Novel acquisition designs for OBN and Seabird's Atlantis 4C OBN survey

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OUTLINE

- ☐ OBN and Designs

- ☐ Physical Modeling

- ☐ Seabird's Seatrial 4C OBN data

- ☐ Conclusion

*Ge*Sciences
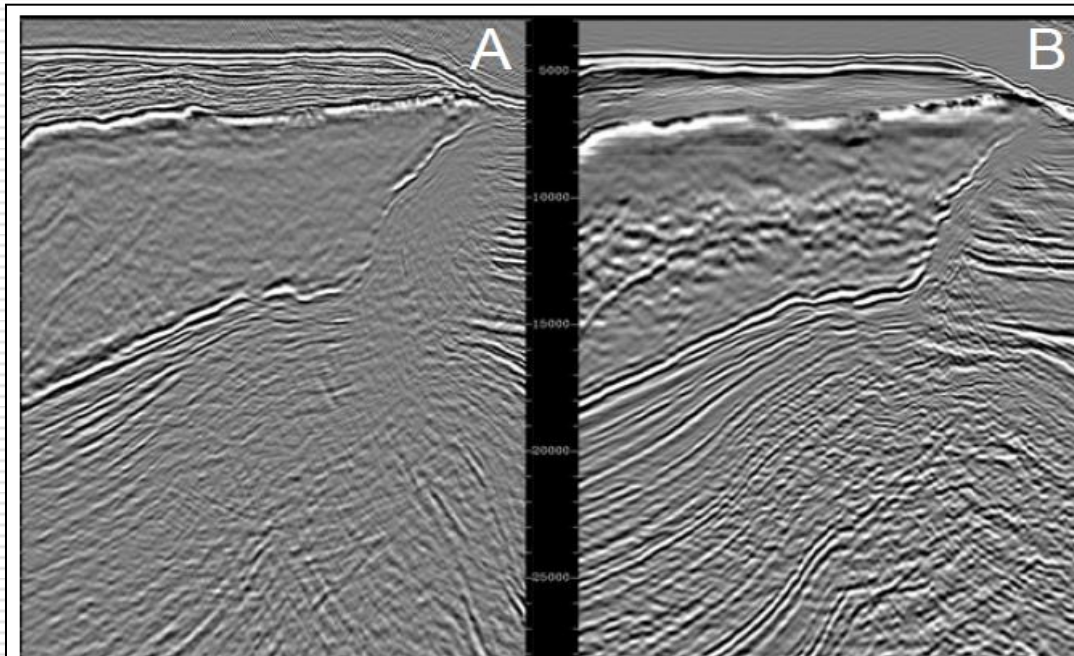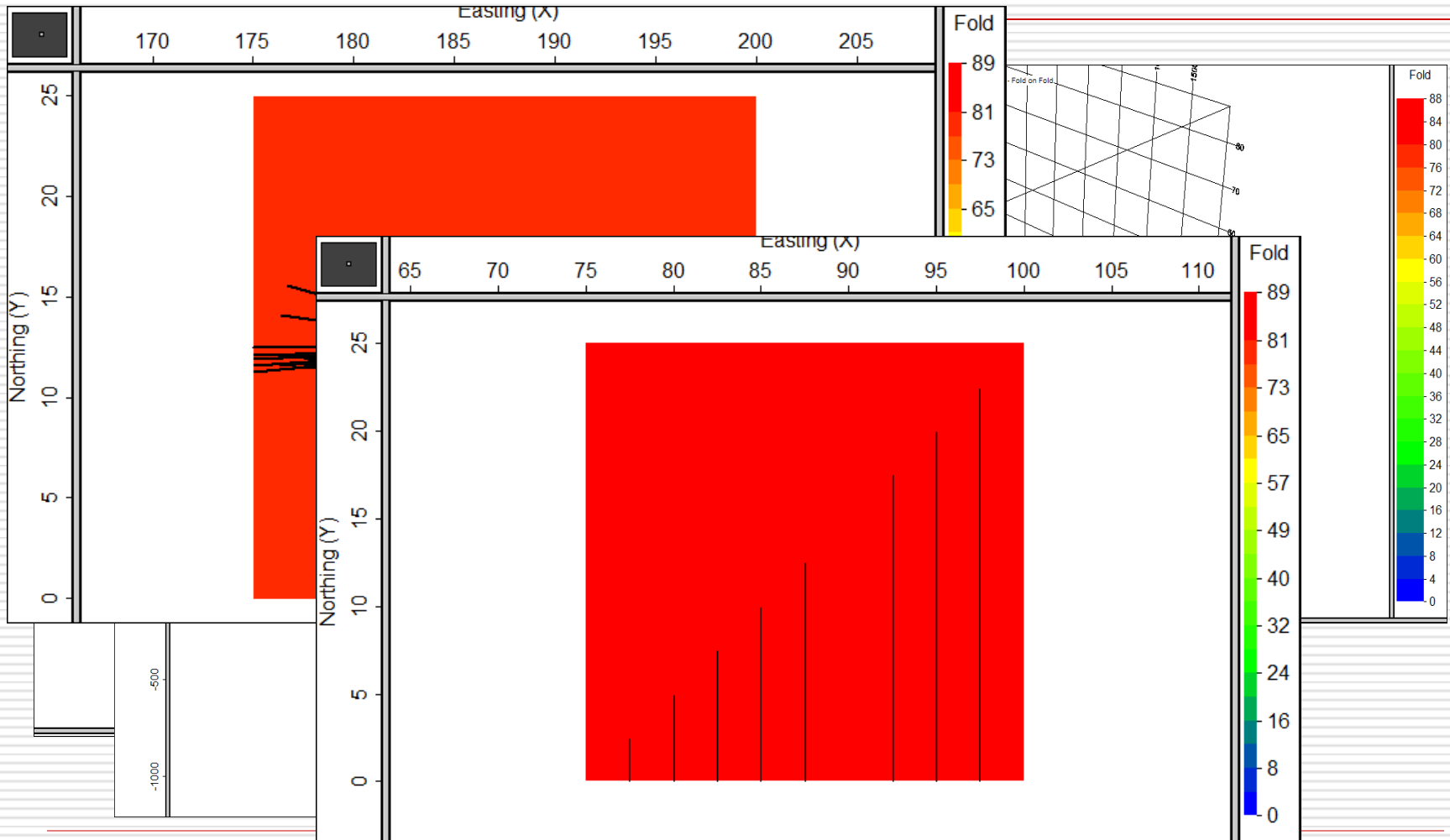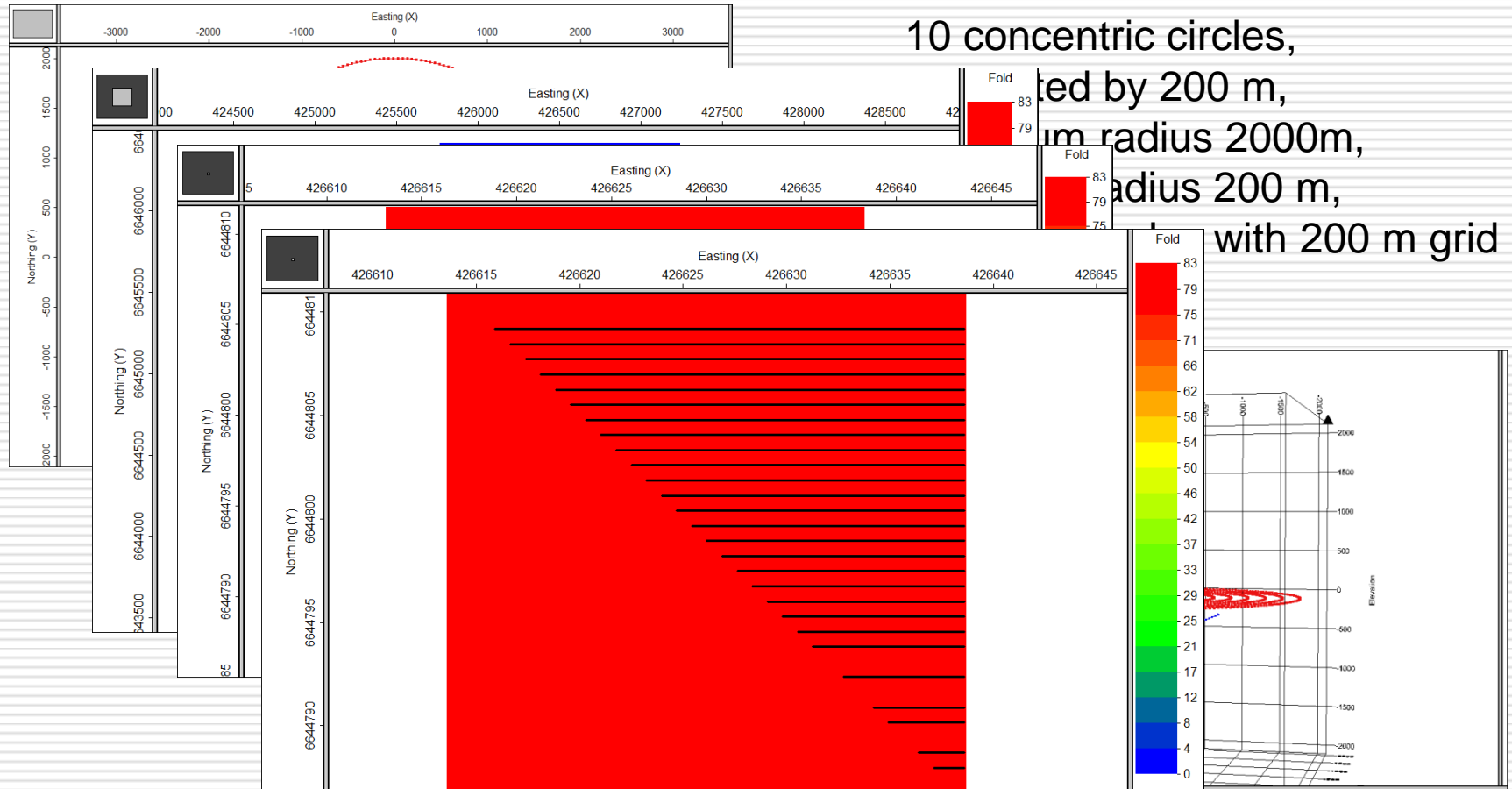
OBN and Survey Design

WHY OBN?

Figure 6. Comparison of narrow-azimuth towed streamer (A), and receiver-migrated OBS node (B). The node images benefit from an improved salt model.
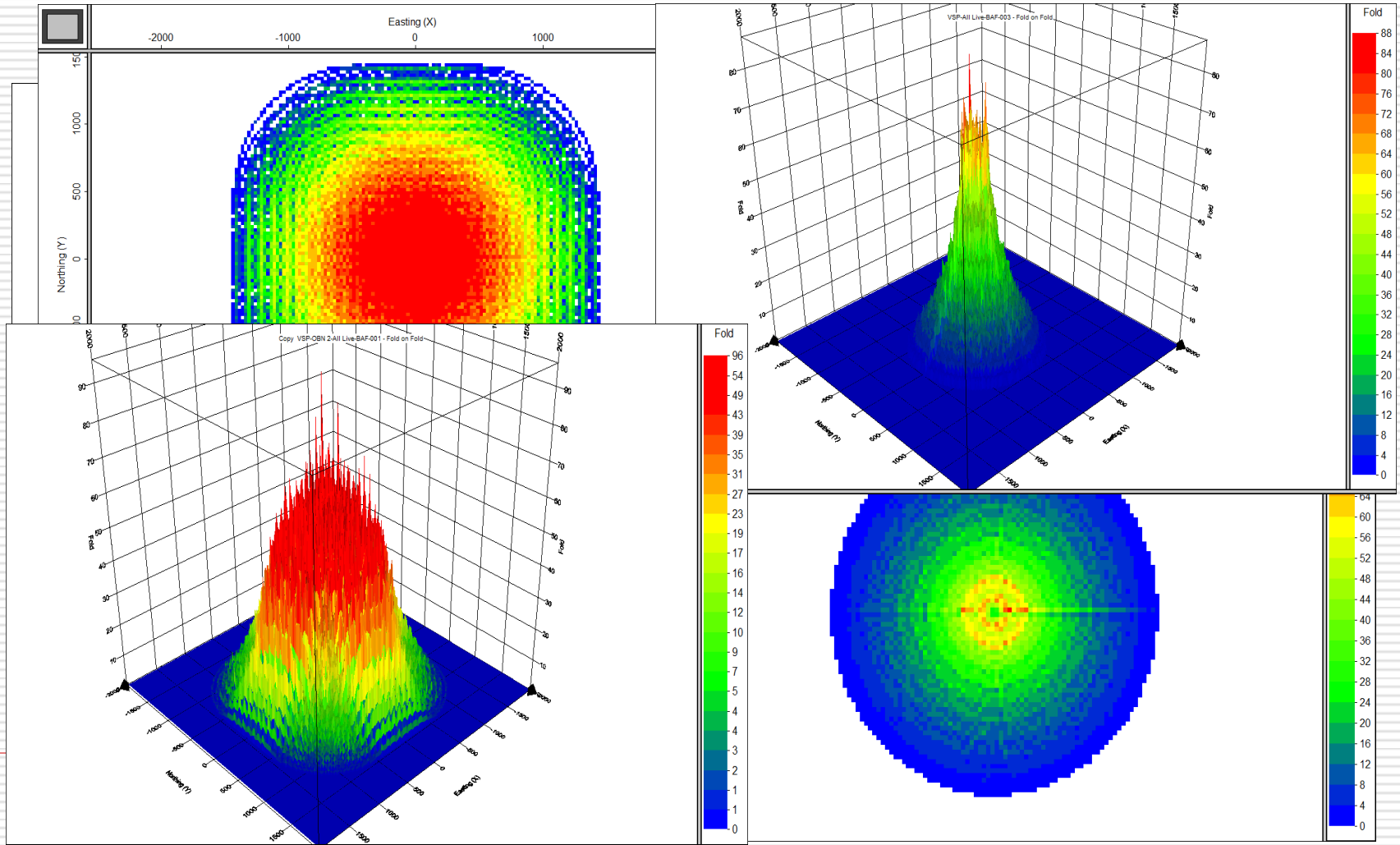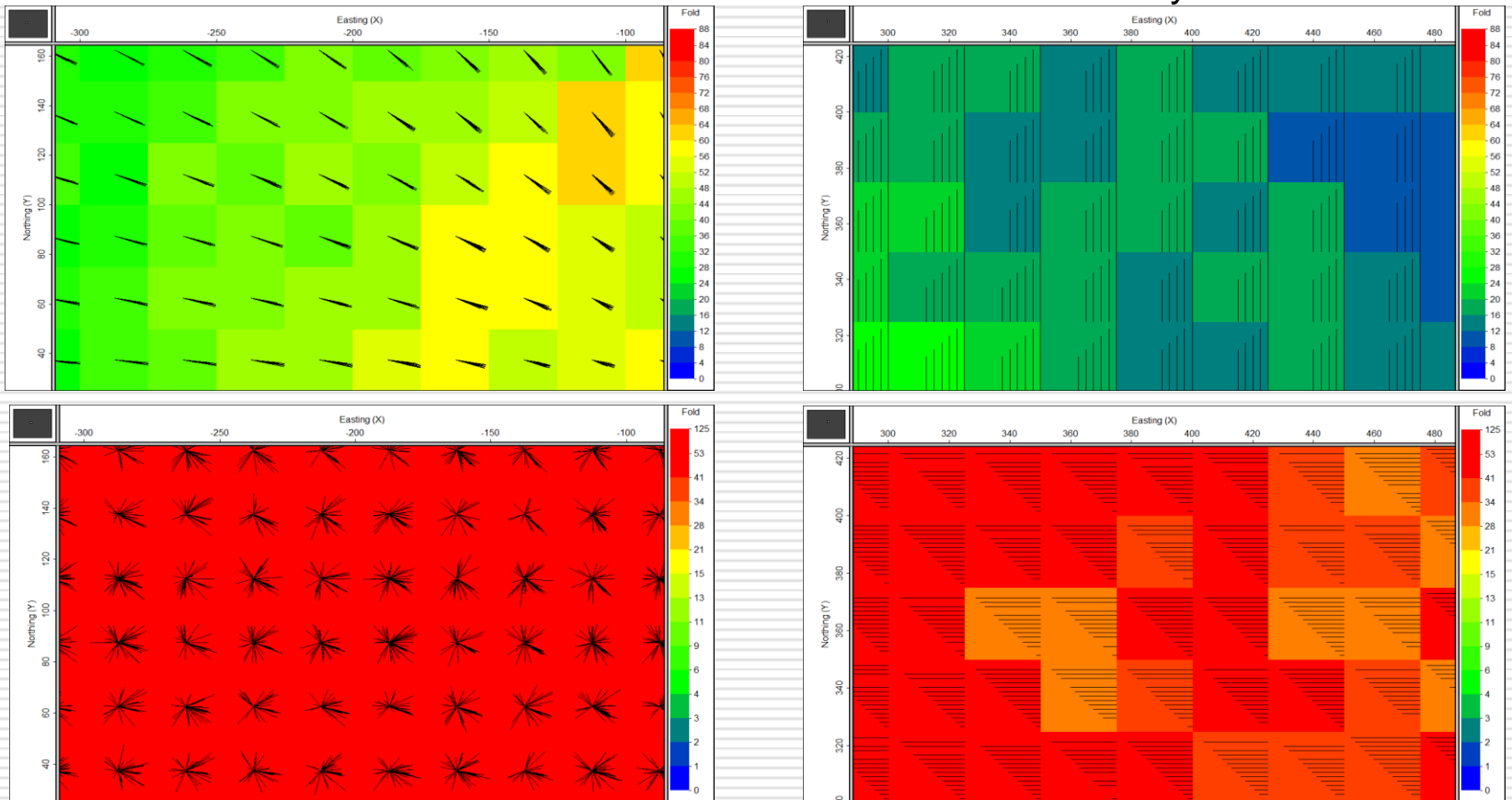
Survey Designs (VSP)

Survey Designs (OBN)

10 concentric circles,
~~separa~~ted by 200 m,
~~maximu~~m radius 2000m,
~~minimum r~~adius 200 m,
~~sampled~~ with 200 m grid
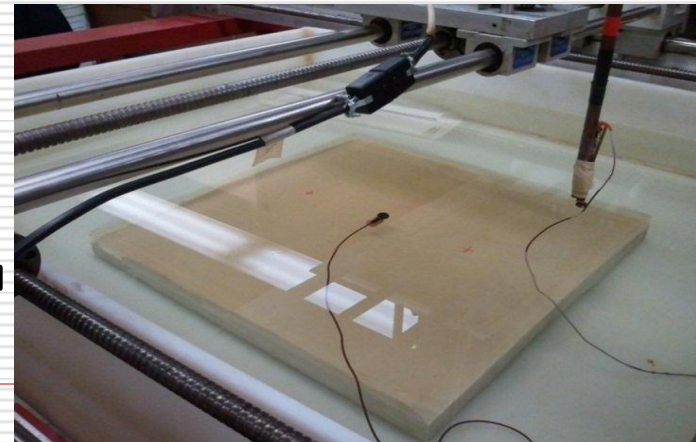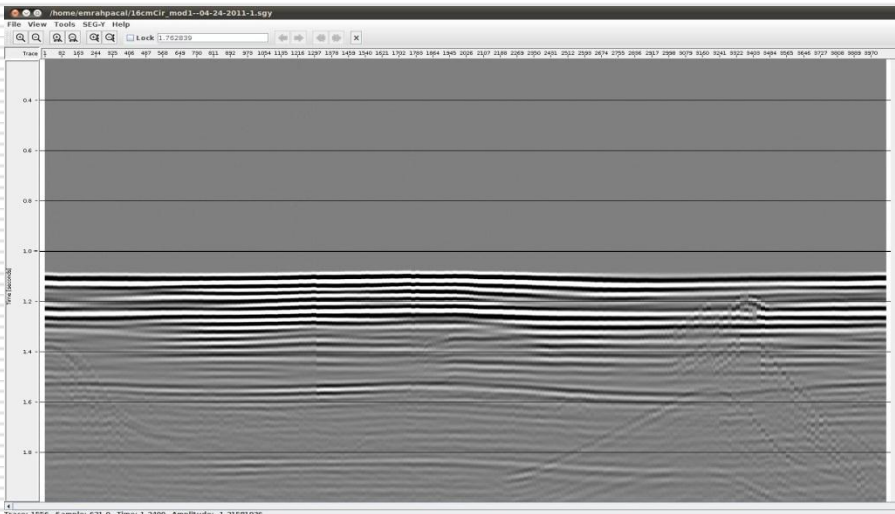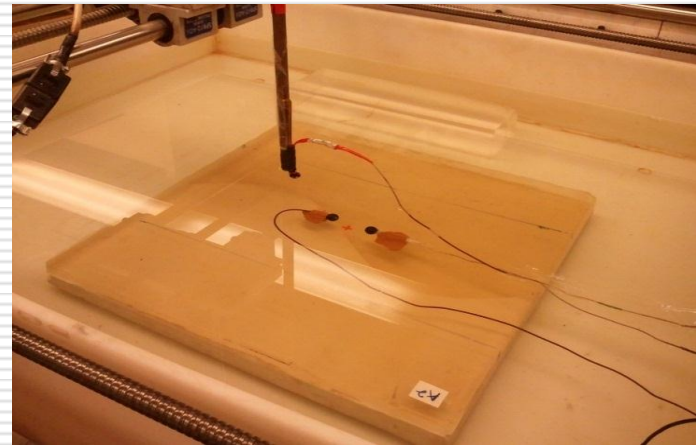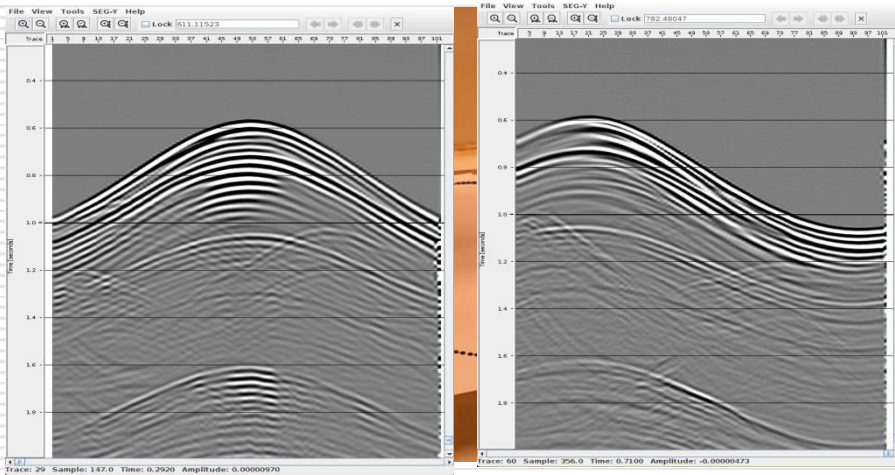
Survey Designs (VSP-OBN)

Azimuth and Offset (VSP-OBN)

Azimuth and Offset distribution for VSP survey

Azimuth and offset distribution for VSP-OBN survey

Physical Modeling-AGL

Seabird Seatrial 4C OBN data

Survey map – Multi-client data

Nodes:
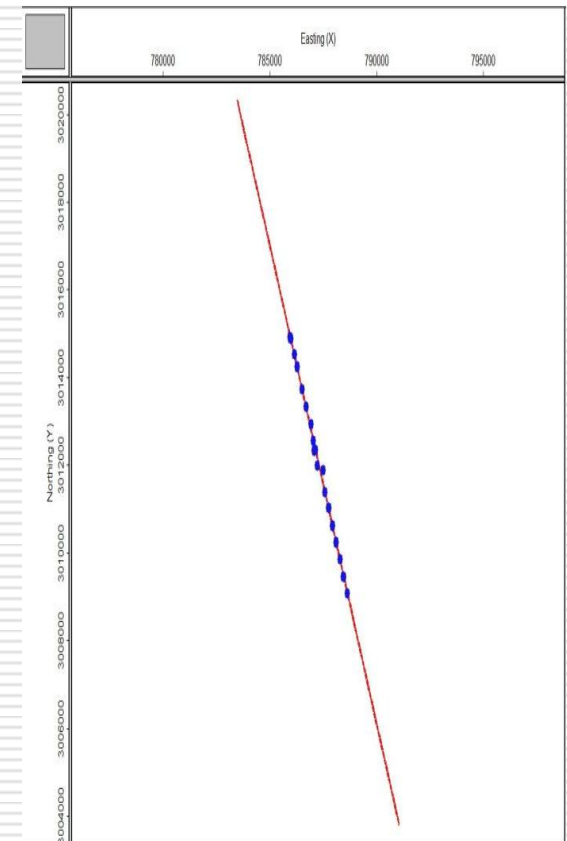- 41 nodes at 17 locations (plus 2 'test' nodes)
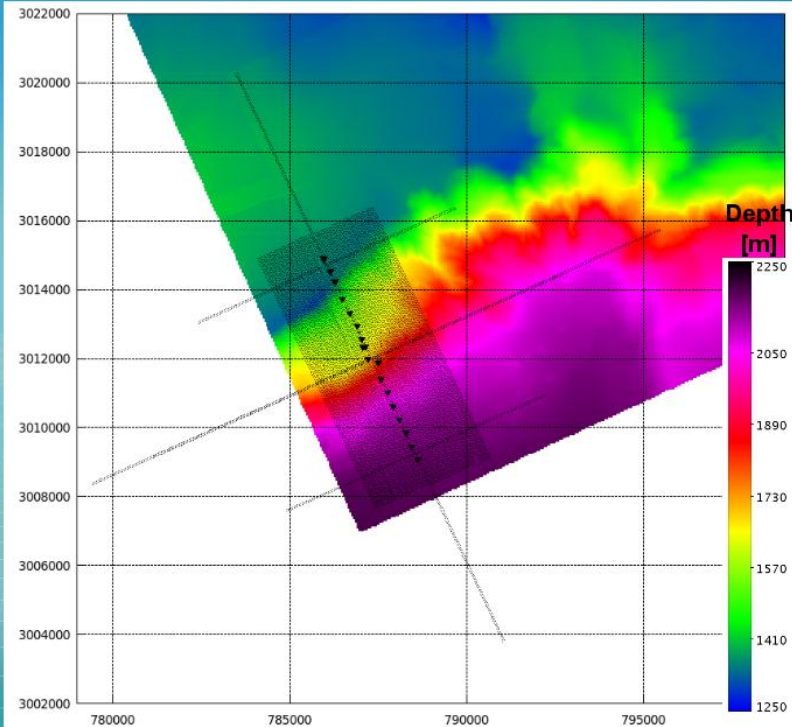- 426m node interval

Shots:
- Total 14058 shot points
- 4 crosslines (three short and one long)
- One long inline
- Dense shot carpet 26.85m x 46.5m

Data:
- 15 nodes at 15 locations recorded all SPs
- All 41 nodes recorded at least 10612 SPs

The Seatrial 4C OBN survey is a test survey that was acquired by SeaBird Exploration in 2009 at the West of the GoM Atlantis field.

Seabird Seatrial 4C OBN data

Direct Arrivals

Primary PP Reflections

First Water Bottom Multiples
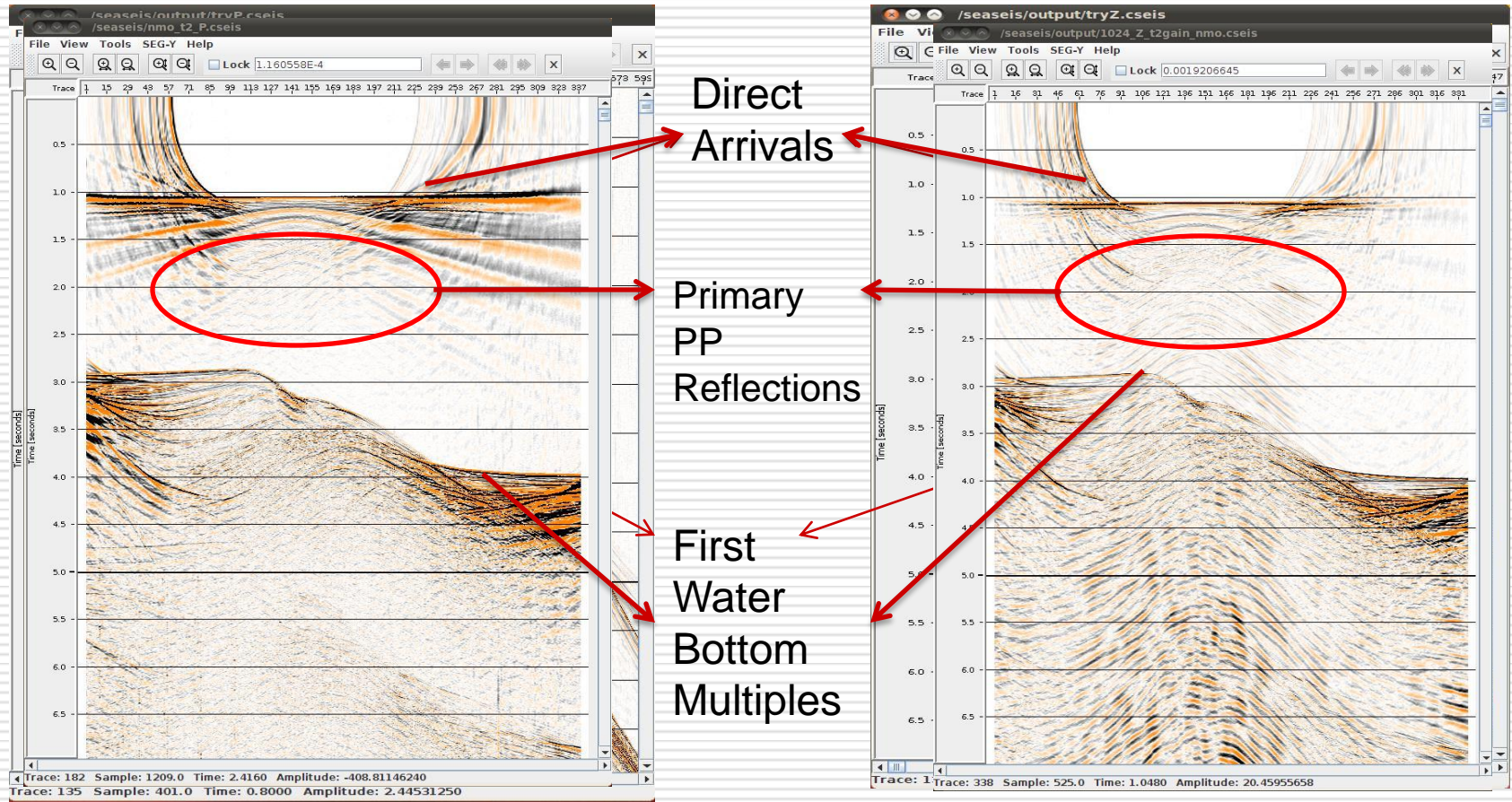
Raw hydrophone data for a single shot line from a receiver gather

Raw vertical data for a single shot line from a receiver gather

MIRROR IMAGING

The separation of the wavefields recorded on the seabed by multi-component ocean bottom nodes or cables is well known. The hydrophone and the vertical component data are combined to provide the up-going P-wave (U) and down-going P-wave(D).
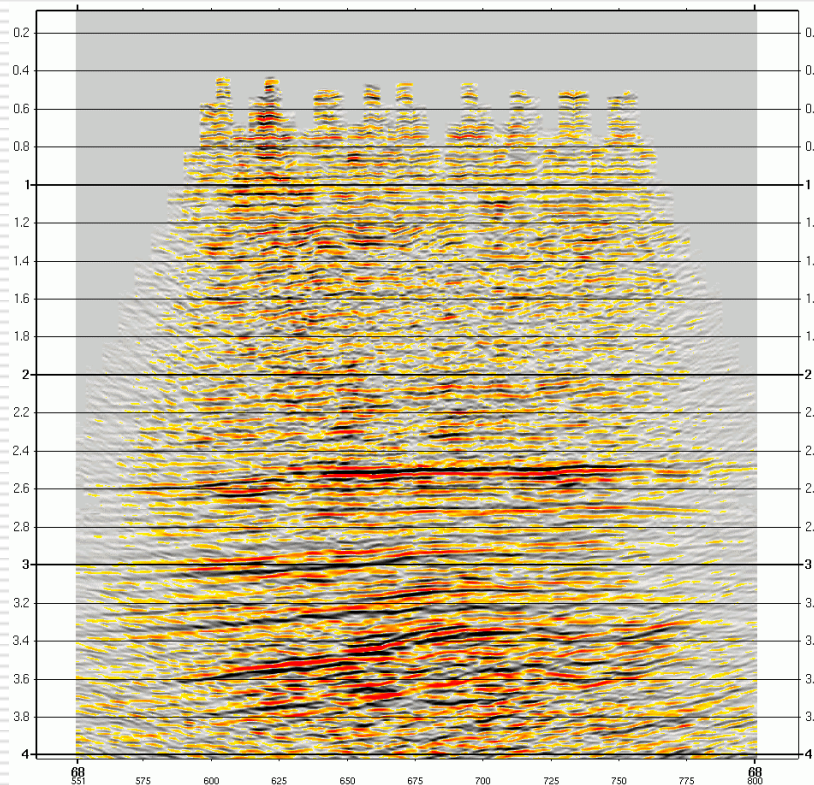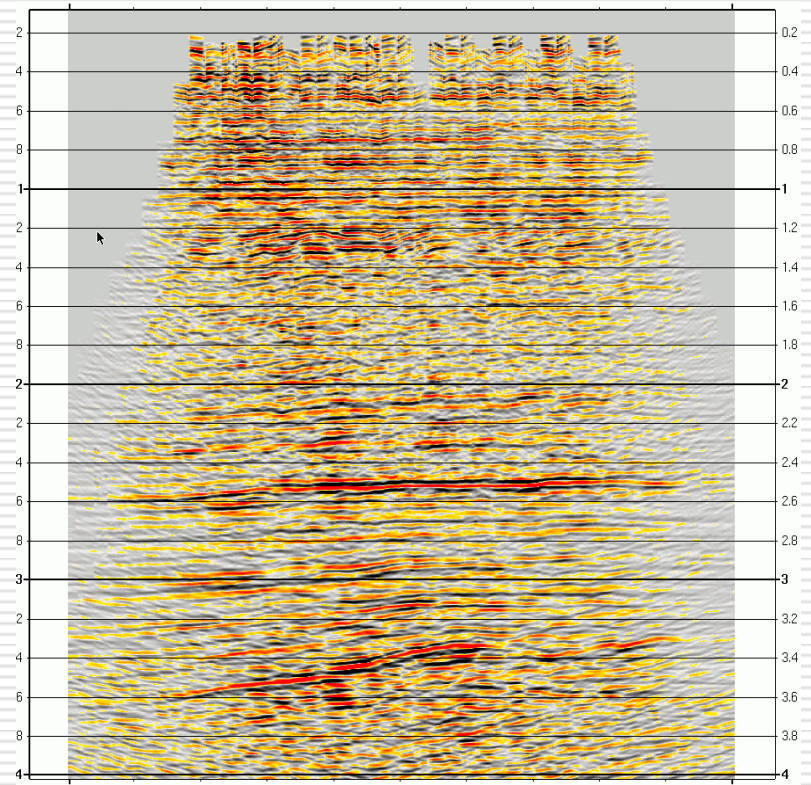
PZ summation gives up-going waves

PZ subtraction gives down-going waves

Almost all OBC and OBN data today are imaged as up-going waves. However, the down-going waves also can be used for imaging.

Sanders, 1989
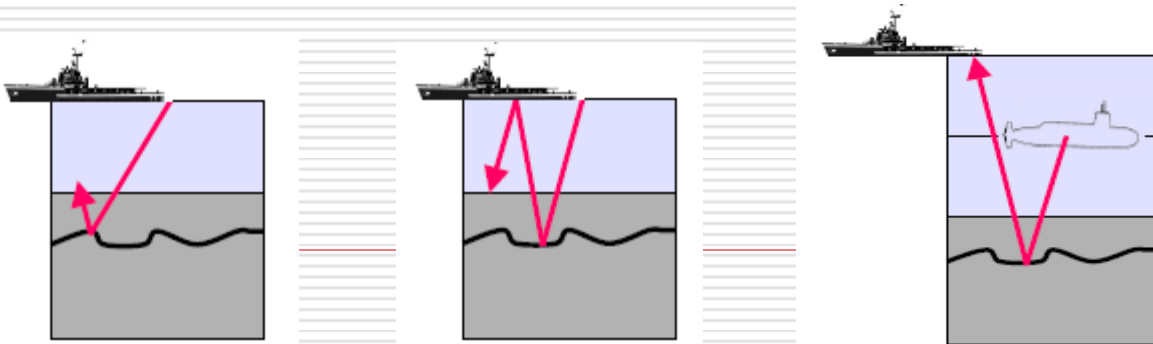
MIRROR IMAGING

The image produced by conventional migration the up going waves

The image produced by migrating the down going waves

Ronen, 2005

CONCLUSION

- OBN survey with circular shooting provides full-azimuth dataset.

- Structures under complex overburdens such as subsalt can be imaged with OBN system

- Nodes with VSP survey give better fold, azimuth and offset distribution

- We can demo circular shooting geometry in AGL

- The downgoing waves contain no primaries, only multiples. However, they provide a better image than the upgoing waves, which contain mostly primaries.

FUTURE WORKS

• Using circular shooting geometry to acquired data in the AGL with VSP and OBN

• Using Seatrial dataset to obtain down-going imaging (Mirror Imaging)

Acknowledgement

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☐ GEDCO

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THANK YOU