**INTRODUCTION**

We explore the applicability of two-dimensional seismic waveform tomography to conventional deep-water, long-offset (10s of kilometers) seismic refraction experiments in which ocean-bottom receivers and sea-surface sources are usually spaced several kilometers and a few hundreds of meters apart. In particular, we test the application of waveform tomography to ocean-bottom seismometers (hydrophones) data collected along the rift valley of the Mid-Atlantic Ridge near 26°N in the vicinity of the active TAG hydrothermal system, which is thought to be located on the hanging wall of an active detachment fault. While successful, waveform tomography could provide detailed velocity information related to fluid flow and alteration along the fault zone that cannot be obtained from traveltime tomography analyses. We use the frequency-domain elastic-wave equation approach of R. Pratt. Source velocity inversion is done at selected frequencies using ‘efficient waveform inversion’ to minimize the misfit of data residuals with the gradient method.

**FORWARD MODELING**

The velocity model at each frequency minus the starting model, to show the updates with respect to the original at each sequential stage. As expected, the maximum updates occurred at 5.5Hz. The first input of seismic energy on the seismograms arrives. All colors indicate velocity in m/s. Axes are marked in km.

**DATA PROCESSING**

Multiples beyond an arrival time of 7.5 s were time reduced. Seisgram for velocity = 6km/s was used.

Spherical Divergence was corrected for using a multiplicative correction factor of value of V=1500m/s at 0s.

Seisgram was wavelet-shaped as response to a minimum-phase Butterworth wavelet (length 300ms, df= 2Hz to 35Hz).

Predictive deconvolution operators were designed individually for each of the OBS gathers using a window of 1 around the first arrival for offset, seismic refraction energy. Specifications: Operator length = 20 samples, bandwidth = 2Hz to 15Hz, 0.1% spectral whitening.

Low-pass filtering used a Butterworth filter (length 51 points, lower order =3, higher order =6). Bandpass = 2Hz to 15Hz.

End-to-end, mostly instrument related, before the first arrivals were muted for reduced time earlier than 1.75s.

The direct wave is muted so that the inversion procedure specifically uses the large-offset, undepressed energy to fit the model.

Maximum modelled time =10.5 s for an input into inversion.

Offset-dependent amplitude scaling is done on the observed data in appropriate ratio with the forward modelled data on the Traveltime model.

**REFERENCES**

P. H. Canales, Ocean-bottom seismometers (OBS) along the Trans-Atlantic Geotraverse (TAG) segment (Mid-Atlantic Ridge, 26°N); implications for the nature of hydrothermal circulation and subaqueous structures at Sweet Spot seeping site, Geosci. Geophys. Geosyst., 5, 2004.