



## 1. KTB drilling site

The German Continental Deep Drilling Program (KTB: Kontinentales Tiefbohrprogramm der Bundesrepublik Deutschland), was a scientific drilling project carried out from 1987 to 1995 near Windscheschenbach, Bavaria, Germany. It is located 50 km east of Nürnberg, close to the border of Czech Republic, and on the western flank of the Bohemian Massif. During the exploration phase crustal rocks have been drilled down to 9 km depth.

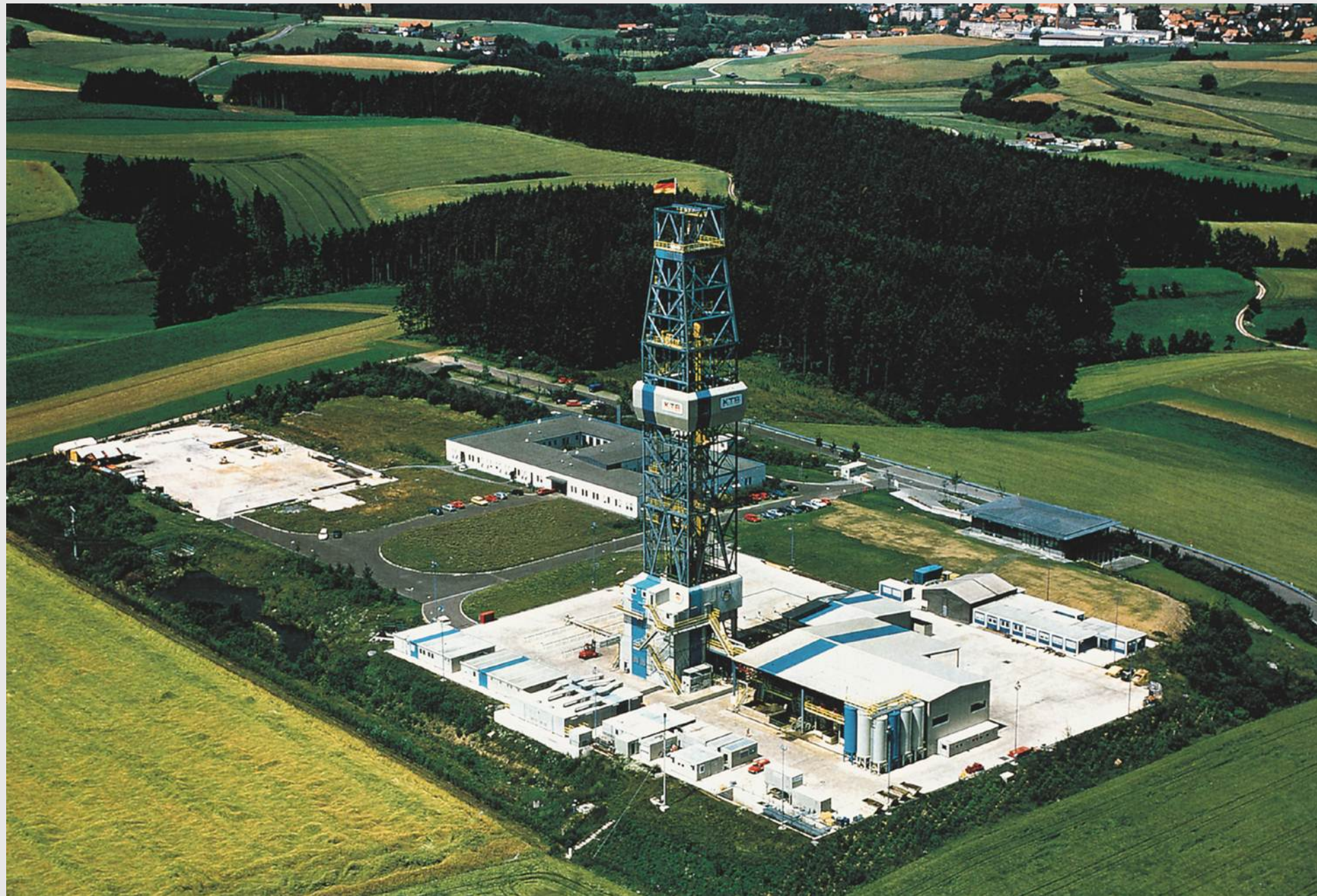
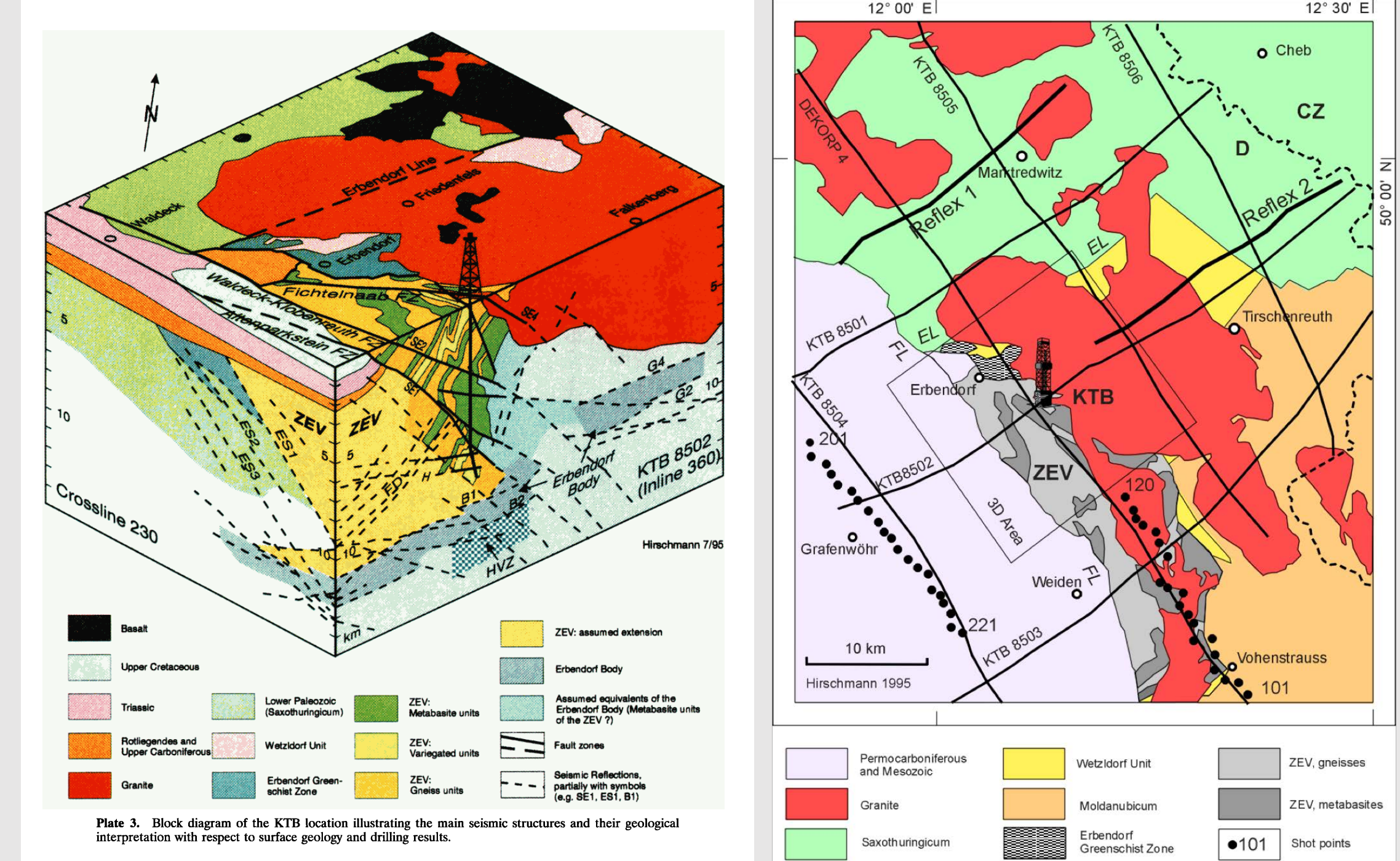


Figure: [https://www.gfz-potsdam.de/en/media-and-communication/infoteh/med\\_iathek/images/deep-continental-drilling/](https://www.gfz-potsdam.de/en/media-and-communication/infoteh/med_iathek/images/deep-continental-drilling/).

## 2. Geology setting

The KTB drill site is situated in the northern part of the ZEV which is a small high-grade metamorphic unit inserted into the tectonic boundary zone between the Saxothuringian terrane in the north and the terranes of the Moldanubicum in the South. The boundary is designated as the Erbendorf Line. The Saxothuringium and the Moldanubicum are the main tectonic parts of the European Variscides. The European Variscides, crossing Europe from the Iberian peninsula to the Bohemian Massif, were formed between 500 and 250 Myr ago when Gondwana-derived continental fragments of terranes were accreted to the southern margin of Laurasia along prominent collision zones (Ziegler 1984).



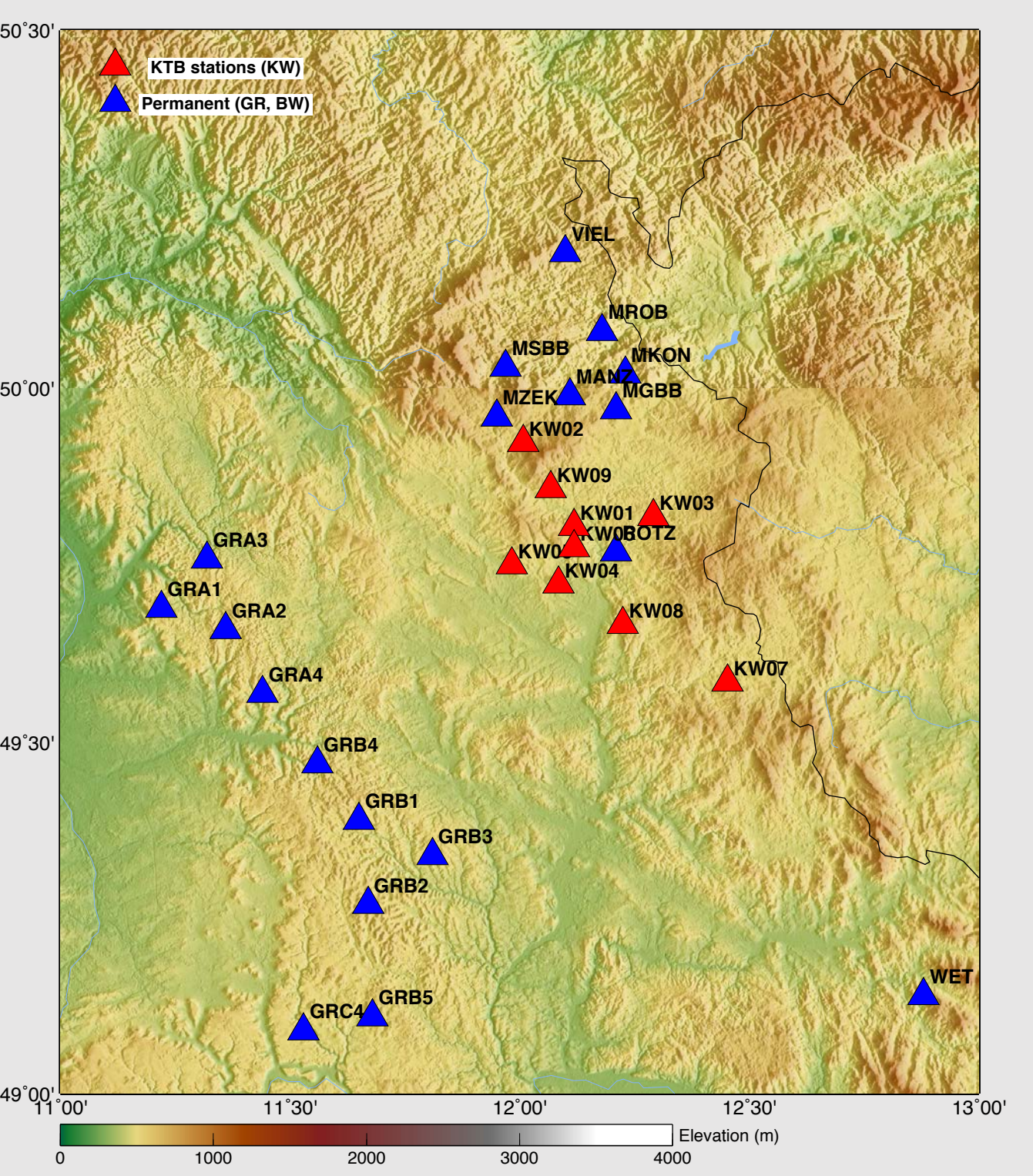
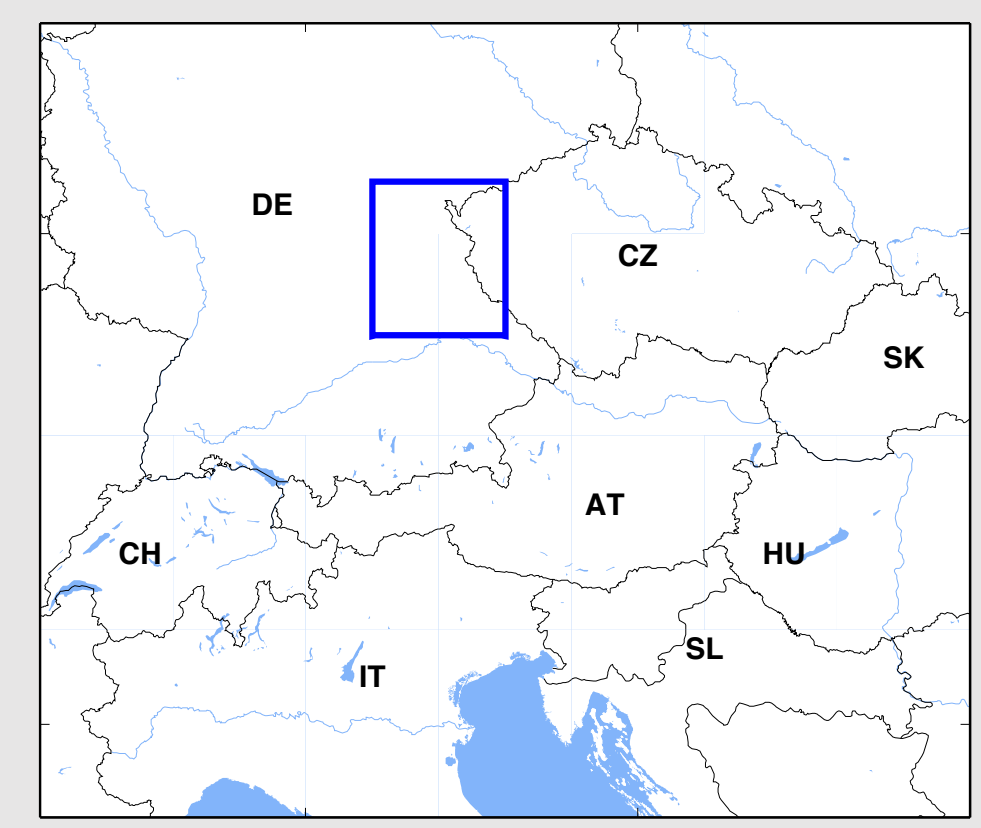
Figures: Szaloiava et al., 2015; Hirschmann, 1996; Hajres et al., 1997.

## 3. This study

The KTB drilling project was accompanied by a large number of geophysical and geological studies at the Earth surface and downhole. The KTB database provides an exceptional amount of high-quality data from numerous experiments (Szaloiava et al., 2015). Therefore, the KTB area is here taken as a sample for testing and verifying the potential resolution of passive seismic techniques. In this study, we show results from ambient noise tomography at the KTB drilling site. The aim is to present a new shear-wave velocity model of the area while comparing the results to the previous velocity models and hints for anisotropy depicted by former passive and active seismological studies.

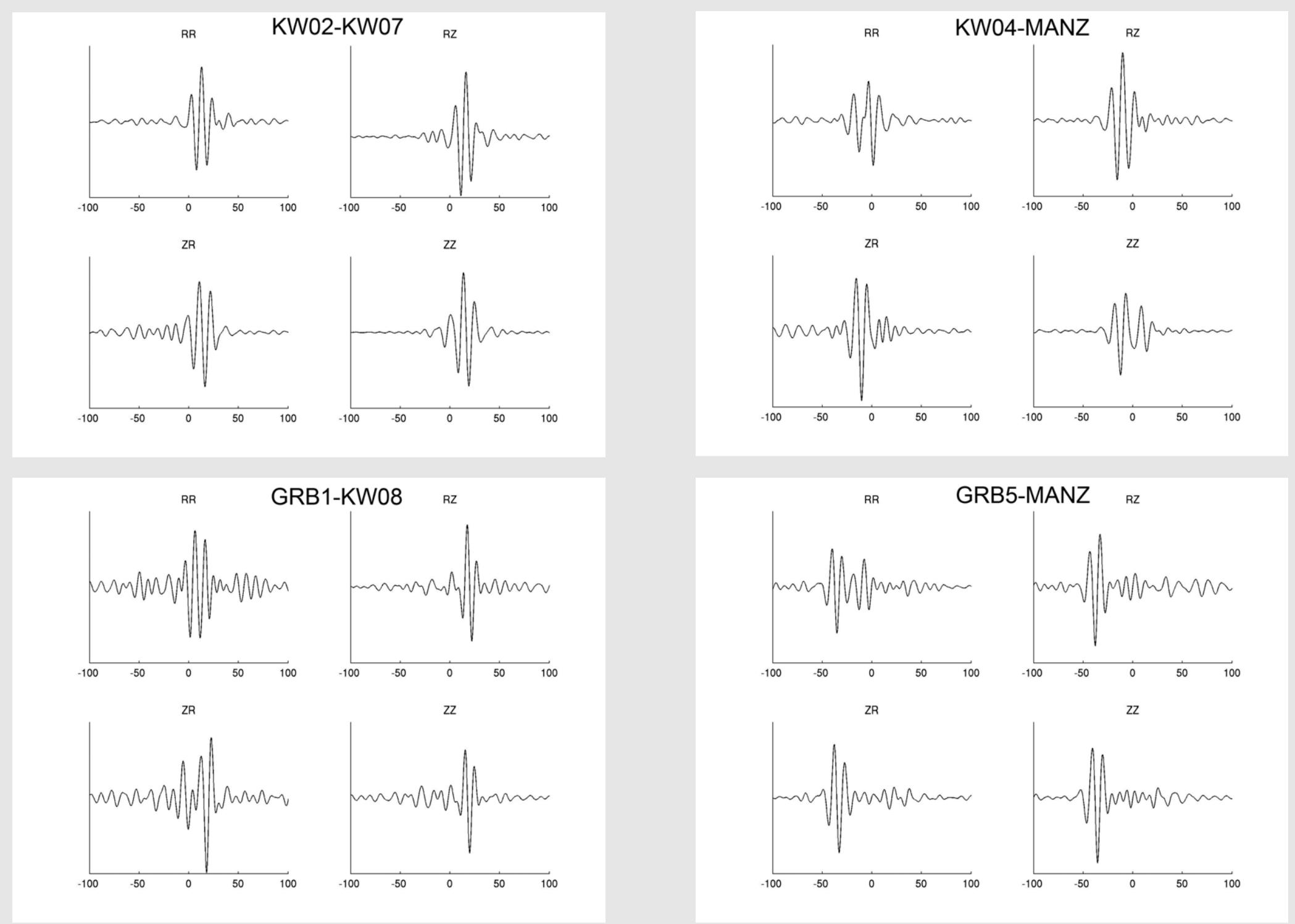
## 4. Station and data

We use a unique data-set composed of two years of continuous data recorded at nine 3-component temporary stations installed from July 2012 to July 2014 in the vicinity of the drilling site (Bianchi et al., 2015). Moreover, we included a number of permanent stations in the region in order to improve the path coverage. Figure shows the location of the stations.



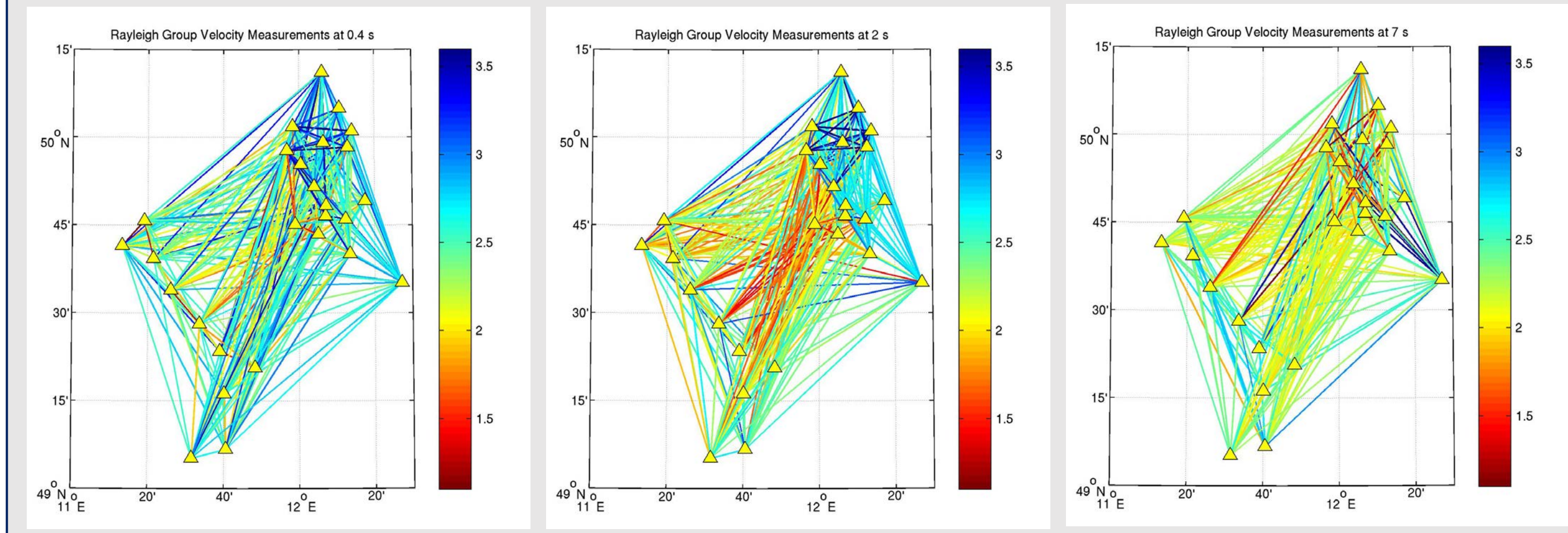
## 5. Cross correlation example

Cross correlation functions are computed for 9 inter-components (daily time windows); ZZ, ZE, ZN, EZ, EE, EN, NZ, NE, and NN. They are stacked over the two years and rotated to radial (R), transverse (T), and vertical (Z) components, RR, RT, RZ, TR, TT, TZ, ZR, ZT, and ZZ.



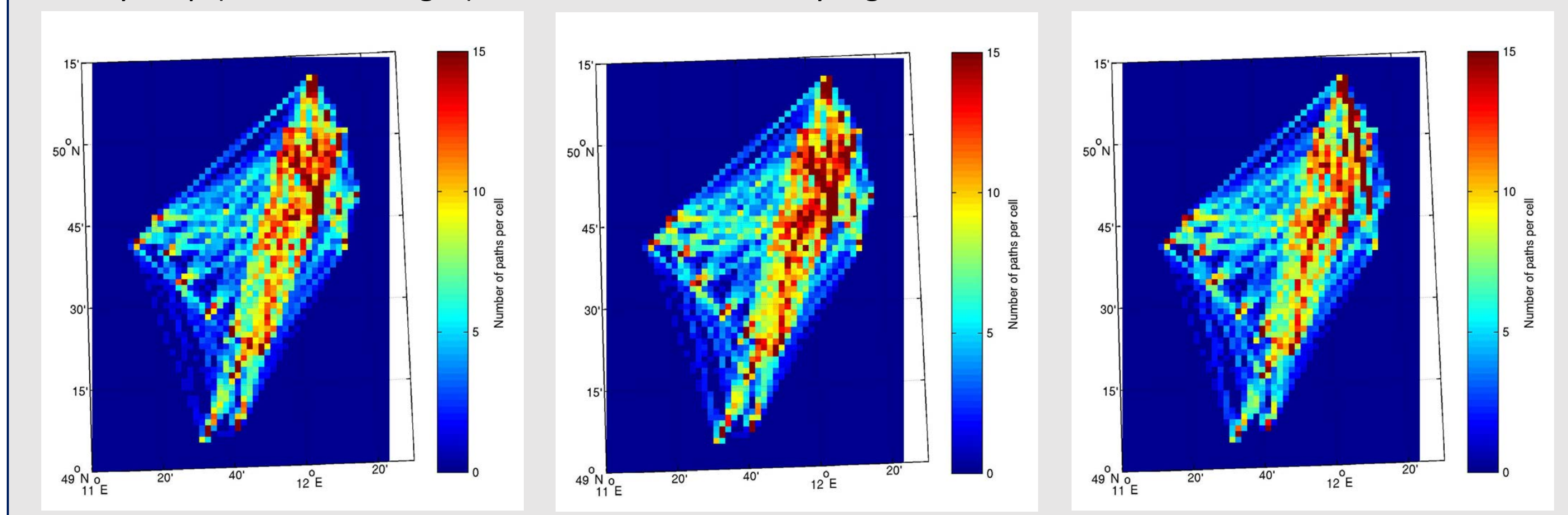
## 6. Dispersion measurements

Dispersion curves of the surface-waves are derived on both causal and anti-causal parts of the correlations for the four inter-components of the correlation tensor; RR, ZZ, RZ, ZR, contain Rayleigh waves (using SVAL program, Kolínský and Brokesová, 2007). Figure presents wave paths showing velocity measurements (from left to right) for 0.4, 2, and 7 sec periods.

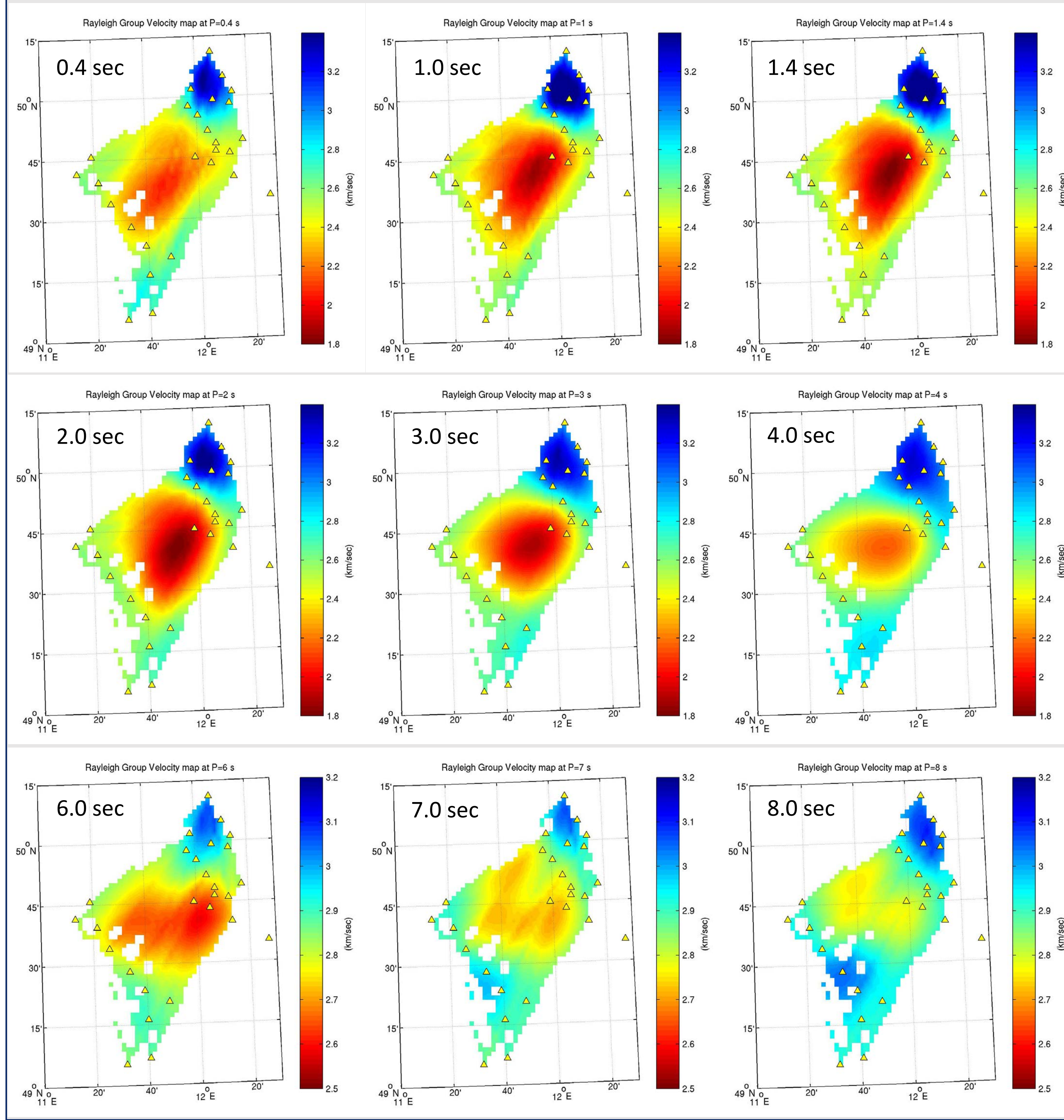


## 7. Group velocity inversion

Inversion of velocity measurements from dispersion curves is performed following Barmin et al. (2001) using 2 km grid size. The method is based on minimization of a penalty function having a linear combination of data misfits, magnitude of perturbation, and model smoothness. Figure shows path density map (from left to right) at 0.4, 2, and 7 s for Rayleigh waves.



## 8. Group velocity map



## 9. Remarks

The marked separation between low velocities in the SW part of the study area from the high velocities in the NE area observed from the surface down to about 7-8 km depth, which might correspond to the Franconian lineament separating the Mesozoic sediments from the older metamorphic and intrusive bodies of the Saxothuringian and Moldanubicum units. The high velocities in the NE part of the study area visible at both short and long periods, can be associated to the presence of the Tertiary basalts within the Saxothuringian units.