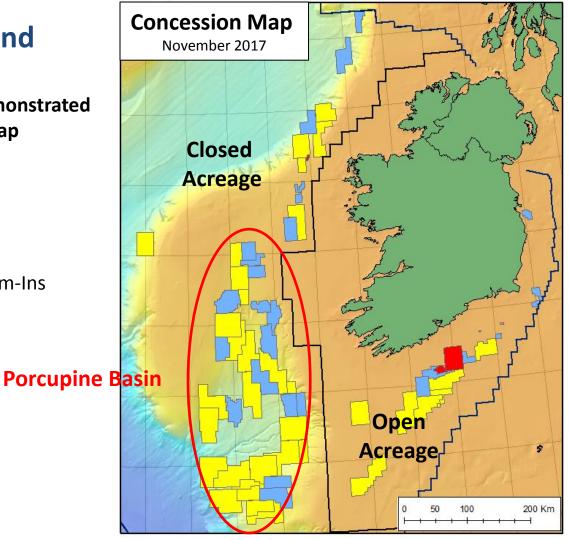


#### **Licensing Offshore Ireland**

Exploration interest offshore Ireland is demonstrated by the current offshore Concession Map

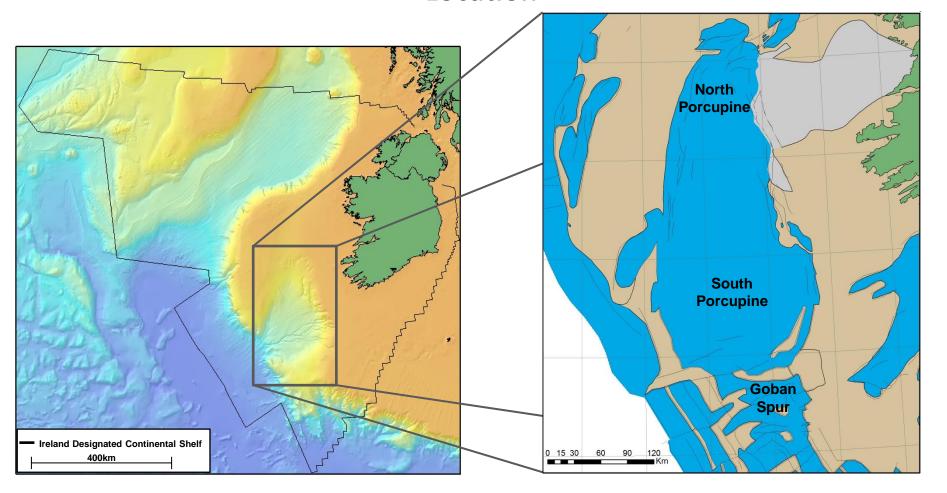
Exploration Licence
Licence Option
Petroleum Lease

Licensing Options\Exploration Licences\Farm-Ins





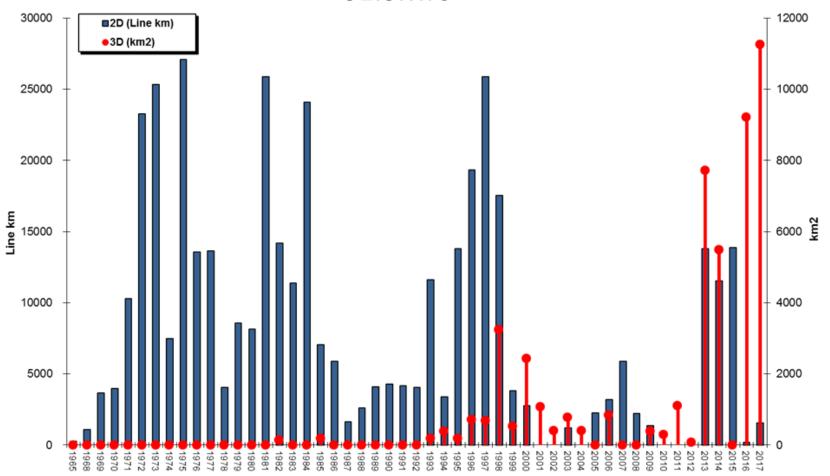
#### Location



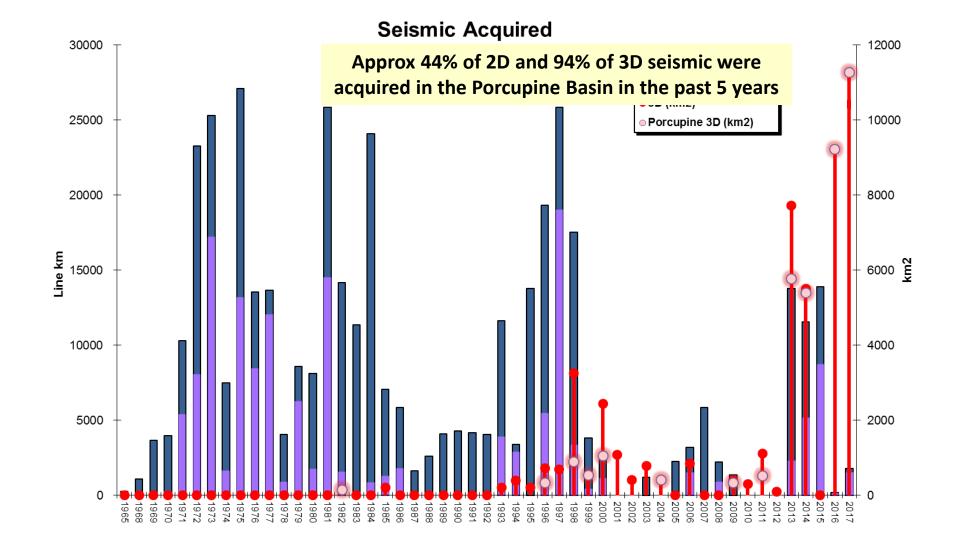


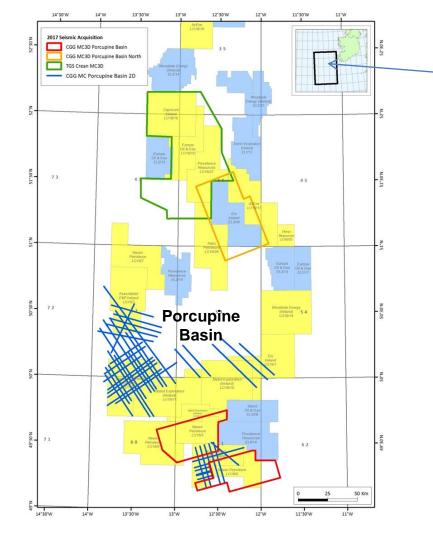
### **New Data**

#### **SEISMIC**









## Seismic acquired in 2017

3D:

CGG South Porcupine c. 3,080 sqkm CGG North Porcupine c. 2,740 sqkm TGS North Porcupine c. 5,450 sqkm

2D (2.5D):

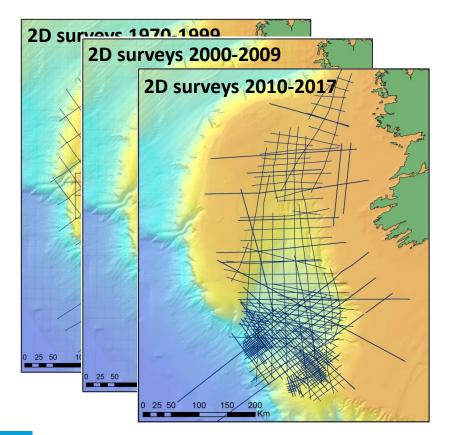
CGG South Porcupine c. 1,570 km

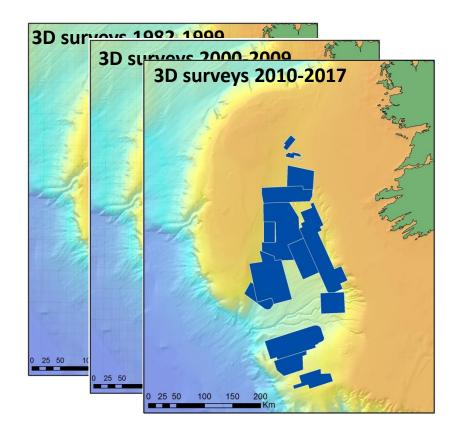
Total 3D acquired in 2017 : c. 11,270 sqkm

Total 2D acquired in 2017: c. 1,570 km



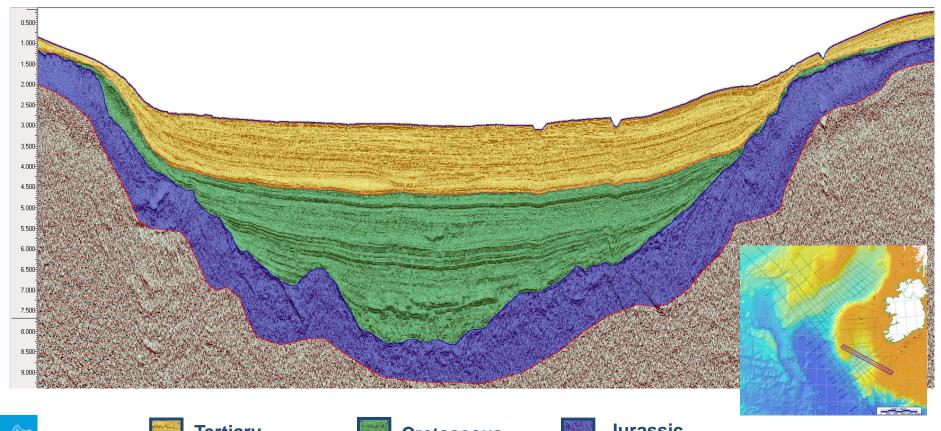
#### Seismic surveys Porcupine Basin







#### **Porcupine Basin Play Types**



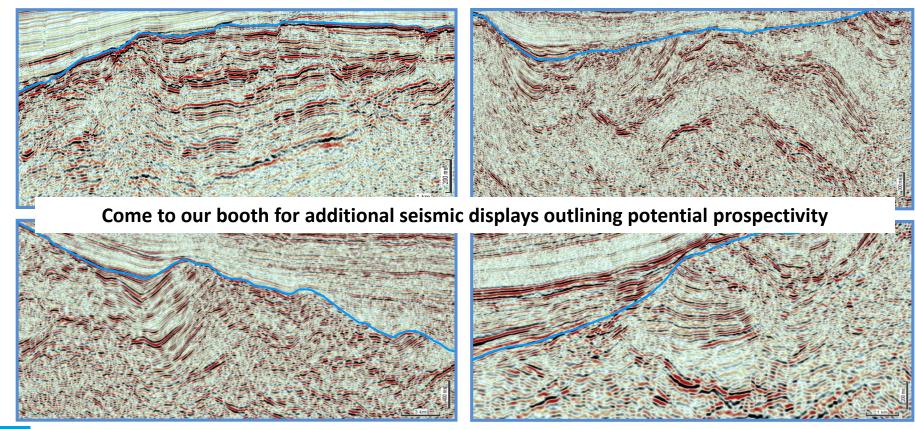






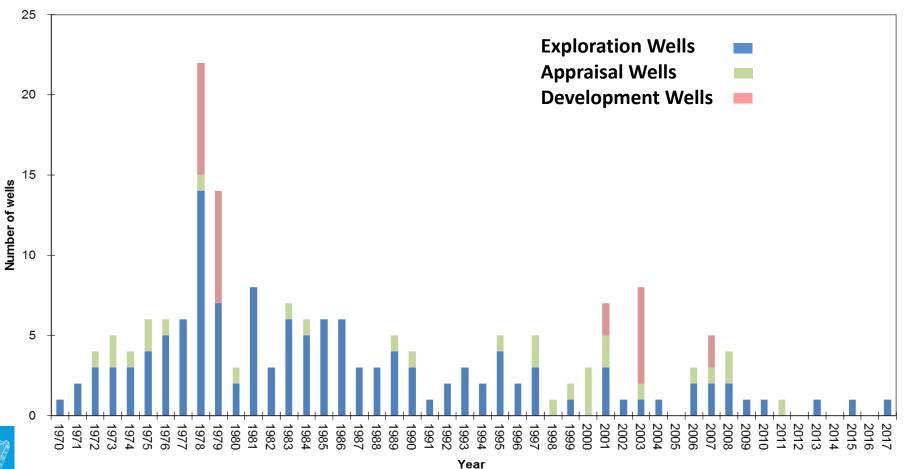


#### **Jurassic Rift and Syn-Rift Plays**



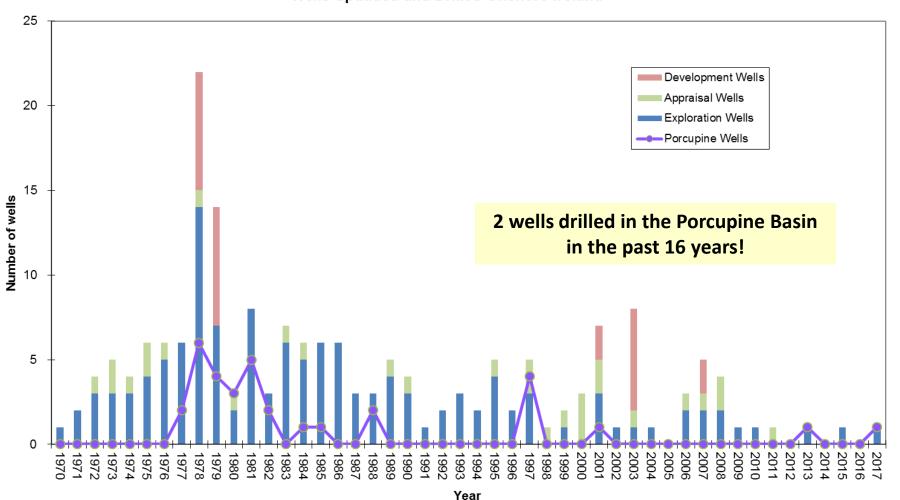


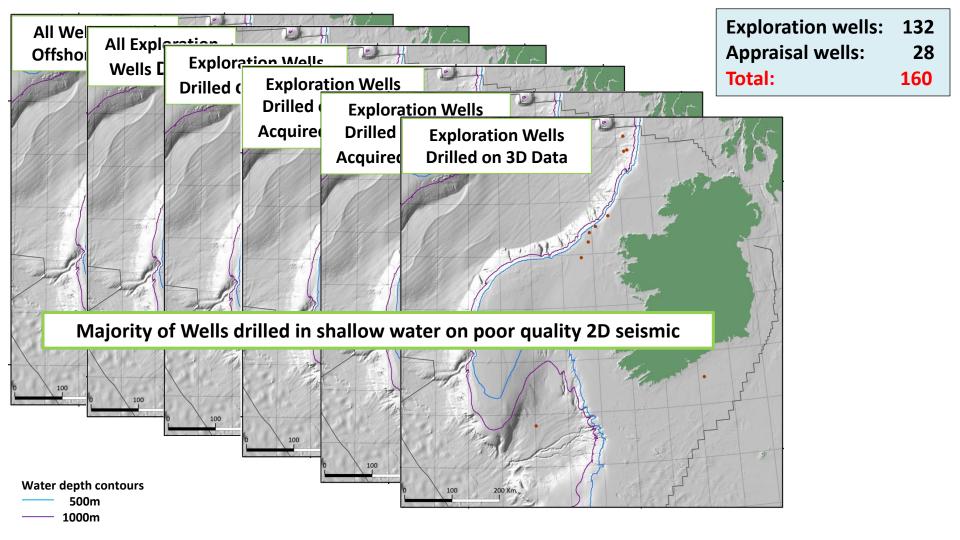
#### Wells



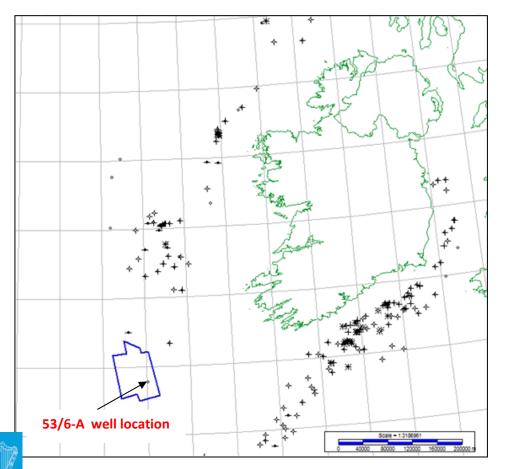


#### Wells Spudded and Drilled Offshore Ireland





#### **Drilling in 2017**



#### **Druid Drombeg Well**

- Well drilled in FEL2/14 in the Porcupine Basin
- Well location approximately 215km SW of Kerry coast
- Water depth at location = 2233m (deepest water well)
- Nearest well 44/23-1 ('Dunquin'), 71km to the NE

#### FEL2/14 comprises:

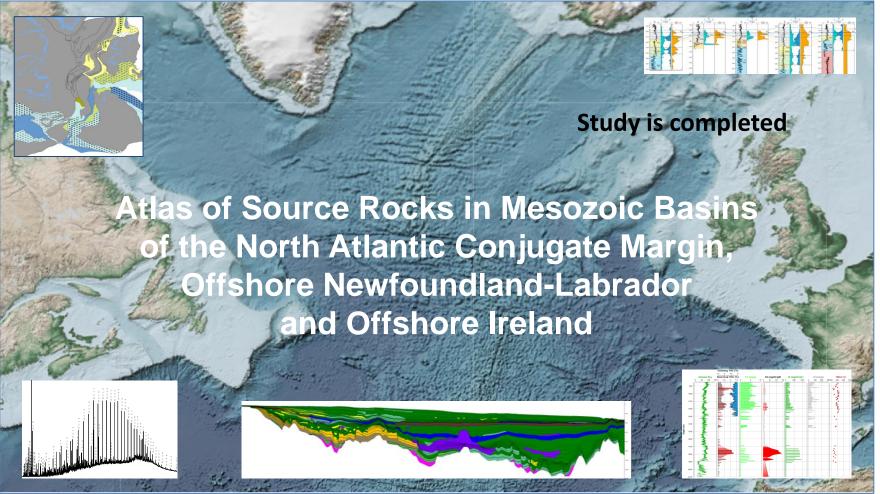
Providence Resources plc (Operator)
Capricorn Ireland Ltd
Sosina Exploration Ltd

### Press Releases 53/6-1 Providence Resources

04 August and 11 September 2017

Palaeocene Druid reservoir interval and Lower Cretaceous Drombeg reservoir interval encountered within the pre-drill depth prognosis, comprising a porous water bearing reservoir interval at each target.

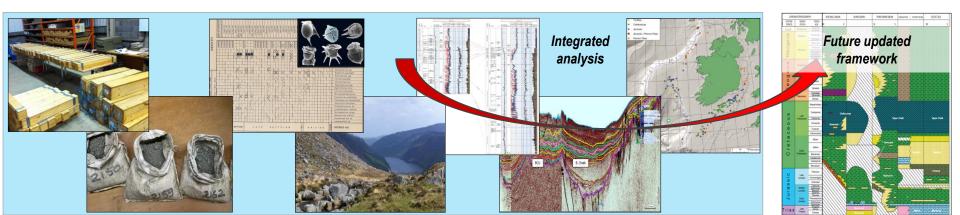




#### **Updating Ireland's Stratigraphic Framework**

- Ongoing initiative to construct an updated stratigraphic framework for all basins offshore Ireland.
- Integrated analysis of lithology, biostratigraphy and seismic data currently underway by Merlin Energy Resources Consortium, and is funded, supported and steered by members of PIP, PAD and academia.
- Long-awaited project to improve our understanding of the offshore basins, and aid in future exploration and research initiatives.

#### Study to be completed in 2018.



#### **Porcupine Basin Prospectivity Workshop**

PIP (Irish Shelf Petroleum Studies Group)

**Held at University College Dublin** on 30 August 2017 1. Lithospheric Scale Structure & Structural 4. Sediment 3. Stratigraphy

Themed sessions dealing with different aspects of the Porcupine Basin that iCRAG is actively researching.

Industry meet the Researchers face to face and witness PIP/iCRAG project progress.

The researchers are interested in hearing directly from company representatives what are the main issues and challenges. Awareness of (and possibly share) data available.





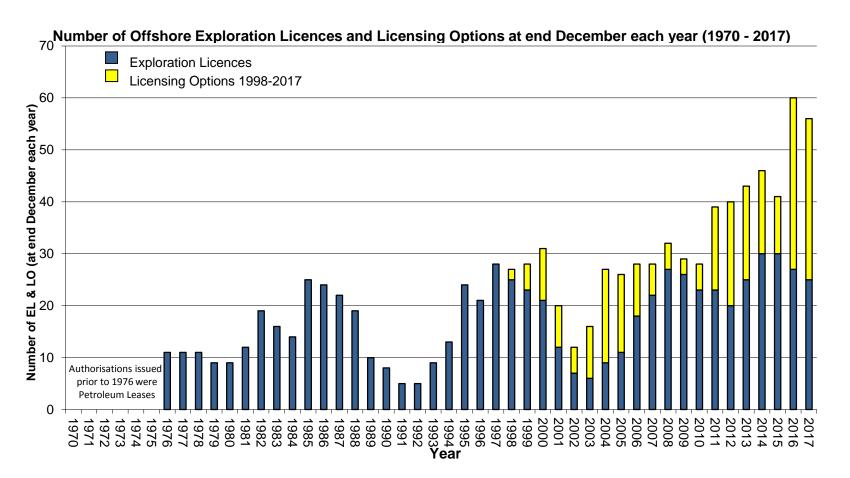
#### **New Research** www.pip.ie www.icrag-centre.org From Rifting to hyperextension: Upper Jurassic - Lower Cretaceous tectonostratigraphy of the Porcupine Basin High-resolution imaging of seismic Lewis Whiting, Peter Haughton & Patrick Shannon properties in the Porcupine Basin by full trick Centre for Research in Applied Geospieson. University College Dublic UCD School of Earth Sciences, University College Dublin Controls of pre-existing structures on the post-Jurassic waveform inversion of long-streamer data deformation of the Porcupine Basin, offshore west Ireland F. Lavoué<sup>1,2,\*</sup>, M. Prada<sup>1,2</sup>, M. M. Sagab<sup>1,3</sup>, S. Lebedev<sup>1,2</sup>, B. M. O'Reilly<sup>1,2</sup> Muhammad Mudasar Saqab<sup>13</sup>, Efstratios Delogicos<sup>13</sup>, Conrad Childs<sup>13</sup>, John Walsh<sup>1</sup> Ad druh Cente for Research in Applied Gerasian ass), School of Earth Sciences, University College Dublin, Selfeld, rish Centre for Research in Apolied Geosciences (ICRAG). Dublin Institute for Advanced Studies (DIAS), Geophysics Section, 5 Merrion square, Dublin 2, Ireland, 3 School of Earth Sciences, University College Dublin (UCD), Belfield, Ireland, 4 francois lavoue@icrog-centre.org An interpretation of the property of the prope The Porcupine Basin is a falled rift located in the North Atlantic margin offshore The Proceptie Basis is a failed rift located in the North Alastic mergin officers and the process of the Process of the North Alastic mergin of the subsidience please during Lief Relaxación and Circustic, with one processed rift pleas occurrie; in Lief Jurials Castly Octaonous times. From the perspective of hydrocation with poetrial physical posterior within the post off statisticals respective processes. Consideration with poetrial physical posterior within the post off statisticals respective to properties of the rooks, such as pomoly and failed contents, both critical for respective characterization. In this work, we see for characterization from posterior Basis by building high-control contents. The processes of the her norm dring an improvement, price in terminal belong, and introducing from the price interest interest consents. In the property of the consent, which is expected to highly controlled the consent price of the finite or the consent that or the price of the consent that the price of the consent to the consent to the consent price of the consent to the consent price of the consent to the consent price of the consent to the consent to the consent to the consent price of the consent to the consent price of the consent to the consent price of the consent price of the consent price of the consent price of the consent to the consent price of the consent pr clution, quantitative models of seismic properties along 2D sections of the basin by full reform inversion (FWI) of long-streamer data. FWI is a state-of-the-art imaging technique record and improved and the control of the control of a proupoil and the control of the control weeterim mierston (\*Mil) of lang determent data. Mil is a state-of-the-art imaging schriliques able to retrieves solveweight hassed or multiple parameters area serious viscolités des rois prosédy and fluid content through emphrical certainty or substrate, and fluid content through emphrical membrane and serious solves. The serious solves are solves and fluid content through emphrical research (serious solves and fluid content through emphrical serious solves and fluid content through emphrical serious solves and fluid content and serious solves and serious s No. 20 April 19 and a separate of the authority reserve of count to have a section before one the last. 5.2 Devlocked Redship of the Moling of Committee of the Commit 5.5 feienik toterpretation O harm pringers because contractor to the sence of fluids. Further steps will include the estimation of density in the fault zone and it wersion into porosity, and the consideration of higher frequencies and shorter offsets fo Context and aim of the study Throw profiles & strain localisation stions, Climate Action and Environmen 6.1 Spirell's to early post offi Fig. 2: Comparison of the interpreted migrated (see poster by Sagab et al) with the starting to tomography model (see poster by Prada et al). continuity training seri, and the deposition baselines along the contribution of participations of the contribution of the con **Quality control:** comparison of observed vs. synthetic data . . . 5445 . . . . . Jurassic & Cenozoic fault traces LT Post of P. Heak rotation and colleges The "form furth" superfrontly fusion) travels partiages, benefits then on polestrophysics highformity may be refer to the earth of Data and Methods Data: long-streamer (10 km) multichannel seismic datasets (PAD14-053, Fig. 1). Method: 2D adjoint-based full waveform inversion (FWI) selsDD package (Yuan et al., 2015). Entire seismic wavefields are computed numerically using the spectral-element method (Specfern2D, Komatitsch and Villotte, 1998). Starting model: First arrival traveltime tomography (FATT, Prada et al., 2017, AAPG; see also poster by Prada et al.). Data processing: low handness filtering (5-9 Hz) data mute: selection of long-offset refractions Ela. 7: Comparison of the fitted unseforms us mathetics computed in the EMO, the ERT and the - 3D-to-2D conversion (Bleistein, 1986) source signature estimation by linear inversion of the direct arrival propagating in deep water (Pratt. 1999). Herarchical strategy: from acoustic to elastic Consideration of higher frequencies (up to 40 Hz): more details, better resolution from monoparameter (Vp) to multiparameter (density, Vs) Multiparameter acoustic FWI: joint reconstruction of Vp and density. References from low to high frequencies Investigation of the imprint of S waves in the data, via synthetic simulations Elastic FWI: reconstruction of Vs (Vp/Vs ratio), eventually of anisotropy and/or attenuatio Interpretation in terms of petrophysical properties (porosity, permeability, fluid content). And it was been also as an electric property of the second party o Here we present the results for the very first stage of this bigrarchical approach. Migration of the data in the new velocity models: more accurate seismic images.

**Examples of projects - All in the Porcupine Basin** 



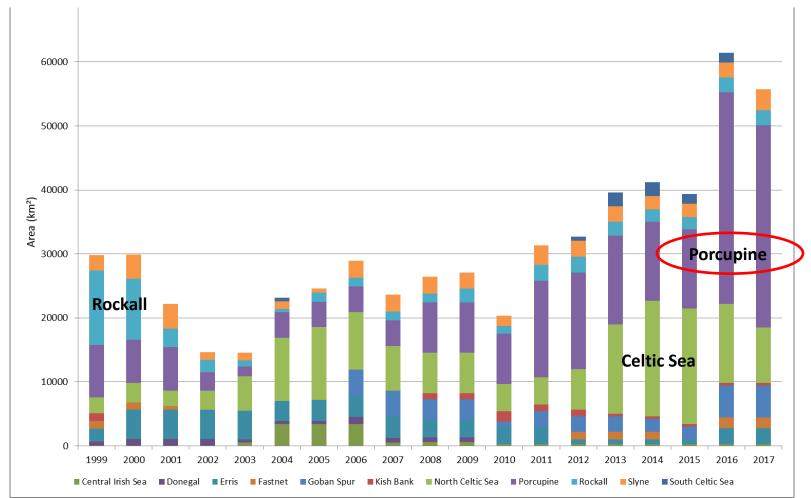
### Interest in the Porcupine - Licences

#### Licences

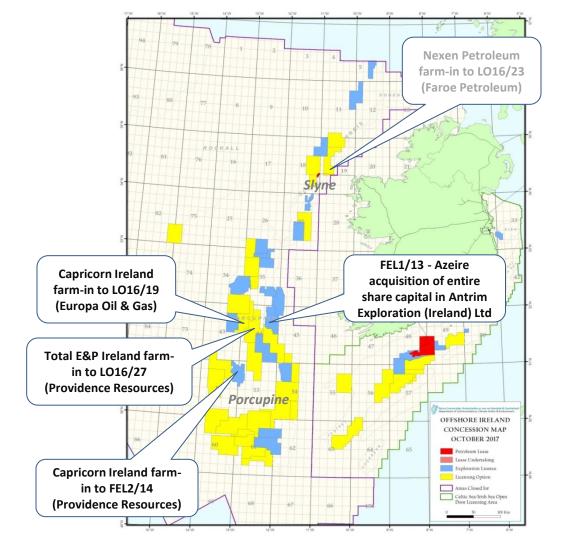




#### Licensed Acreage offshore Ireland by Basin (1999-2017)







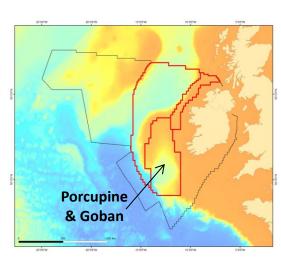
#### **Licences**

**Licensing Options Exploration Licences Farm-Ins** 

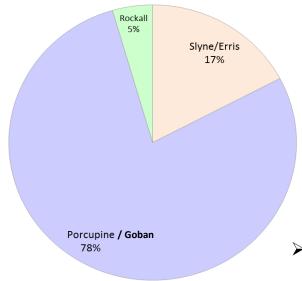


#### **2015 Atlantic Margin Licensing Round**

#### **Applications by Region**



2015 Licensing Round Regions —



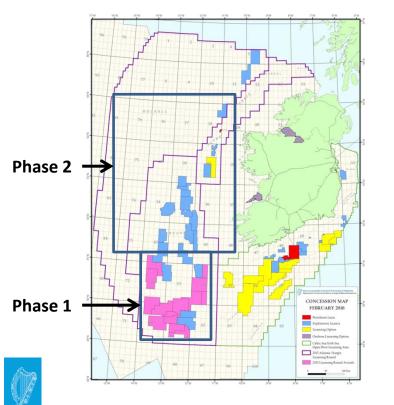
### Porcupine Basin & Goban Spur

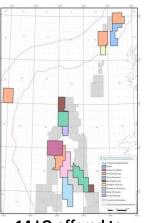
- Applications received over new blocks never licensed before.
- More than 50% of blocks applied for involve overlapping bids.
- ➢ 60% of applications included new seismic acquisition (3D mostly)



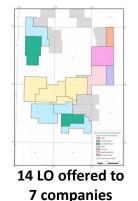
#### 2015 Atlantic Margin Licensing Round – Blocks Awarded

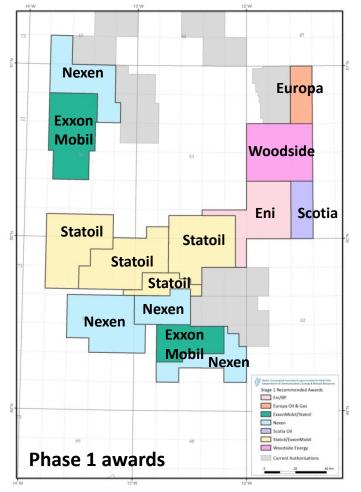
There were 2 stages of Licence Awards following on the outcome of the 2015 Atlantic Margin Licensing Round (Phase 1 and Phase 2)





14 LO offered to 9 company operators





#### Licence Status – Conversion of Licence Option to Frontier Exploration Licence

Phase 1: 14 Licence Options were offered to 7 companies. All are in the south Porcupine Basin

/Goban Spur

License Options 16/1 to 14 (Option Period 1 March 2016 to 28 February 2018):

- > One Licensing Option has already converted to a Frontier Exploration Licence
- ➤ Applications to convert to a Frontier Exploration Licence have been received in respect of 12 Licensing Options.
- > One Licensing Option has been surrendered

Eni, Europa, ExxonMobil, Nexen (CNOOC), Scotia, Statoil, Woodside X

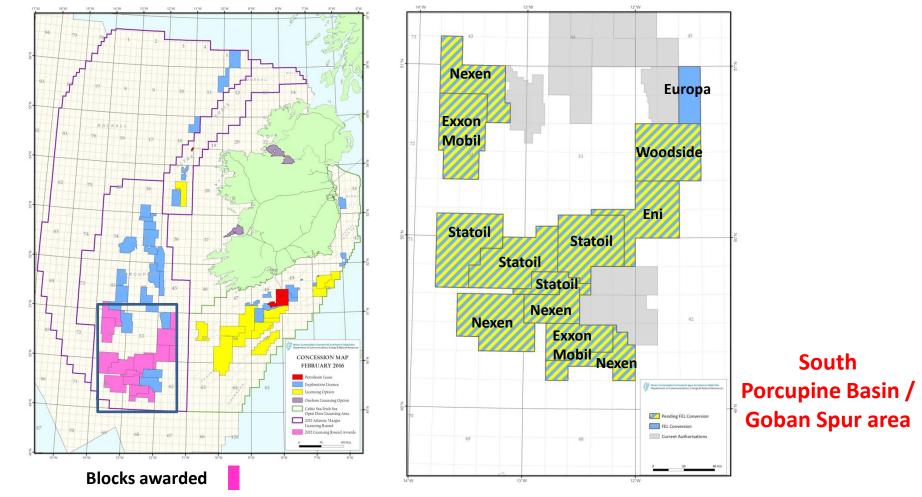
Department has applications for 13 Licence Options to progress to Frontier Exploration Licences



Phase 2:

14 Licence Options were offered in to 9 companies. 9 LO are in the Porcupine Basin License Options 16/16 to 29 (Option Period 1 July 2016 to 30 June 2018/30 June 2019). The 9 LO in the Porcupine Basin will be evaluated in Q2 2018

#### 2015 Atlantic Margin Licensing Round – Blocks Awarded



#### **Conclusions**

#### **New Data provides New Knowledge**

Ireland's Porcupine Basin has had a substantial increase in new data, regional studies and research initiatives in recent years.

Evaluation of the new data highlights the petroleum prospectivity of the Porcupine Basin. A large number of prospects have been identified within a variety of structural and stratigraphic plays. The basin is under-explored in terms of drilling.

Oil company, seismic contractor and academic interest in the basin is heightened. 93% of current Licence Options in the South Porcupine Basin have applications for conversion to Frontier Exploration Licences. Department evaluation of Porcupine Basin Phase 1 applications to convert LO to FEL is ongoing with Phase 2 Porcupine Basin application/evaluation to be completed by mid year.



# **Thank You** Booth 20 Roinn Cumarsáide, Gníomhaithe ar son na hAeráide & Comhshaoil www.pad.ie Department of Communications, Climate Action & Environment