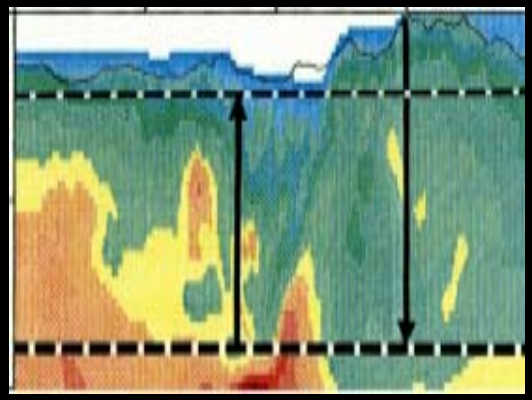
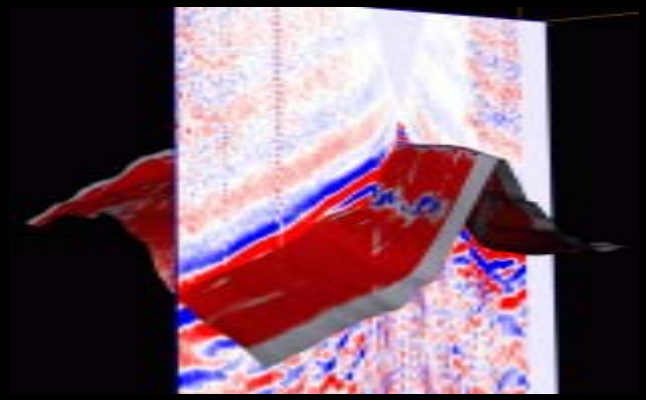
Tomostatics: Its New Applications and Solutions

Xianhuai Zhu





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Outline

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- **Introduction**
- **Basalt-outcrop example**
- **First-arrival picking in holoSeis**
- **Conclusions**

The Problem

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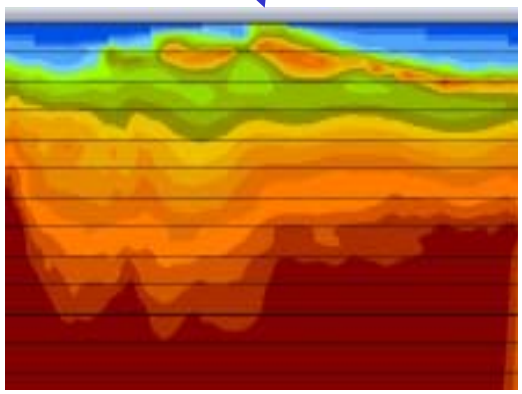
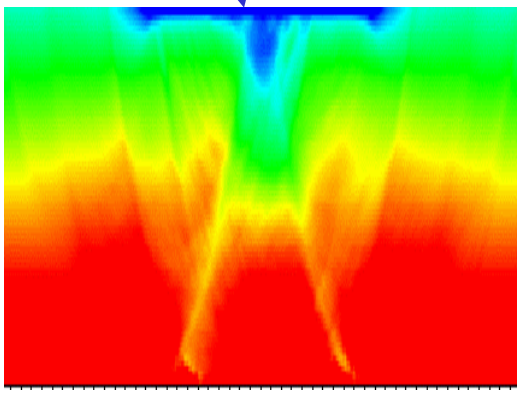
Conventional refraction statics usually fails in areas where the first arrivals cannot be modeled by refractions, such as

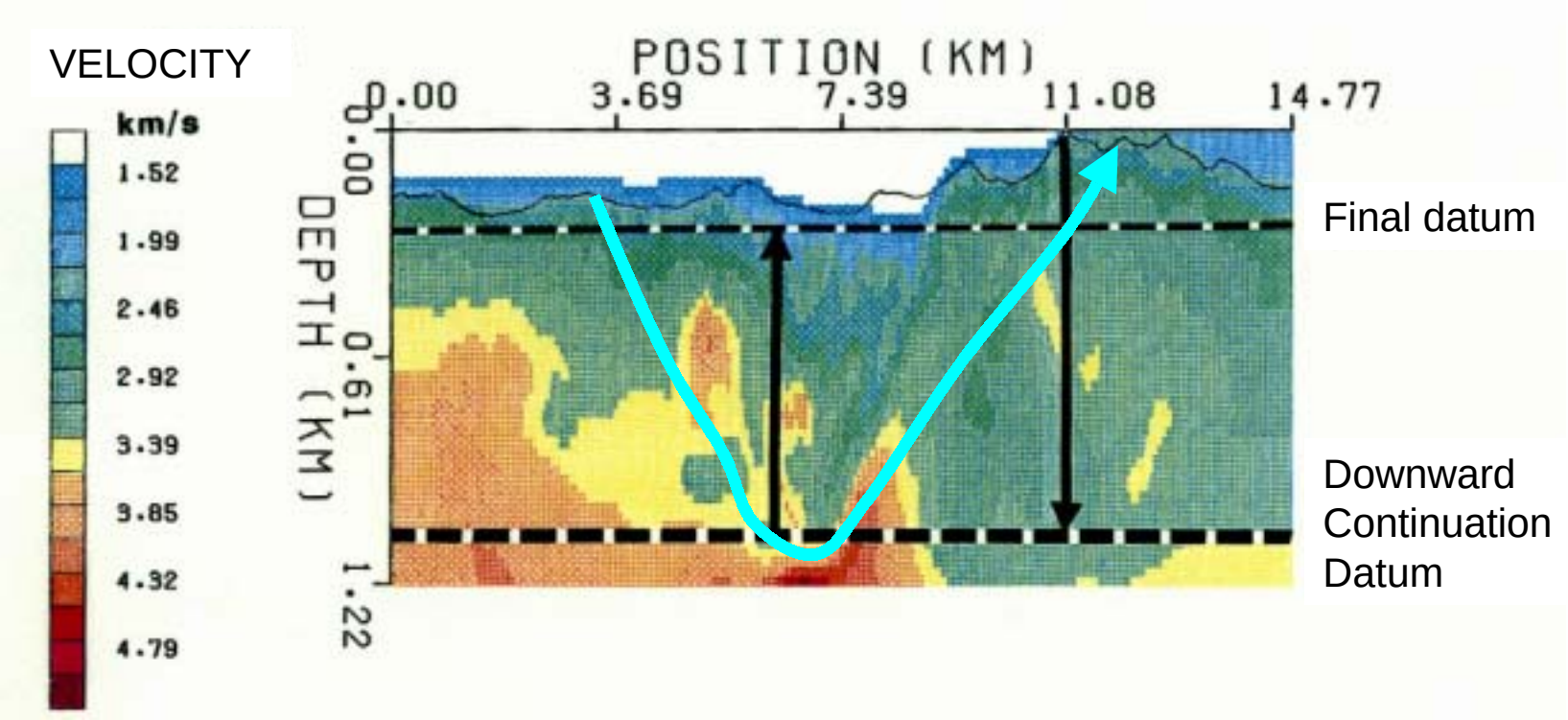
- marine trench
- gas clouds
- basalt / carbonate outcrop
- overthrust





Turning-Ray Tomography

+ Static Corrections



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Initial vs. Tomographic Velocities

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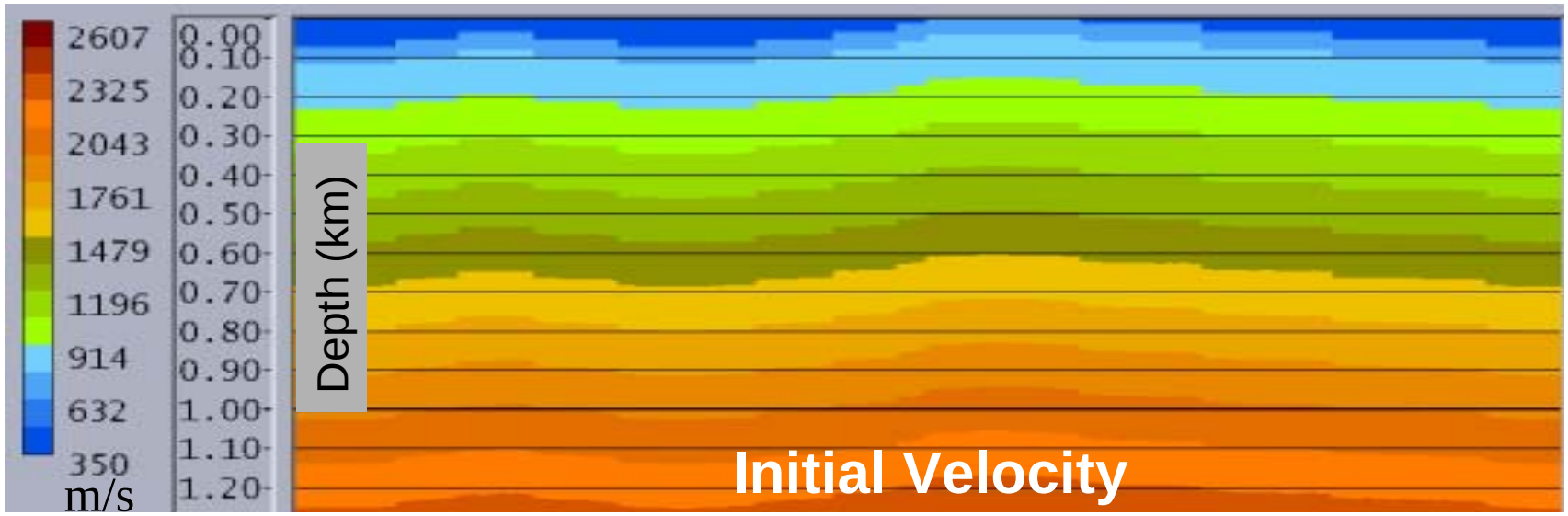

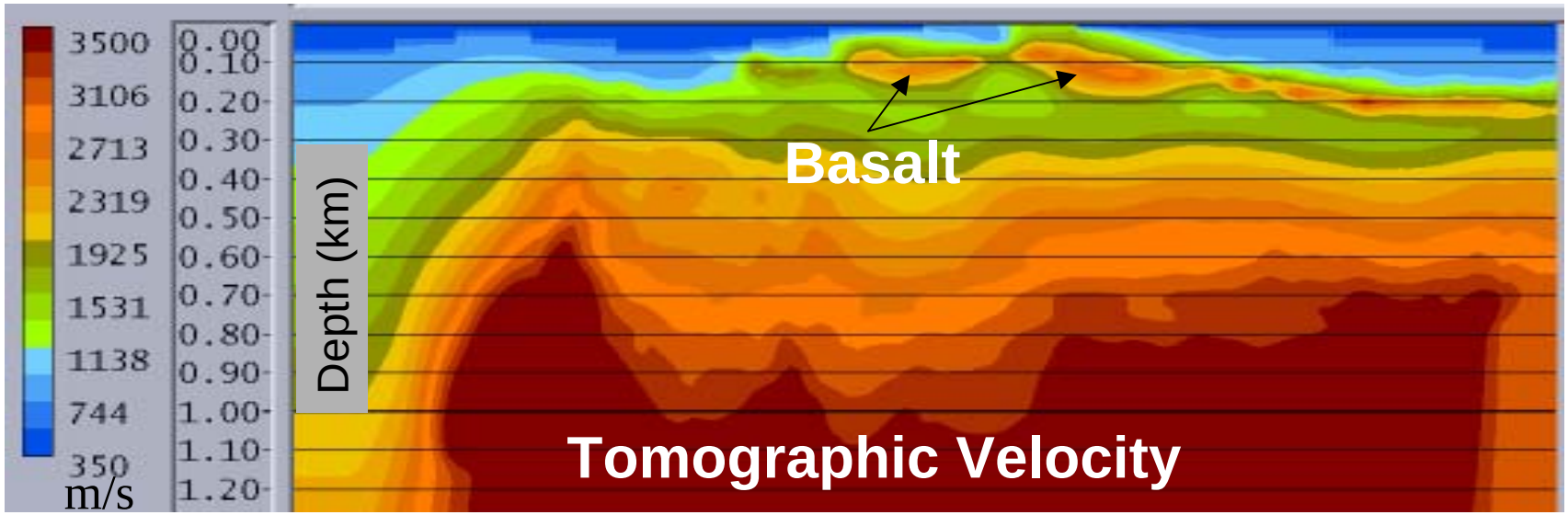

Line B: Stack with Elevation & Residual Statics

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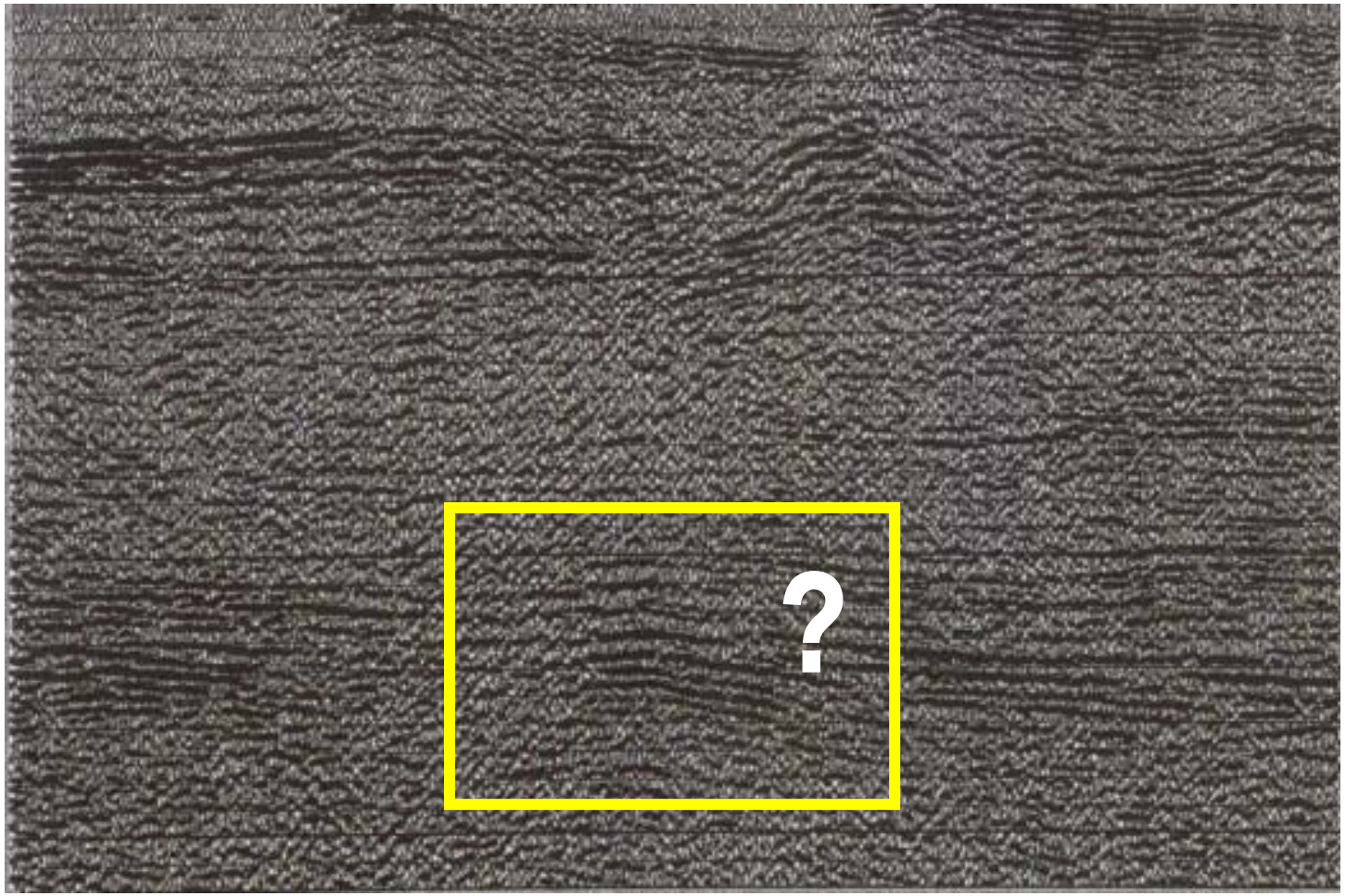

Line B: Stack with Tomostatics & Residual Statics

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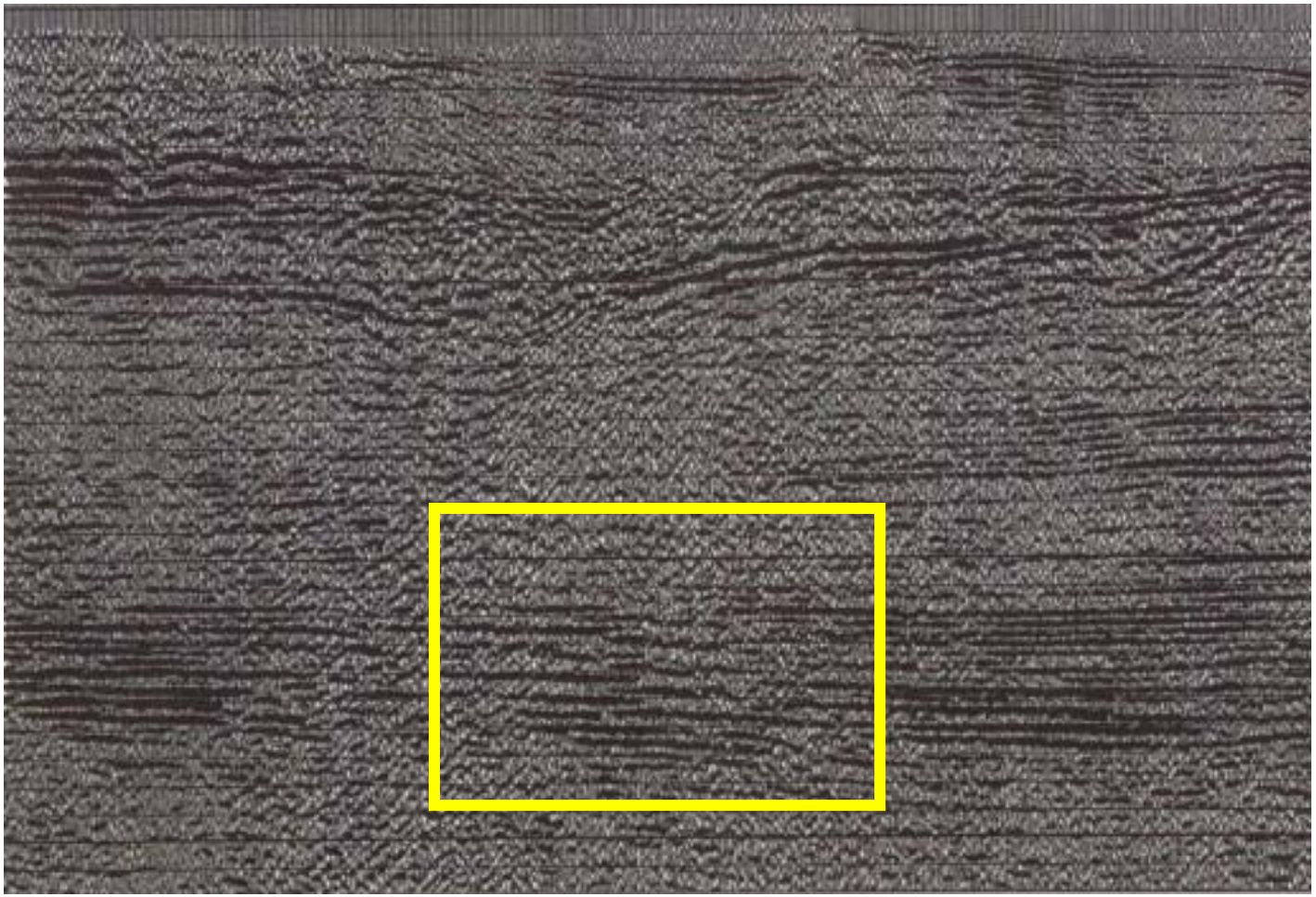

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First-Arrival Picking in holoSeis

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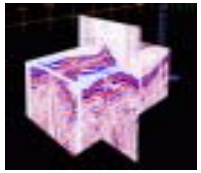
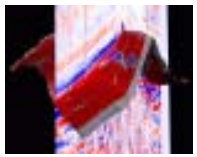
- A 2D line can be formed as a cube



- A 3D survey can be formed as multiple “Common-Offset” cubes
- First-arrival picking in holoSeis/deskSeis is automatically growing in 3D
- Several seeds are required, depending on the complexity of the first arrivals
- Pickers can be interactively edited in 3D
- Filed data example



Seismic Cube

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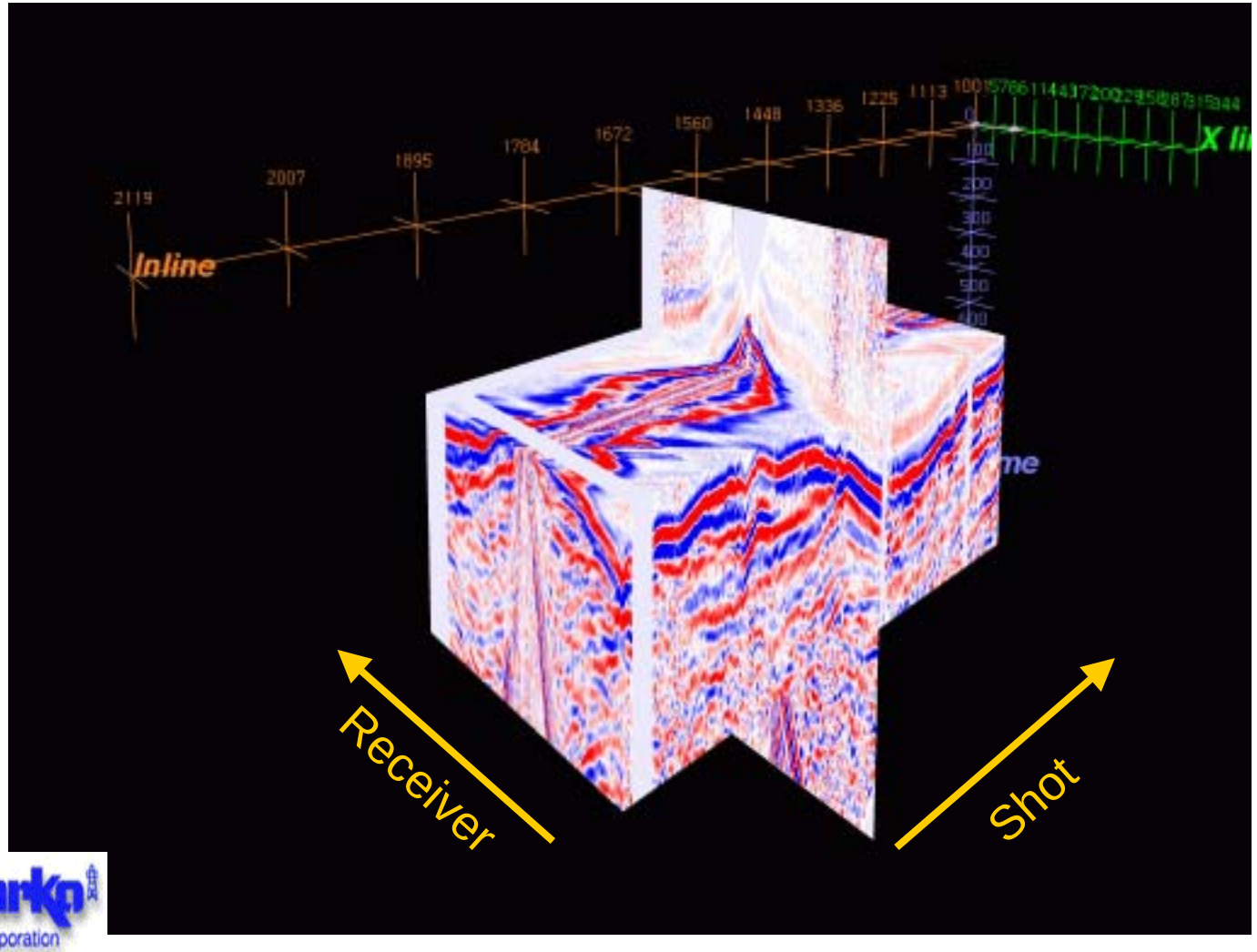

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First-Break Picking in holoSeis

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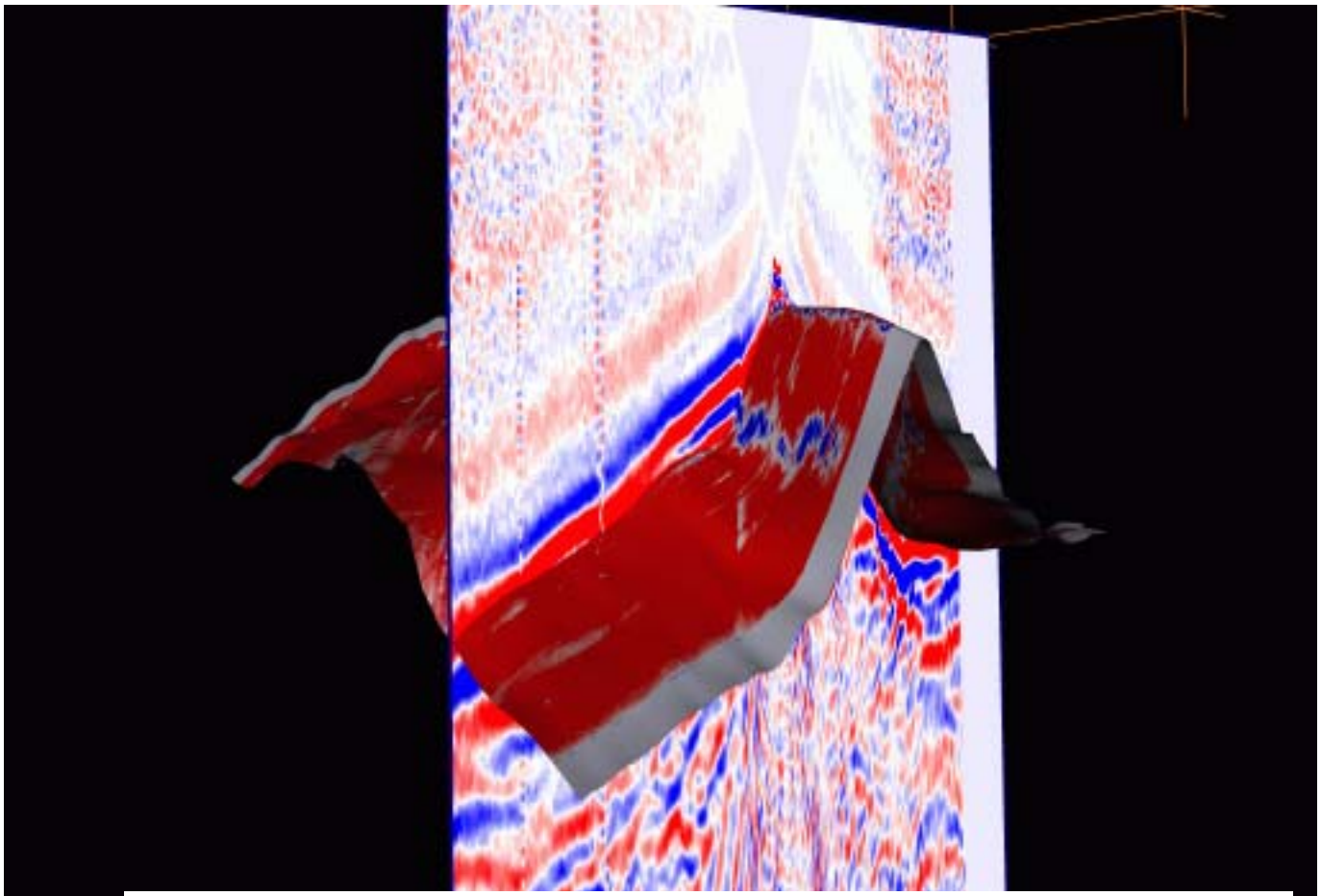

At least 20 times faster and more accurate than the conventional picking procedures.

First-Break Picking in holoSeis (before edit)

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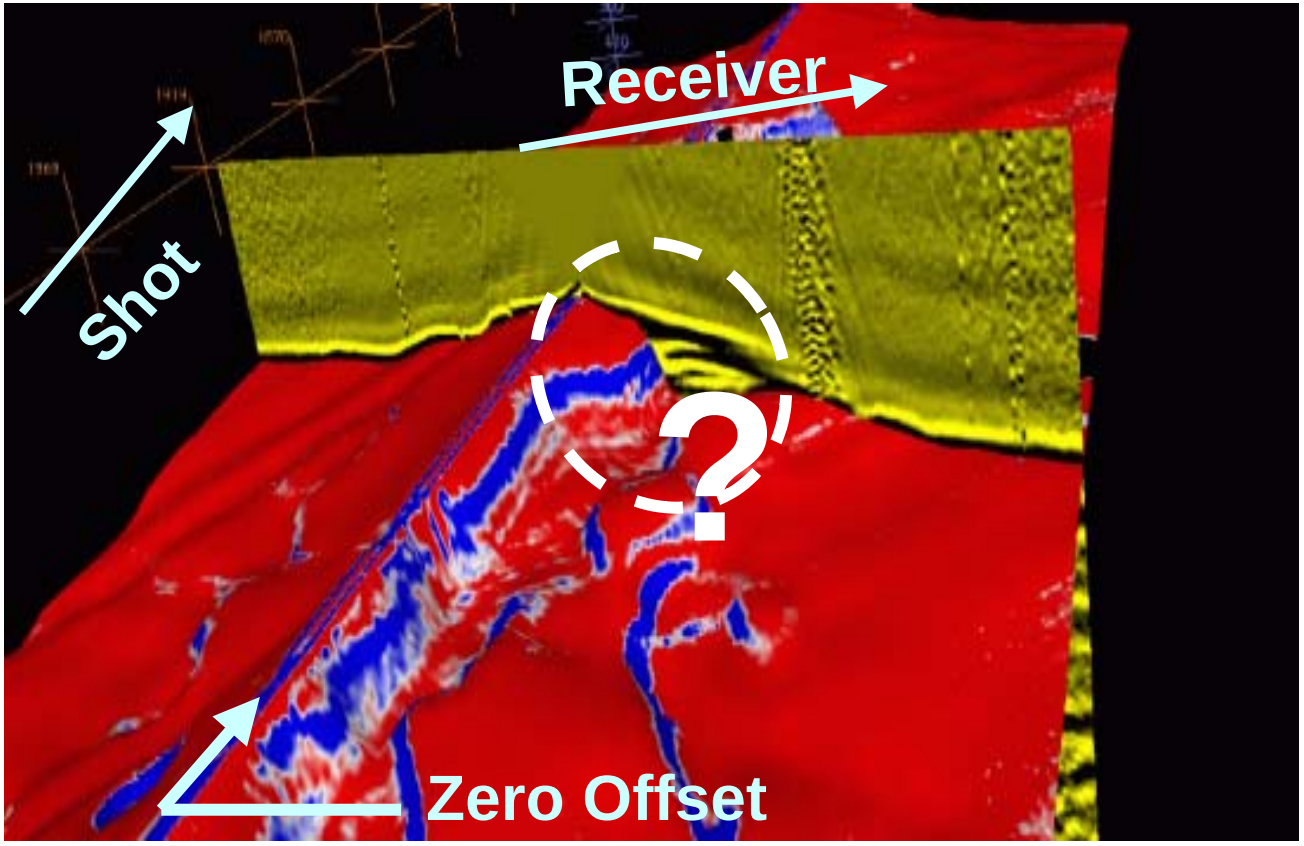

It is easy to QC in holoSeis

First-Break Picking in holoSeis (after edit)

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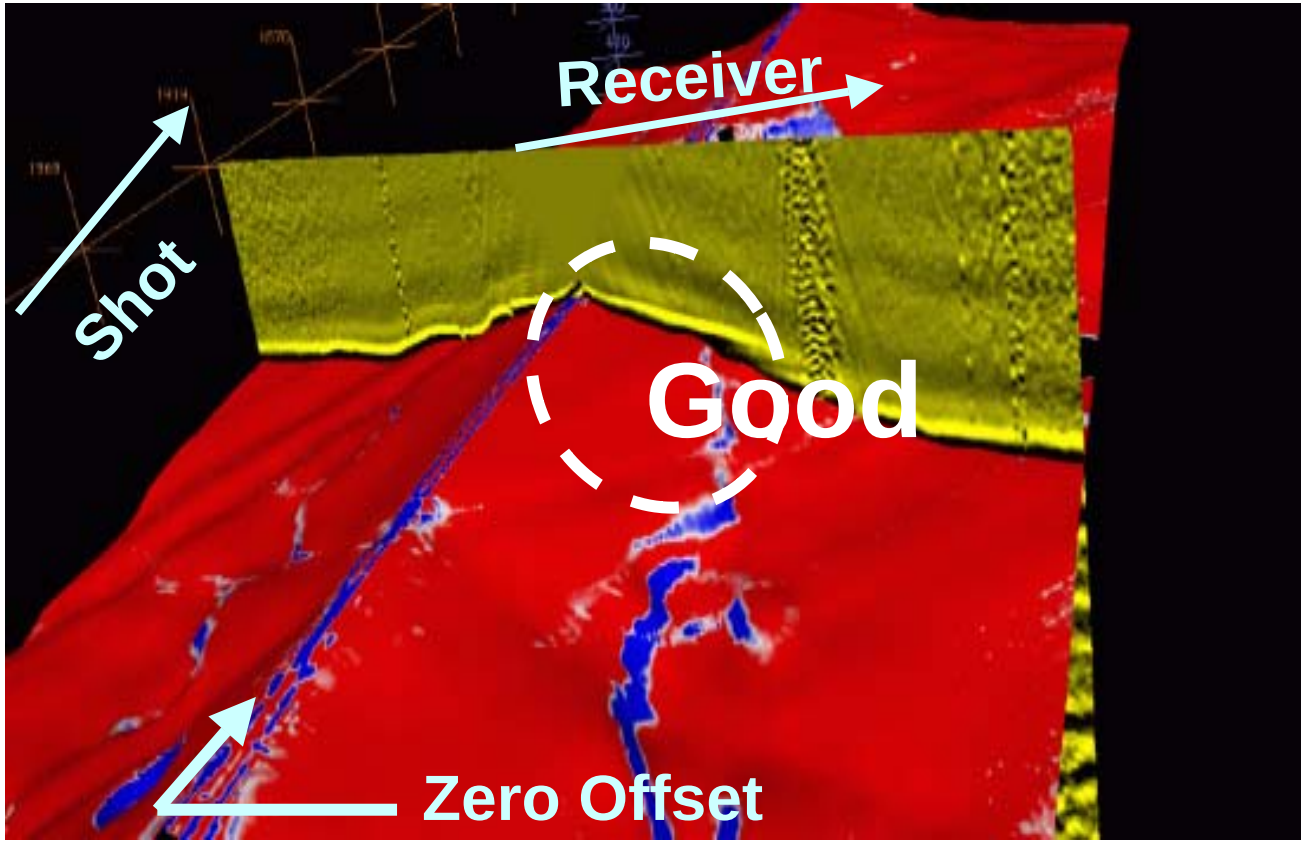

It is easy to edit in holoSeis

Conclusions

- Turning-ray tomography provides more accurate near-surface velocity models for static correction, wave-equation datuming and prestack depth migration;
- Tomostatics usually produces better structural images than refraction statics when the first arrivals cannot be modeled by refractions (*e.g*. marine trench, gas clouds, basalt outcrop, overthrust);
- First-arrival picking via holoSeis (a virtual reality system) significantly improves efficiency and reliability for Tomostatics and the subsequent processing.

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Thank you for attending this presentation

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