



ATLAS TO EXPLORE HYDROCARBON OPPORTUNITIES IN THE DUTCH OFFSHORE

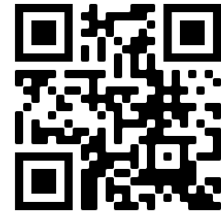
Explore in a mature basin

18 November 2021 – EBN Exploration Seminar

GEODE in a nutshell



- ❑ Joint project of EBN B.V. and TNO to create an atlas to explore hydrocarbon opportunities in the Dutch offshore.
- ❑ Easily accessible web-based GIS environment where play-based exploration data including risk maps and post drill well analysis data is presented for the main hydrocarbons (sub)plays of the Dutch offshore.
- ❑ Results of this project are immediately made available in the public domain for free.
- ❑ Work in progress



www.geodeatlas.nl

Agenda



1 Introduction

Project goal and deliverables of GEODE

2 Data flow and processing

Play maturation
(Play Based Exploration)

3 Metadata

Workflow content

4 The future ..

Future directions and data needs a/o
requirements

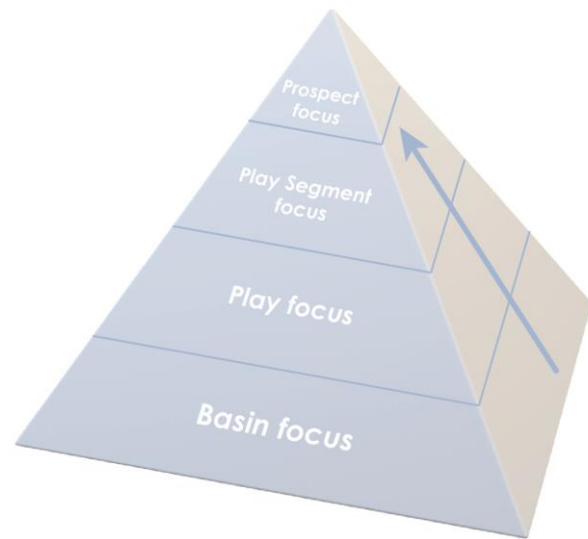
5 GEODE demonstration

Q&A

GEODE Project goals



- ❑ GEODE aims to help to better understand and frame exploration opportunities against the backdrop of regional common risk segment maps with the objective to stimulate exploration activities within the Dutch Offshore.
- ❑ A Play Based Exploration (PBE) approach is used to create these common risk segment maps.
- ❑ The aim is to mature all relevant plays to a 'Play focus' level in the PBE pyramid in order to:
 - Consolidate subsurface knowledge,
 - Support the identification of the most prospective areas,
 - Make the best possible use of the limited remaining time window for exploration activities.



Selected play for the Dutch offshore

TNO

ebn

- Intention to evaluate and describe 8 plays and 4 source rock intervals by the end of 2022.
- Work in progress!
- 5 plays and 2 source rock intervals will be published by the end of December 2021



Project deliverables per (sub)play**



- Data quality maps
- Pools in play & subplays
- Well status and analysis (penetration, hydrocarbons, technical status, etc)
- Top and base play depth maps
- Reservoir & seal (gross) thickness maps*
- Average porosity maps and porosity classes*
- Gross Depositional Environment maps
- Aggregated supercrop maps
- Post-drill well analysis (PDWA)
- Common Risk Segment maps (CRS)
- Critical Risk (Weakest Element) maps
- Composite Common Risk Segment maps (CCRS)
- Annotated play map

* (sub)play dependent

** Existing public data

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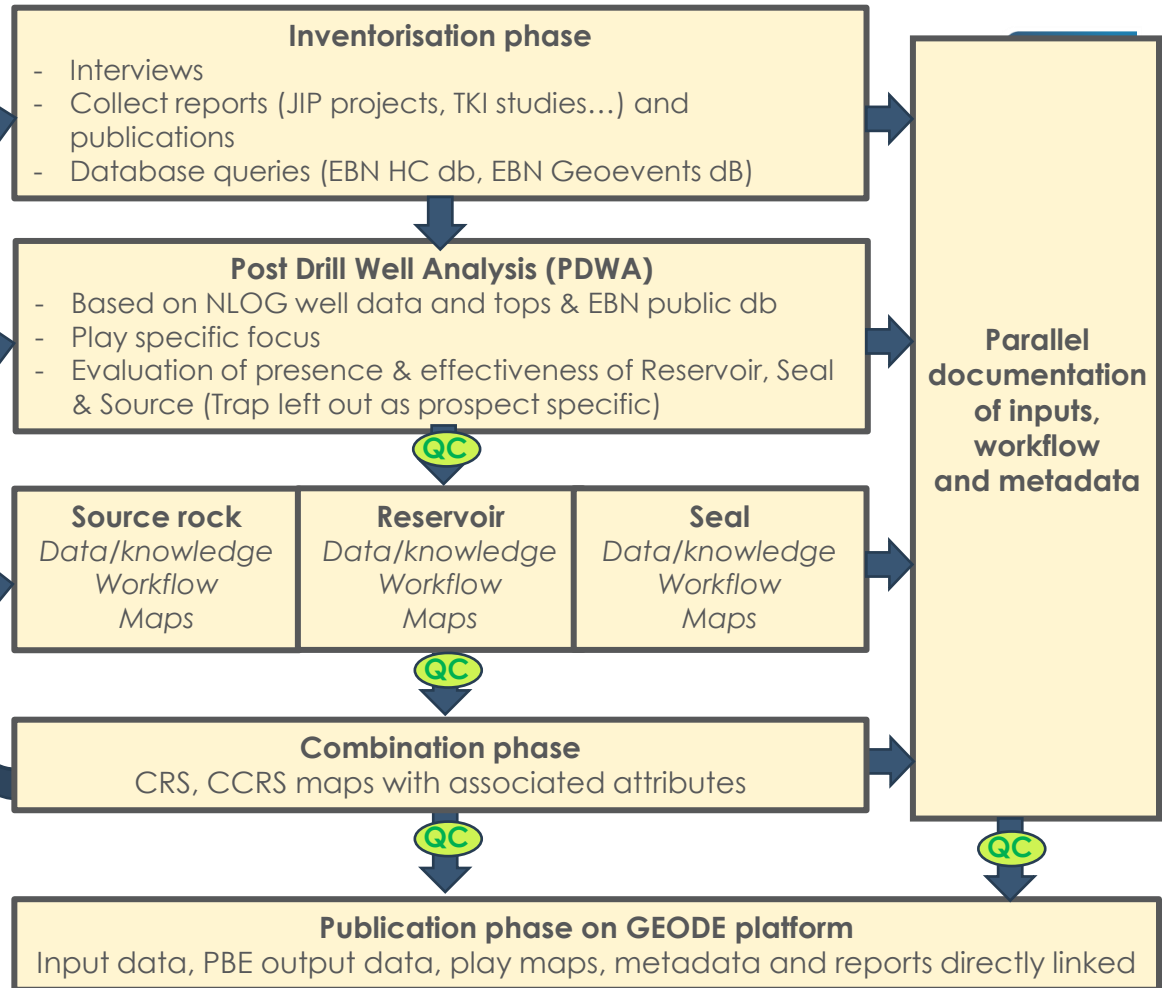
Q&A

Workflow ("Logistics")



Quality control step done with the QA/QC team of the play. These QC teams are formed by external Subject Matter Experts

Update where necessary

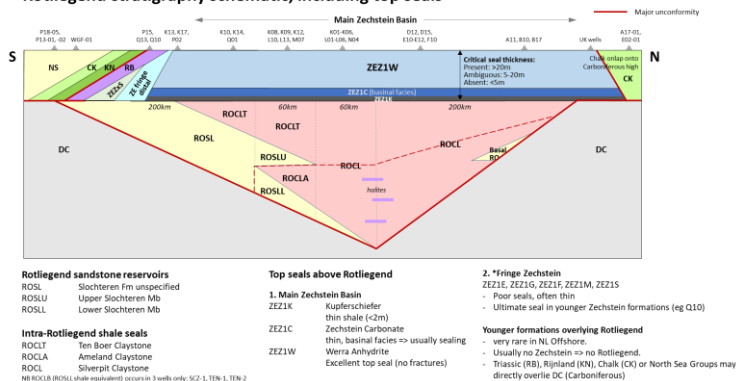


Our Dutch Gas

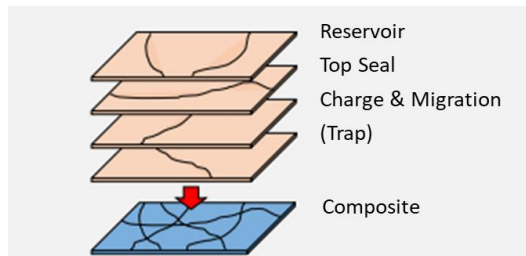
Workflow (“Geological”)

1. Play and sub-play definition (Reservoir and Seal pairs)

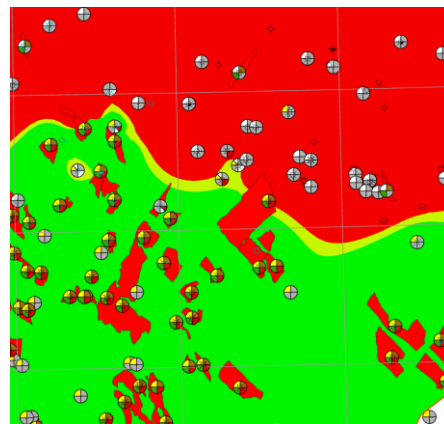
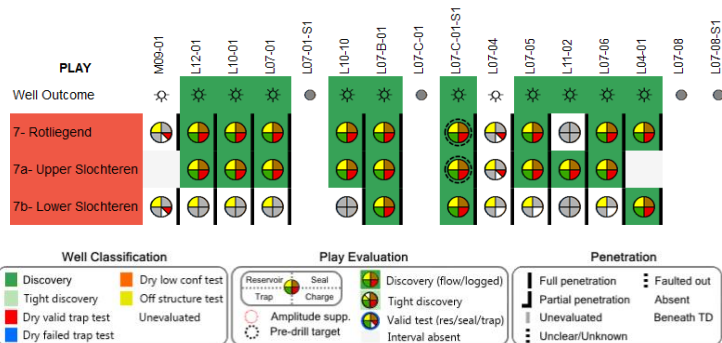
Rotliegend stratigraphy schematic, including top seals



3. Composite Risk Segment maps for play elements of selected (sub)plays using geological proxy maps and incorporating exploration history data; based on split risk: average prospect risk maps where each segment carries an estimate of the shared (play) vs local (repeatability) risk



2. Exploration history and Post-Drill Well Analysis: play penetrations, well failure analysis, trap types in relation to predrill target definition

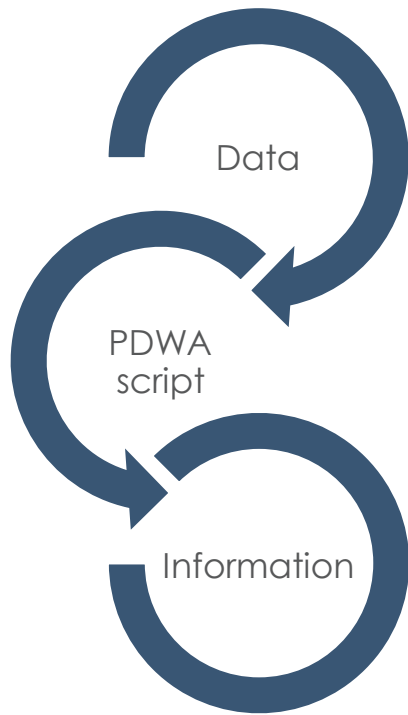


4. Composite Common Risk Segment maps and quantification of the shared (play) and local (repeatability) risk (Split risk approach)

Process improvements: from Data to Information

Fully automated Post Drill Well Analysis (PDWA)

- Based on (public) data available through EBN Datalake
- Hardcoded extraction by Feature Manipulation Engine into the Player ArcSDE database in ArcGIS Pro



☒ Play7a_PDWA Top Seal Presence

- Present
- Ambiguous
- Not Present
- Unevaluated

☐ PDWA Reservoir Presence

- Present
- Ambiguous
- Not present
- Unevaluated

NLOG Well Tops

☐ PDWA Reservoir Effectiveness

- Effective
- Ambiguous
- Not effective
- Unknown

Petrophysical evaluations

- NLOG
- Missed Pay Analysis (Panterra)

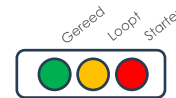
☒ PDWA Gas Shows





- EvalGasShows
 - Gas shows
 - Interpreted gas
 - Proven gas

HC Shows db (EBN), Well status (NLOG)



Progress Atlas Play Teams



1 CENOZOIC - SHALLOW GAS	  	Completed
2 UPPER CRETACEOUS - CHALK	  	Not yet started (planned 2022)
3 LOWER CRETACEOUS	  	Not yet started (planned 2022)
4 JURASSIC	  	Upper Jurassic Completed
5 TRIASSIC	  	In progress, planned to be completed before end of year 2021
6 ZECHSTEIN	  	In progress, planned to be completed early 2022
7 ROTLIEGEND	  	Completed
8 CARBONIFEROUS	  	Not yet started (planned 2022)
9A SOURCE ROCKS - WESTPHALIAN COALS	  	Completed
9B SOURCE ROCKS - POSIDONIA SHALE	  	Completed
9C SOURCE ROCKS - LOWER CARBONIFEROUS	  	Completed, not yet available
9D SOURCE ROCKS - OTHER INTERVALS	  	Partially started (planned completion 2022)

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GeoNetwork for meta-data



□ **GeoNetwork** open-source platform for publishing the metadata associated with the various maps and data.

□ Each dataset (at Play level) in portal is linked to its corresponding metadata fileset in GeoNetwork.

7a_ROSLU_Thickness_Map

Gross thickness map (in m) for ROSLU as a proxy for reservoir presence

Completed

Download and links



Stratigraphy per well

Open link

Excel list of well tops for all public wells
https://www.nlog.nl/sites/default/files/thematische_data/nlog_stratistelsel.xlsx

About this resource

Categories

Datasets

Continents, countries, sea regions of the world.

Netherlands

Other keywords

RO
ROSLU
Reservoir presence
Map

Contact for the resource

EBN
Author:
Audrey Roustiau

Status

Completed

Technical information

Lineage

TNO NLOG marker file (well tops) exported on 24/02/2021 edited to be fit for purpose for the project (see process step below)

Is source dataset of

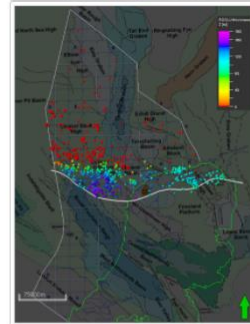
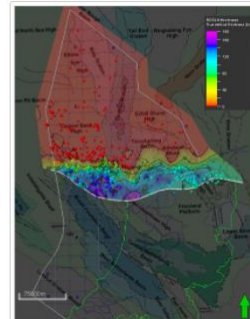


7a_ROSLU/ROSLU_CRS_Reservoir_Presence

Associated record

Common Risk Segment map (CRS) for reservoir presence for the Rotligend Undefined/ Upper Slochteren subplay more...

Overview



No ratings ★

See all feedback

Add your review

Temporal extent

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Planning Geode Play Teams 2022

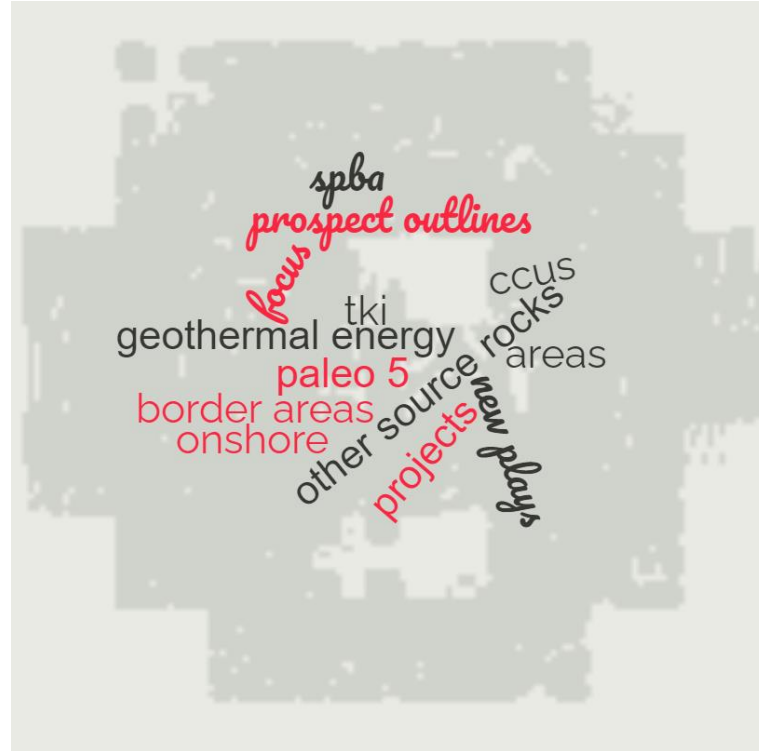


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The future ...

Future directions and data requirements

Future directions for GEODE



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GEODE is a joint initiative of EBN BV and TNO

Thanks for your attention. Any questions?



Contact us at **exploration@ebn.nl**

TNO

