



GEOLOGICAL
SURVEY OF
NORWAY

- NGU -

JOINING FORCES

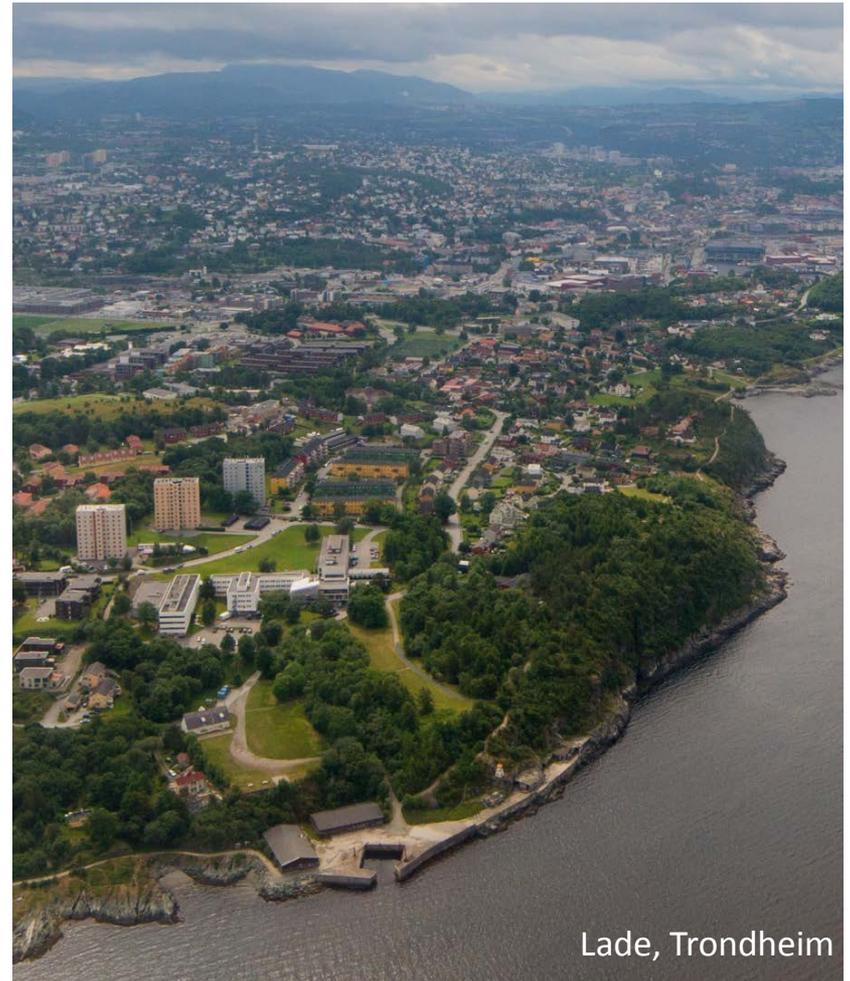
Odleiv Olesen, Team leader Continental Shelf Geophysics

Geological Survey of Norway

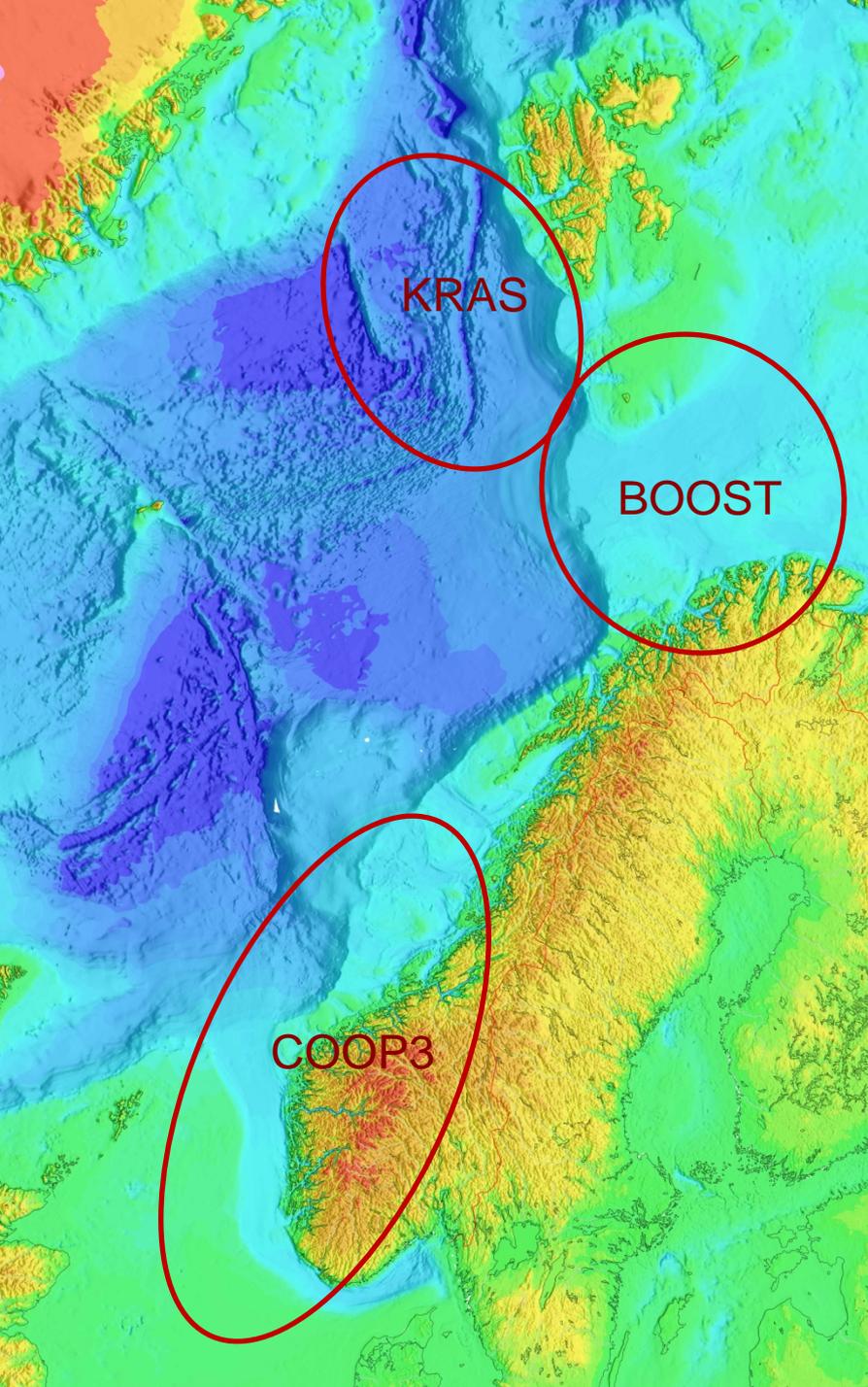
Geoscience organisation

<u>Managing director</u> Morten Smelror		
<u>Georesources</u> Director Tom Heldal	<u>Geoenvironment</u> Director Jan Cramer	<u>Geomapping</u> Director Øystein Nordgulen
<u>Industrial minerals and metals</u> Henrik Schiellerup	<u>Marine Geology</u> Reidulv Bøe	<u>Bedrock Geology</u> Bernhard Bingen
<u>Natural Construction Materials</u> Kari A. Aasly	<u>Groundwater and Urban Geology</u> Hans de Beer	<u>Quaternary Geology</u> Astrid Lyså
<u>Applied Geophysics</u> Jan. S Rønning	<u>NGU-Laboratory</u> Ana Banica	<u>Geodynamics</u> Susanne Buitter
<u>Geochemistry</u> Berlinda Flem		<u>Geohazards</u> Reginald Hermanns
		<u>Continental Shelf Geophysics</u> Odleiv Olesen

220 employees



New research projects at NGU



- BOOST Barents Onshore-Offshore Structural and Thermal Modelling
- COOP3 Crustal Onshore-Offshore Project 3
- NAG-TEC2 Northeast Atlantic Geoscience Tectono-stratigraphic Atlas 2
- BASE2 Petroleum in weathered and fractured basement 2
- KRAS Knipovich Ridge Aeromagnetic Survey



Aeromagnetic data

bayerngas

centrica
energy

ConocoPhillips



DONG
energy

Eni
Eni Norge

GDF SUEZ

Lundin
Petroleum

MAERSK
OIL

NORECO



Statoil

SUNCOR
ENERGY



VNG
Norge

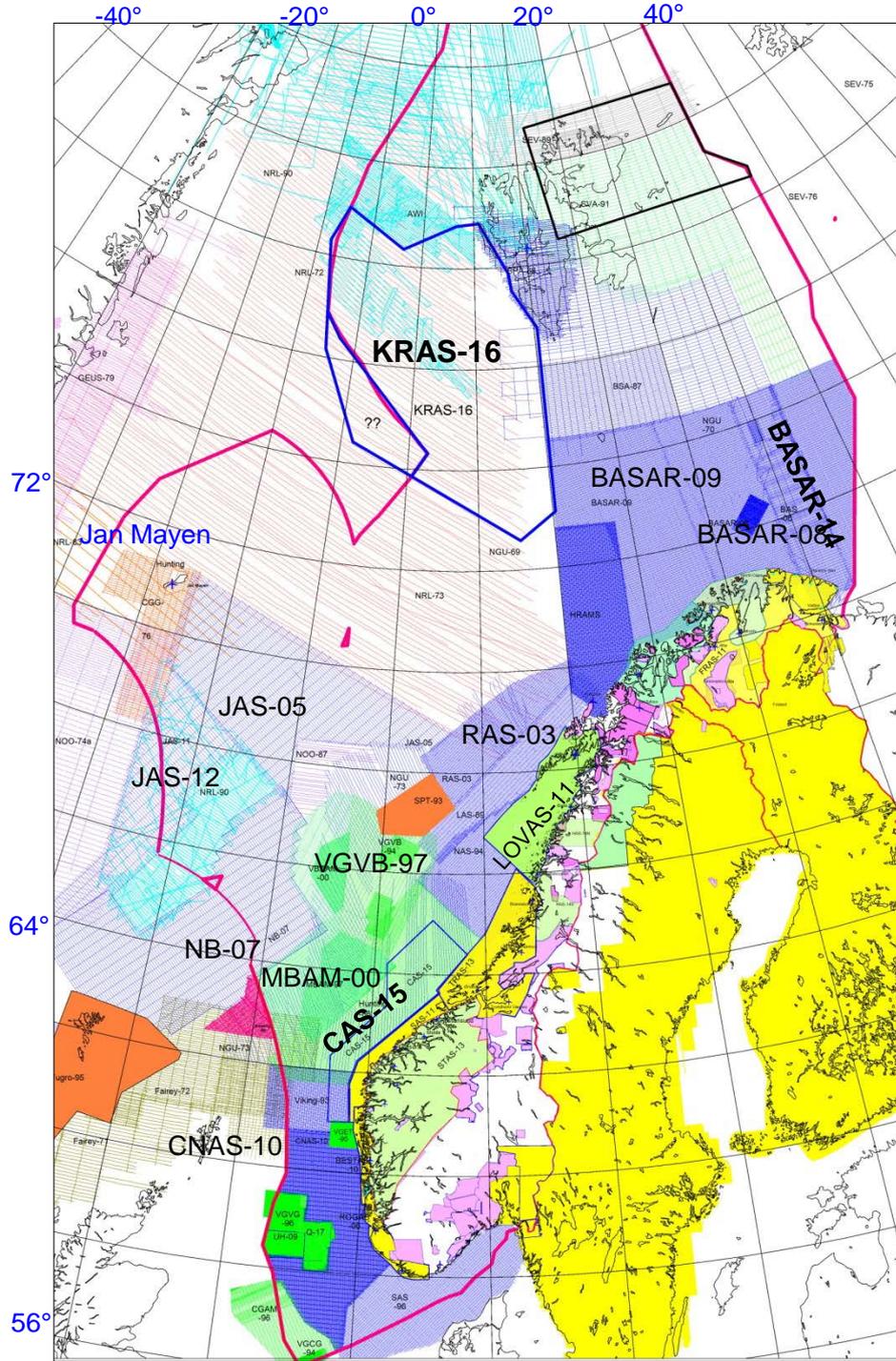
wintershall



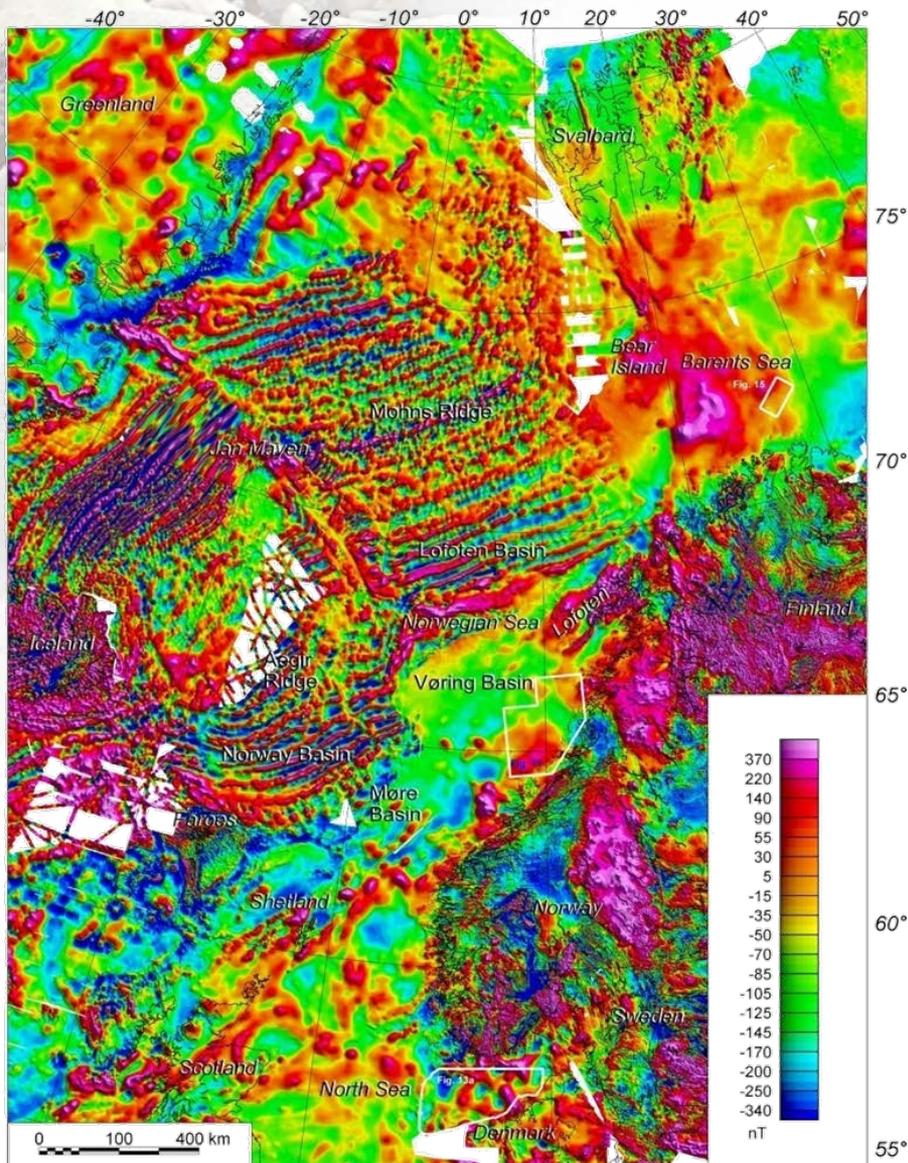
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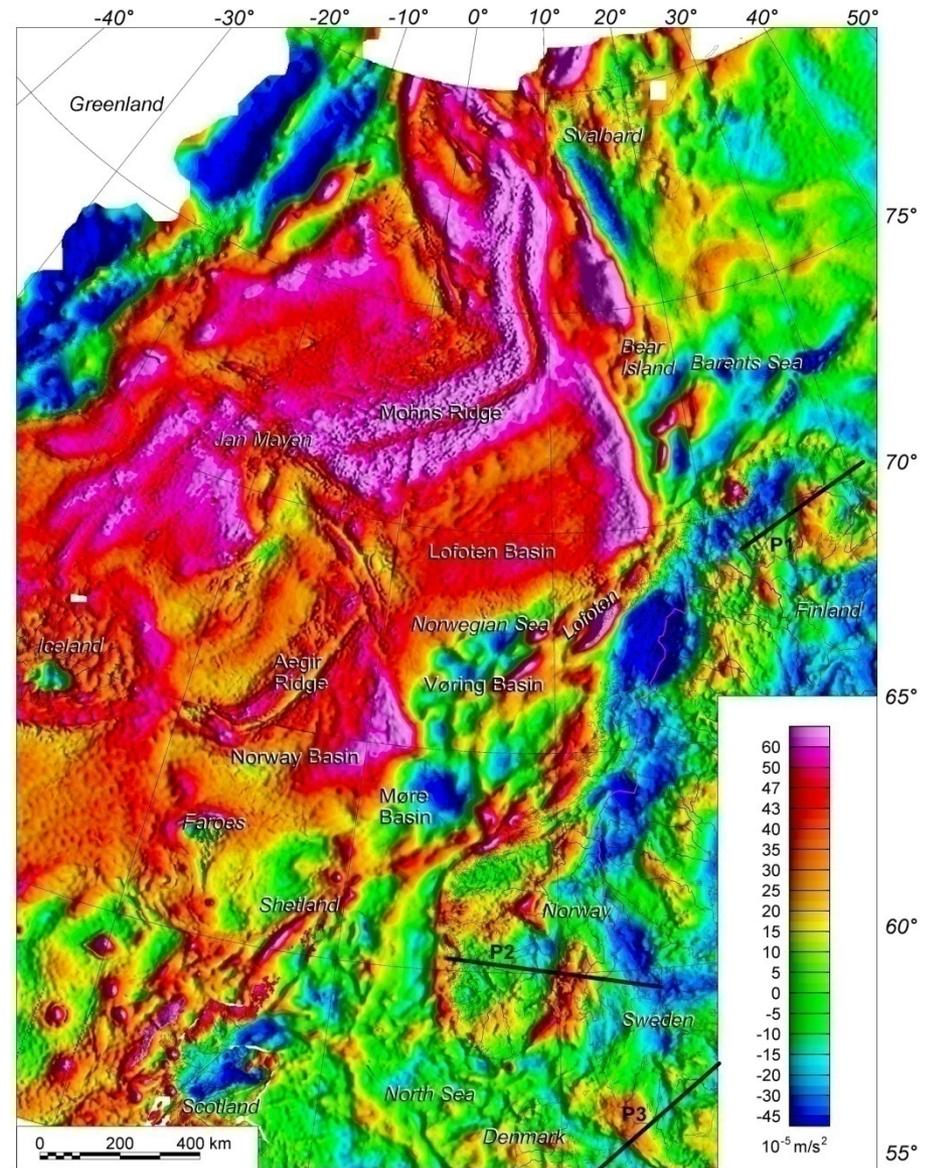
NORWEGIAN PETROLEUM
DIRECTORATE



Aeromagnetic compilation



Gravity compilation Isostatic residual



Coop

Crustal onshore-offshore projects

Main objectives

- Basement characterization
 - Heat production
 - Lithology
 - Deep weathering
 - Depth to basement
 - Fault zones (onshore-offshore)
 - Dyke swarms
 - 2D & 3D crustal modelling
 - 3D thermal modelling
 - Geodynamic and tectonic interpretations
-
- Subcrop pattern
 - Quaternary sand channels



bayerngas



centrica
energy

ConocoPhillips



DONG
energy

Eni Norge

e-on

GDF SUEZ

Lundin
Petroleum

MAERSK
OIL

NORECO

OLJEDIREKTORATET



Statoil

TOTAL

SUNCOR
ENERGY

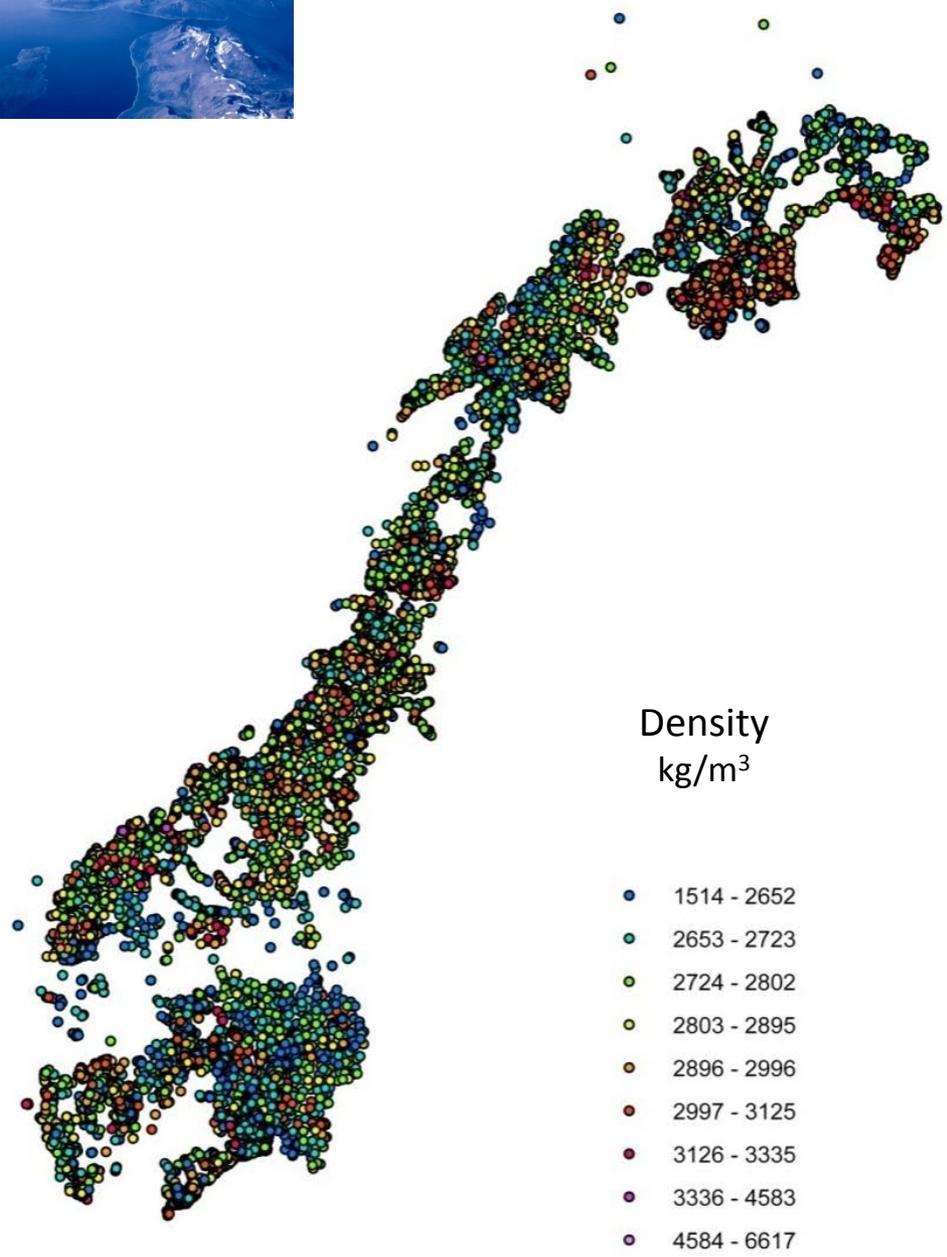
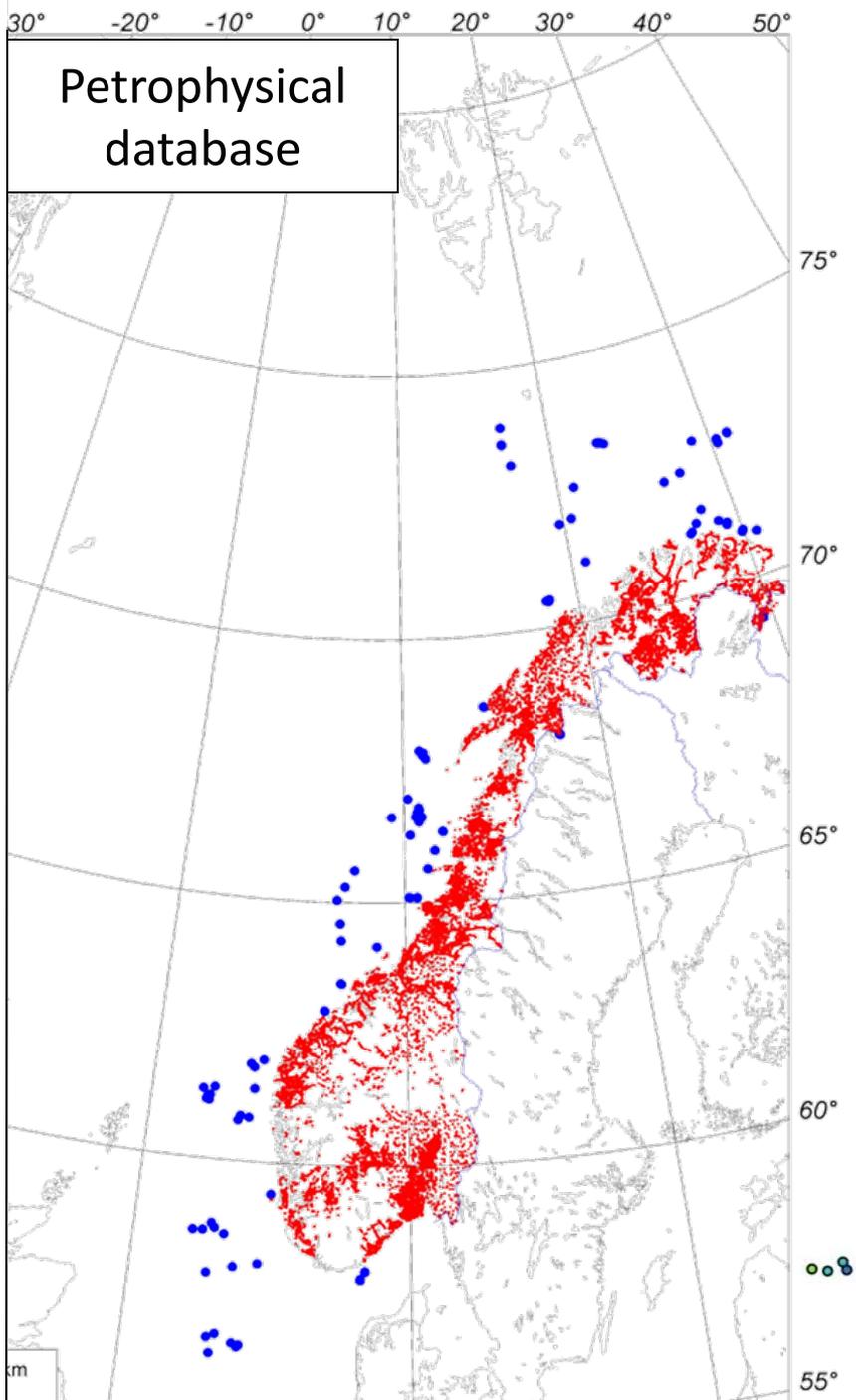
VNG
Norge

wintershall

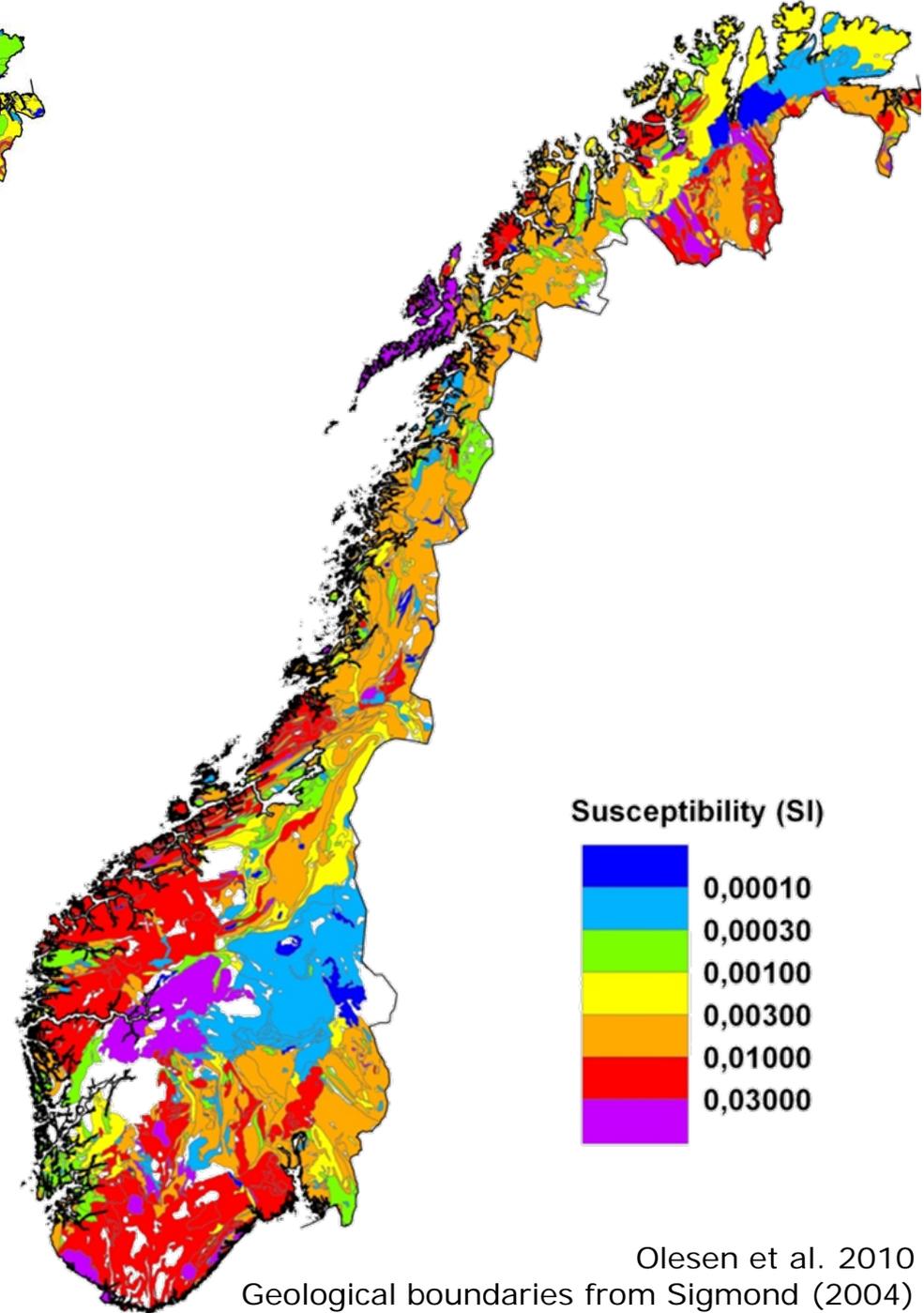
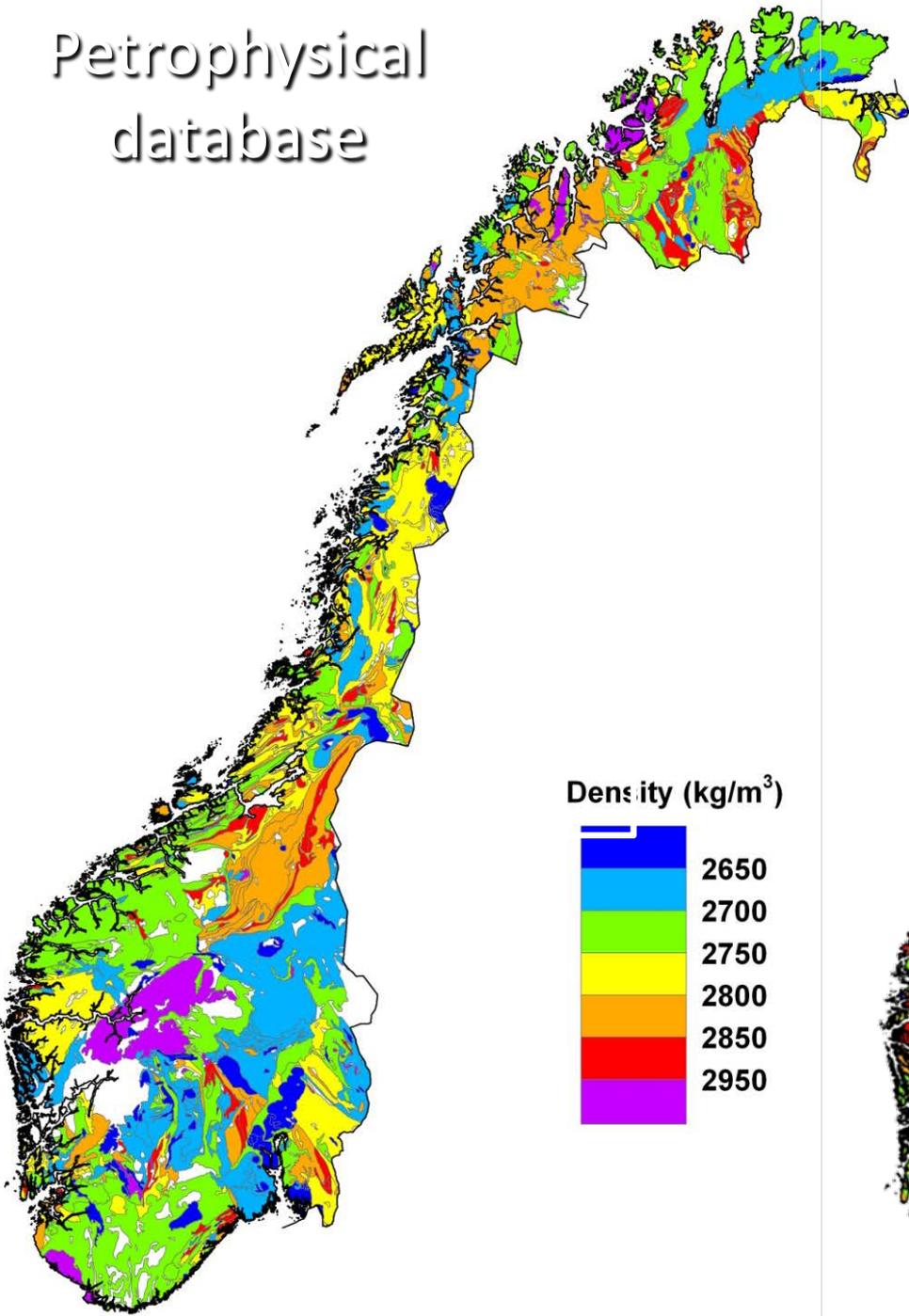


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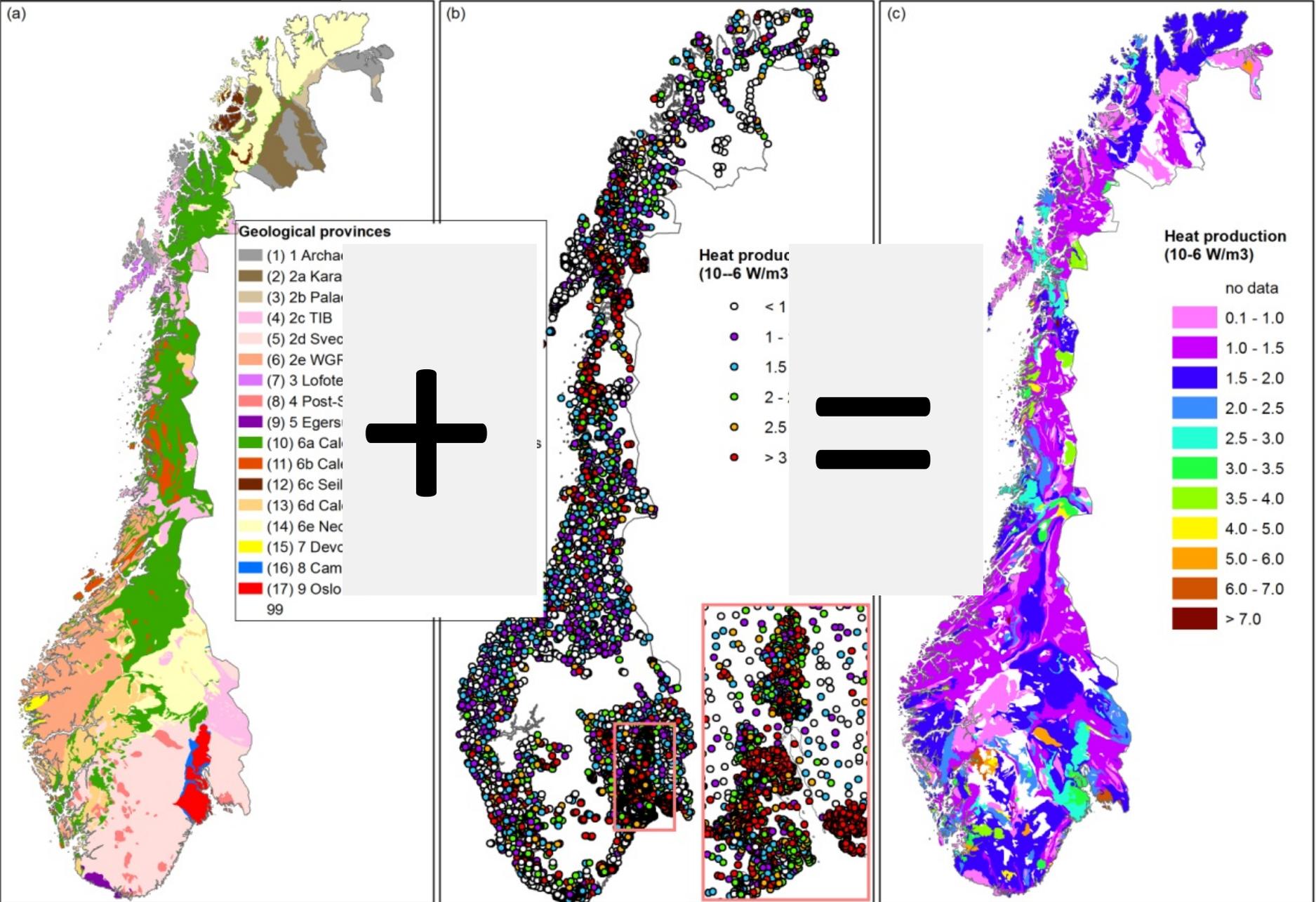
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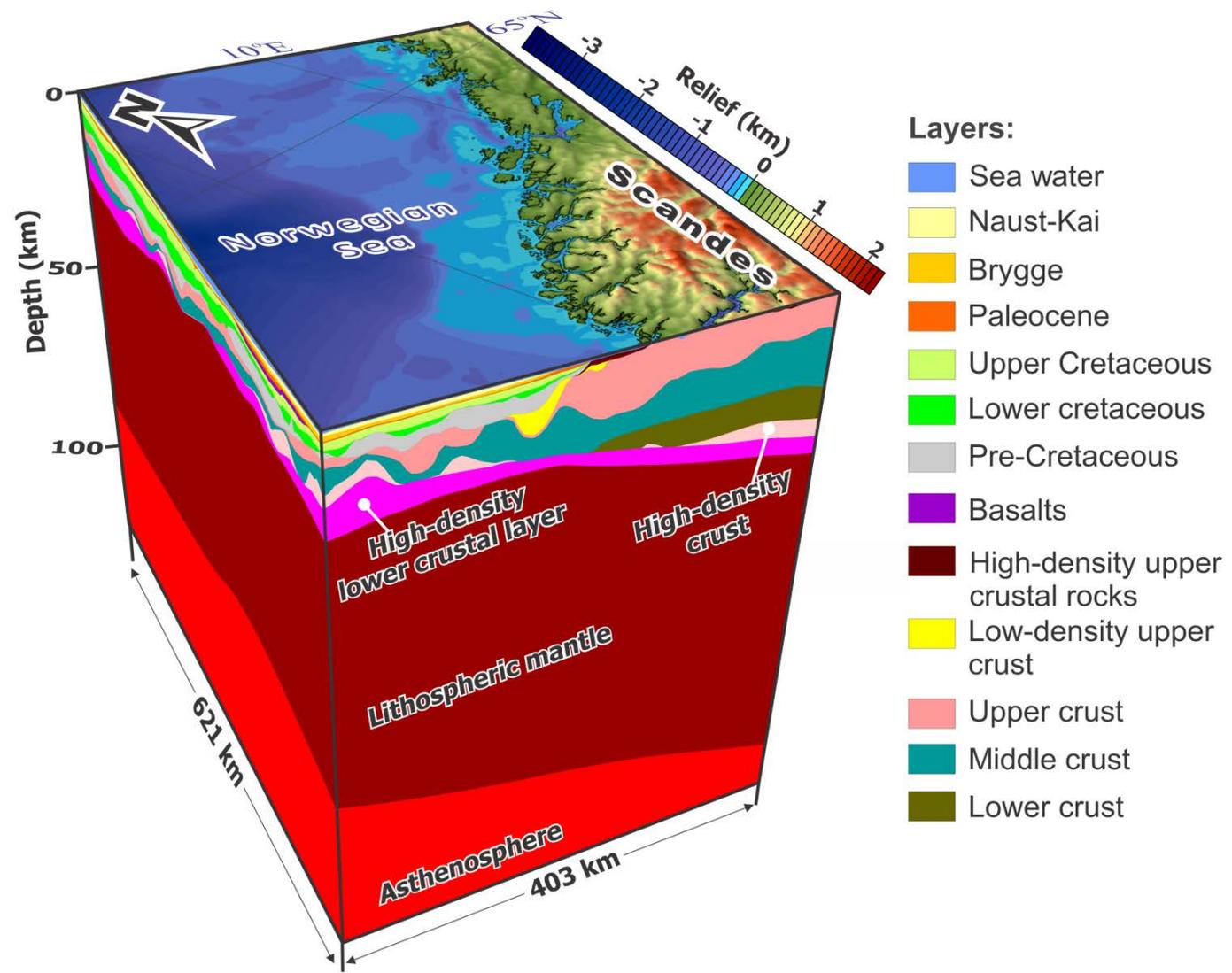
Petrophysical database



Determining heat production



3D density/structural model



Deep weathering analogues in the Ukrainian Shield



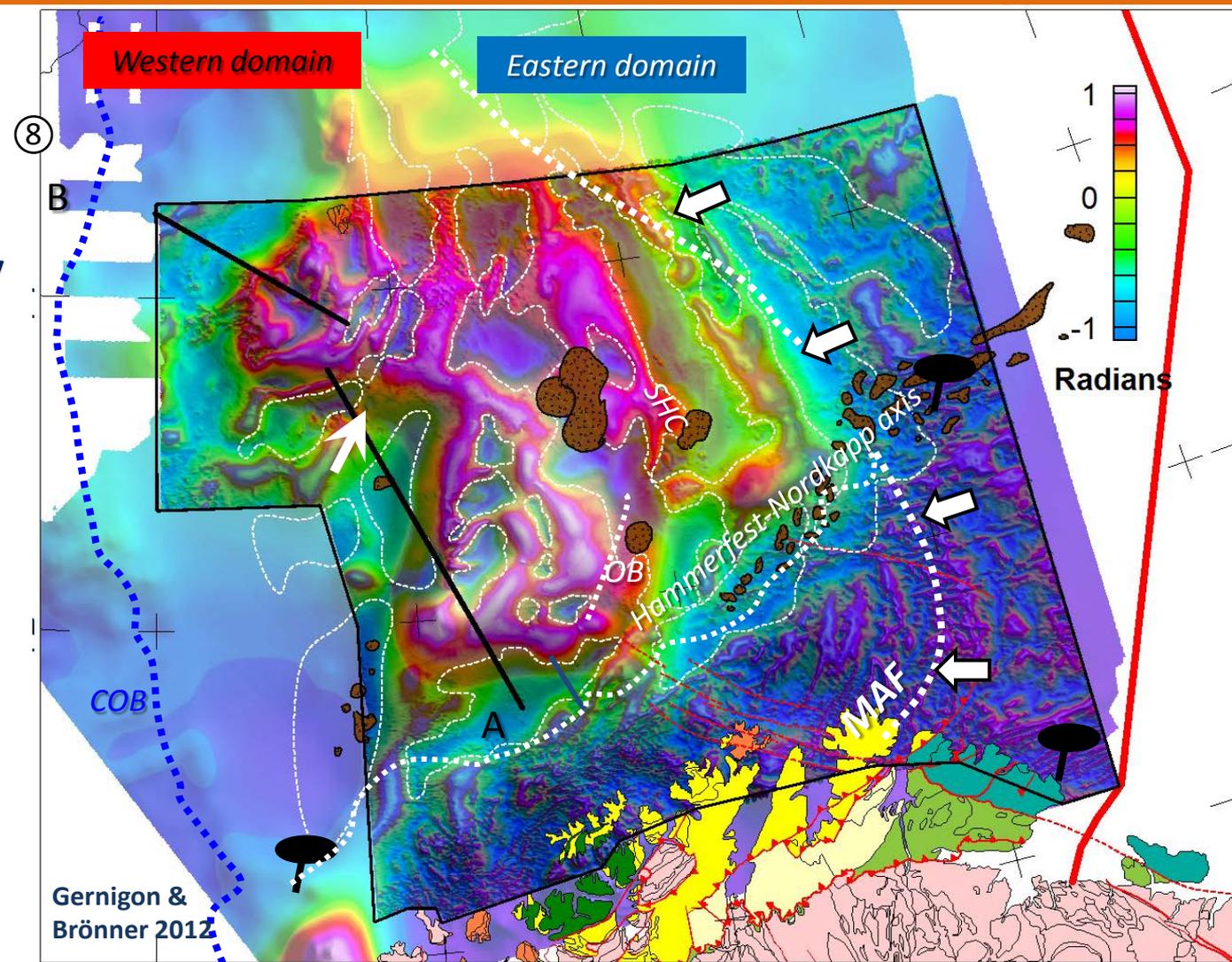
Granite quarry beneath deep weathering, Donetsk, (Rose of Azov granite)



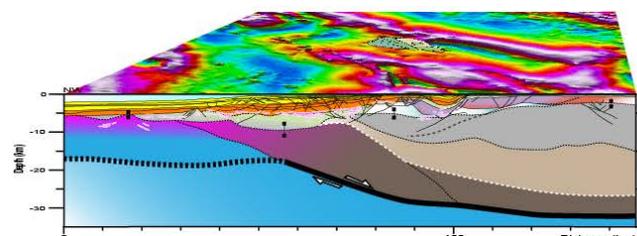
Borehole samples of deep weathering in Ukraine; limonite, silcrete, soap stone and clay containing kaolinite, smectite and hyalite.

BOOST - Barents Onshore-Offshore Structural and Thermal Modelling

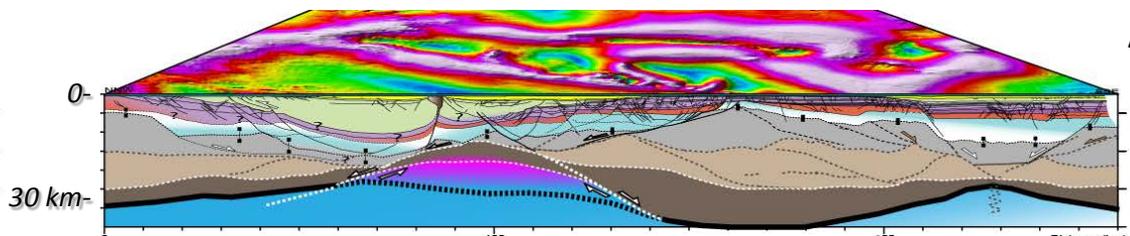
- Coastal aeromag. survey
- Core drilling, Bjørnøya
- 3D crustal modelling
- 3D thermal modelling
- Geodynamic and tectonic interpretations



B

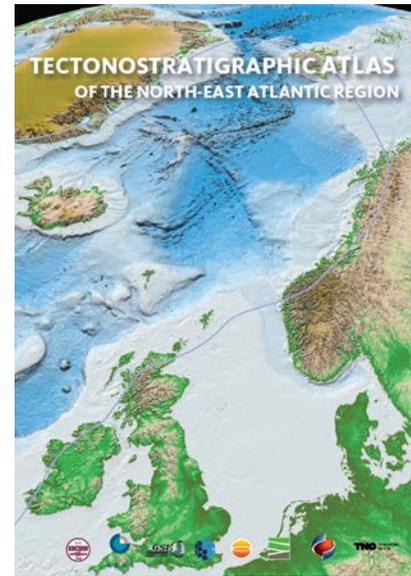
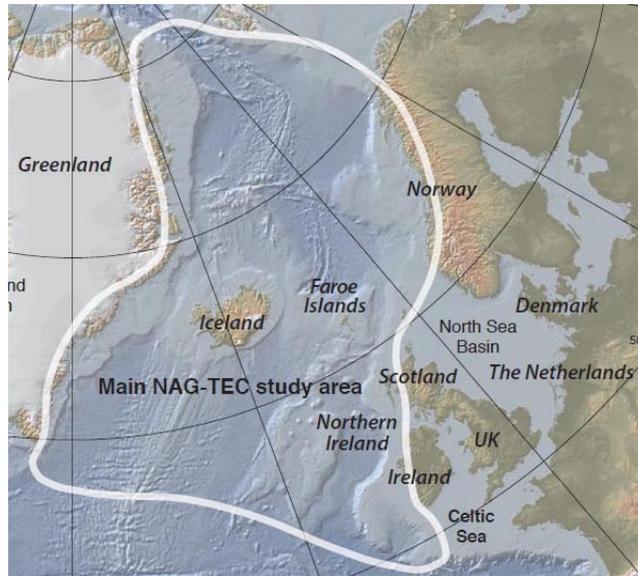


A



NAGTEC2:

Northeast Atlantic Geoscience - Tectonic Development Theme – PHASE 2

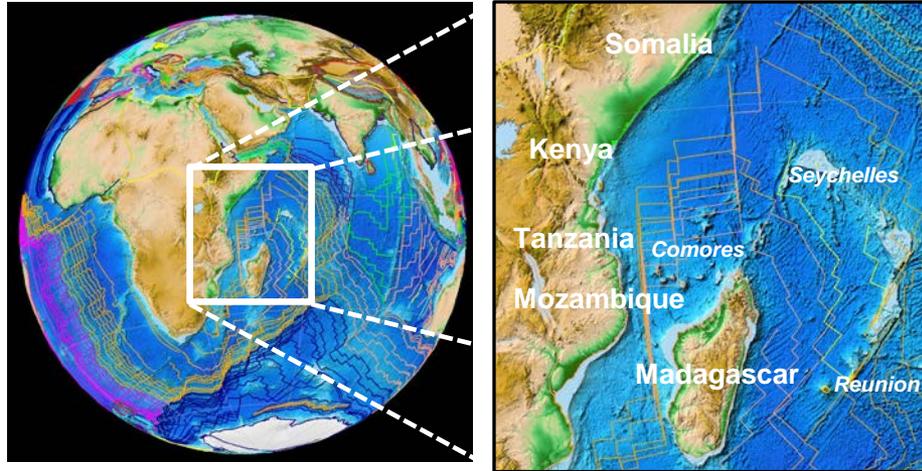


The development of the North-East Atlantic :

- from orogenic collapse (early-rift margin evolution),
- to the main extensional phases (structural and stratigraphic rift development),
- to breakup and active spreading (post-rift evolution)

Full Proposal available on demand. Contact:
Gwenn Peron-Pinvidic – gwenn@ngu.no

TEAM: The East-Africa – East Antarctica/Madagascar rift system: influence of opening kinematics on rifted margin architecture



Reappraisal of the rift system in the light of new rifting concepts:

- Plate Kinematics (GPlates)
- Offshore Investigations (Detailed seismic interpretations)
- Dynamic Modelling (Numerical and Analogue)

Full Proposal available on demand. Contacts:

Gwenn Peron-Pinvidic – gwenn@ngu.no

Susanne Buitter – susanne.buitter@ngu.no



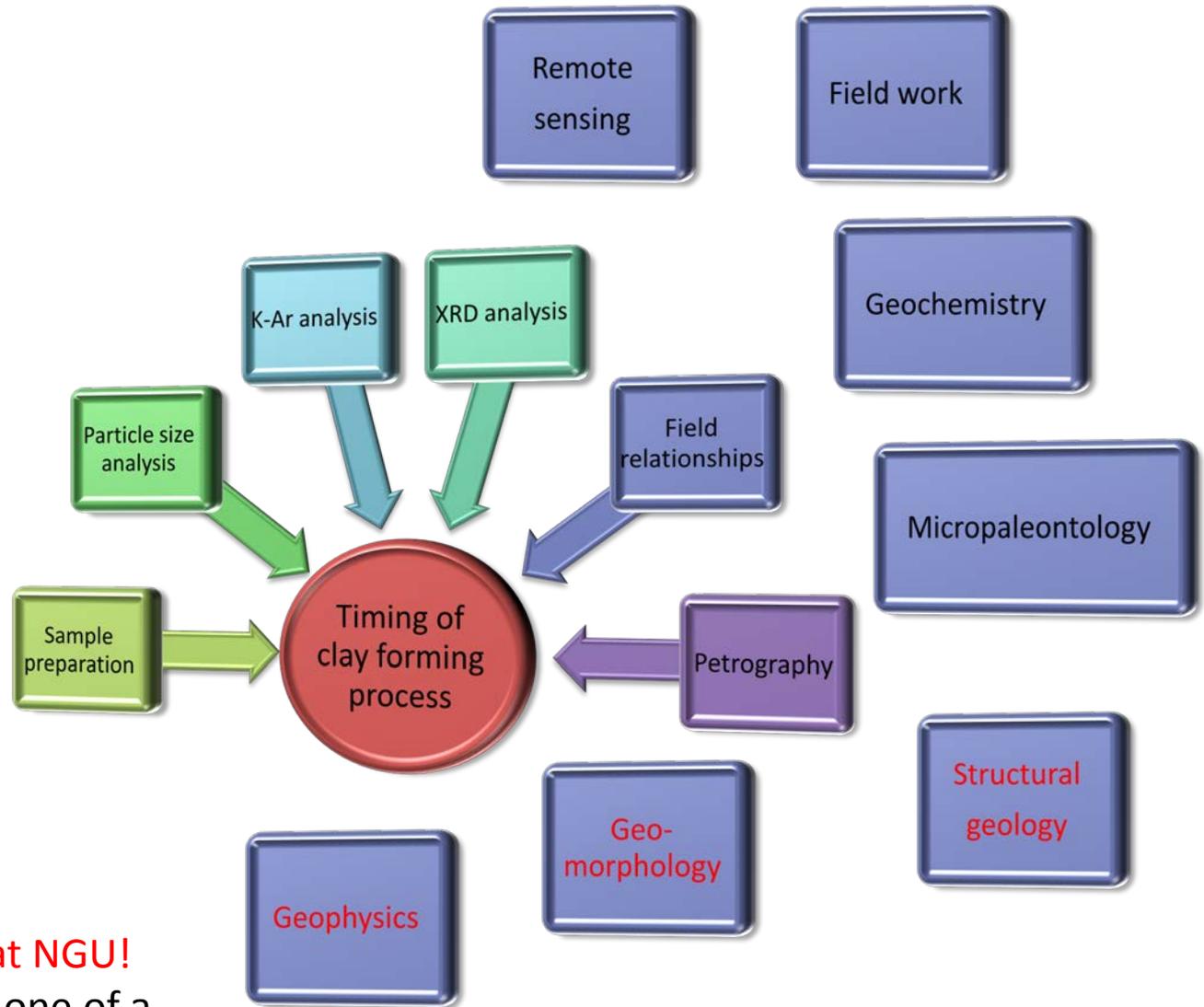
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SFI – Petroleum Potential in Weathered and Fractured Basement

Initial ideas/concept

SFI



Unique conceptual and scientific approach (relevant to the industrial world!):

Dating landscapes and brittle deformation as part of a joint scientific effort!

Unique analytical toolbox at NGU!

State of the art laboratory, one of a kind in Europe. Room for improvement, synergy with Ar/Ar lab, new SEM, cooperation with nanolab at NTNU.

Uniquely multi-faceted team with nicely integrated expertises.

Contact: Jochen Knies (jochen.knies@ngu.no)



From Drilling report :

Basement:

*Granite: pink to light red
...common hematite veinletes and
hematite coatings
to fracture surface*

Sedimentary rocks:

*...basal part of the Triassic is
characterised by increasing
frequency of derived lithic fragments.
...Kaolinite, white blocky to angular,
moderately hard.
(pers. comm. J.A. Øverland), NPD*



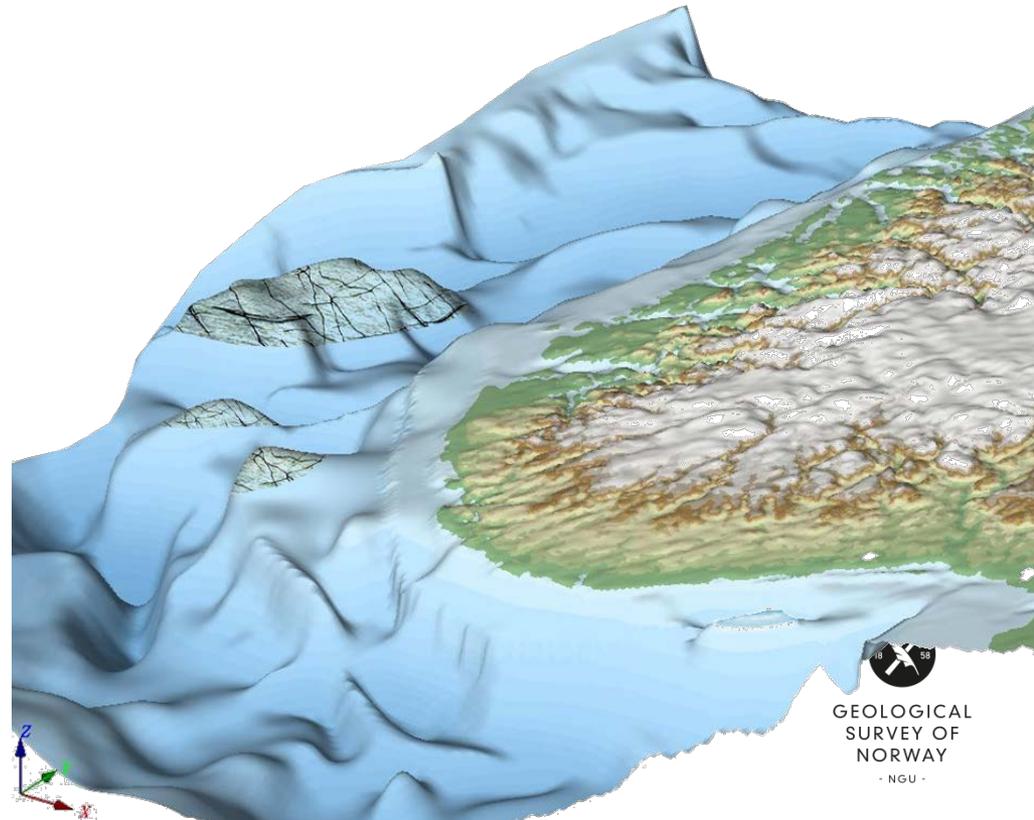
NGU's projects on deep weathering

TWIN – onshore

RAMSÅ – basement high

COOP – strandflat

BASE – timing



Why a SFI: The Rationale

- **One common scientific goal of relevance to NGU, the partners and the national/international scientific community :**

- An integrated Earth-Science expertise platform for the development and implementation of innovative tools that maximize hydrocarbon exploration success rates in fractured and weathered basement offshore Norway (including the Barents Sea).
- A new toolbox to date landscapes – ”hvordan ble landet til?”

- **Implemented through :**

An overarching research initiative of broad interest capable of producing individually-targeted solutions for each partner.



Why a SFI: The Rationale

- **Resulting in:**

- Innovation and value creation in the studied fields
- Powerful synergies between innovative companies and prominent research groups
- High quality scientific research
- First-class international cooperation
- Recruitment of talented researchers



SFI– What?

- Apply/develop/refine innovative conceptual and exploration tools for offshore hydrocarbon prospection in basement highs and nearby basins.
- Refine understanding of offshore plays through detailed analysis of onshore analogues.
- Establish a spatial and temporal framework for multiple episodes of deep weathering and faulting on- and offshore.
- Provide templates for improved exploration success rates.





More Information?

Contact: Jochen Knies (jochen.knies@ngu.no)