Ultra-high Resolution Marine Seismic Reflection

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2D Seismic

- Marine use since the 1950s (earlier on land)
- Involves towing a single streamer
- Works best in areas of simple structure

- Yields a simple cross-section
- Assumes all reflected energy is in vertical plane
- Good for reconnaissance surveys ahead of 3D
- High-resolution 2D used in geohazard work
3D Seismic

- Emerged in the 1980s
- Enabled by major advances in digital recording technology and computing
- Involves towing multiple streamers
- Gives a more complete and accurate picture

- Allows migration of out-of-plane reflectors back to where they belong
- Preserves higher frequencies
- Higher resolution (spatial and vertical)
- Much better imaging of complex structure
3D Seismic

More cost effective than 2D
What is “Ultra-High Resolution” 3D?

• Determined by inline/crossline spacing of hydrophones

• Typical industry array is 12.5-25m (inline) x 50-100m (crossline)

• Ultra-high resolution: 1.56 – 6.25m (inline) x 6.25 – 12.5m (crossline)
A Question of Scale
More Hydrophones = more pixels
So What Do You Get?
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Data courtesy StatoilHydro
**Water depth:** 300 m

**P-Cable:** 24 streamers, 25 m length, 12.5 m spacing, 192 channels

**Source:** 4 x 40 cu in Sleeve gun

*Data courtesy StatoilHydro*
Water depth: 800 m

P-Cable: 16 streamers, 25m length, 12.5 m spacing, 128 channels

Source: 2 x 90 cu in GI

Data courtesy P3S/University of Tromsø
**Water depth:** 1250 m

**P-Cable array:** 16 streamers, 25 m length, 12.5 m spacing, 128 channels

**Source:** 2 x 45/45 cu in GI

Data courtesy University of Tromsø
Water depth: 300m

P-Cable: 12 streamers, 25m length, 12.5m spacing, 96 channels

Source: 1x45/45 cu in GI

Data courtesy University of Tromsø
Deploying the P-Cable System
谢谢！！

http://www.geometricspcable.com

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