# *EM TECHNOLOGY - THE BARENTS SEA*

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# 3D WIDE-AZIMUTH DATA ACQUISITION





# TECHNICAL REQUIREMENTS – 3D WIDE-AZIMUTH DATA





- Capacity: up to 200 receivers
- Started production of 5<sup>th</sup> generation receivers
- Powerful source
- Accurate navigation, positioning and timing
- Efficient operations: ~1000 km<sup>2</sup> per month
- Water depth range: 20–3500 m



#### FROM 2D TO 3D WIDE-AZIMUTH PROCESSING





### 3D WIDE-AZIMUTH DATA ACQUISITION



All receivers and lines live with wide-azimuth information



# 3D ANISOTROPIC INVERSION IS CRUCIAL

#### The subsurface is anisotropic

- Resistivity depends on direction
- Vertical and horizontal resistivity different
- This must be handled correctly

#### Best solution: 3D anisotropic inversion

- Real data is compared with modelled data
- Final product is 3D resistivity cubes in a standard seismic format (SEGY)
- Can estimate the "relative volume" using the final model



3D data from the Barents Sea



# BARENTS SEA - HISTORY & DISCOVERIES





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# BARENTS SEA - NCF

- More than 80 exploration wells
- Large proven petroleum system
  - Non-commercial discoveries & shows
- High potential
- 5 main commercial discoveries •
- All detectable with 3D CSEM •

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#### BARENTS SEA 3D EDDA CONSORTIUM – SNØHVIT

- **Participants :** ConocoPhillips, Shell Statoil, RWE, VNG and Rocksource
- Observer: NPD
- Snøhvit: Deep and challenging target







Complex and anisotropic area





- Increased resistivity along North/North East
- Dry well in the area







• Anomaly on highest point in Jurassic rocks?









• Stratigraphic traps ?





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Mapping geology





Mapping geology





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- Mapping geology
- Magnetotelluric data





- Mapping geology
- Magnetotelluric data
- Deep resistive structures
  - Base of salt







#### BARENTS SEA SUGGESTED AREAS FOR THE 2012 CAMPAIGN



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#### BARENTS SEA FUTURE POTENTIAL

- The "Grey Zone" NPD acquires 2D seismic lines in an area of 39.000 km<sup>2</sup>
- 2D seismic & 3D wide azimuth CSEM give quicker picture of the hydrocarbon potential





## SUMMARY

EMGS offers wide azimuth 3D surveys and performs 3D anisotropic inversion

EMGS's technology verified in complex geology - proven track record in the Barents Sea

Show case with applications worldwide!



