



# Exploration Update Offshore Ireland

## Atlantic Ireland 2018, Dublin

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Petroleum Affairs Division

Department of Communications, Climate Action and Environment



## Petroleum Affairs Division (PAD) Technical

### Presentation outline:

- Licences
- Operations
  - Seismic
  - Well
  - Producing fields
- Research
- Data
- Communication / Outreach
- Conclusions

# Licences



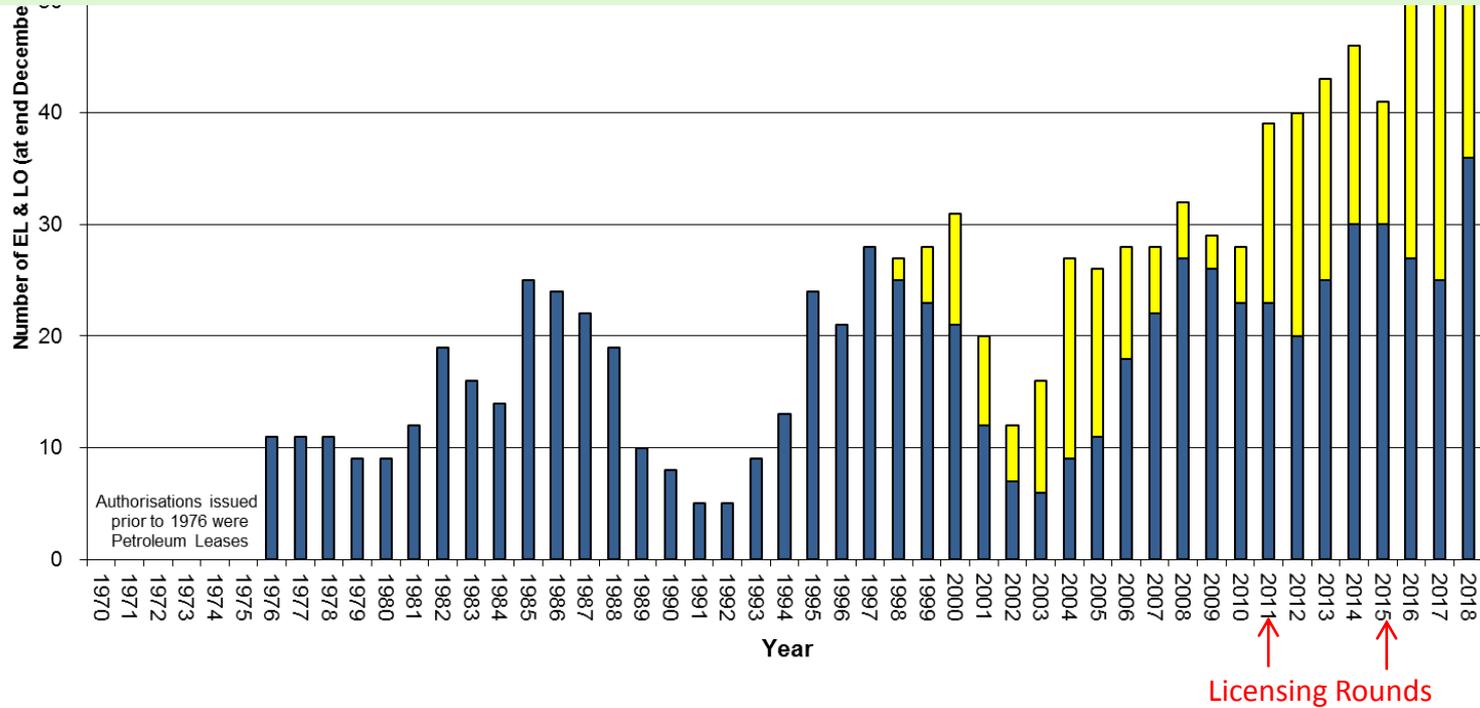
# Licences



Number of Offshore Exploration Licences and Licensing Options at end December each year (1970 - Oct 2018)



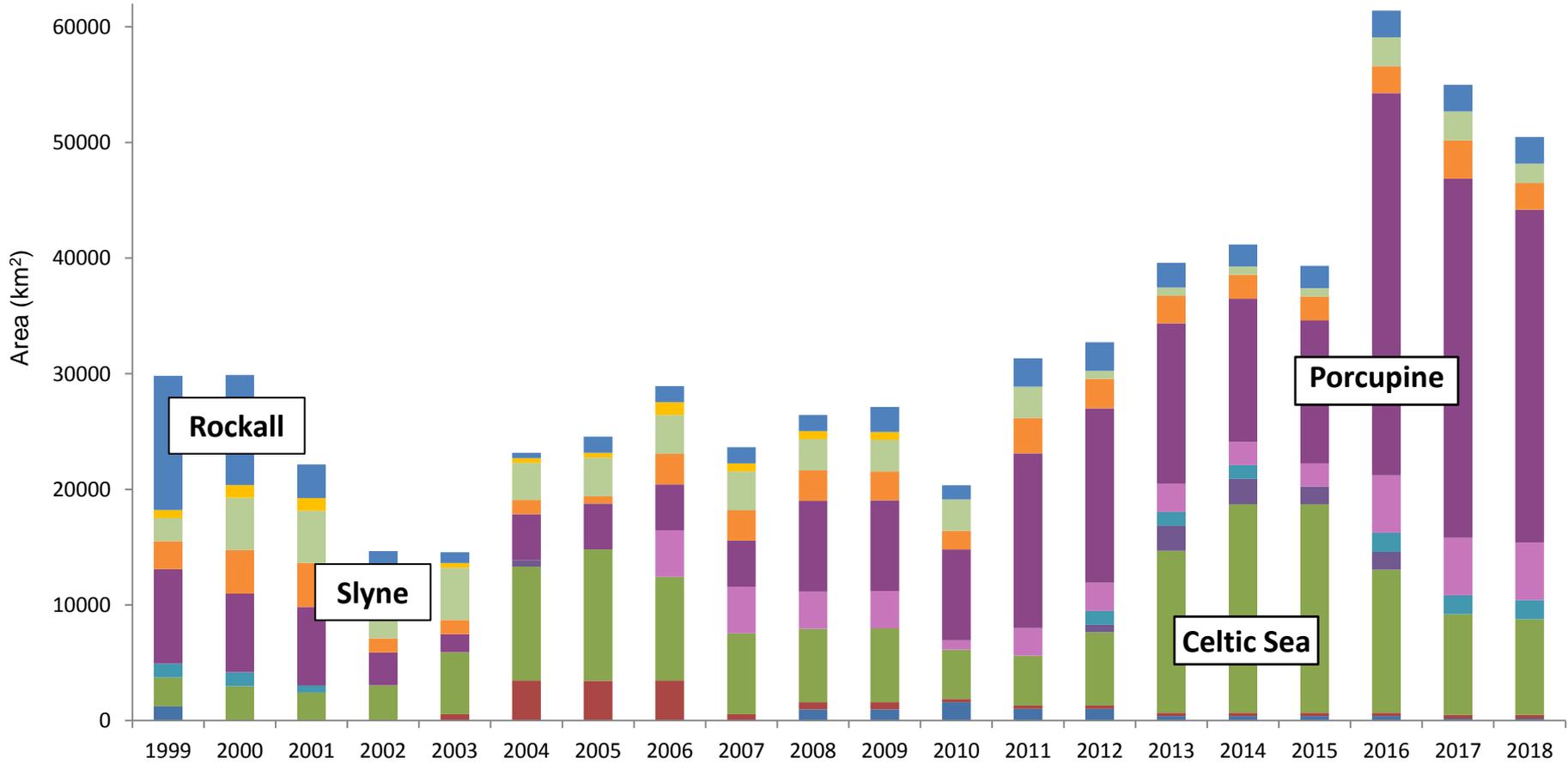
*The number of exploration licences in 2018 is at the highest level since exploration began in the Irish offshore in the 1970s*



# Licensed Acreage offshore Ireland by Basin (1999-2018)



■ Kish Bank 
 ■ Central Irish Sea 
 ■ North Celtic Sea 
 ■ South Celtic Sea 
 ■ Fastnet 
 ■ Goban Spur 
 ■ Porcupine 
 ■ Slyne 
 ■ Erris 
 ■ Donegal 
 ■ Rockall



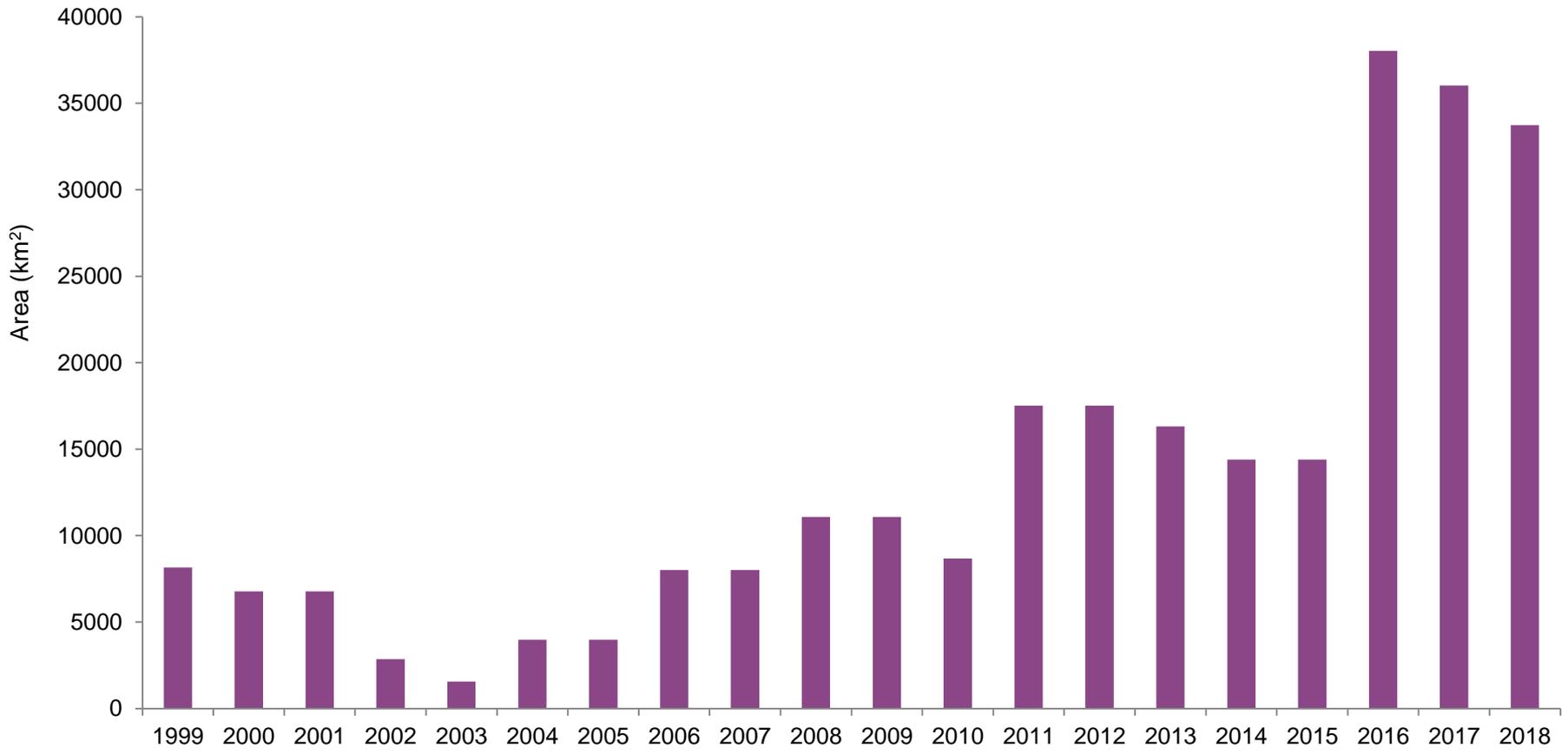
Rockall

Slyne

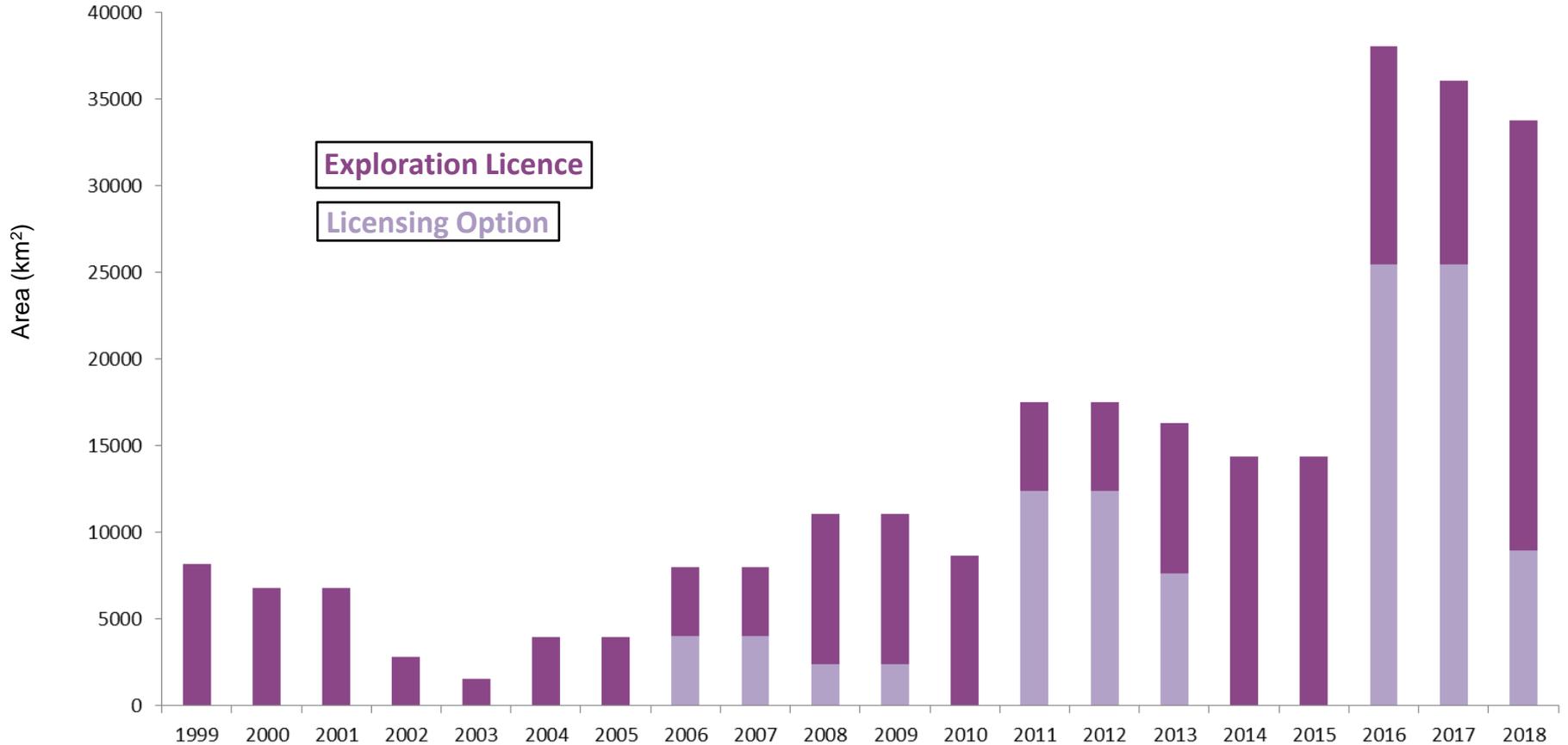
Celtic Sea

Porcupine

# Licensed Acreage in Porcupine & Goban Spur Basins (1999-2018)



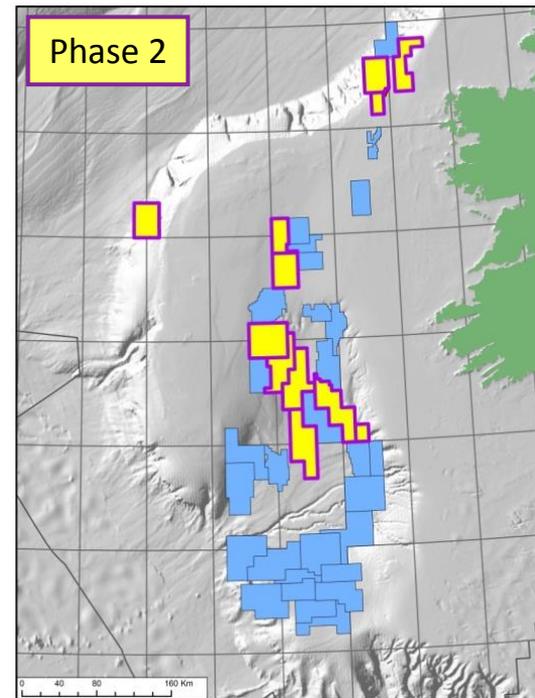
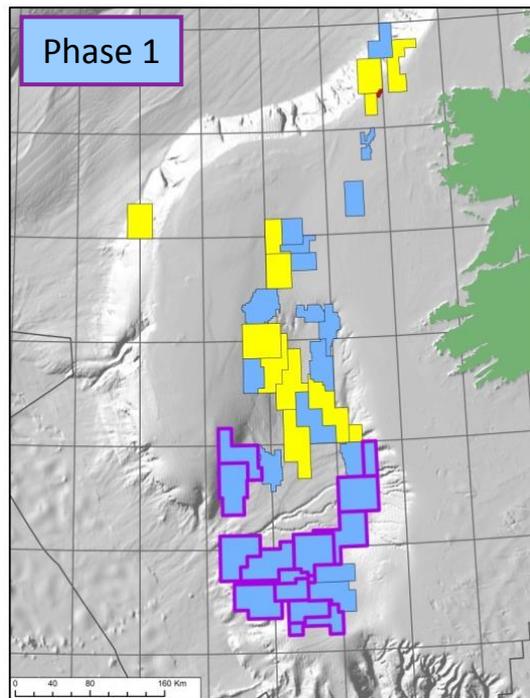
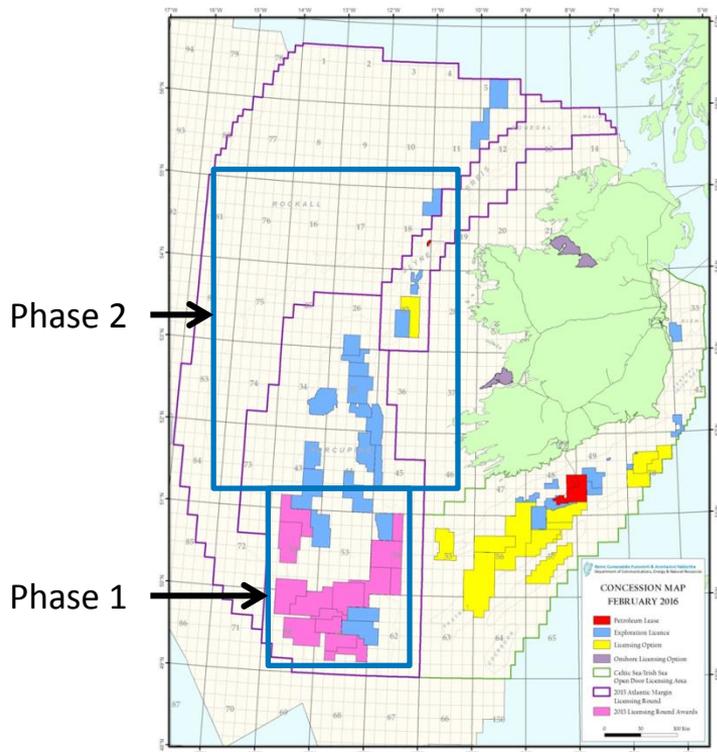
# Licence Options and Exploration Licences in Porcupine & Goban Spur Basins (1999-2018)

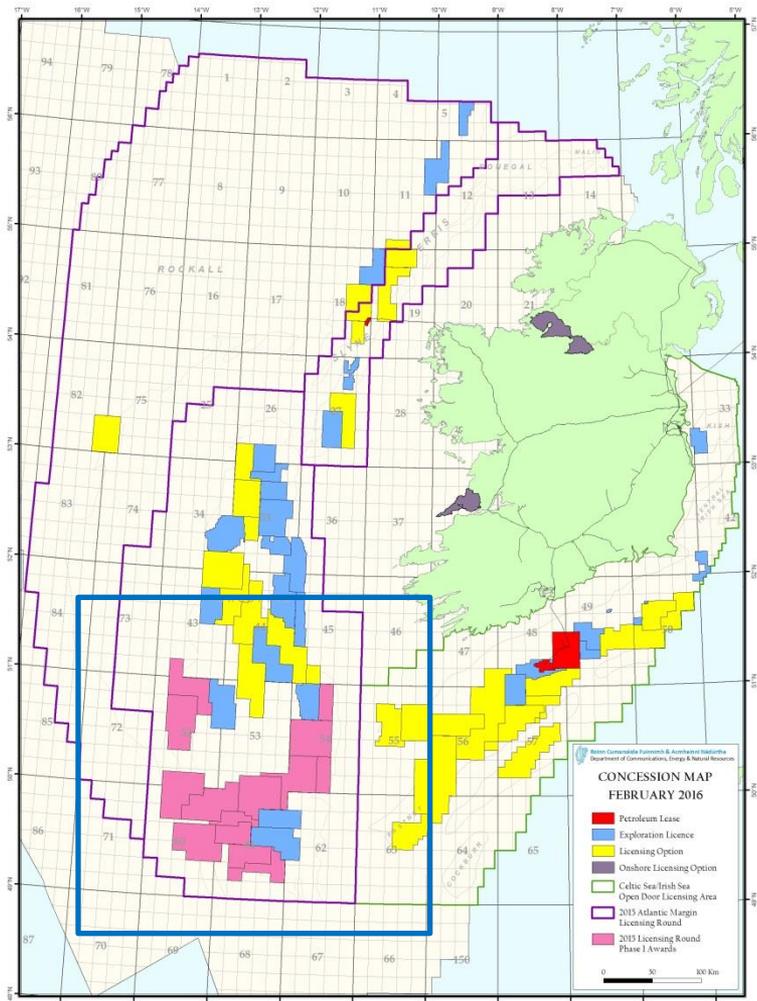


# 2015 Atlantic Margin Licensing Round – Blocks Awarded

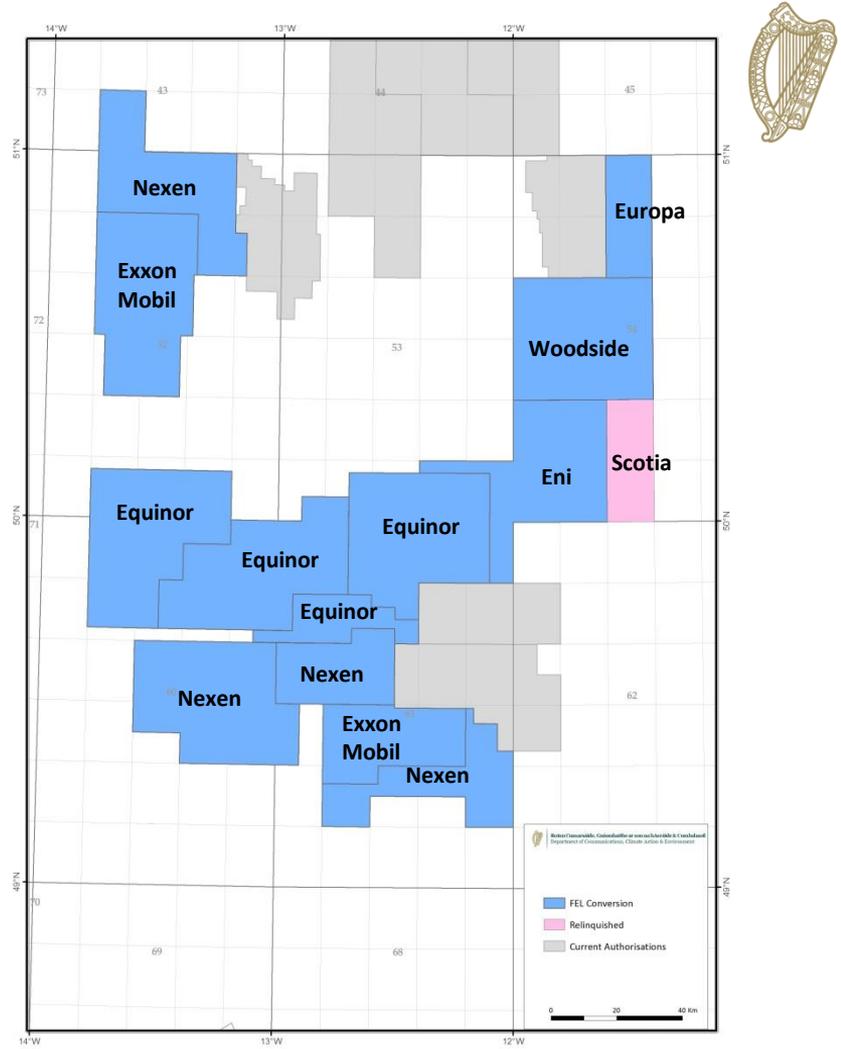
There were 2 stages of Licence Awards from the 2015 Atlantic Margin Licensing Round (Phase 1 and Phase 2)

## Licence conversions

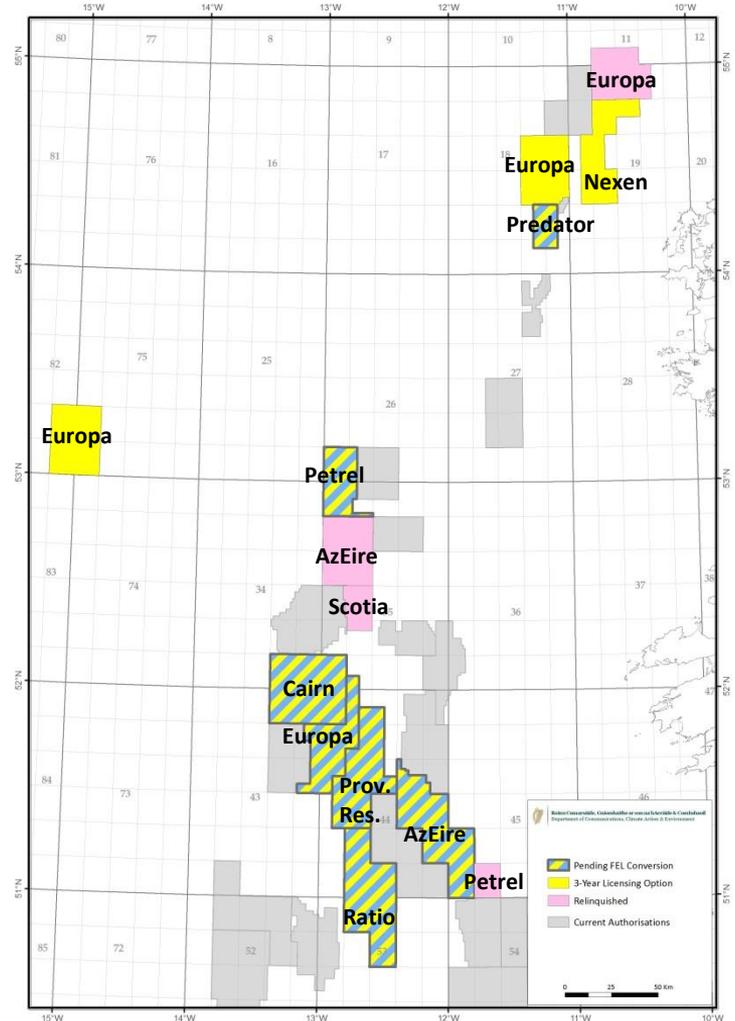
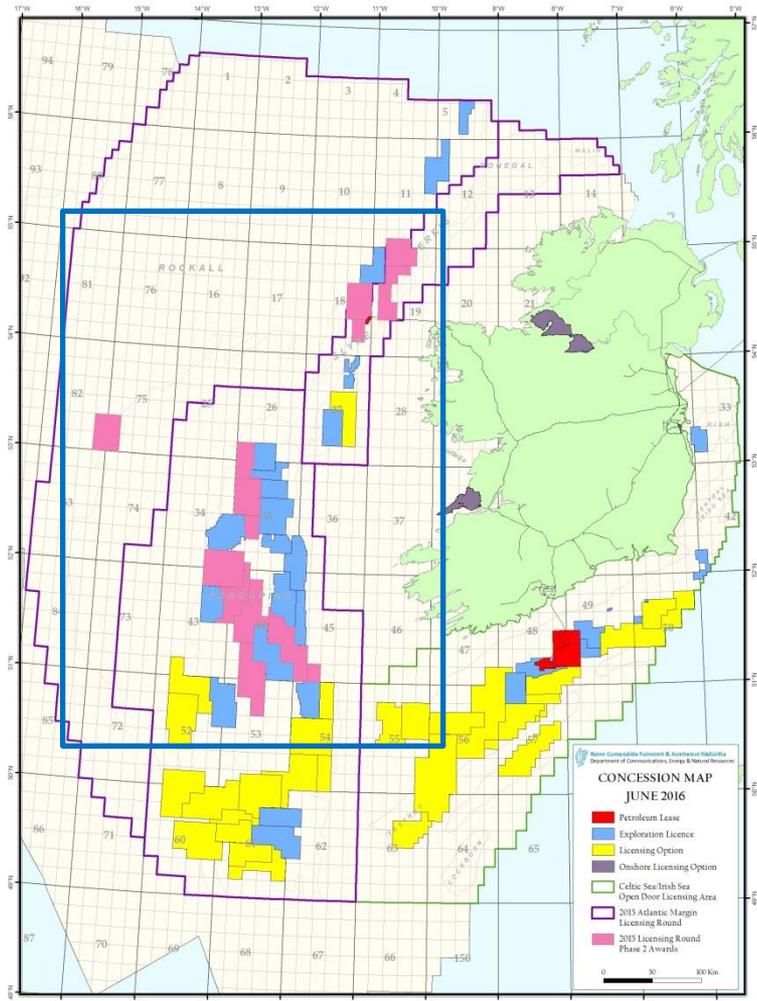




# Phase 1 Update

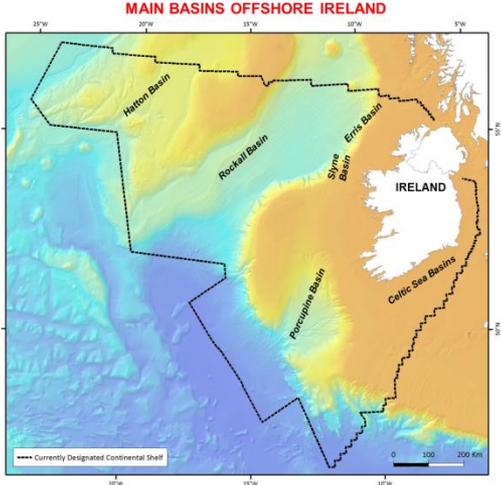
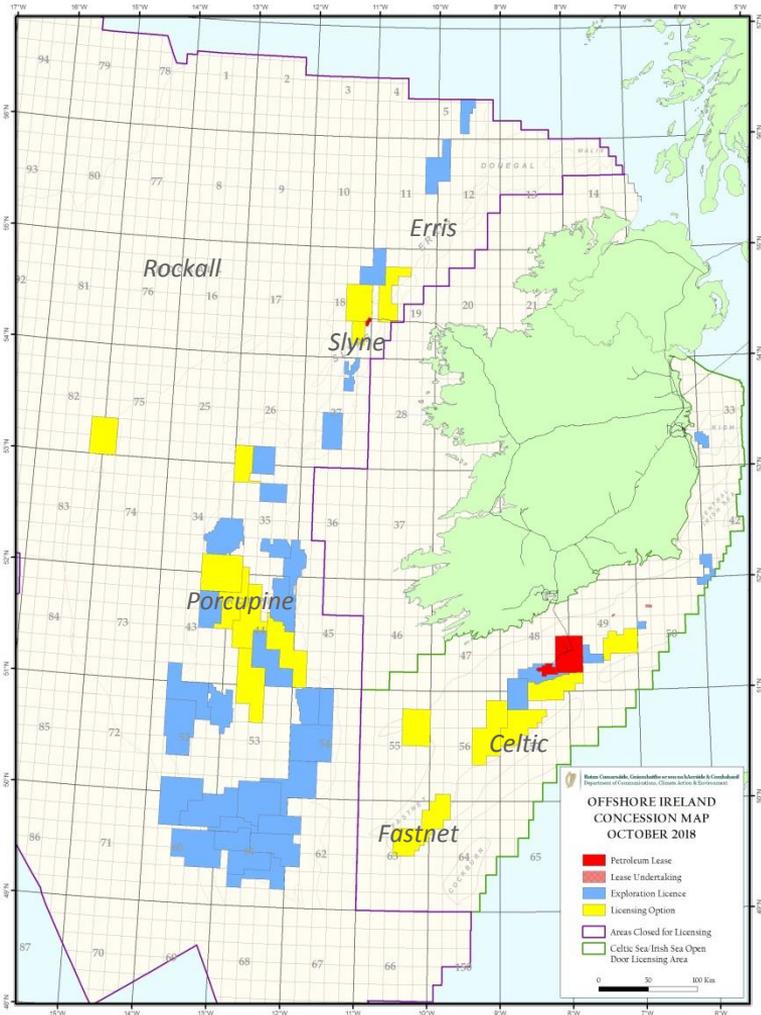


# Phase 2 Update





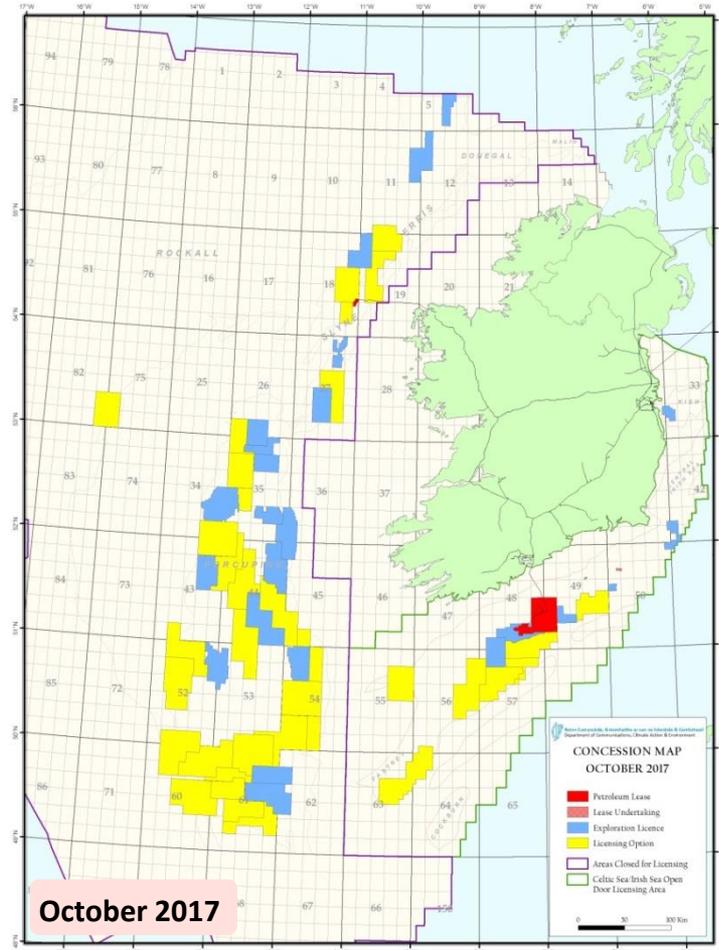
# Concession Map



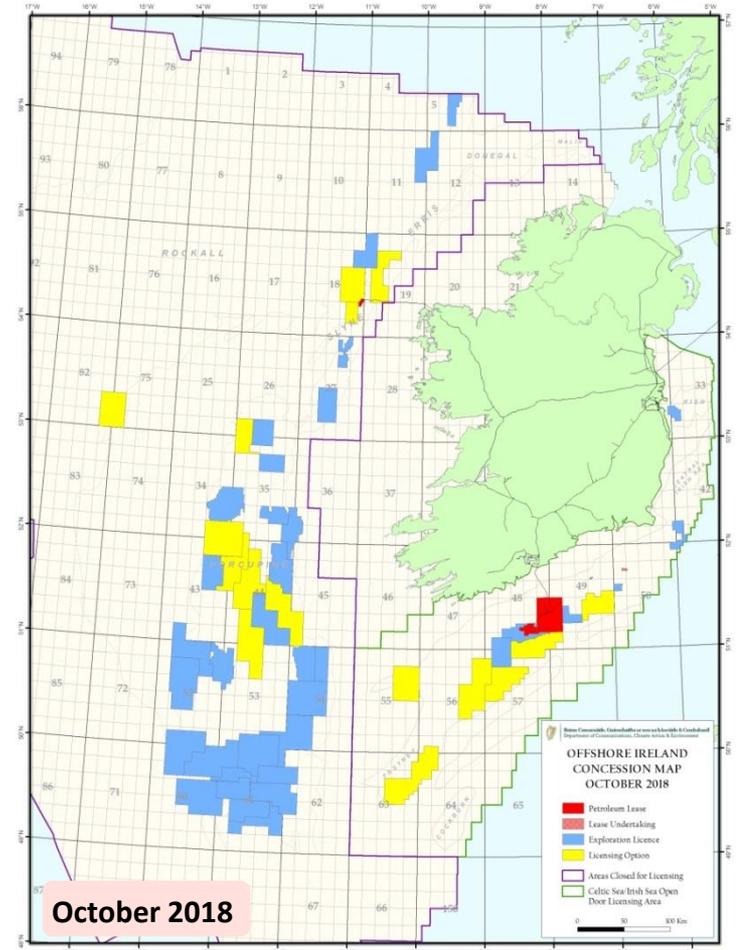
Approximately 7% of Ireland's offshore designated continental shelf is currently licensed. ~50,000sqkm

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

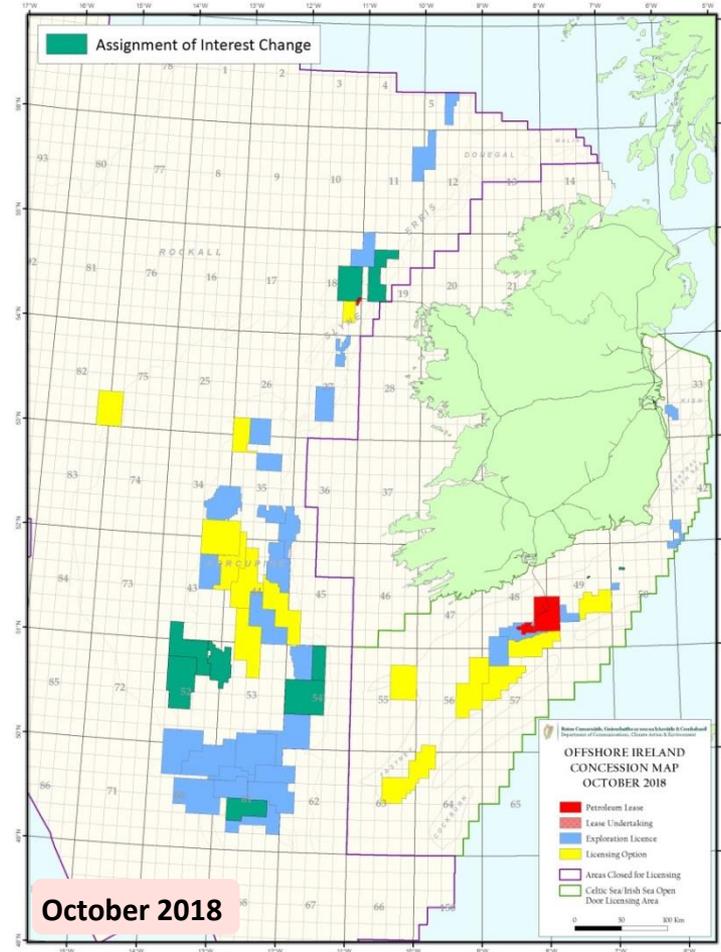
# Concession Map AI2017



# Concession Map AI2018



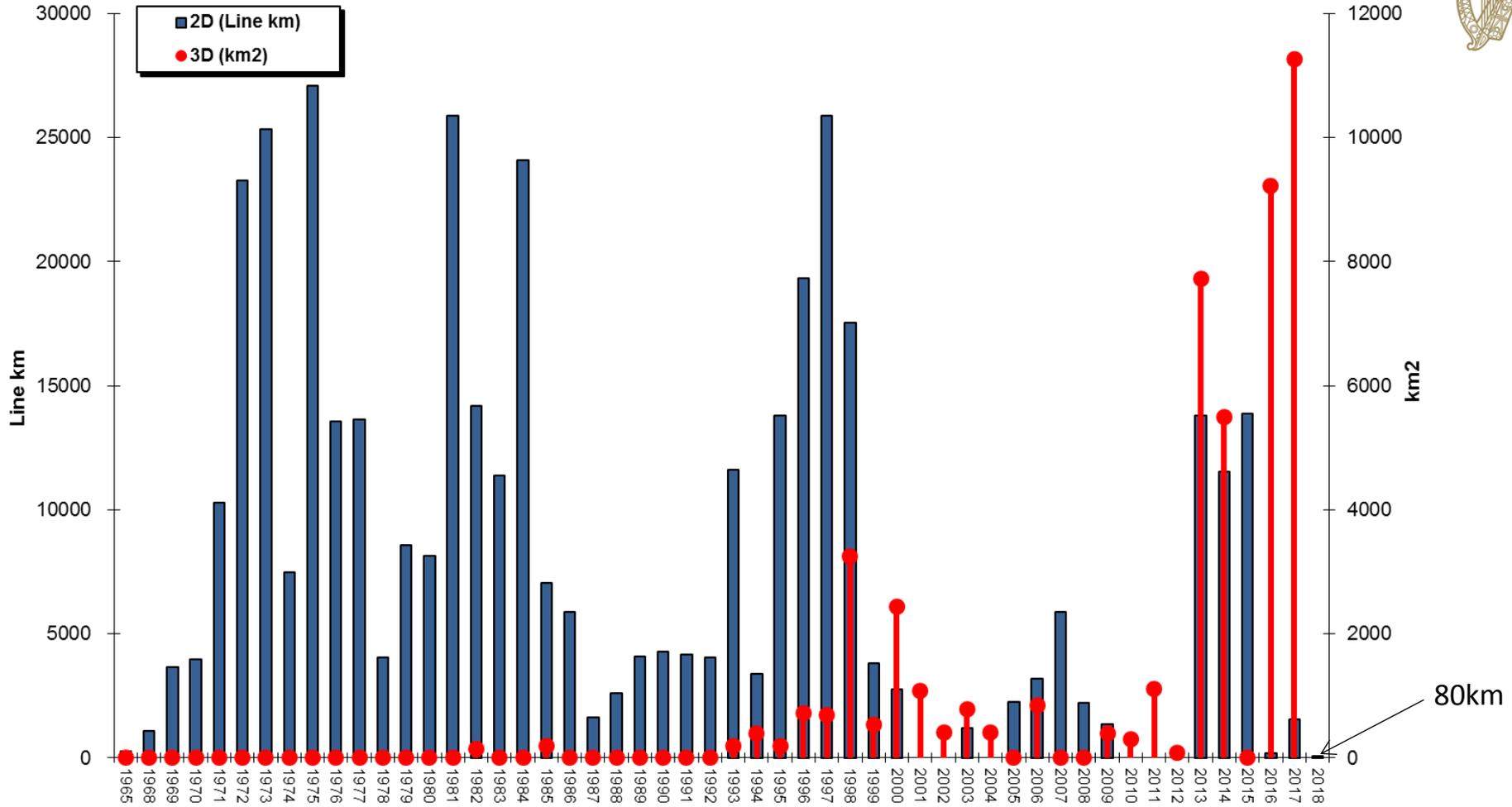
# Concession Map AI2018



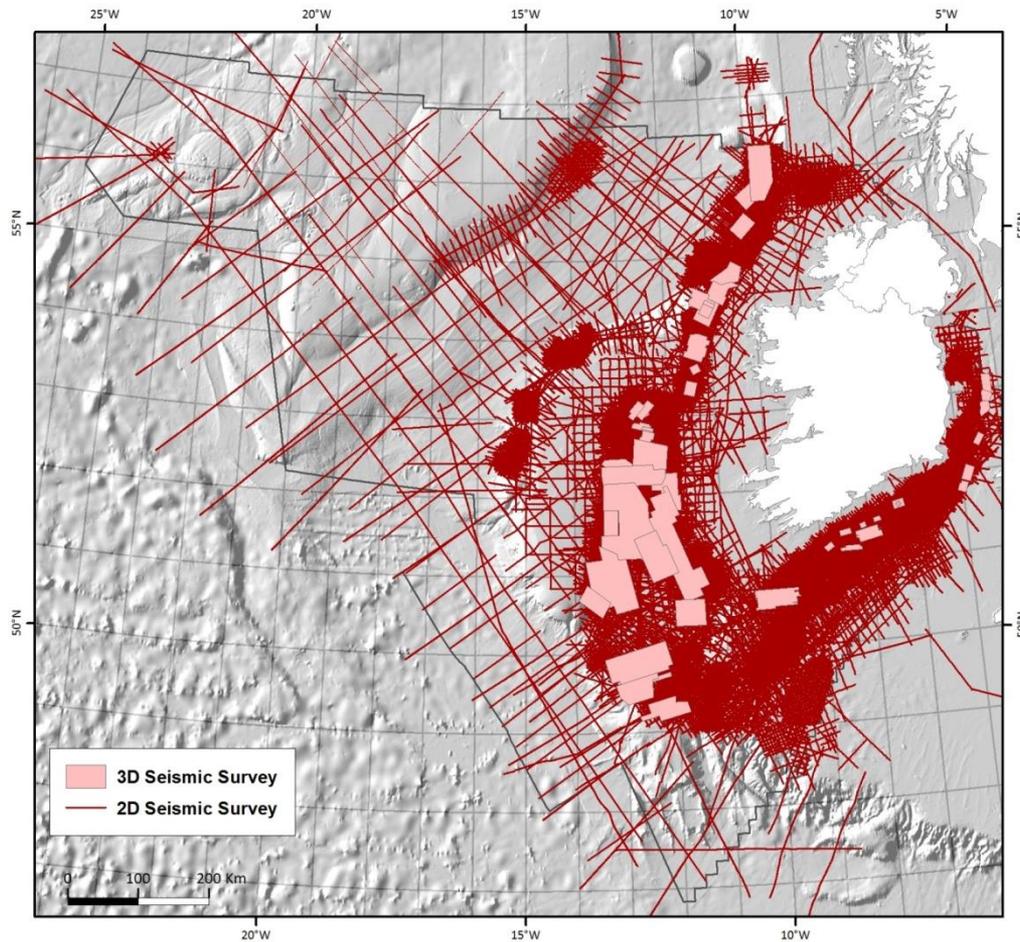
# Operations



# SEISMIC



# Seismic Data acquired Offshore Ireland – all basins



# Seismic Data acquired Offshore Ireland – Porcupine Basin

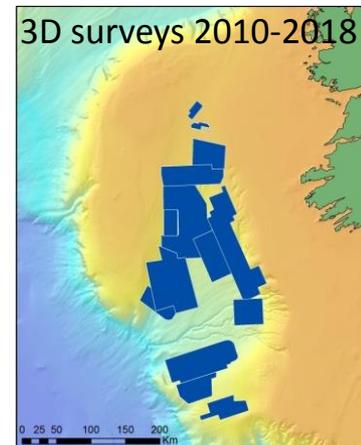
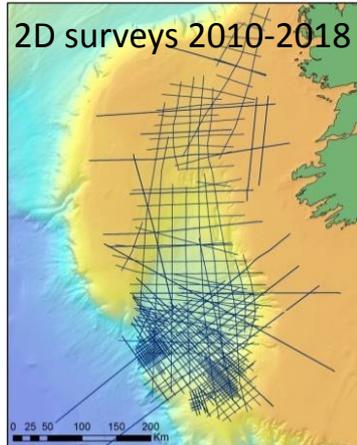
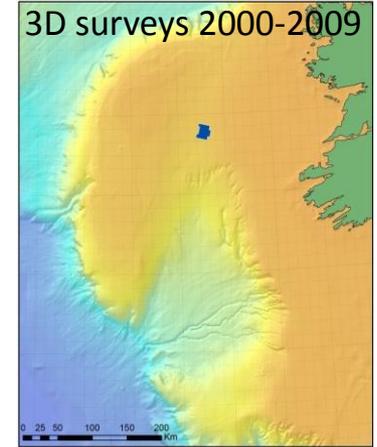
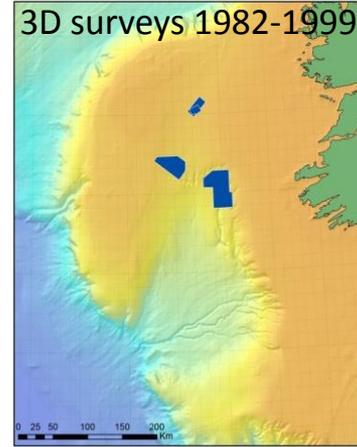
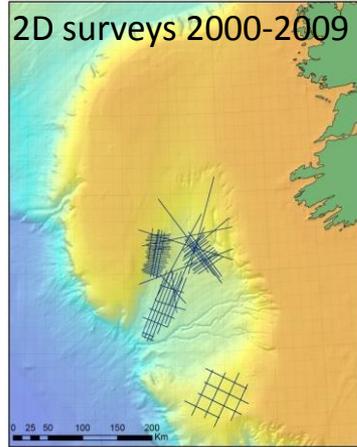
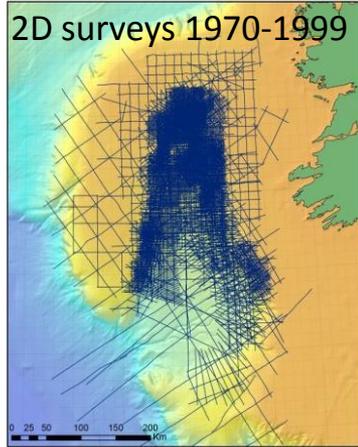
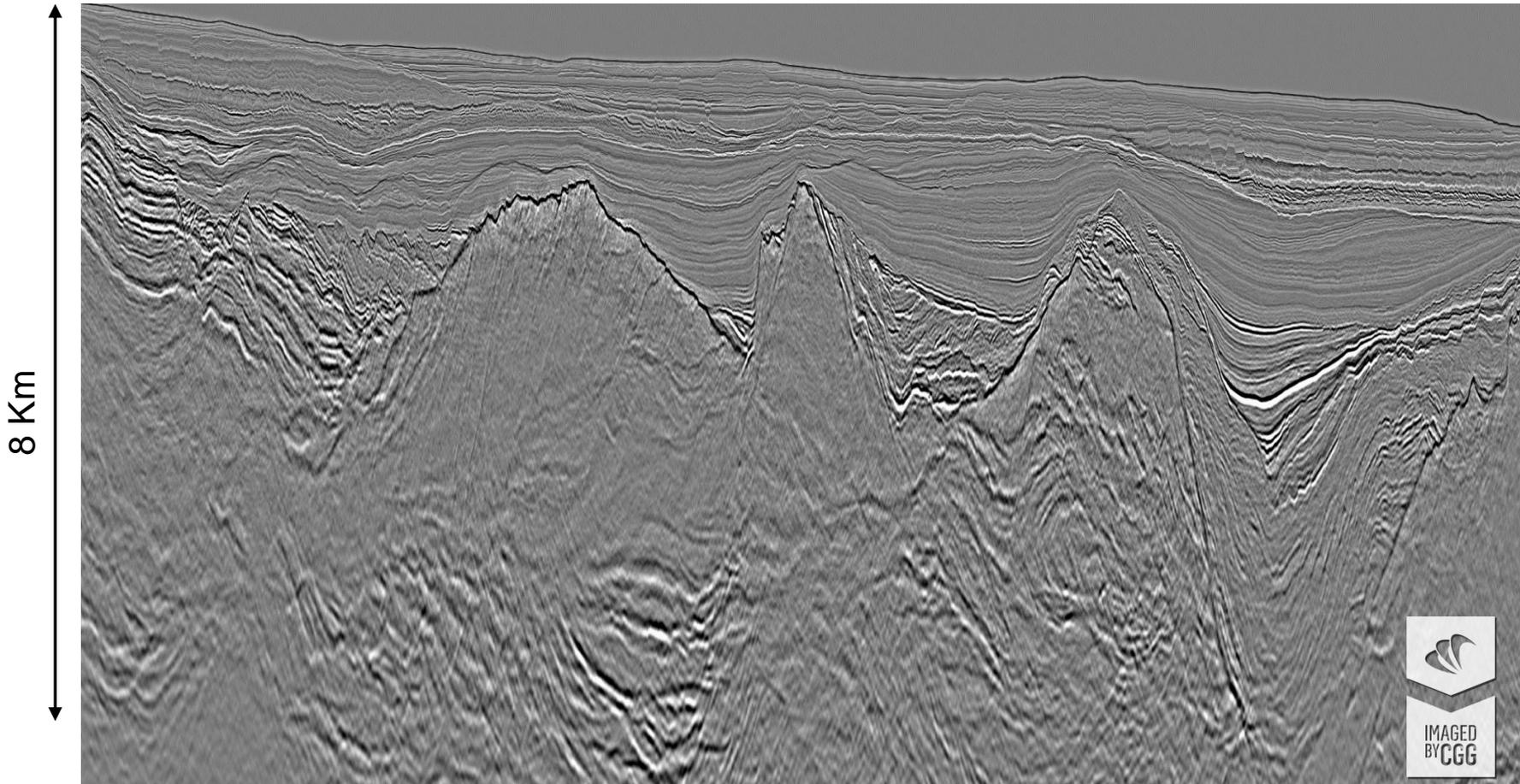
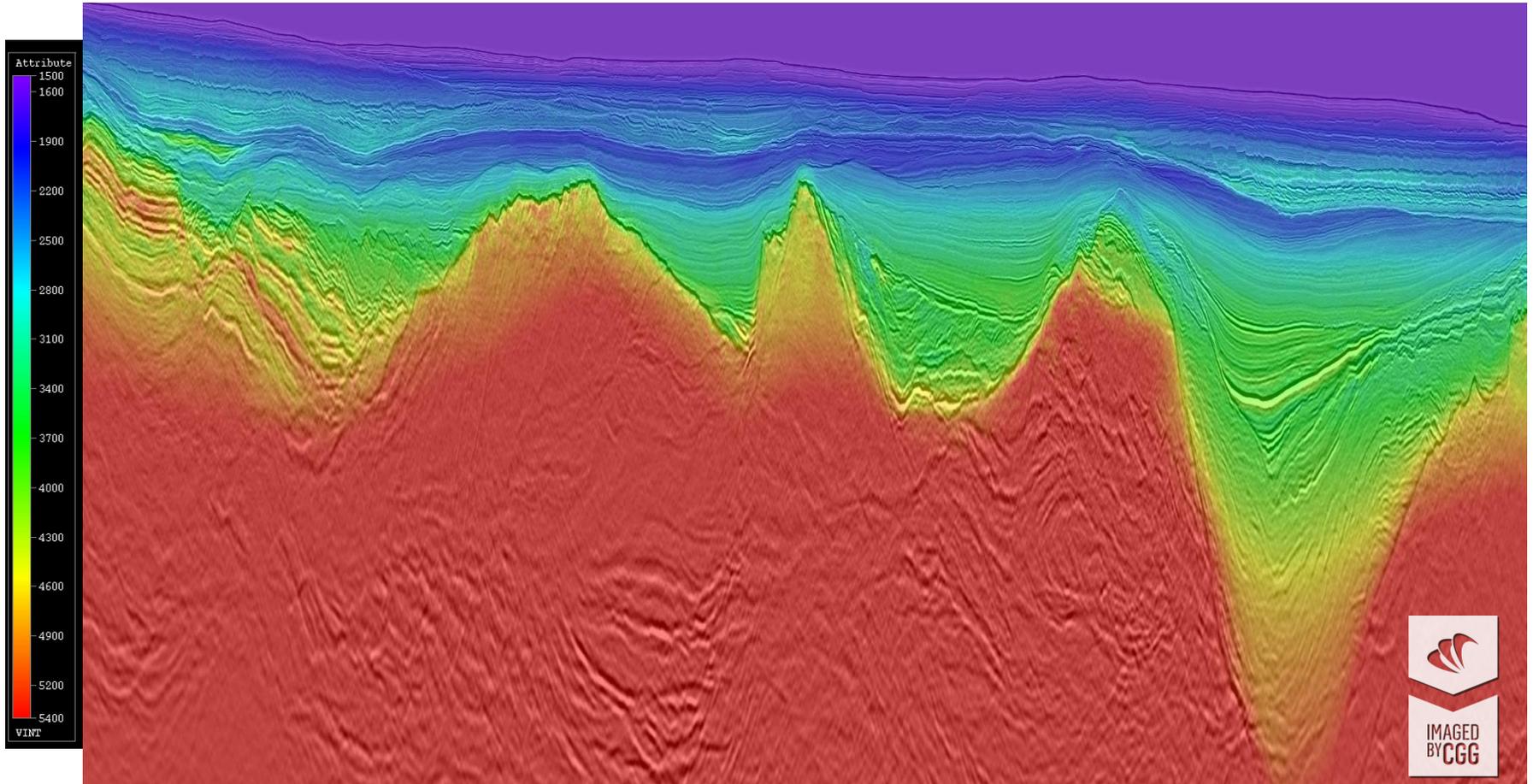


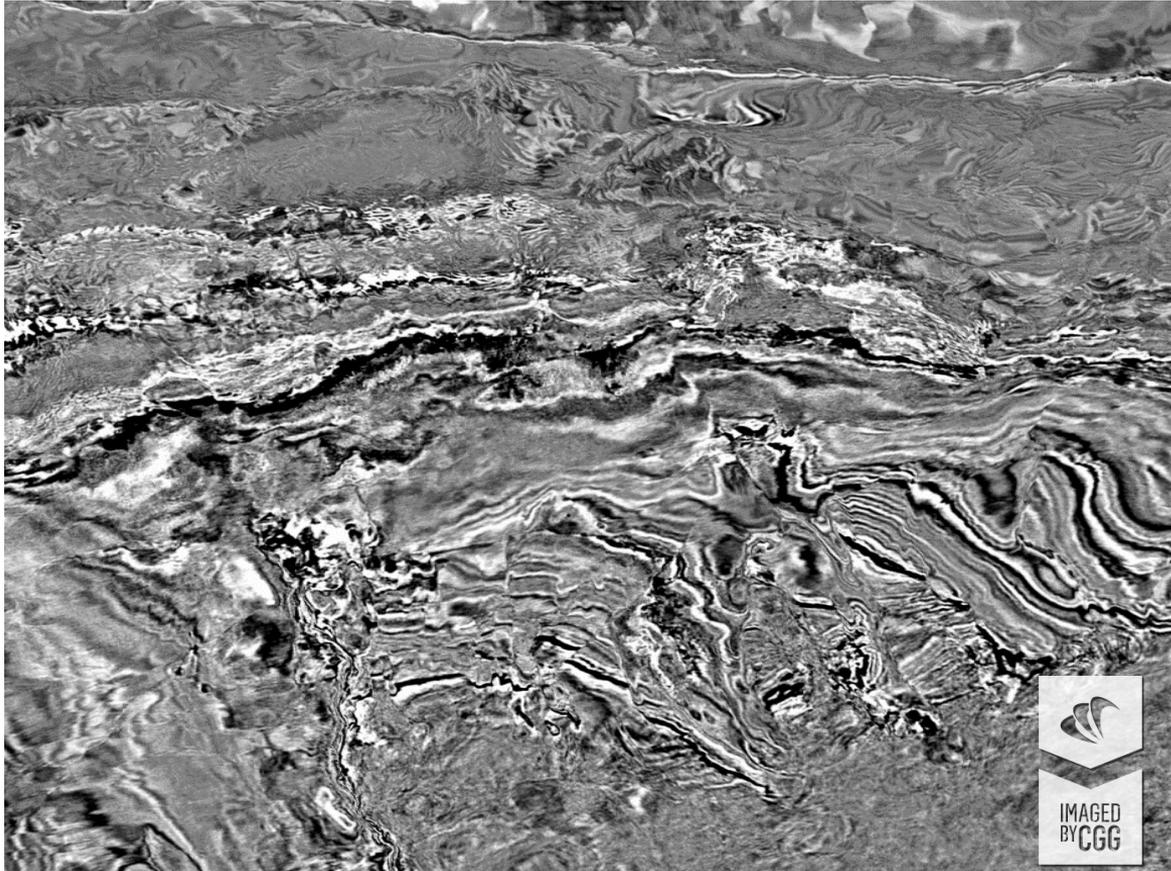
Image 1 (Pre-SDM data in Depth, Arbitrary line)



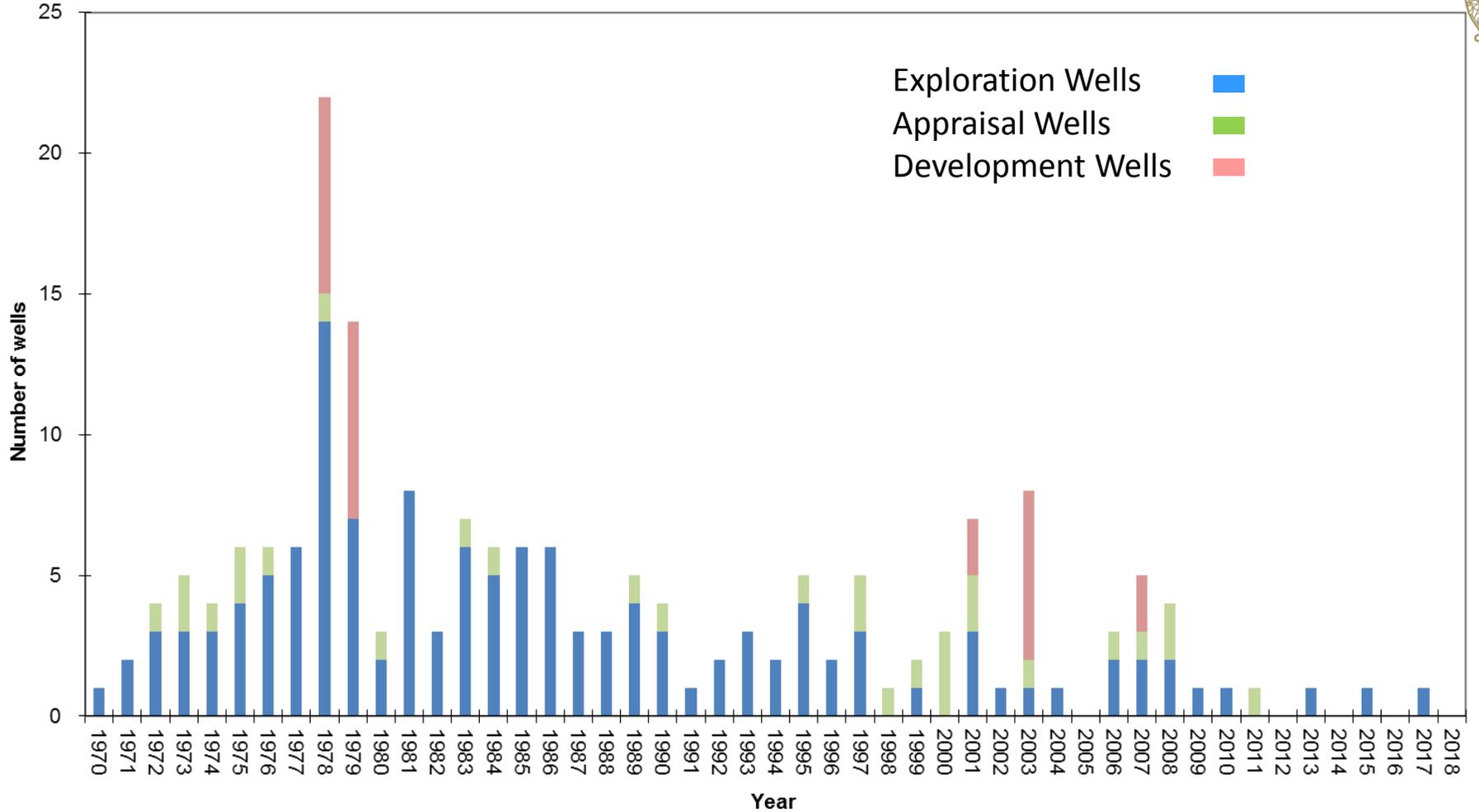
# Image 1 With Velocity Overlay



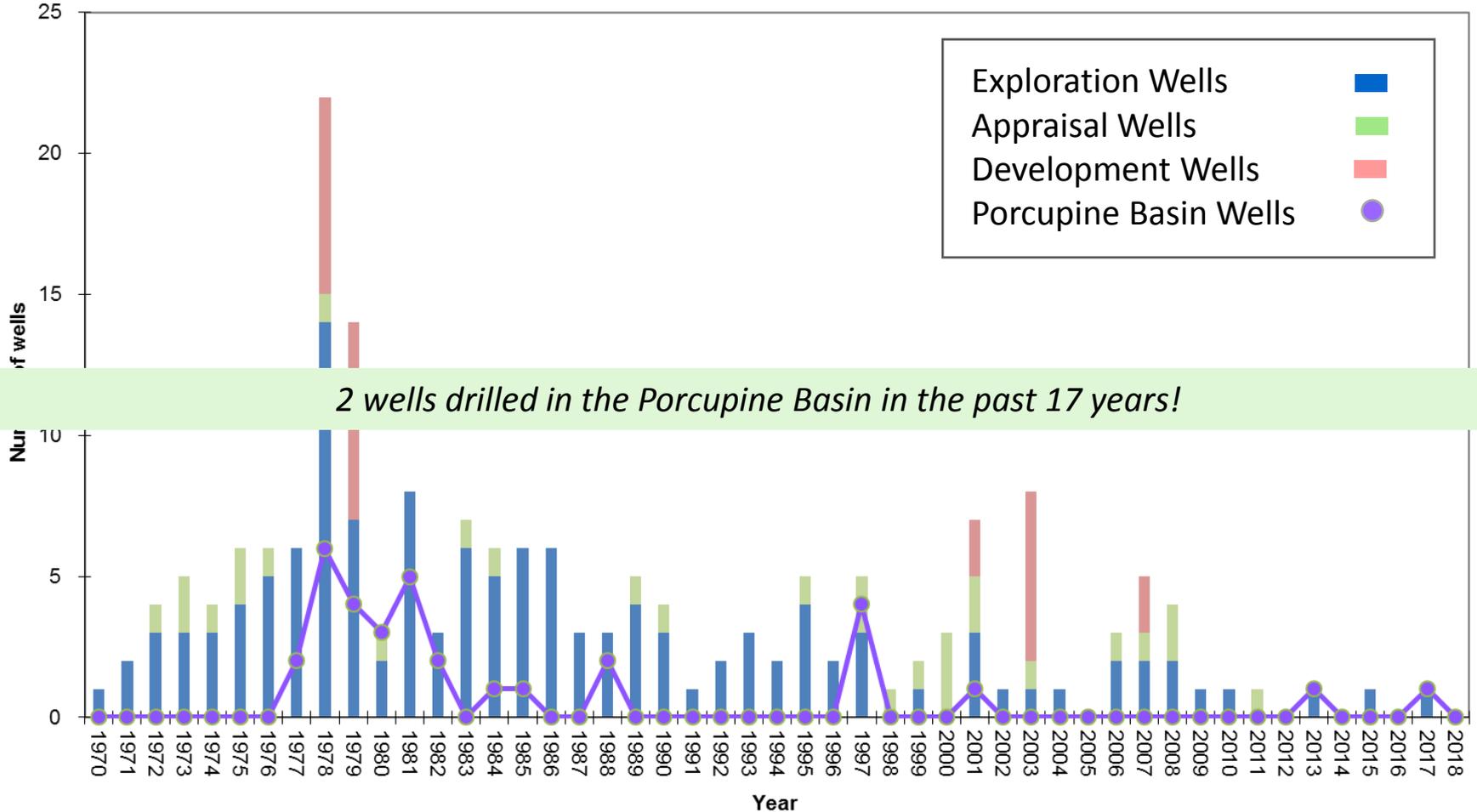
## Time Slice (3200m)



# Wells



# Wells



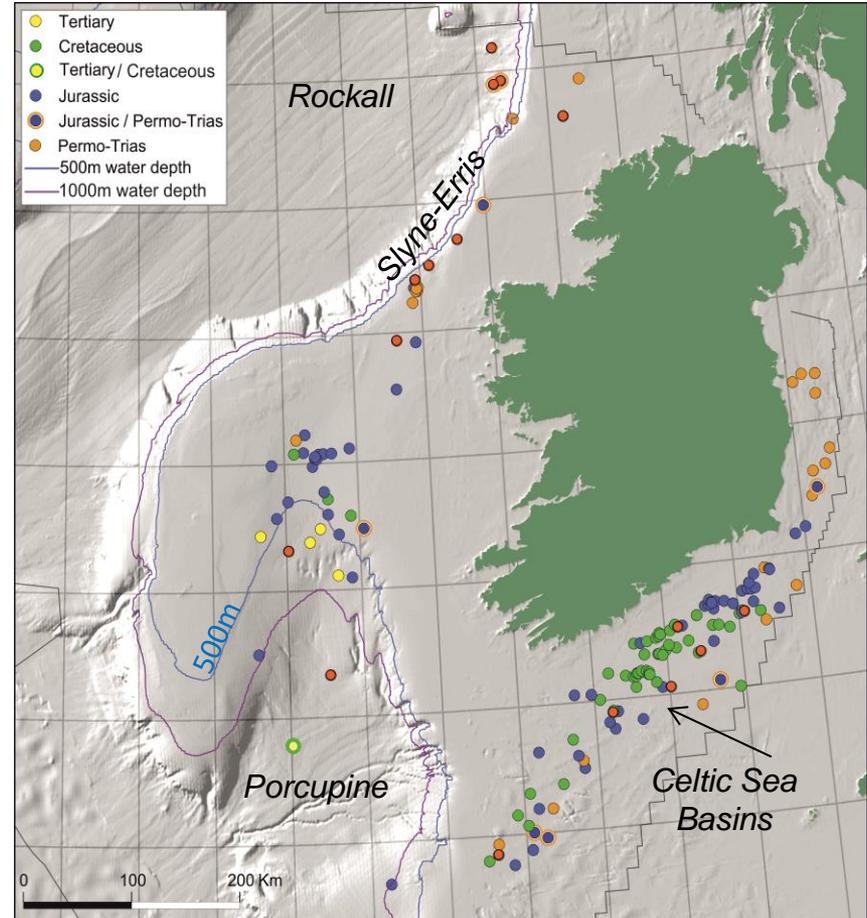
*2 wells drilled in the Porcupine Basin in the past 17 years!*

# Wells



Exploration wells:	132
Appraisal wells:	28
<b>Total:</b>	<b>160</b>

- Only 5 wells >1 km water depths  
= *1 discovery*
- Only 11 wells drilled on 3D seismic  
= *2 discoveries*  
= *2 well in Porcupine*
- 2 wells drilled on post-2000 2D seismic



Majority of Wells drilled in shallow water on poor quality 2D seismic

# Producing fields

## Discoveries

- Gas /Condensate
- Oil

## Commercial Fields

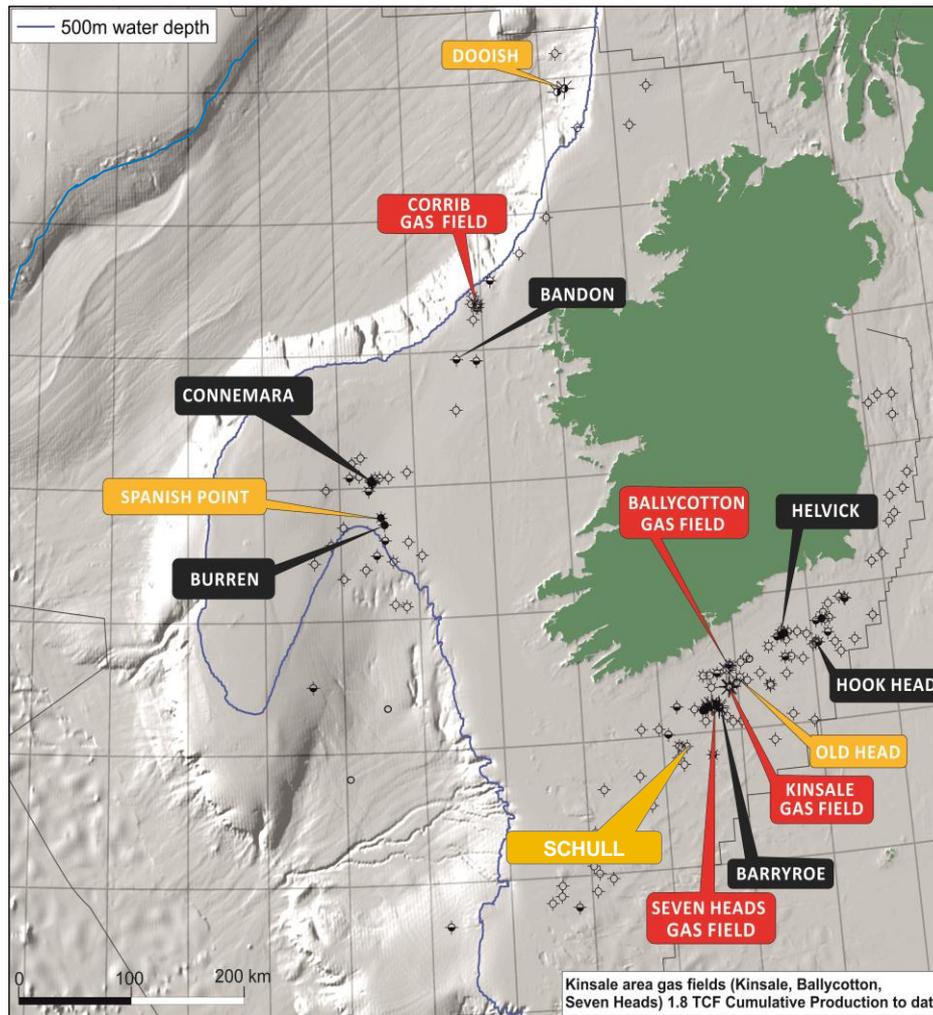
- Gas Field

### Corrib gas field

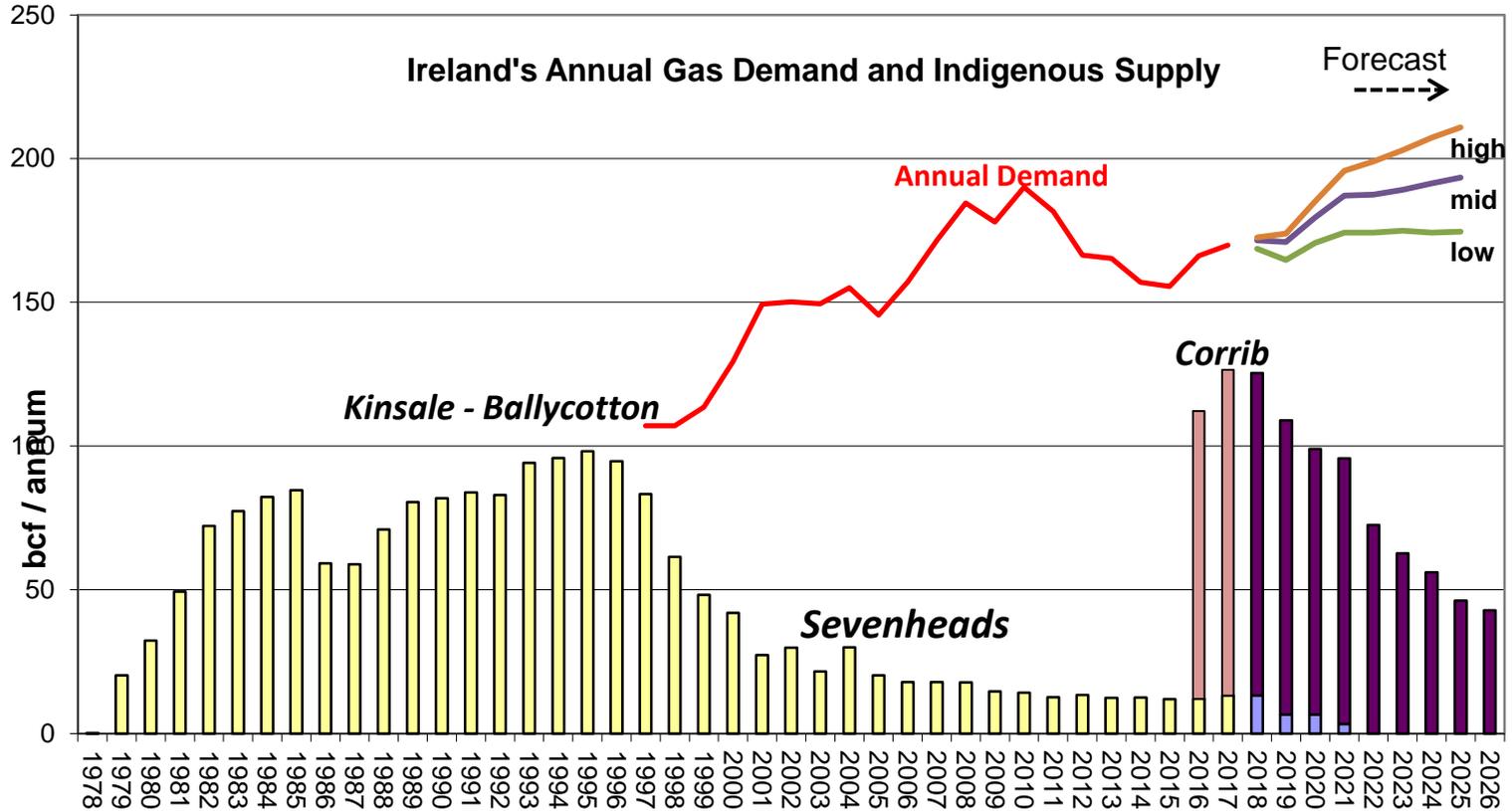
Slyne Basin

### Kinsale gas field complex

North Celtic Sea Basin



# Production from Offshore Gas Fields

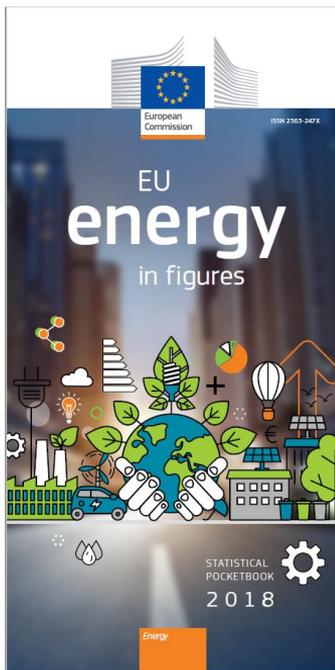


**Even in low case demand scenario, demand significantly exceeds supply**

# Production offshore Ireland



The latest version of the Commissions energy statistics handbook (August 2018)  
[https://ec.europa.eu/energy/sites/ener/files/pocketbook\\_energy\\_2018\\_web.pdf](https://ec.europa.eu/energy/sites/ener/files/pocketbook_energy_2018_web.pdf)



The impact of Corrib field is starkly shown in one of the tables:

	1995	2000	2005	2010	2015	2016
<b>Ireland</b>						
<b>Import Dependency (%)</b>	<b>69.5%</b>	<b>84.9%</b>	<b>89.7%</b>	<b>86.6%</b>	<b>88.6%</b>	<b>69.1%</b>
of Solid Fuels	64.9%	64.6%	71.4%	48.8%	66.5%	54.7%
of Hard Coal	105.9%	93.2%	100.8%	79.3%	102.7%	84.9%
→ of Petroleum Fuels	100.1%	98.9%	100.0%	97.2%	103.9%	98.4%
of Crude and NGL	100.2%	89.8%	98.8%	101.6%	108.2%	100.1%
→ of Natural Gas	3.6%	72.1%	86.7%	95.5%	96.5%	40.1%

↑  
Corrib field came on production Dec 2015

# Research



## Research Entities

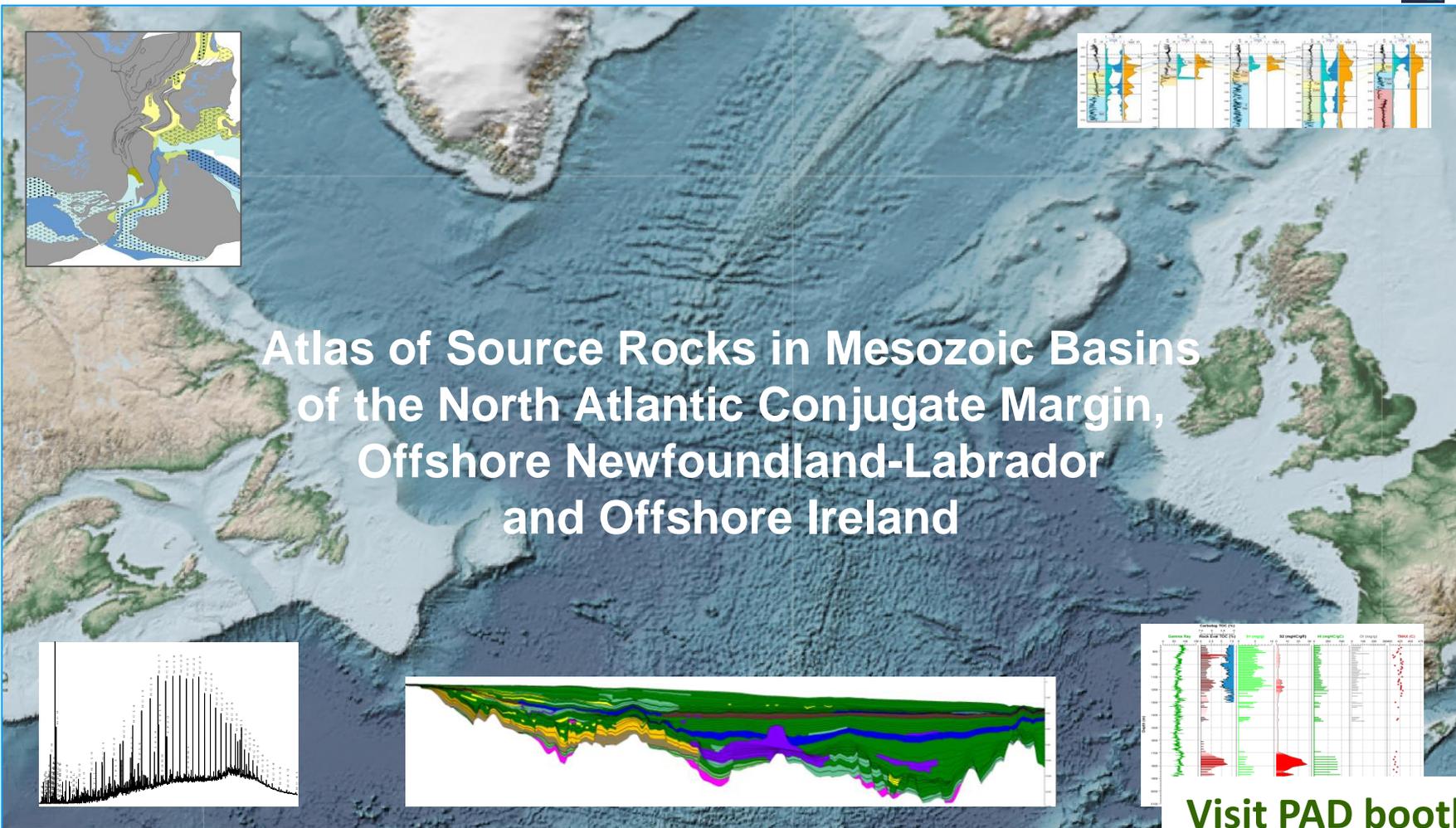


The Petroleum Infrastructure Programme (**PIP**)  
was initiated by the PAD 1997 [www.pip.ie](http://www.pip.ie)

**iCRAG** - Irish Centre for Research in Applied Geosciences  
established in 2015. Based in UCD Dublin [www.icrag-centre.org](http://www.icrag-centre.org)

North Atlantic Petroleum Systems Assessment (**NAPSA**)  
was formalised in 2007 [www.napsaresearch.org](http://www.napsaresearch.org)

**PAD plays an important role in hydrocarbon research to complement increased industry investment in exploration activity**





# Research progress 2018 - PIP



The Geology & Geophysics;  
Engineering;  
Environmental and  
Data management & Support Services

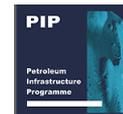
PIP ISPSG Technical Committees were active throughout 2018 and a number of very relevant projects are being scoped/on-going or completed.

Example of PIP projects that cross a range of disciplines:

- Reprocess Regional Seismic Survey
- Investigate Shallow Boreholes
- Oil Spill studies

[www.pip.ie](http://www.pip.ie)

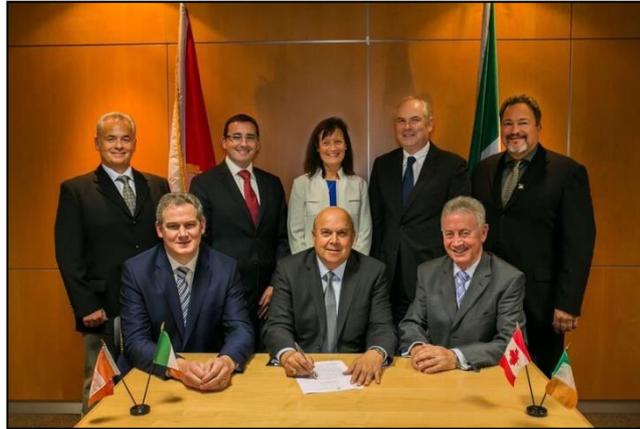
**Visit PIP booth**





## NAPSA workshop in St. John's Newfoundland, June 2018

Bruneau Centre for Innovation and Research, Memorial University of Newfoundland

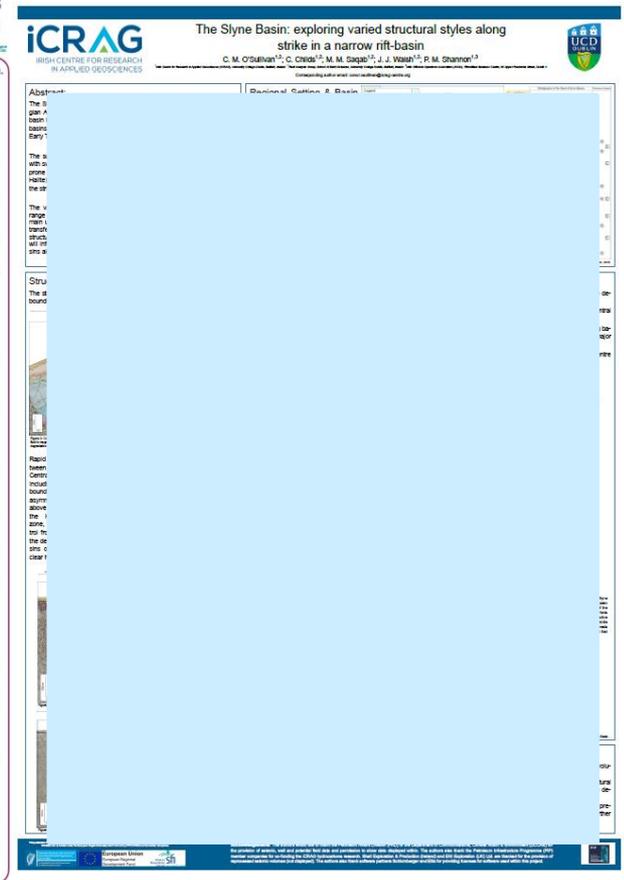
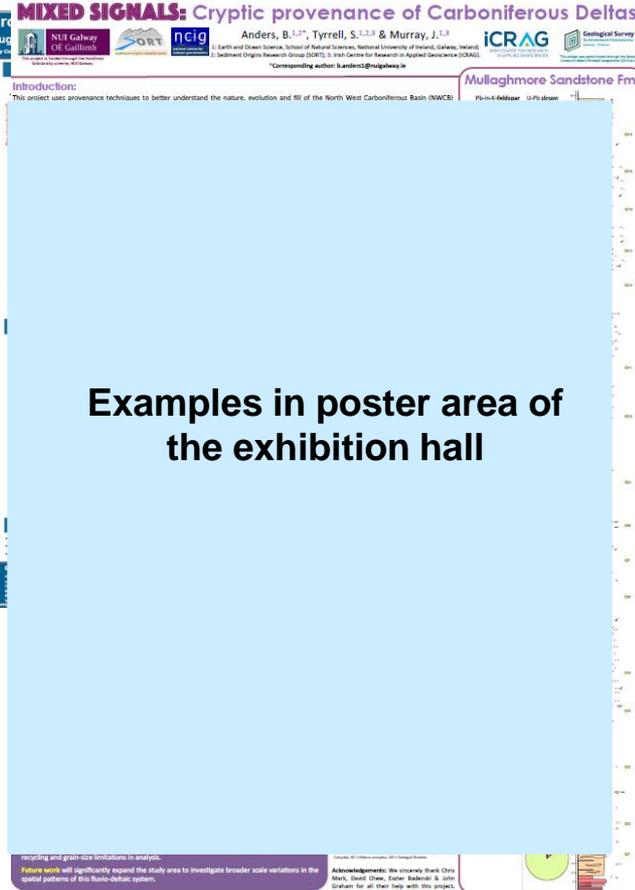
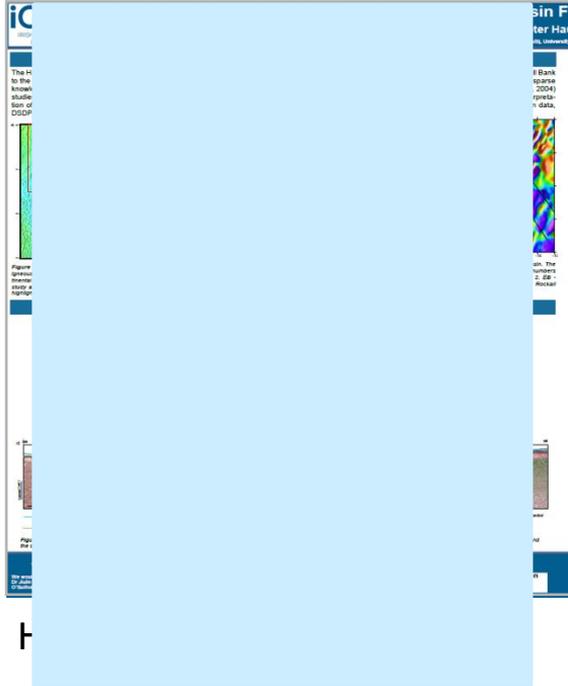


Signing of the renewal of the North Atlantic Petroleum Systems Assessment Agreement for an additional 5 years;  
Canadian Embassy, Dublin November 2017

### The Objectives of the NAPSA Workshop 2018:

- To present some of our current ideas on the session themes to industry and researchers
- To debate the validity and implications of these ideas and
- To identify knowledge gaps in our understanding of North Atlantic Conjugate Margin petroleum systems and suggest areas of study for new research projects

# Research progress 2018 - iCRAG



Examples in poster area of the exhibition hall

[www.pip.ie](http://www.pip.ie)  
[www.icrag-centre.org](http://www.icrag-centre.org)

NW Carboniferous Basin - NUIG

Slyne Erris Basins - UCD



## iCRAG Testimonials - Geoscientists

### **Geologist:**

ICRAG researchers are addressing fundamental questions with regard the structural and stratigraphic response to extension/hyperextension in the Porcupine Basin, and in turn impacting key Petroleum Systems uncertainty such as heat flow, bathymetry, provenance and source/reservoir distribution. In terms of broader application, lessons learned in the Porcupine are globally applicable to other hyperextended failed rifts and passive margins.

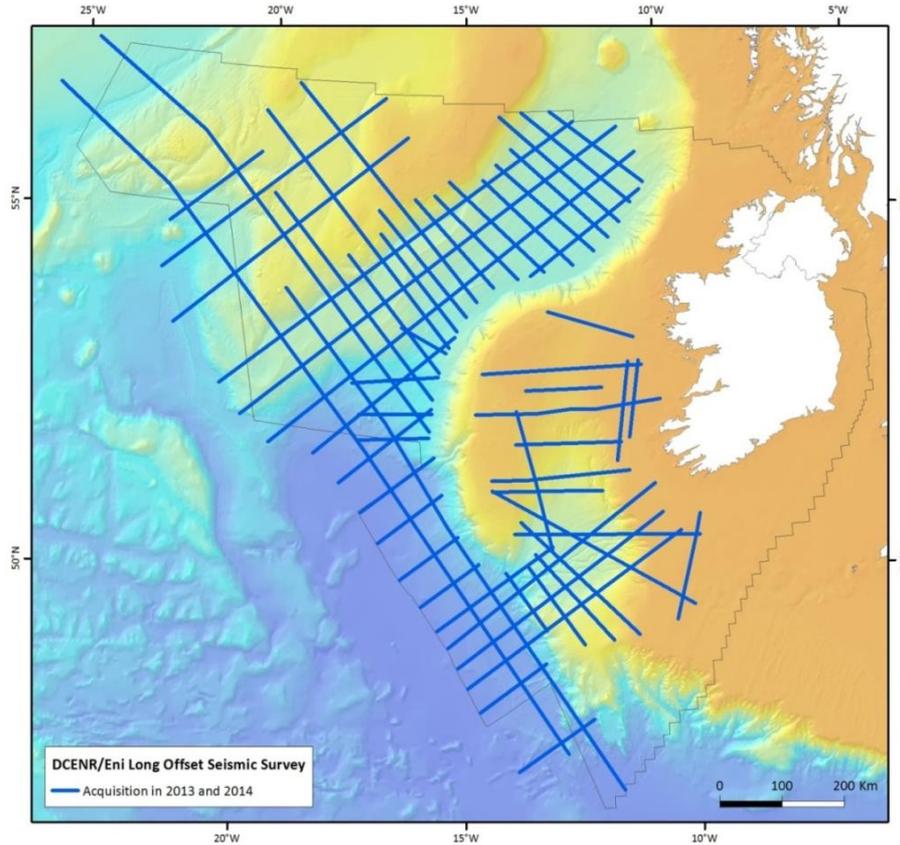
As a vehicle for training next generation Geoscientists, either for industry or academia, the cross disciplinary, industry facing and collaborative ICRAG program sets a standard for others to follow.

Ian Sharp, Equinor

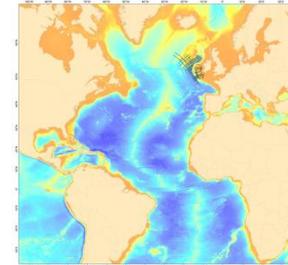
# Data



# DCENR/Eni regional seismic survey 2013/2014



- Acquired programme**  
**16,800km of new:**
- **2D PreStack Time Migrated seismic data**
  - **velocity**
  - **gravity**
  - **magnetic and**
  - **field data**
  - **Acquisition report**
  - **Processing Report**

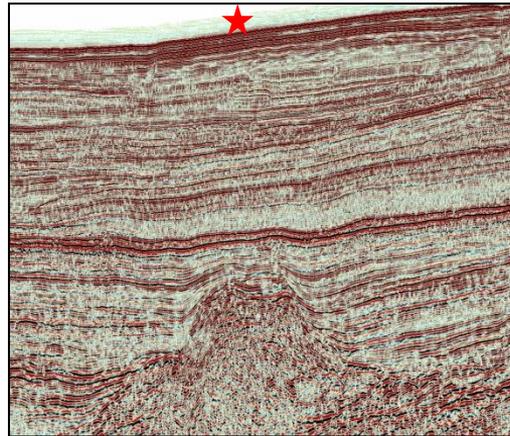
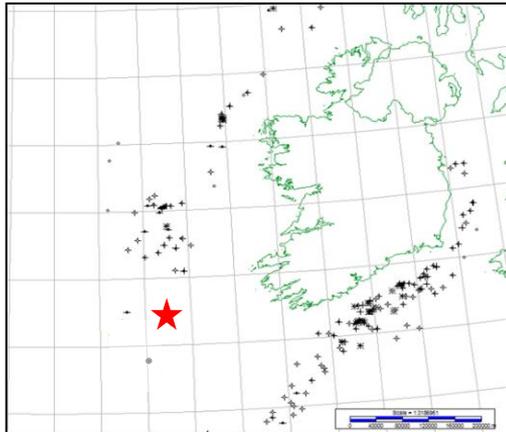


All data released for copying charge only announced at AI 2018

# Well Release 2018



Data from the Dunquin North, well 44/23-1, drilled in 2013 in the Porcupine Basin, was released on 31st July 2018 as it is 5 years since operations were completed on the well.



## Dunquin Exploration Well 44/23-1

Exploration Licence FEL 3/04

Drilled by ExxonMobil and JV partners

Well located approximately 160km off southwest coast of Ireland in water depth of 1663m

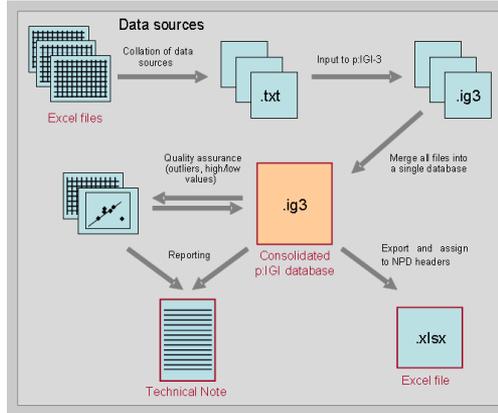
**This is an important reference well for both industry and the research community**

# Example - New Geochemistry Database

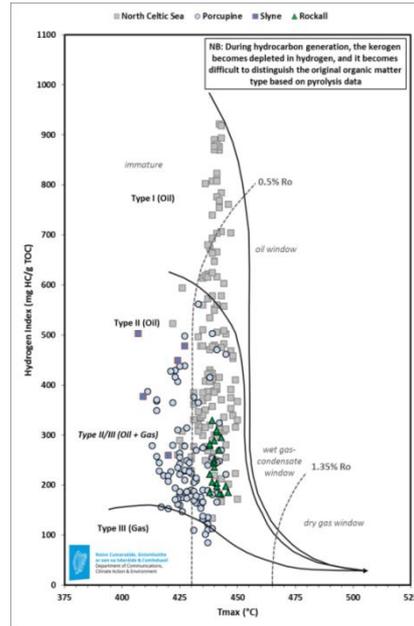
## from TransAtlantic Source Rock Study (Ireland-Canada)



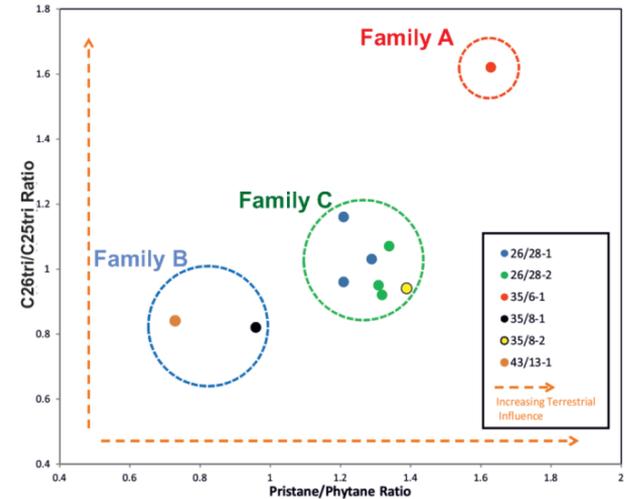
All available geochemical data for each well offshore Ireland have also been digitised and compiled into a single geochemical analytical database, allowing data to be interrogated and trends to be observed



Data type	Samples
Total Organic Carbon (TOC)	12,725
Rock Eval pyrolysis	6,472
Pyrolysis gas chromatography	177
Maceral analysis	613
Vitrinite Reflectance ( $R_o$ )	3,179
Gas chromatography (GC)	1,182
GC-MS (biomarkers)	389
Gasoline composition	470
Bulk fraction carbon isotopes	252
Gas composition	2,118
Gas carbon isotopes	206



Upper Jurassic - by Basin



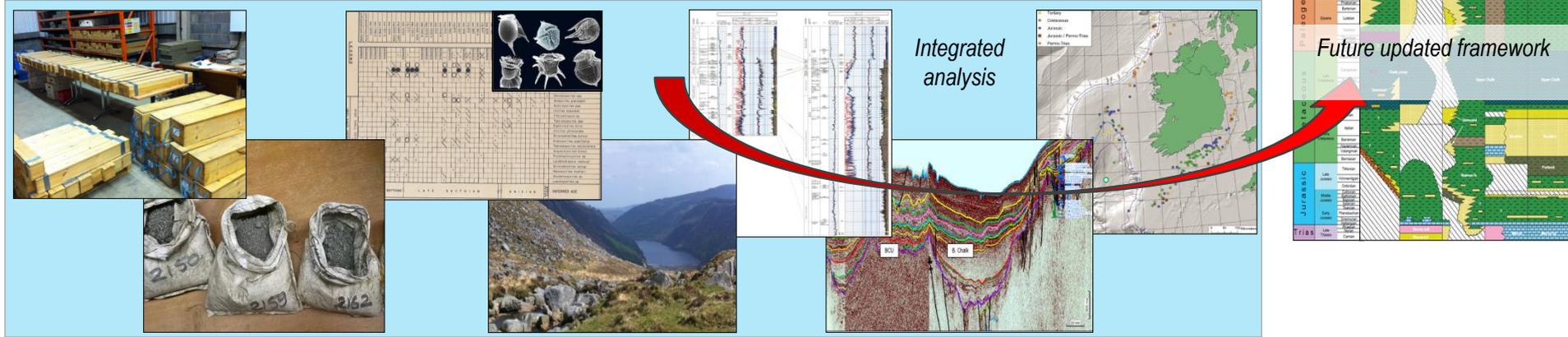
	Pr/Ph	CPI	Gammaerane/ Hopane	C35 / C34 homohopanes	Sterane / Hopane	Sterane distribution	C30 $\beta\beta\delta$ sterane index	C26/C25 tricyclic terpene
Family Porcupine A	> 1	> 1.1	0.15 - 0.2	< 1	very low	High C29	< 4	> 1
Family Porcupine B	< 1 to 1	1 to 1.1	0.2 - 0.3	" or > 1	> 1	C27/C29 ~ 1	> 7	< 1
Family Porcupine C	> 1	1 to 1.1	0.1 - 0.2	< 1	< 1	C27/C29 ~ 1	~ 5	~ 1

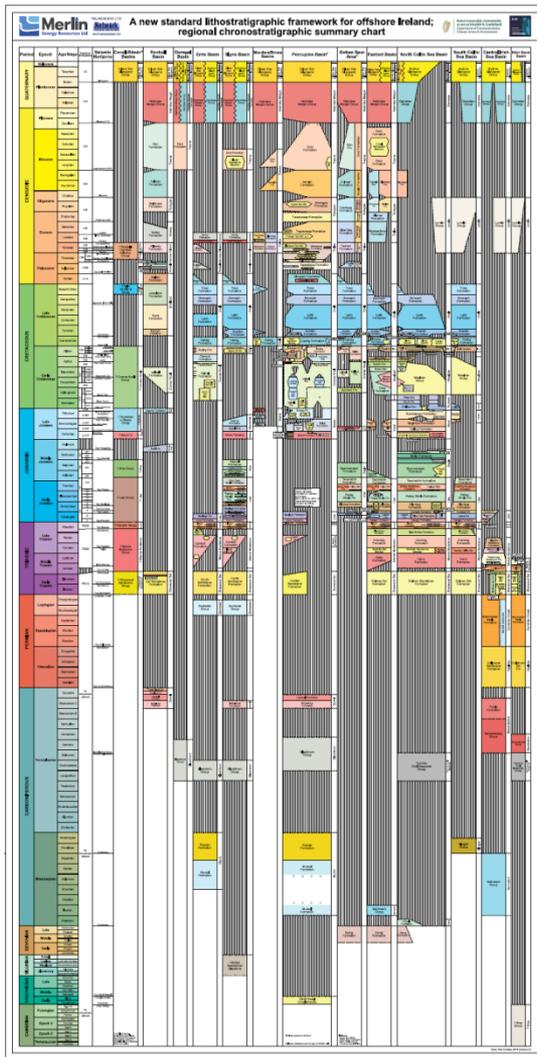
# Ireland's Stratigraphic Nomenclature



- 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 nearing completion





## Ireland's Stratigraphic Nomenclature



A regional chronostratigraphic summary chart of a new standard lithostratigraphic framework for offshore Ireland

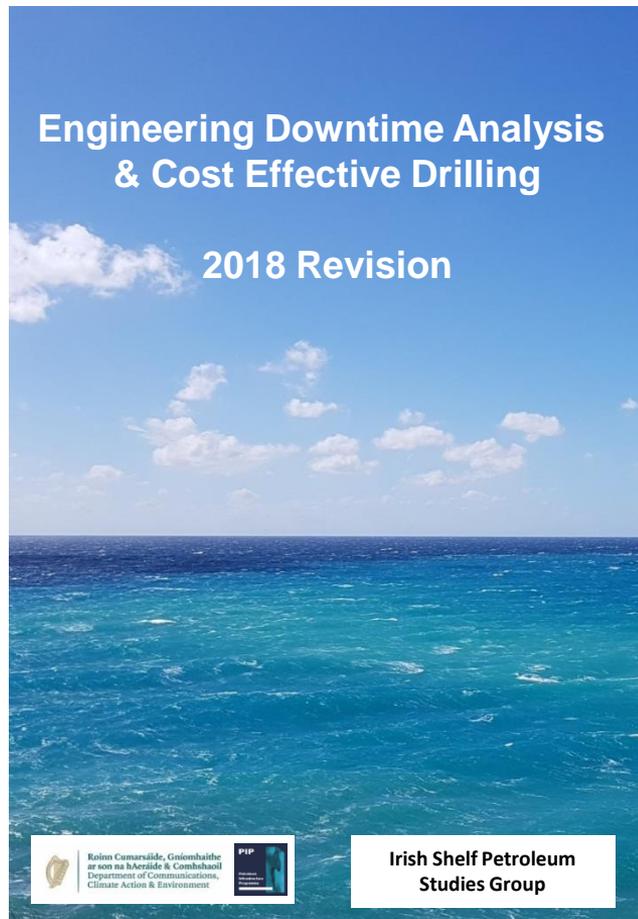
Available to view at PAD booth

Well tops and new stratigraphic chart are available on usb

**Visit PAD booth**



## Drilling Downtime study



Available to view at PAD booth

**Visit PAD booth**

# ObSERVE Data



The baseline aerial and acoustic data acquisition (2015 - 2017) of the ObSERVE programme is completed and results and impact are currently being analysed.

Data is to be made publically available before year end by DCCAE

Acoustic and aerial environmental baseline programme of marine wildlife



Roinn Cumarsáide, Gníomhaithe  
ar son na hAeráide & Comhshaoil  
Department of Communications,  
Climate Action & Environment



An Roinn  
Cultúir, Oidhreacht agus Gaeltachta  
Department of  
Culture, Heritage and the Gaeltacht

Visit ObSERVE booth

# Digital Capture of Technical Data



**Objectives –  
Ease of data access  
Progress work programme timelines and to  
aid in disaster recovery**

Metrics – 337 seismic surveys from 1968 to 2000 across all offshore and onshore basins, some 1492 rolls, 26,000 profiles, 300,000 line km of data

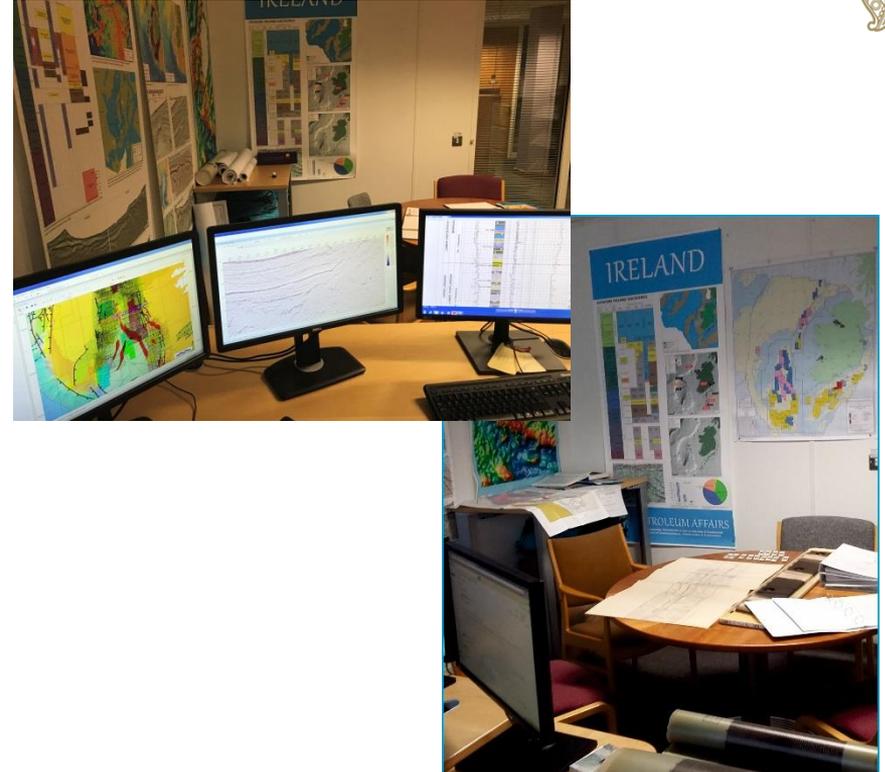
Digital capture of seismic film data commenced in Q3 2017 and was completed in 2018. Subsequent removal of hard copies to Iron Mountain for permanent storage in August 2018



# Technical Data Archive



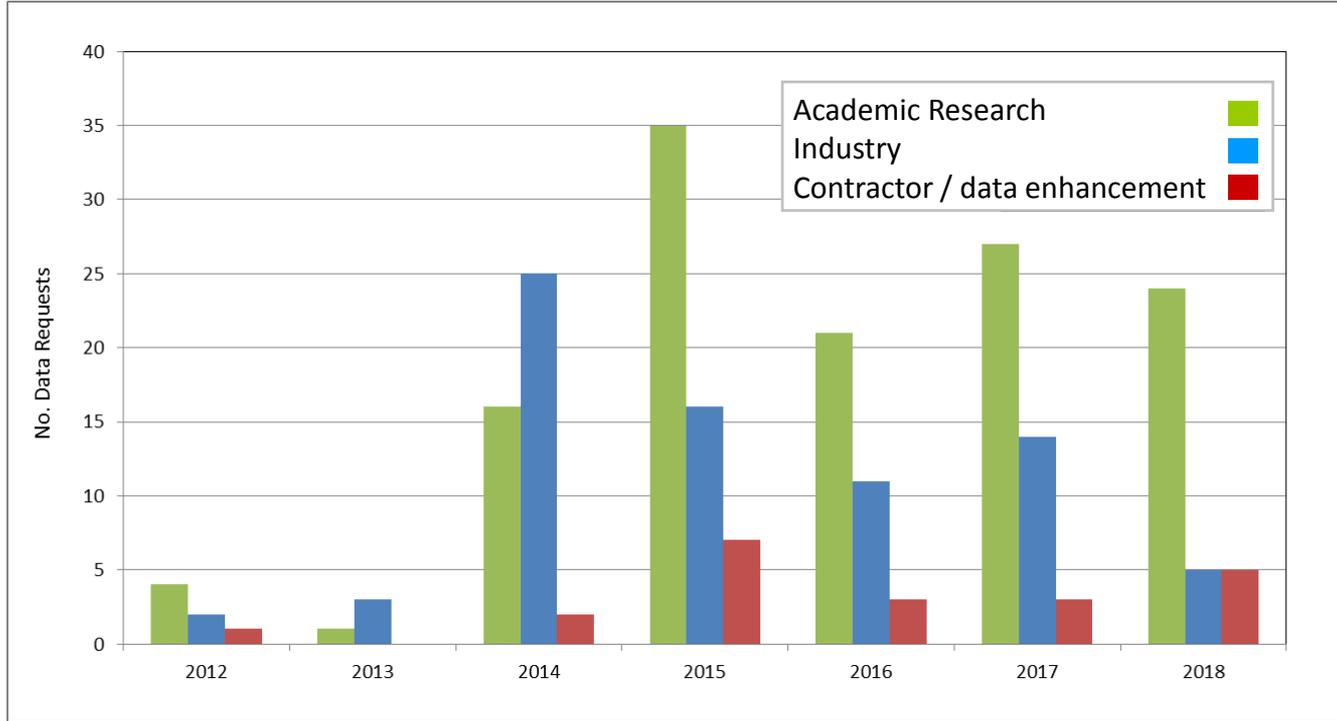
PAD Corestore, Sandyford, Dublin



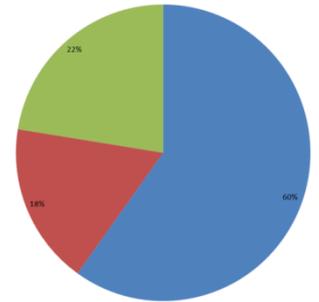
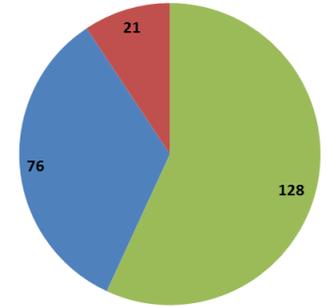
PAD Dataroom, Adelaide Road, Dublin

PAD is responsible for the National Archive of all Petroleum Data

# Data Requests



## Data Requests



## Dataroom Visits

# Communication/Outreach



# Communication/Outreach



**PAD/DCCAE Booth 2018**

# Communication/Outreach



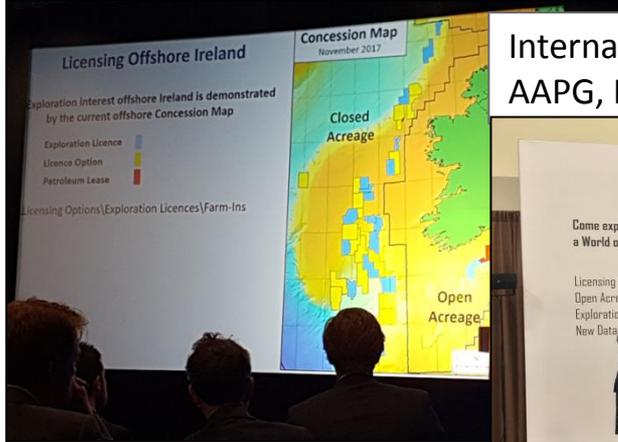
BT Young Scientists Exhibition,  
Jan 2018, Dublin



# Communication/Outreach



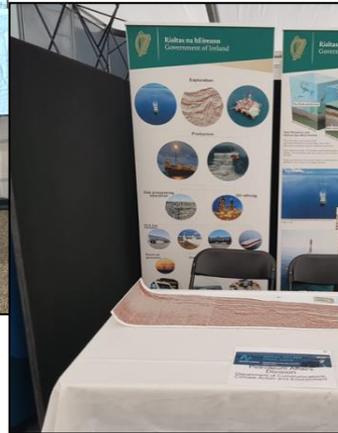
APPEX March 2018 ,  
London



International Pavilion Theatre  
AAPG, May 2018



PAD Booth at Our Ocean Wealth  
tradeshow, June 2018, Galway



Conjugate Margin Conference,  
August 2018, Halifax, Nova Scotia



# Irish Geosciences Early Career Symposium 2018



**January 11th and 12th 2018 the inaugural iGEO2018 event where student Geoscientists participate in cutting-edge scientific debate and network directly with early-career geoscientists, industry members and government officials from across Ireland.**



# Irish Association for women in Geosciences 2018



**Our mission is to encourage, promote and support women in geosciences at all levels of their career**

**Launch of the first European chapter of AWG at  
University College Cork, 24<sup>th</sup> February 2018**



Irish Association  
for Women in Geosciences

# Science & Technology in Action



science & technology in action



## Petroleum exploration in Ireland's offshore basins

<http://sta.ie/lesson/petroleum-exploration-in-irelands-offshore-basins>



The discovery of natural gas fields offshore Ireland has enabled the transition from fuel sources such as peat, coal and wood to natural gas, which is a low-carbon fuel. Continued offshore exploration for natural gas can help secure Ireland's energy supply and help meet our current and future energy needs.

 **Download Lesson Kit**

Contains the full lesson along with a supporting toolkit, including teachers' notes.



Teacher comments include:

"Topics covered are Irish, relevant, more interesting than textbook, allow students to see science at work in Ireland"

"Addresses areas students are interested in and may not be aware of the science involved"

sta 2018

## Ongoing debate in Parliament



January 2018 saw the introduction into Dáil Eireann of the **Petroleum and other Minerals Development (Amendment) Climate Emergency Measures Bill 2018**.



Scrutiny stage  
Climate Action Emergency Bill,  
Private Members Bill  
26 June 2018, Leinster House

TIM GOULD  
HEAD OF THE WORLD ENERGY OUTLOOK TEAM  
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JOINT COMMITTEE  
Future exploration, energy supply and energy security  
COMMUNICATIONS, CLIMATE ACTION AND ENVIRONMENT

A photograph of Tim Gould, Head of the World Energy Outlook Team at the International Energy Agency, speaking at a hearing. He is wearing a suit and tie, and has a microphone in front of him. The background shows a sign for the Leinster House. The image is part of a slide that includes text about the scrutiny stage of the Climate Action Emergency Bill and the name of the committee.

The Bill remains a legislative proposal. Government policies in respect of climate action, energy and offshore exploration, and the application of such policies, remain unchanged.

**Minister/Department will continue to implement the legal and policy framework for exploration**

# Conclusions



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- ❖ Exploration interest in Ireland's offshore basins remains strong. Out of 25 two year Licence Options awarded in 2016 as a result of the 2015 Atlantic Margin Licensing Round, operators of 20 Licence Option's (i.e. 80%) have applied to the Department to convert to Frontier Exploration Licences.
- ❖ Ireland offshore is under-explored in terms of drilling. The quality of seismic data has improved significantly in recent years and evaluation of the new seismic data acquired highlights the petroleum prospectivity of the basins. It is anticipated that the seismic data will translate into the drilling of exploration wells in the immediate future.
- ❖ The generation of regional digital technical datasets, from landmark research projects, have been created. 2018 also saw the digital capture of legacy seismic data.
- ❖ Government is committed to support the exploration of fossil fuels in Ireland's offshore.

**PAD will continue to collaborate with industry and academia to ensure effective exploration in our basins**



**Rialtas na hÉireann**  
Government of Ireland

**Thank you**