How to support the green transition with free subsurface data

- New Deep Subsurface Data portal at GEUS.

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Text-version.

Slide 1:

- Welcome to my presentation.
- My name is Kenneth Nordstrom, and I'm working as a Geodata Scientist in the 'Geological Data Centre' at GEUS, - the Geological Survey of Denmark and Greenland
- The presentation, made together with my colleagues, Marianne and Lasse is, as you can see titled '**How to support the green transition with free subsurface data -** New Deep Subsurface Data portal at GEUS', hence an introduction to our new data distribution model, but I will also take you through the journey of handling data in GEUS form the beginning.

Slide 2:

- GEUS is 'An independent research and advisory institution under the Danish Ministry of Climate, Energy and Utilities'
- We are Denmark's 'largest geoscience research community, we employ approx. 350 people' and we work close together with the various other geoscientific communities and universities in Denmark and abroad.

Slide 3:

- **As this is a 'historical conference', then first a bit of GEUS history:**
- GEUS was established in 1995 as a merger between the 'Geological survey of Denmark' and 'Greenland' established back in 1888 and 1946.
- The purpose of the two Survey's was initially to undertake geological mapping in the two parts of the kingdom to identify and exploit various raw material (e.g. marl, brown coal, peat, clay and gravel and later oil and gas)
- Later and especially now the focus has changed towards 'Finding and safekeeping clean drinking water, looking into new green energy supply solutions, adaptation to climate change and searching for critical raw materials'.

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- A quick look at the GEUS 'organization' just to show, that the 'Geological Data Centre' at GEUS where I work, is ranked as a 'Scientific Department', which emphasize that data is regarded as an important asset in GEUS.
- …. And a reason behind that is that GEUS act as the Danish **National Geological Data Centre.**

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- As the '**National Geological Data Centre**' we have our own legislations (which apparently is quite unique), and our mandate is phrased as to 'Collect and compile data about the geology in Denmark and Greenland'
- Both physical and later digital data have been received and handled over the years
    - Both actual physical samples, and a huge number of reports have been received.

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- Drill cores, seismic data and well data in various formats (paper and sepia rolls, etc.) as well.

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- And also, later digital data in various tape and cartridge formats was received and finally data is archived in online storage.
- **So,….as a Geological Data Centre,** GEUS act as the **custodian of all the subsurface data acquired in Denmark**

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- As **custodians** we are not just responsible for the retrieval and archiving of the data, but also for the **registration** of the data in a prober way.
    - …. and all deep data received is registered in our SAMBA database, were all the relevant metadata is recorded.
- **BUT,** in the concept of these talk, then the second part of the role as a custodian is equally as important.
- … which is, that our responsibility is not just to safekeep the data, but also to **make it available to the public.**

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- Initially when the public requested data from GEUS, it was handled manually.
    - Data was retrieved from the shelf's, manually copied, put into boxes and physical ship it to the requester.
- This process was quite time consuming and often cumbersome, so it was decided that a semi-automated distribution method was needed, and hence the **Frisbee Webshop** was introduced in 2012.
- I will come to the next part of the journey, - the fully automated solution, in a few slides.

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- With the introduction of the Frisbee Webshop, we had two access gates to data in GEUS:
    - A data portal (Danish Subsurface Data Portal) where data could be searched after and identified.
    - and the Frisbee Webshop, where data could be retrieved and downloaded.

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- The downside with the Webshop was thatonly 3D seismic data (oil & gas related from the offshore Central Graben area), well data and reports was direct available, ……

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- …. and to be able to download data you had to register yourself, you had to pay for the data, and the services for download of data were run on servers with old, soon obsolete technology inside the GEUS firewalls.
- …. And **finally**, a lot of data still needed to be physical transferred.

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- The interest for deep subsurface data in Denmark had for many years been focused on oil and gas exploration in the North Sea, which was covered by 3D seismic data, which again as you saw **could** be retrieved from the Frisbee Webshop

- … but in the early twenties, in connection with the Energy transition, (- *Offshore wind-parks, geothermal energy, CCS (Carbon Capture and Storage) etc.*), the interest for onshore and nearshore subsurface data increased, and that area was mainly covered by old 2D seismic, which hadn't been looked at for years.

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- …. So, in connection with a new GEUS strategy from 2020, driven by the new green interest and political incentives, it was decided that: 'All Danish subsurface data shall be **free and easily accessible** for the public' and that a **new solution for data distribution was required**.
- A project funded by a CCUS pool allocated to GEUS and aligned with the Danish Energy Agency was initiated.

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- The **objective** of the project was to retire the old Frisbee Webshop and create **a new data portal solution based on the existing IT framework***, (hence a redesign of the old data portal)*, no user registration and interaction with GEUS should be needed, and the operation and maintenance cost should be minimal.

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- *We got two years to execute the project, which is ending this summer.*
- To achieve the objective, a redesign of the old portal including an update of the SAMBA registration database was required, a lot of changes of the portal interface had to be done and new download windows was to be made,
- QC of all the old 2D seismic data and compilation of data-packages with all relevant data was to be made, -which is a major task, and ….
- As data now is QC'ed and free a charge an update of the 'Terms of delivery' was needed.
- **Finally**, data packages had to be uploaded to a public cloud (in this case Azure) to enable automatic retrieval without interaction with GEUS.

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The portal was released last year and I'm proud to say that it works very well.

- I would have preferred to make a live demo of the portal, but I think a couple of screenshots to show how the portal works is probably the safest.
- **As an example, I will show you how to find and retrieve a seismic 2D dataset.**
- In the left panel you can find and visualize the various available datatypes for download, but for now I have activated the '2D processings for download' button, and all the available 2D datasets appears in the data window.

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- To identify a dataset, you can click or do a rectangular search in the data window, and a 'Detail window' emerge with the selected datasets. If you hover on a dataset, in this case the KATTEGAT2D dataset, it will be highlighted in the data window.
- If KATTEGAT2D is relevant for you, you now click on the 'Link' button, and a 'Processing Summary sheet' appear with further details of the dataset.

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- ….. and if still relevant, you can now press the 'Download data' button, and…..

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- ….. The updated 'Term and conditions' appear.

- When you have read and **accepted** the conditions, which actually is required prior to download, you can press the download button and a transfer from the cloud will start and the dataset will be transferred directly to your PC, without any interaction with GEUS at all.

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The portal works fine, but there are still some limitations in the data-model though.

- The QC of the many 2D dataset's is not finalized and will continue for the rest of the year and probably beyond, hence not all data is available yet.
- ...and then there is some data size limitations, which means that field-data and big 3D dataset (above 100 GB) still require manual handling. *(primarily due to download thresholds*)
- If data is not available for download, a message tell you to contact us, and we will arrange a transfer of the requested data packages.

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In connection with the implementation of the new portal a range of new products have been introduced

- A lot of the old 2D seismic line was only available as analog displays, so a project together with OvationData was initiated, where these displays were scanned, digitized and navigation merged.
- .. this means that a lot of those old datasets can now be used directly in modern processing applications and be much more useful.

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Further:

- Old digital data is navigation merged, - a lot of old digital seismic do not contain navigation information and hence can't directly by used.
- OCR scanning of data and information extraction from old scanned seismic displays, using AI technologies is initiated.
- GEUS have started acquiring our own seismic data, which is added to the portal.
- Additional datatypes might be incorporated into the portal.
- … and potential merge of different data-portal with other kind of subsurface data is evaluated.

Slide 24

- As a conclusion we are well underway with our new data distribution model, but the journey has not stopped at all, and a lot of interesting topics is still lying ahead of us.
- Thank you for listening.