

Iceland offshore exploration in the Dreki Area, a part of the Jan Mayen Micro-Continent.

Identifying the Challenges, Icelandic perspective

Skúli Thoroddsen Legal Adviser

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Role of Orkustofnun

The National Energy Authority

- Public administration of the energy sector and specialist services to the government
- Long term planning of energy utilisation and the energy system
- Contracting and conducting research on resource utilisation
- Accumulating and maintaining databases on energy utilisation and forecasts for future trends

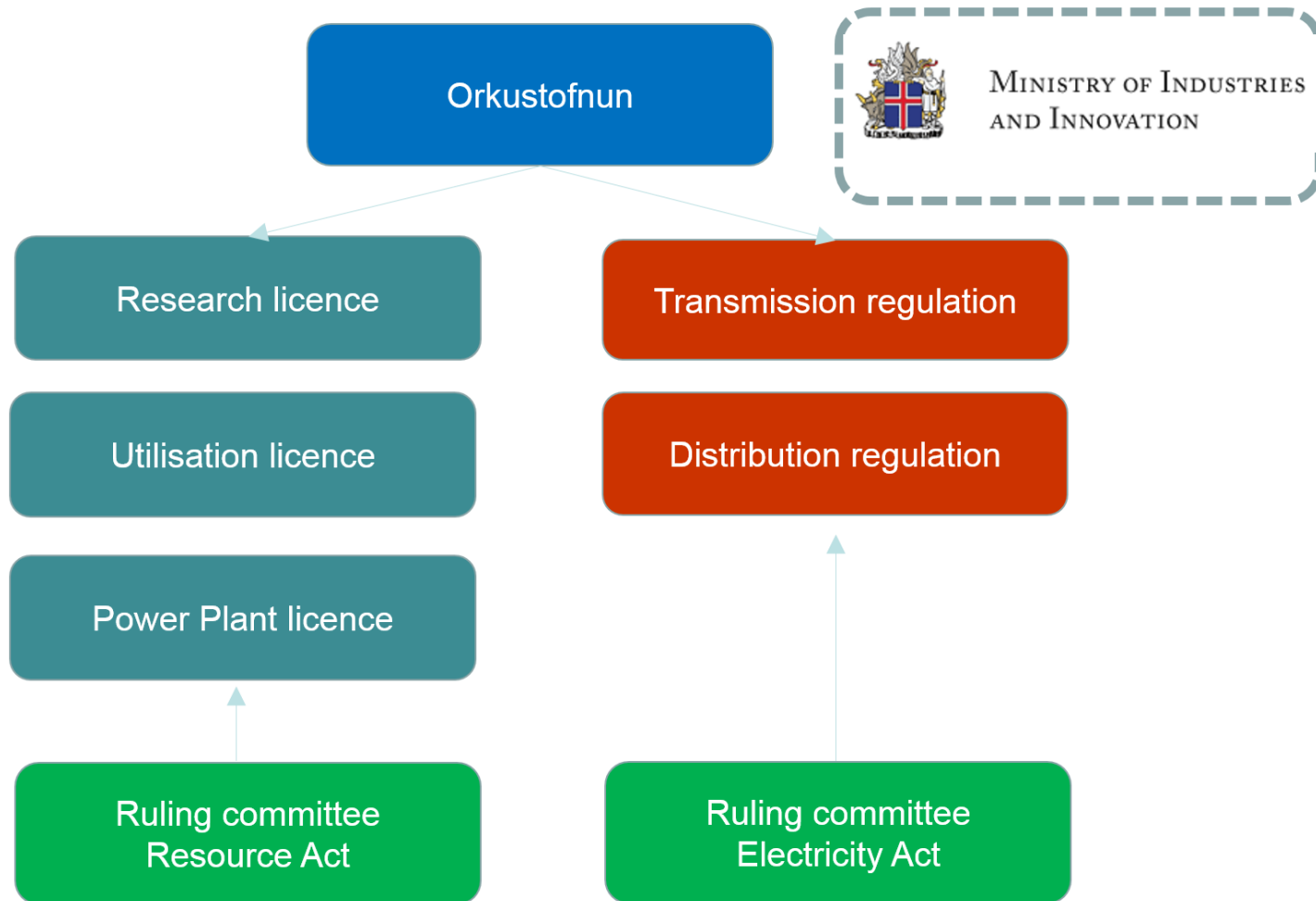


Role of Orkustofnun

The National Energy Authority

- Issues permits for exploration and utilisation of energy and earth based resources
- Issues power plant licences
- Is the regulator for the national grid
- Is the official monitoring body of issued licenses
- Fuel sector administration and work on transition to low carbon fuels
- Administrates The Energy Agency, The Energy Fund and special initiatives for geothermal exploration
- Hosts the UN University Geothermal Training Programme

Role of Orkustofnun



Oil and gas licensing by Orkustofnun

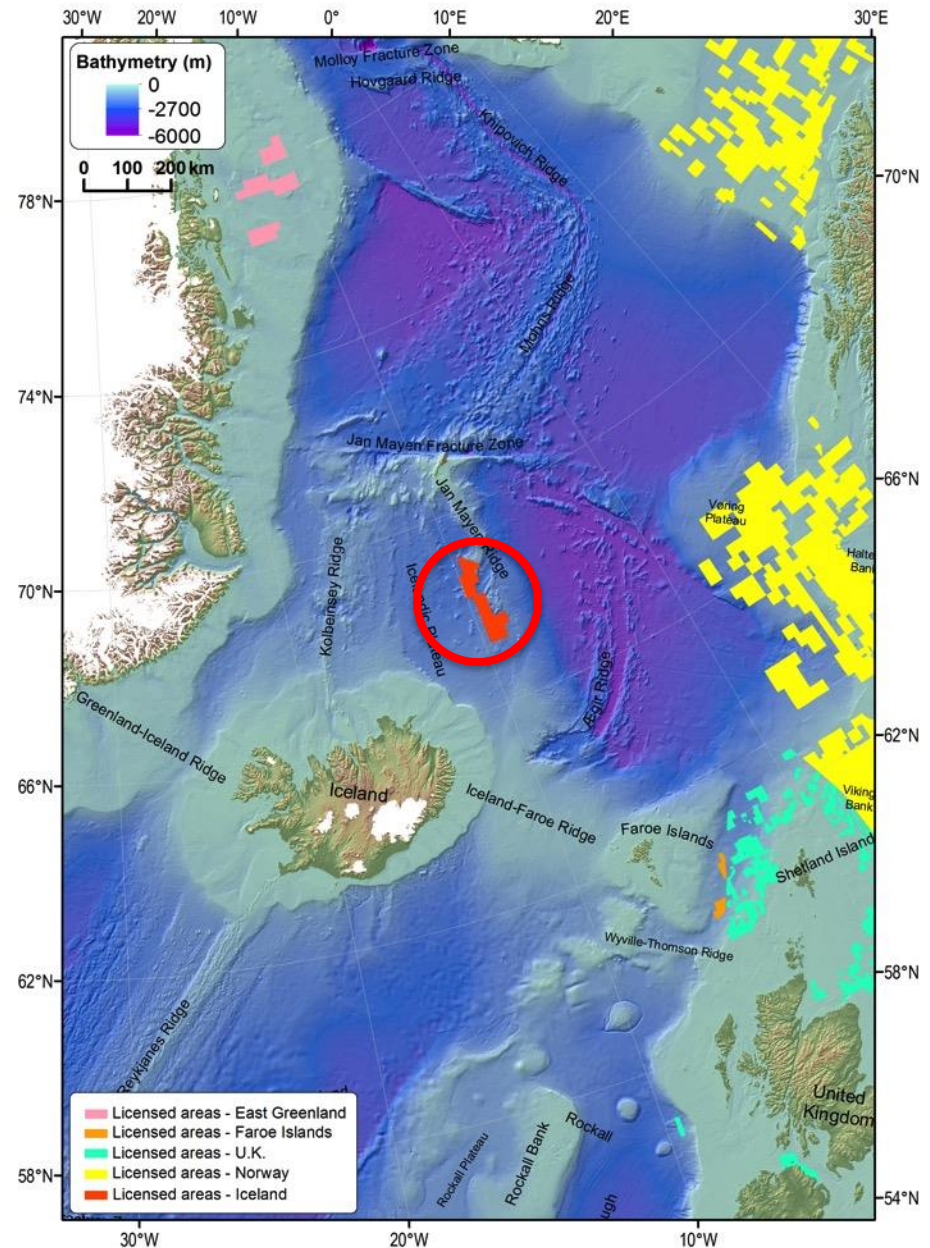
- Based on the Hydrocarbons Act, No. 13/2001
- Licences for exploration and production of hydrocarbons
 - Exclusive licences issued in licensing rounds
 - Exploration phase up to 12 years, max. extendable to 16 years
 - Production phase 30 years

Fiscal Regime: Combination of taxes and fees

- The Icelandic hydrocarbon tax regime is a combination of:
 - Licencing fees in accordance with Act No. 13/2001 on prospecting, exploration and production of hydrocarbons
 - Production levy: 5%
 - General corporate income tax: 20%
 - Special hydrocarbon tax: profit ratio x 0,45

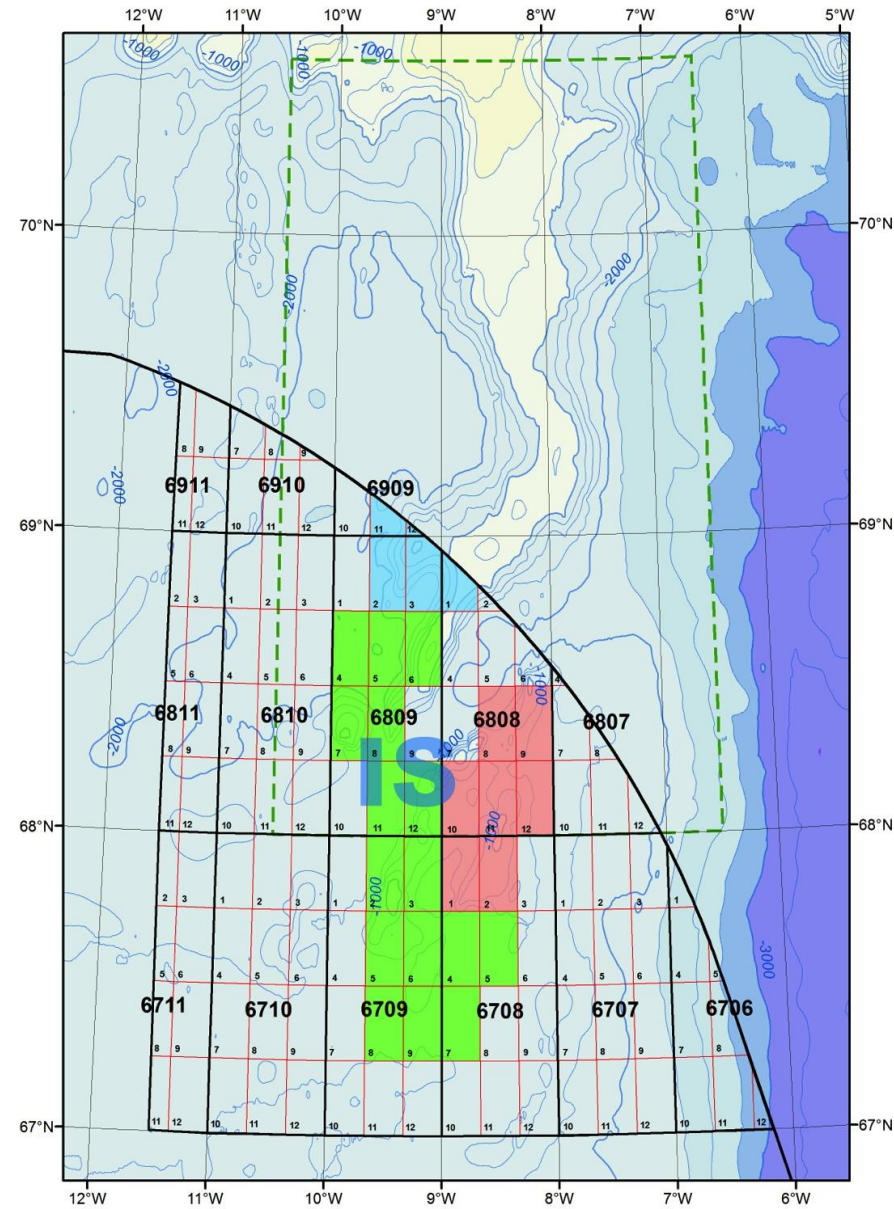
The Dreki Licensing Area

- The northern Dreki Area is a part of the Jan Mayen Micro-Continent with indications of continental strata and suitable structures.
- Similarities to the middle East Greenland coast that is part of Greenland Licensing areas, the Møre- and Vøring Basins at the Norwegian coast, which are proven hydrocarbon provinces.



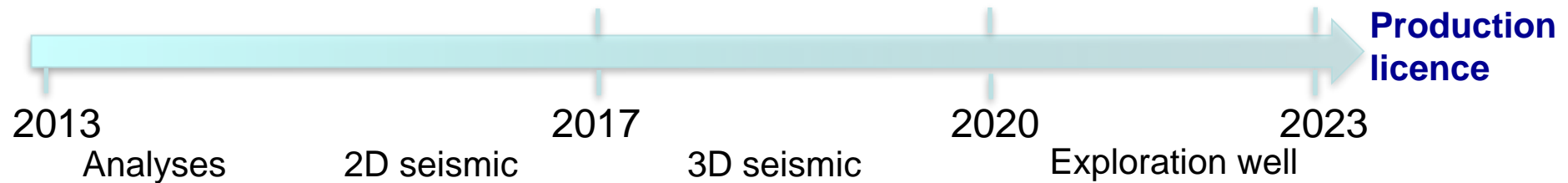
Second Icelandic licensing round – northern Dreki Area

- Two licences granted in January 2013
 - Norway decided to participate in both licences through Petoro Iceland
 - **Faroe Petroleum** (67,5%), Iceland Petroleum (7,5%) and Petoro Iceland (25%) – red area, 7 year licence – **Licence relinquished in January**
 - **Ithaca Petroleum** (56,25%), Kolvetni (18,75%) and Petoro Iceland (25%) – blue area, 10 year licence
- Third licence granted in January of 2014
 - Norway decided to participate in the licence as well
 - **CNOOC International** (60%), Eykon Energy (15%) and Petoro Iceland (25%) – green area, 12 year licence

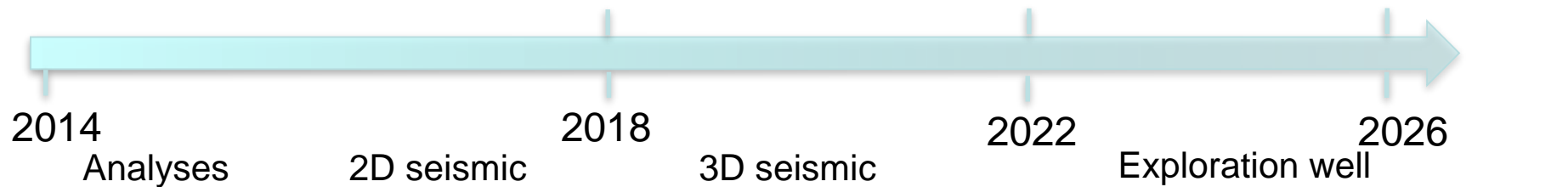


Remaining timelines

Ithaca Petroleum licence – 10 year

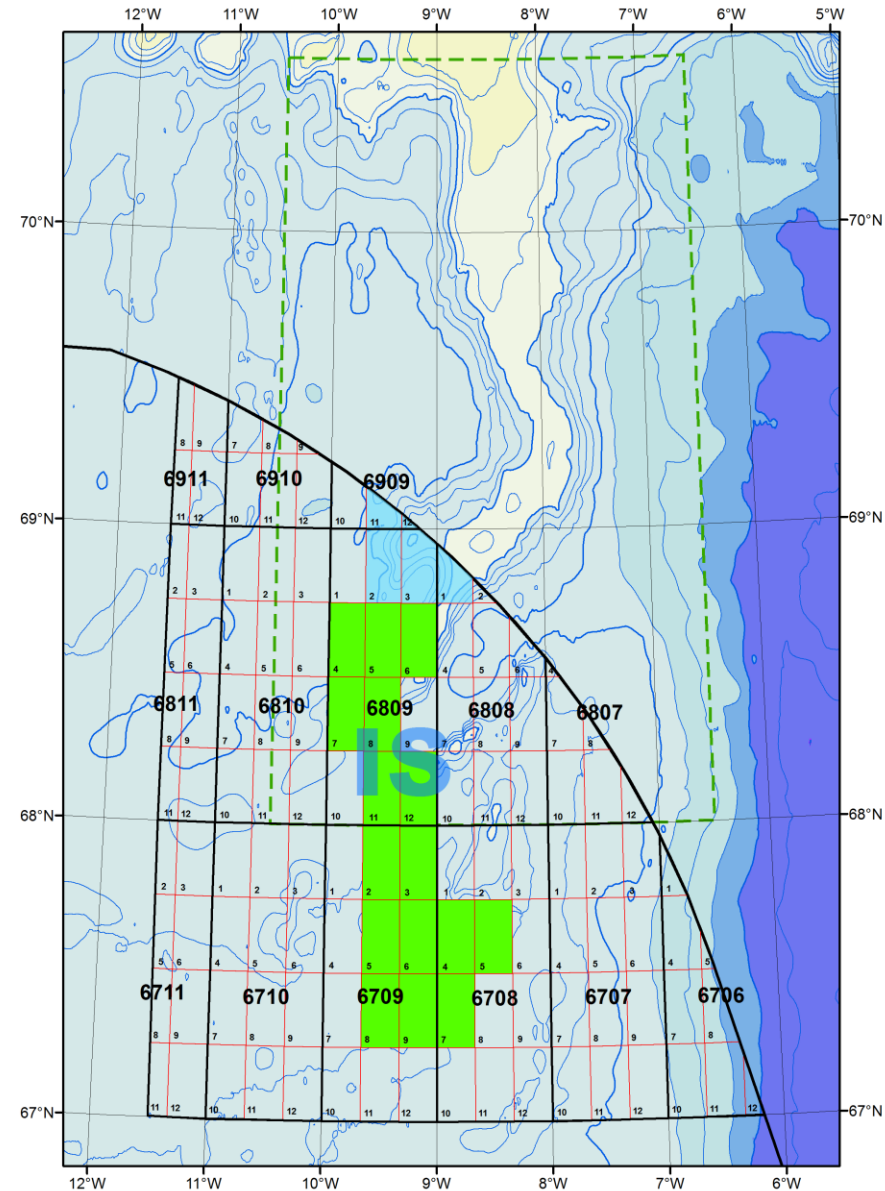


CNOOC International licence – 12 years



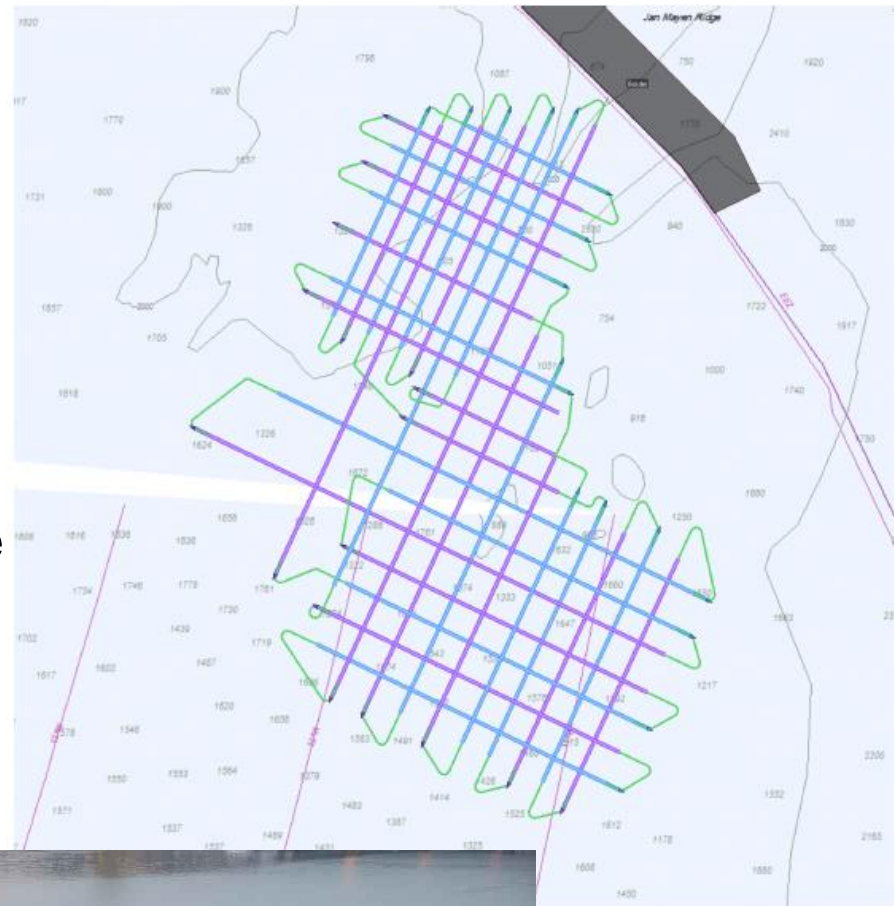
Progress of Licences

- Ithaca seismic was planned for summer 2015
 - Have sold Norwegian branch but moved Icelandic licence to Aberdeen office
 - Preparatory work OK, but petered out last winter 2014/2015
 - Delayed seismic until 2016.
 - Low oil price has had big effect on company

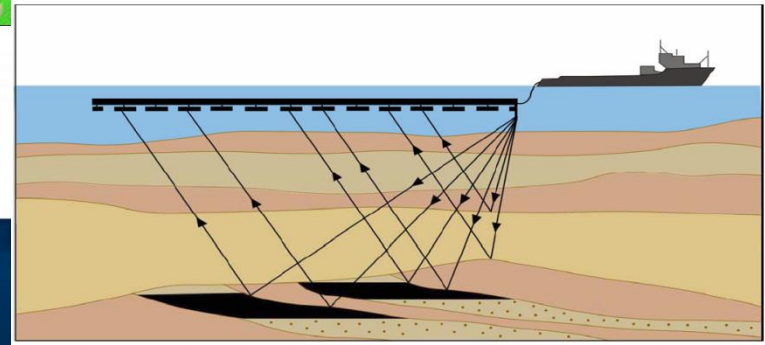
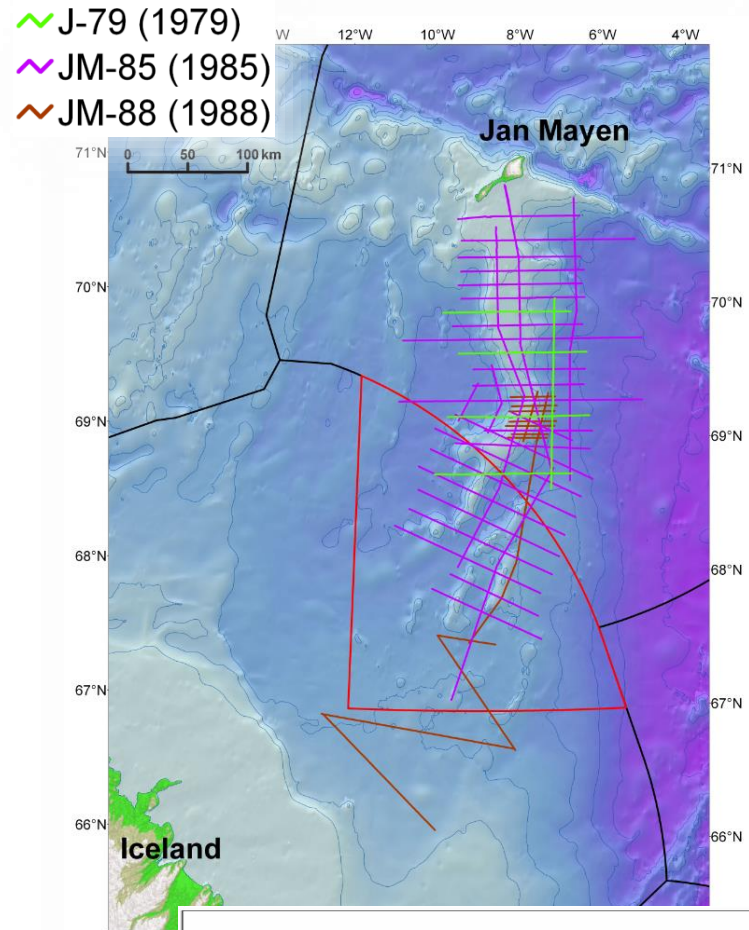
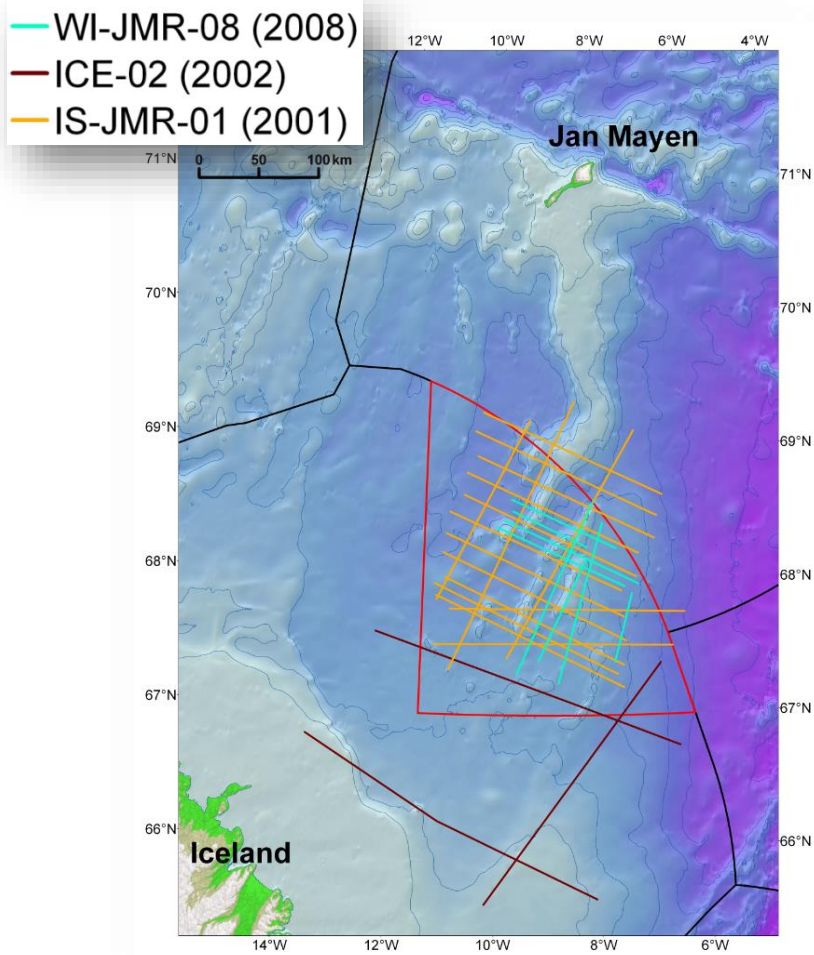


Seismic acquisition 2015

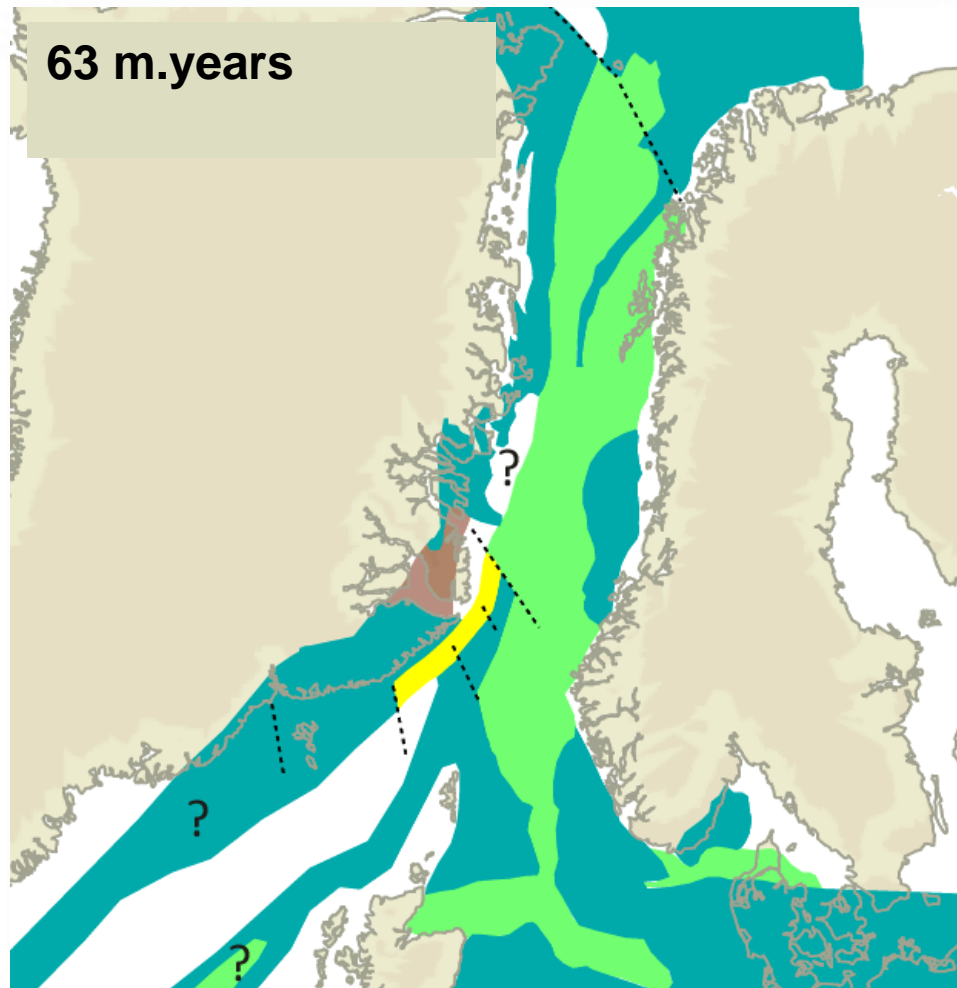
- CNOOC seismic acquisition in last September
- CGG 3D vessel acquired 2700 km 2D survey
- 700 km more than work programme obligation
- Deep discounts in survey price compared to expectation last year
- CNOOC working faster than required by licence



Examples of seismic reflection surveys in the Jan Mayen area

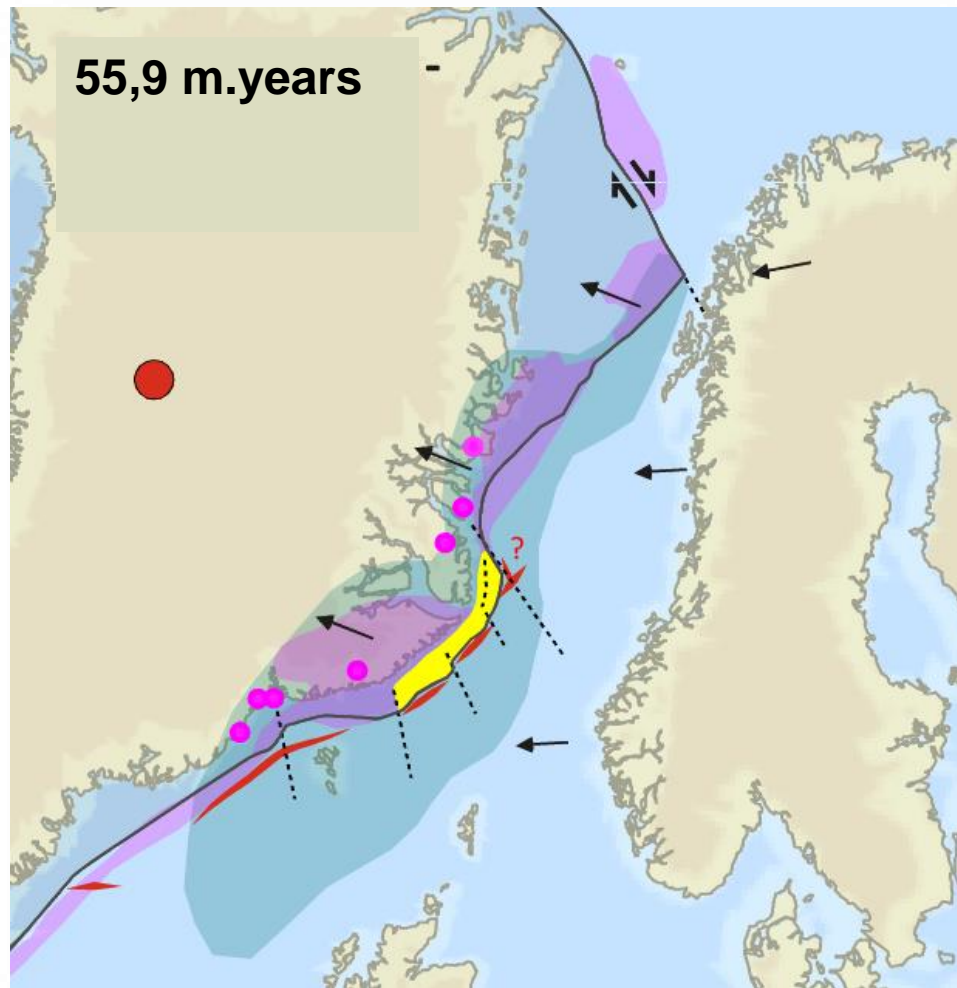


Tectonic history



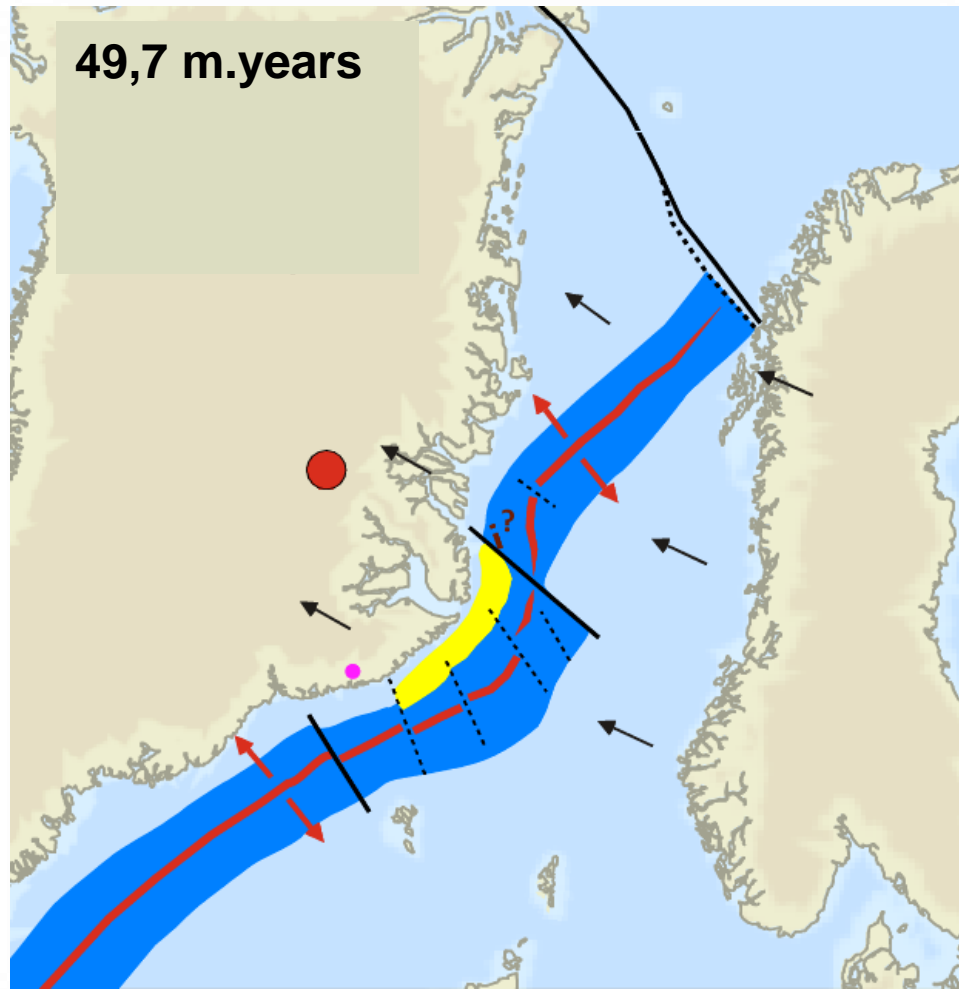
Anett Blischke, ÍSOR (2011)

Tectonic history



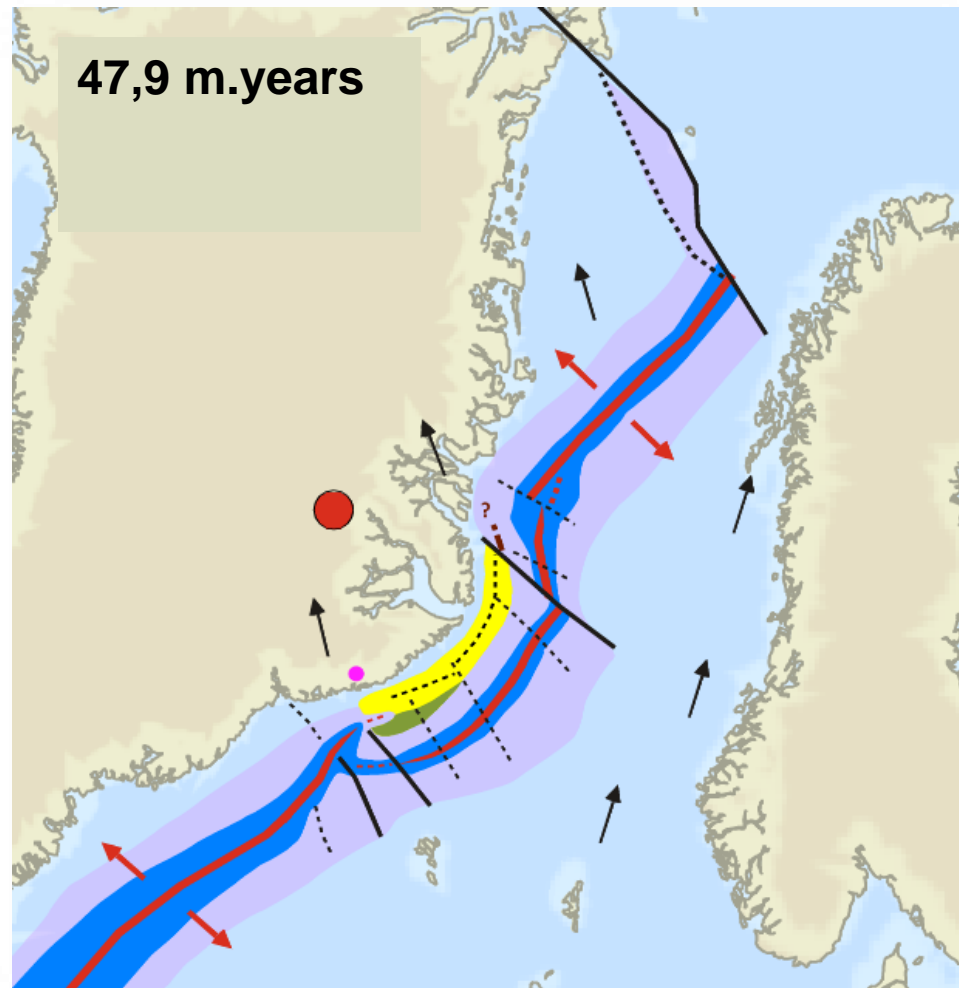
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Tectonic history



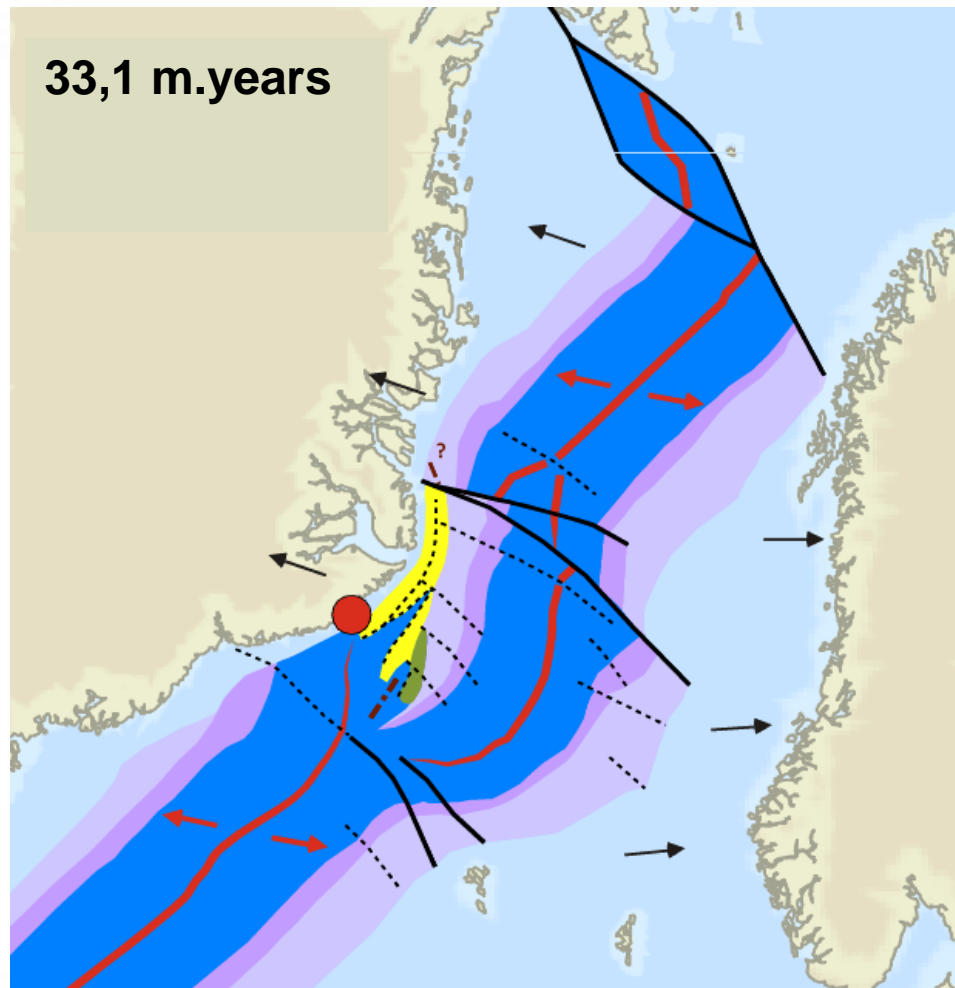
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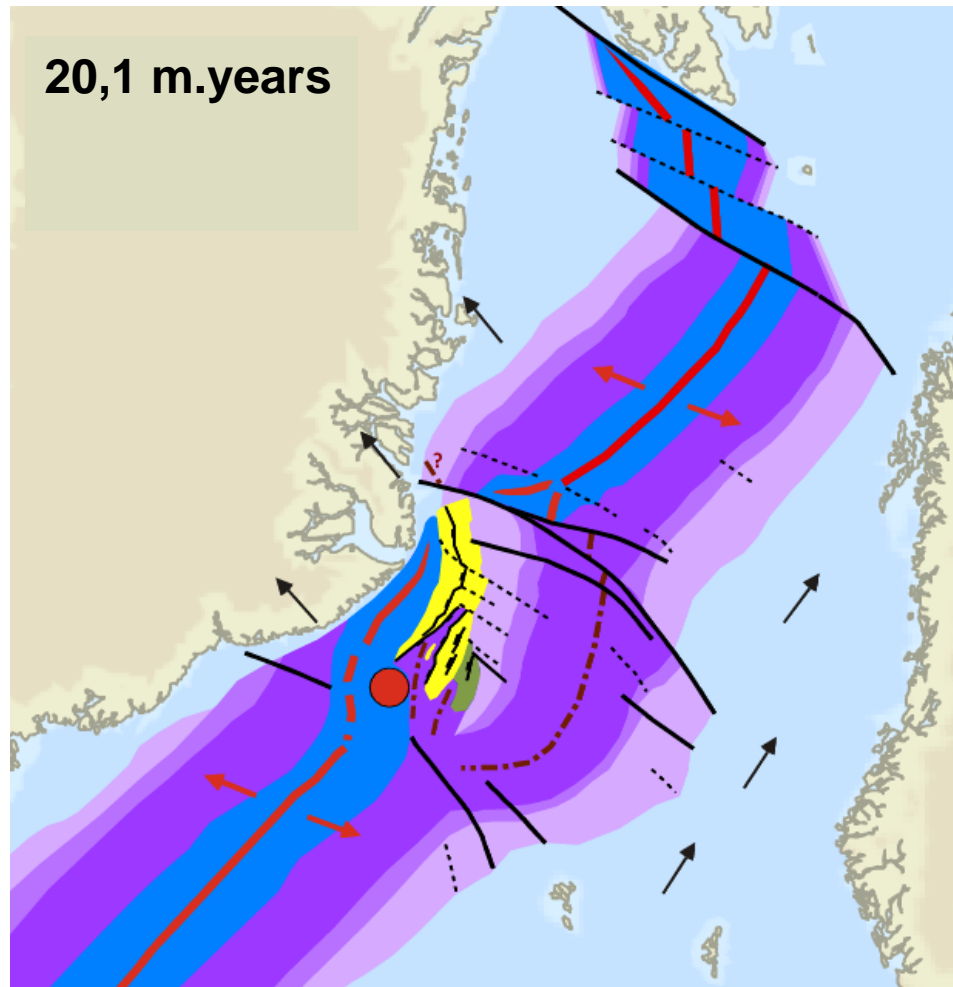
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Tectonic history



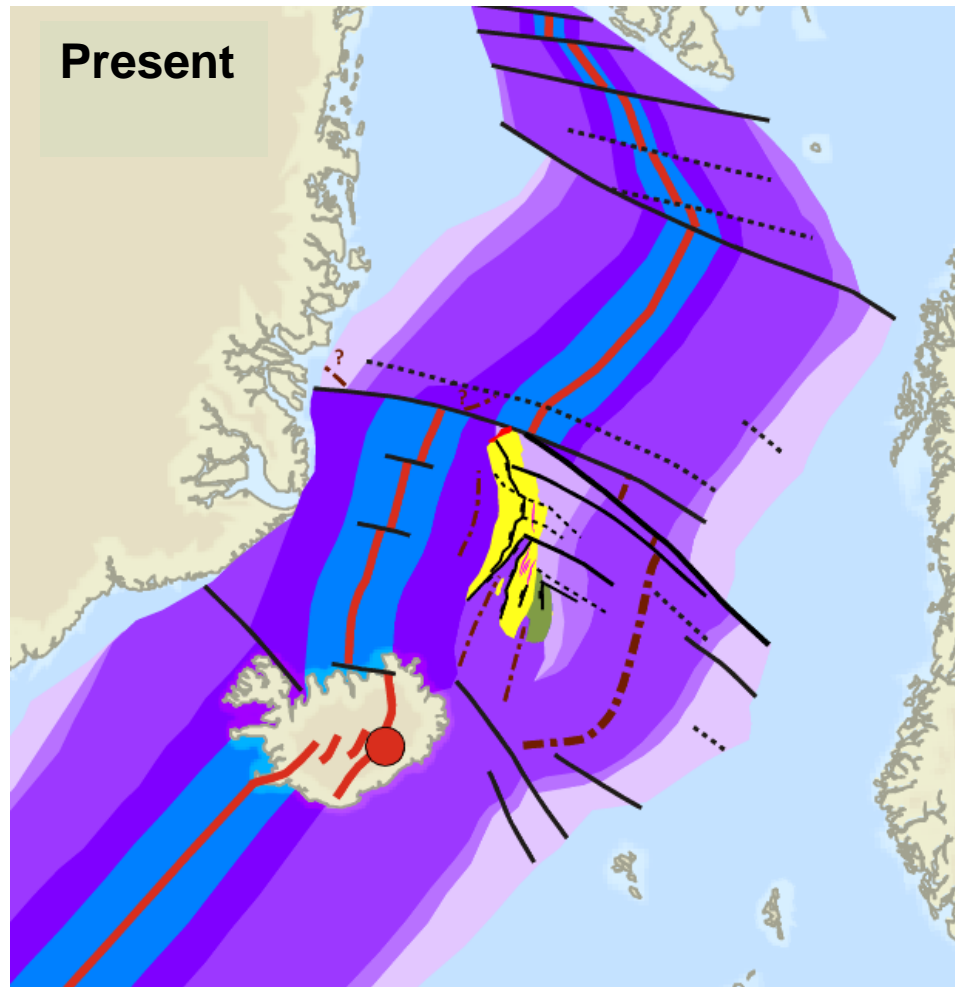
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Tectonic history



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Tectonic history



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» Sampling Operations

Twelve sampling stations (10 gravity cores and two dredges)

Samples ranged in age from Middle Eocene to Permian-Triassic

Samples placed in stratigraphic order to generate a 1000 m pseudo-well

Pseudo-well tied to seismic reflection profile

The results of organic geochemistry analyses suggest seepage of Jurassic oil and the existence of a petroleum system on the Jan Mayen Ridge



Conclusions

- Iceland has opened a new exploration frontier in the Arctic
- The granting of exclusive licences for exploration and production of hydrocarbons an important step in the exploration of the area
- Interpretation of geology for Dreki Area based on analogies for better known areas on either side of North Atlantic
- Key recent research proves presence of pre-opening sediments
- Seepage of Jurassic oil found in sediment samples

Identifying the Challenges: Icelandic perspective

the Area of cooperation between Norway and Iceland

- Icelandic and Norwegian petroleum authorities have agreed to cooperate on petroleum activities on the continental shelf in the Area of cooperation between Norway and Iceland, i.e. the area delimited by the coordinates $68^{\circ} 00'N - 70^{\circ} 35'N$ and $06^{\circ} 30' - 10^{\circ} 00'W$.
- “Overenkomst mellom Norge og Island om kontinentalsokkelen i området mellom Island og Jan Mayen” from 1981.

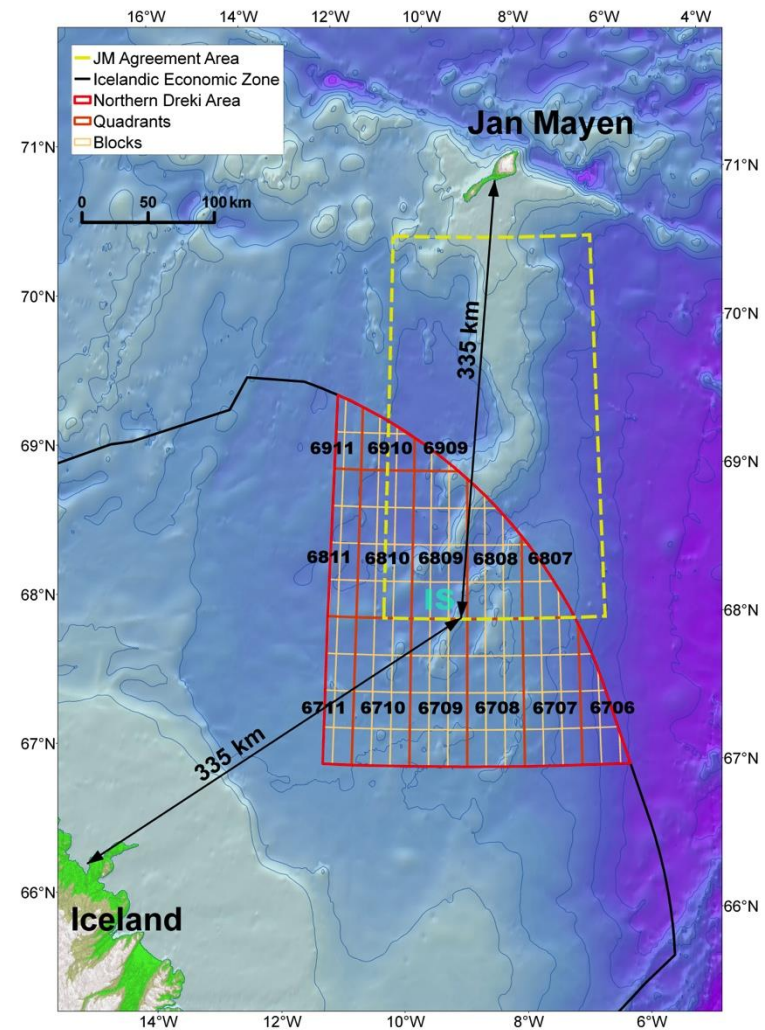
Cooperation agreement between Orkustofnun and Oljedirektoratet

The cooperation involves i.a.:

- Geological interpretation.
- Sharing of data and database.
- Sharing experience as regards issued licences and mutual supervision of licences.
- Sharing experience on legal issues.
- Annual meetings between the two institutes.

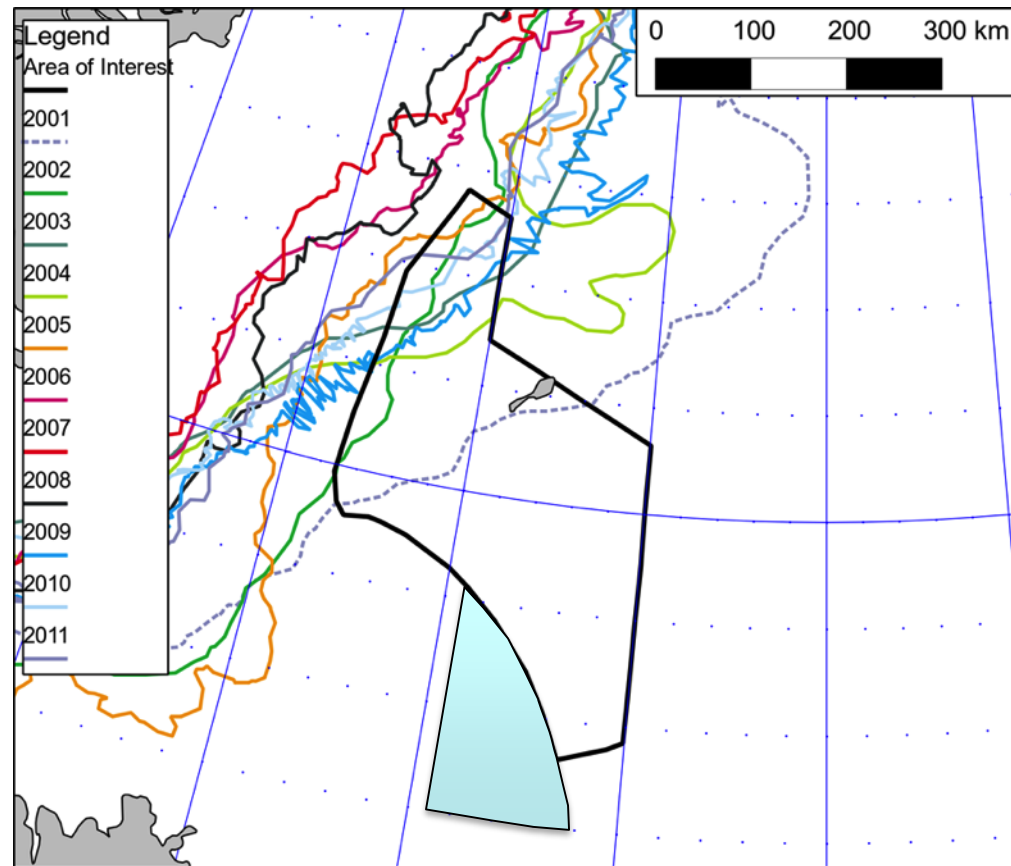
Environmental conditions

- Water depth 800-2000 m
- Distance from shore 200-400 km
- Approximately 24 hr sailing from nearest service harbour
- Cold oceanic climate
- Mean temp. $< 10^{\circ}$ C all year round, ca. 5 to 8° C in summer, -2 to 0° C in winter
- Yearly precipitation ca. 700 mm. Winter lows give snow up to 25 to 30 cm/day



Environmental conditions

- Mean wind speed ca. 10 m/s in winter, but 6 m/s in summer. Over half of obs. < 12 m/s.
- The edge of sea ice has been north and west of the area since the cold period 1965–71
- Wave shelter, 100 year wave around 12 m
- Circular current on surface
- Frequent fogs in summer, icing during winter



Maximum ice extent 2001-2011
Iden et al. (2012)

Arctic Challenges

- Sea-ice and Icebergs
- Weather
- Icing
- Darkness
- Lack of infrastructure
- Vulnerable environment
- Clash of interests - indigenous activities

Arctic Challenges

Icelandic perspective

- (Driftice and Icebergs)
- (Weather)
- Icing
- Darkness - fog
- (Lack of infrastructure)
- Vulnerable environment
- (Clash of interests - indigenous activities)
- Long distance from shore

Art. 22 of the Hydrocarbons Act

Safety Measures

- **Utmost safety measures** shall be taken in hydrocarbon activities, and it shall be verified that the activities **comply with general demands for hydrocarbon activities at any given time**, *i.a.* regarding technical equipment and work processes.
- The licensee and others involved in hydrocarbon activities shall work to provide good and healthy conditions, as well as workplace safety, and actively ensure that the working conditions comply with the legislation that is in force.
- The **licensee and others involved in hydrocarbon activities shall take the necessary measures to prevent damage or reduce the consequences of damage which has occurred**, including measures aimed to bring the environment back to its former state.

Art. 24 of the Hydrocarbons Act

Supervision

- The National Energy Authority shall **operate and lead the work of a consultation group of supervising authorities** regarding prospecting, exploration and hydrocarbon production in Iceland...
- The role of the consultation group shall, among other things, be to ensure an exchange of information and to **co-ordinate public control supervising prospecting, exploration and hydrocarbon production in Iceland...**

HSE Administration in Iceland

National Energy Authority

Occupational Safety and Health Administration

Construction Authority

Environment Agency

Transport Authority

Radiation Authority

Coast Guard

National Planning Agency

Marine Research Institute

Institute of Natural History

HSE Administration in Iceland

M. of Industry and Commerce

National Energy Authority

M. of Fisheries and Agriculture

Marine Research Institute

M. of Social Welfare and Housing

**Occupational Safety and
Health Administration**

M. of Health

Radiation Authority

M. of the Interior

Coast Guard

Transport Authority

**M. for the Environment and
Natural Resources**

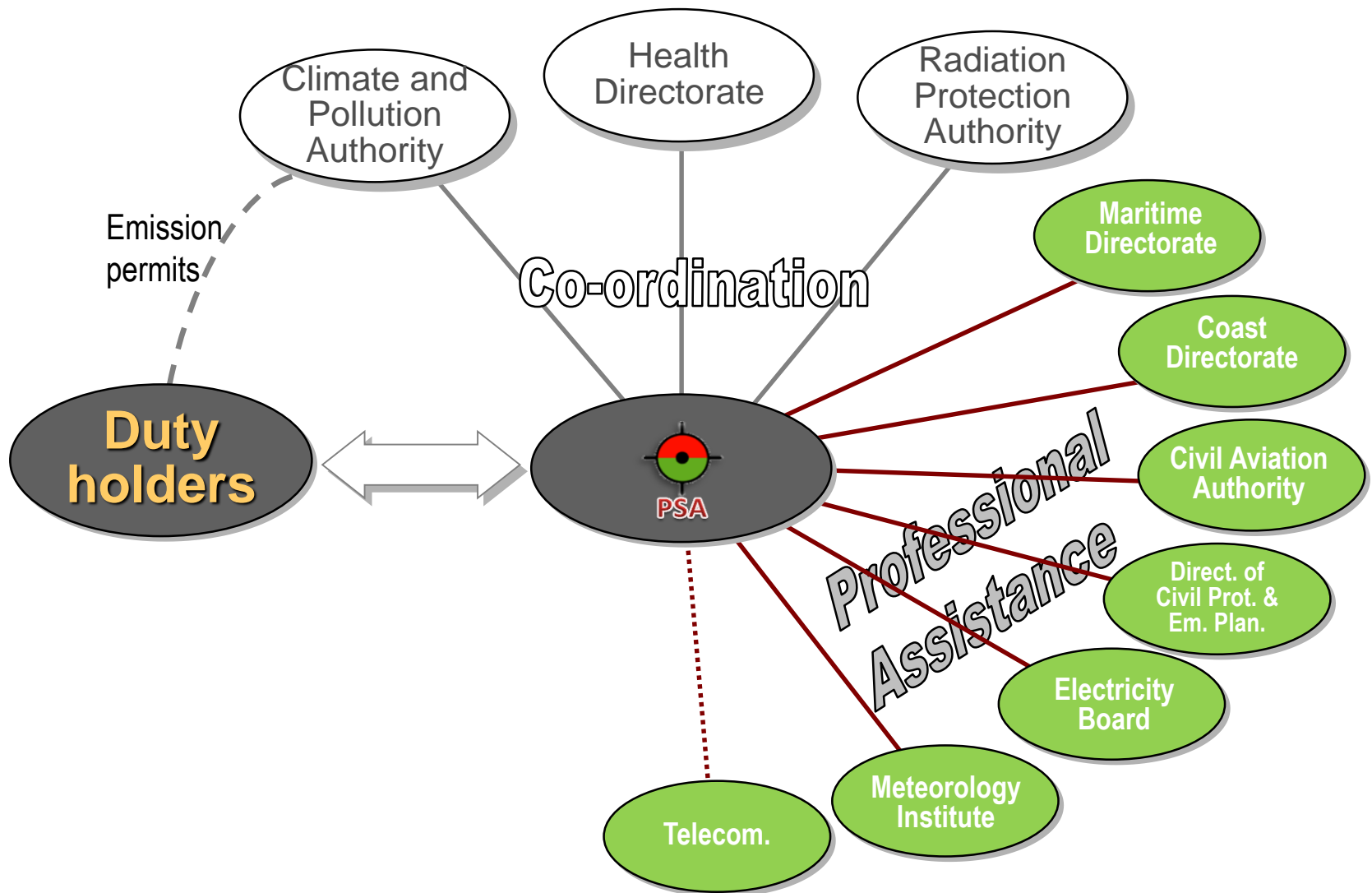
Construction Authority

Environment Agency

Institute of Natural History

National Planning Agency

HSE Administration in Norway



Orkustofnun shall operate and lead the work of consulting group, Paragraph 3 of Article 24 of the Hydrocarbons Act.

- The consulting group, regarding prospecting, exploration and hydrocarbon production, shall consist of representatives nominated by
 - the Iceland Construction Authority, Icelandic Radiation Protection Institute, Marine Research Institute, Icelandic Coast Guard, Icelandic Institute of Natural History, Orkustofnun, Icelandic Transport Authority, Planning Authority, Environment Agency of Iceland and Administration of Occupational Safety and Health.
- The role of the group shall, among other things, be to ensure an exchange of information and to co-ordinate public control supervising prospecting, exploration and hydrocarbon production in Iceland.
 - The conduct of the consultation group shall be further described in a regulation.

HSE supervision – coordinating role of Orkustofnun



Cooperation agreement between PSA and Orkustofnun

- The purpose of this agreement is to promote the development of comparable regulatory framework and policies on the Icelandic and Jan Mayen Continental Shelves.
 - by promoting, strengthening and developing cooperation between PSA and Orkustofnun, particularly regarding exchange of information and cooperation with respect to the regulation of petroleum activities and the implementation of economic, social, and environmental impacts of petroleum activities. The institutes will take appropriate measures to fulfil this purpose.

HSE Administration

- challenges

- Increase coherence between agencies – and ministries
- HSE requirements to be comparable to Norwegian requirements
 - ✓ Comparable conditions in Dreki Area as in remote locations on Norwegian continental shelf, e.g. Norwegian Sea
 - ✓ Comparable requirements should be in effect on both sides of the demarcation line on the Jan Mayen Ridge
- Performance based system, rather than prescriptive
- Close cooperation with Norwegian authorities
- Administrative infrastructure and licence processes have to be in place before the request for a drilling licence is put forward



ORKUSTOFNUN

National Energy Authority