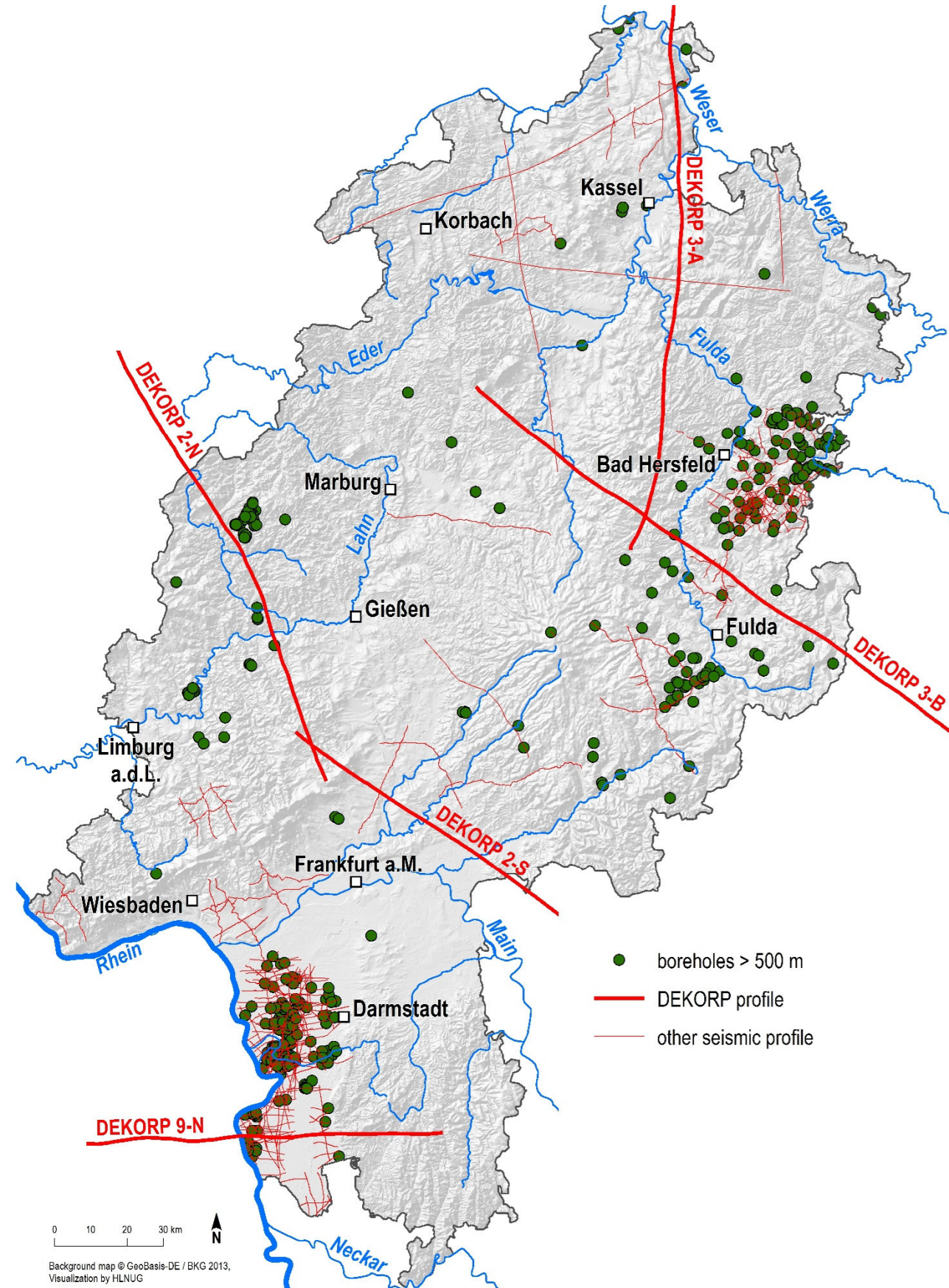


# Reprocessing of the hessian DEKORP seismic profiles

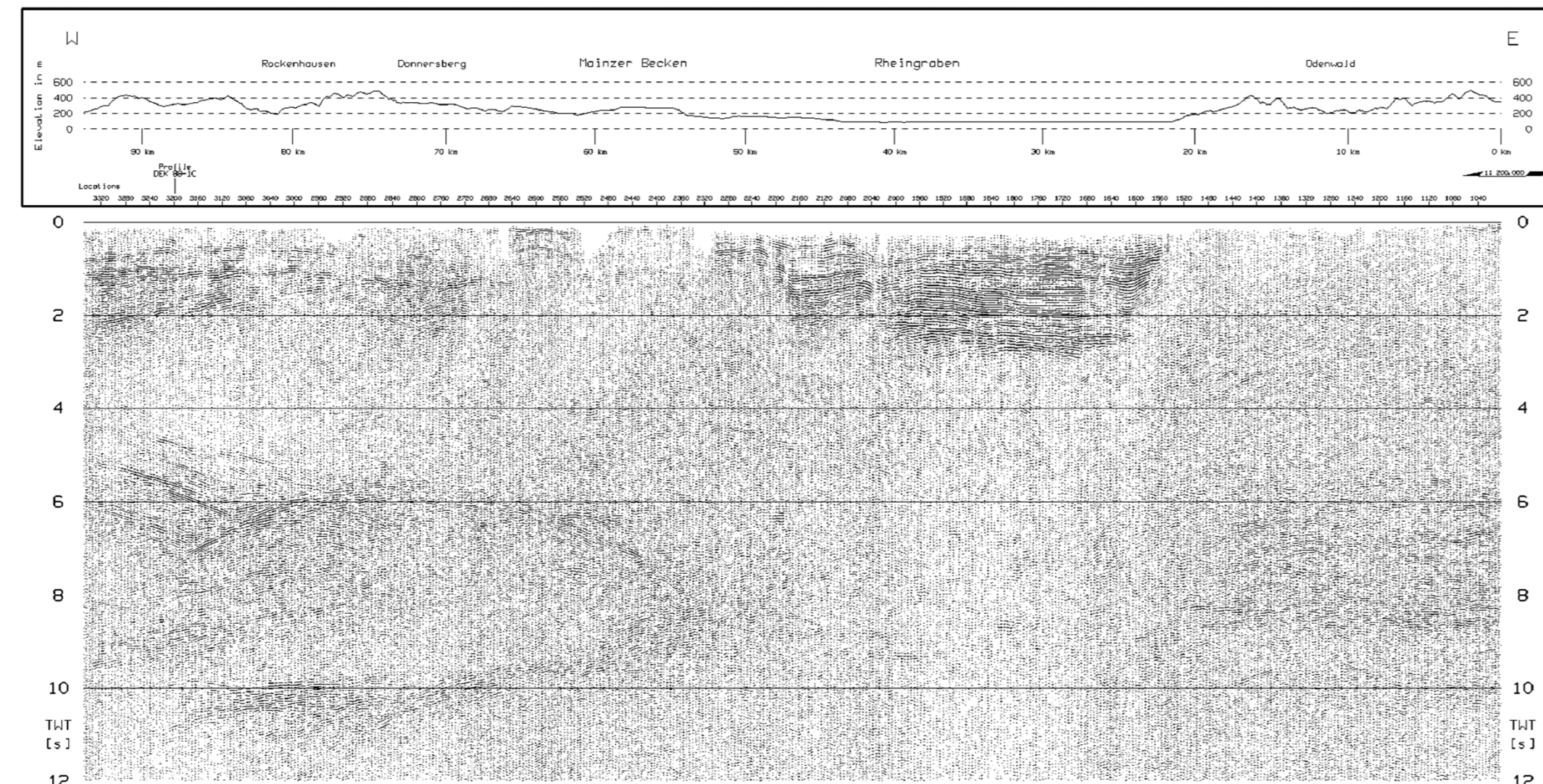


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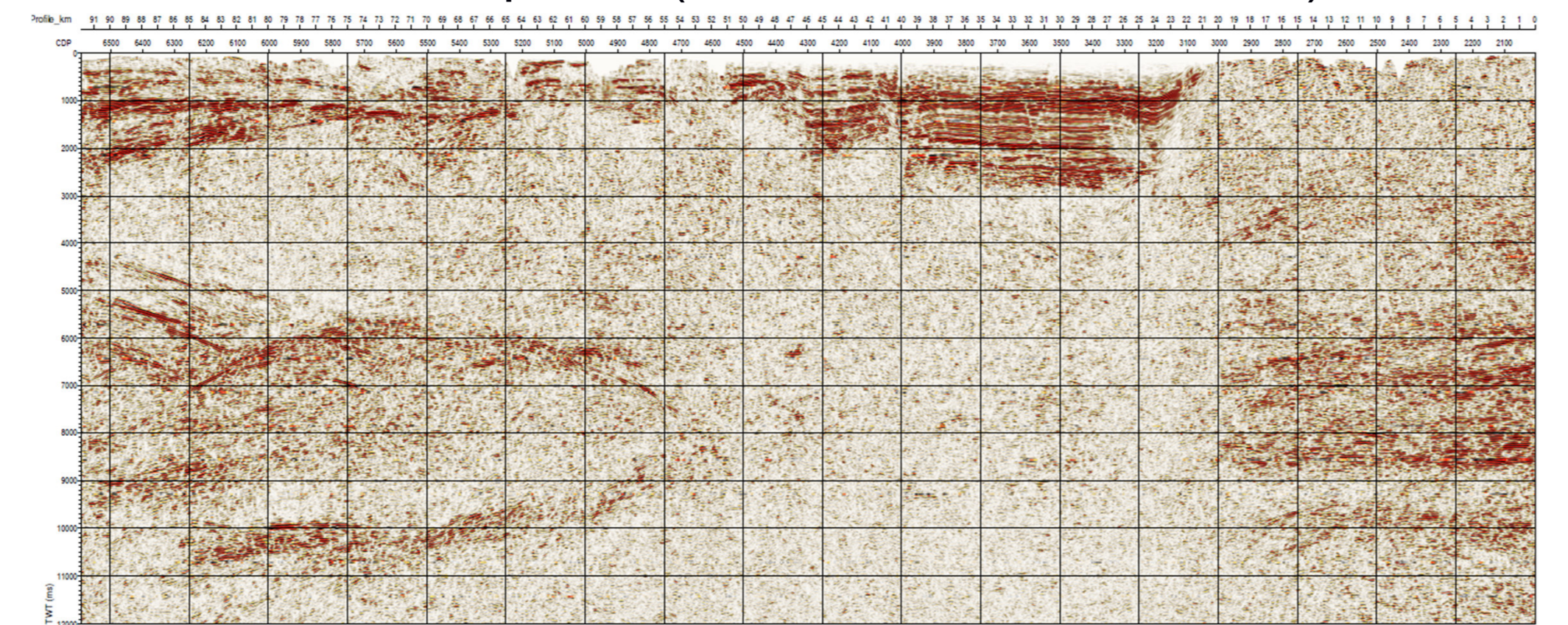
As part of the German continental seismic reflection program (Deutsches Kontinentales Reflexionsseismisches Programm, DEKORP), three large seismic traverses (with the sub-profiles: DEKORP'84-2S and '86-2N; DEKORP'88-9N; DEKORP'90-3A and '90-3B) were measured in the state of Hesse in Germany. The main research topic of DEKORP were deep seismic studies to investigate the lithospheric structure beneath Germany. The DEKORP lines were reprocessed in 2019/20. The focus of the reprocessing was on improving the resolution / mapping of geological structures down to a depth of 6 km (approx. 3 s TWT) to describe the prolongation of faults and geological structures in more detail than in previous studies. From today's perspective, this depth range is of great interest for a wide range of possible technical applications (including medium-deep and deep geothermal projects). The results were directly incorporated into the new geological 3D model of the state of Hesse. Compared to the original processing in the 1990's, a state-of-the-art reprocessing was applied for all DEKORP profiles traversing the state of Hesse. In comparison to the original processing, additional processing steps like CRS (Common Reflection Surface) instead of CDP (Common Depth Point) stacking, turning-ray tomography and prestack depth migration were carried out.



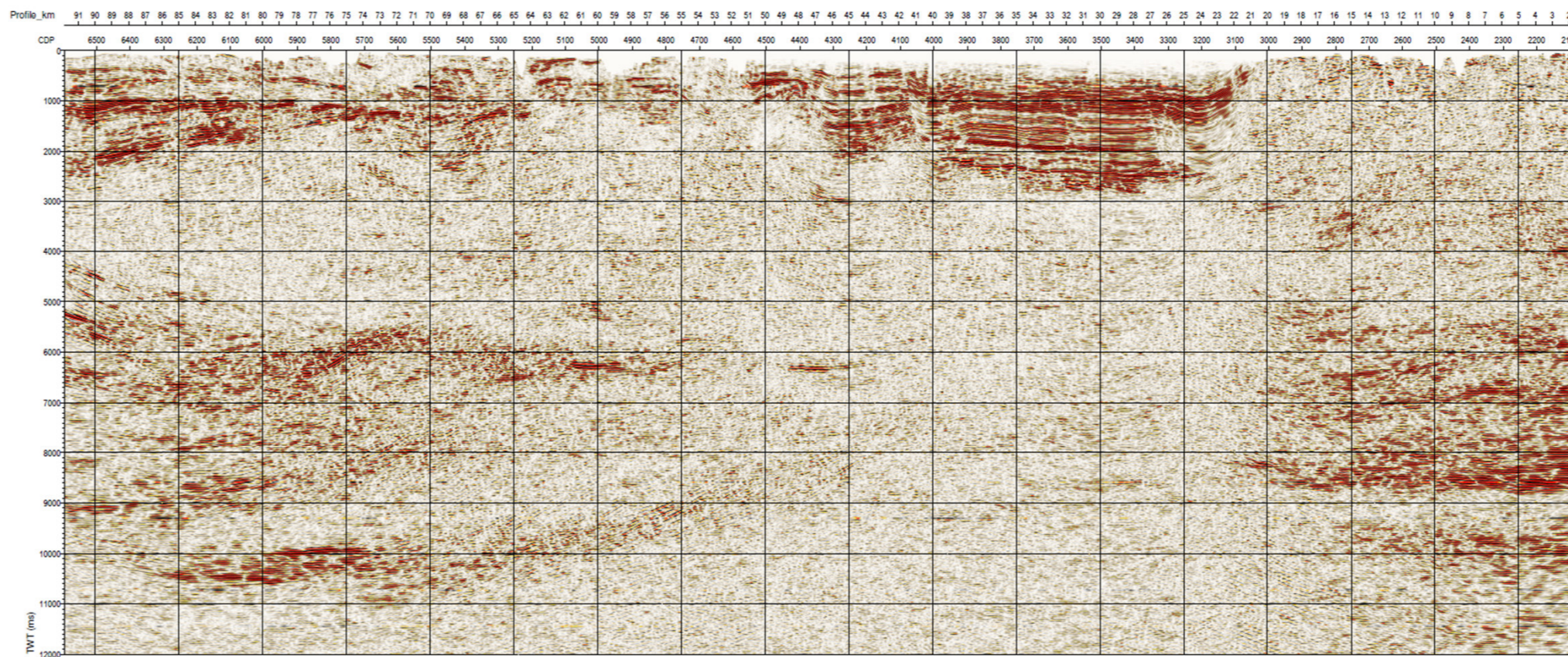
**Fig. 1:** Location of the DEKORP profiles (thick red lines) crossing the state of Hesse in Germany. Other seismic profiles (thin red lines) and known boreholes with depths of more than 500 m are shown (green dots).



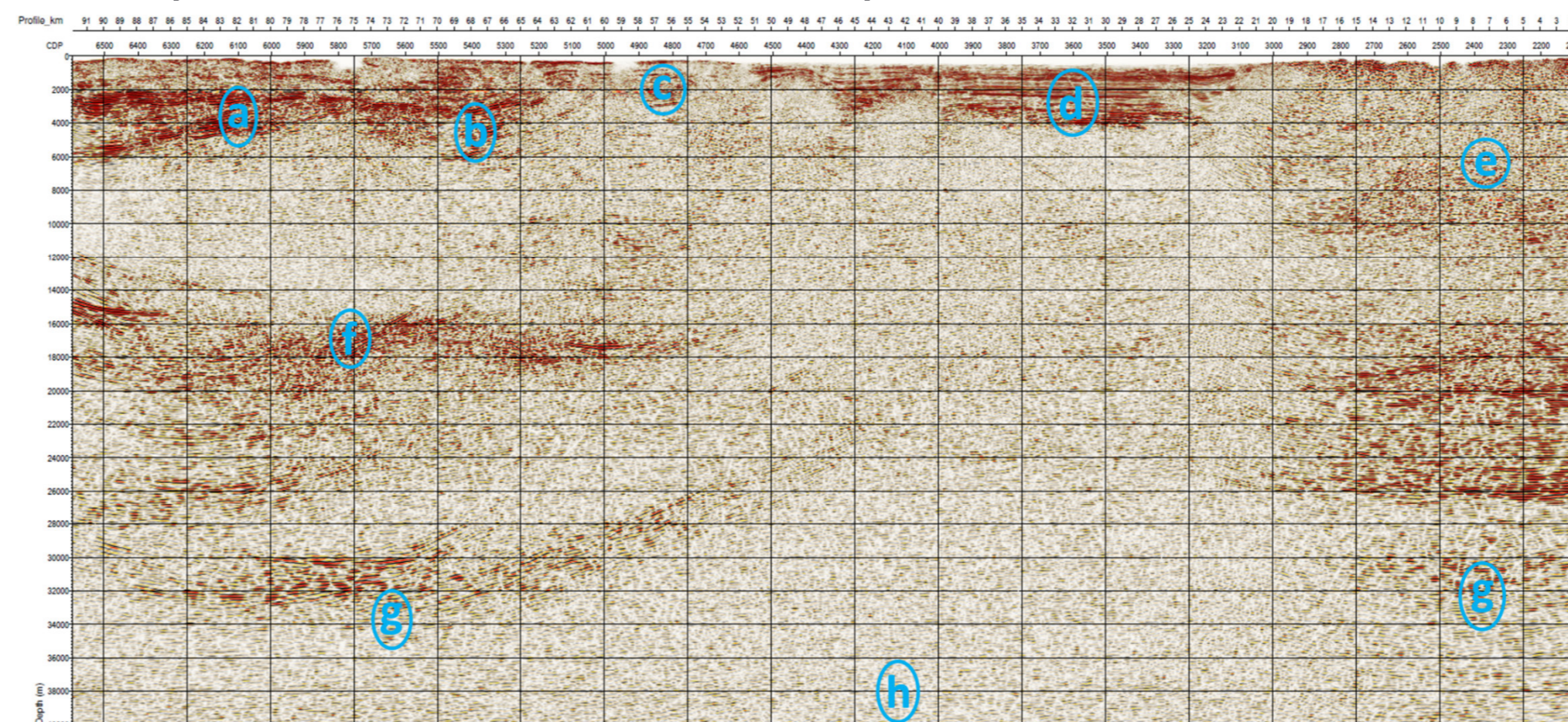
**Fig. 2:** Final CDP stack of the initial processing of the DEKORP'88-9N profile (Meissner & Bortfeld 1990).



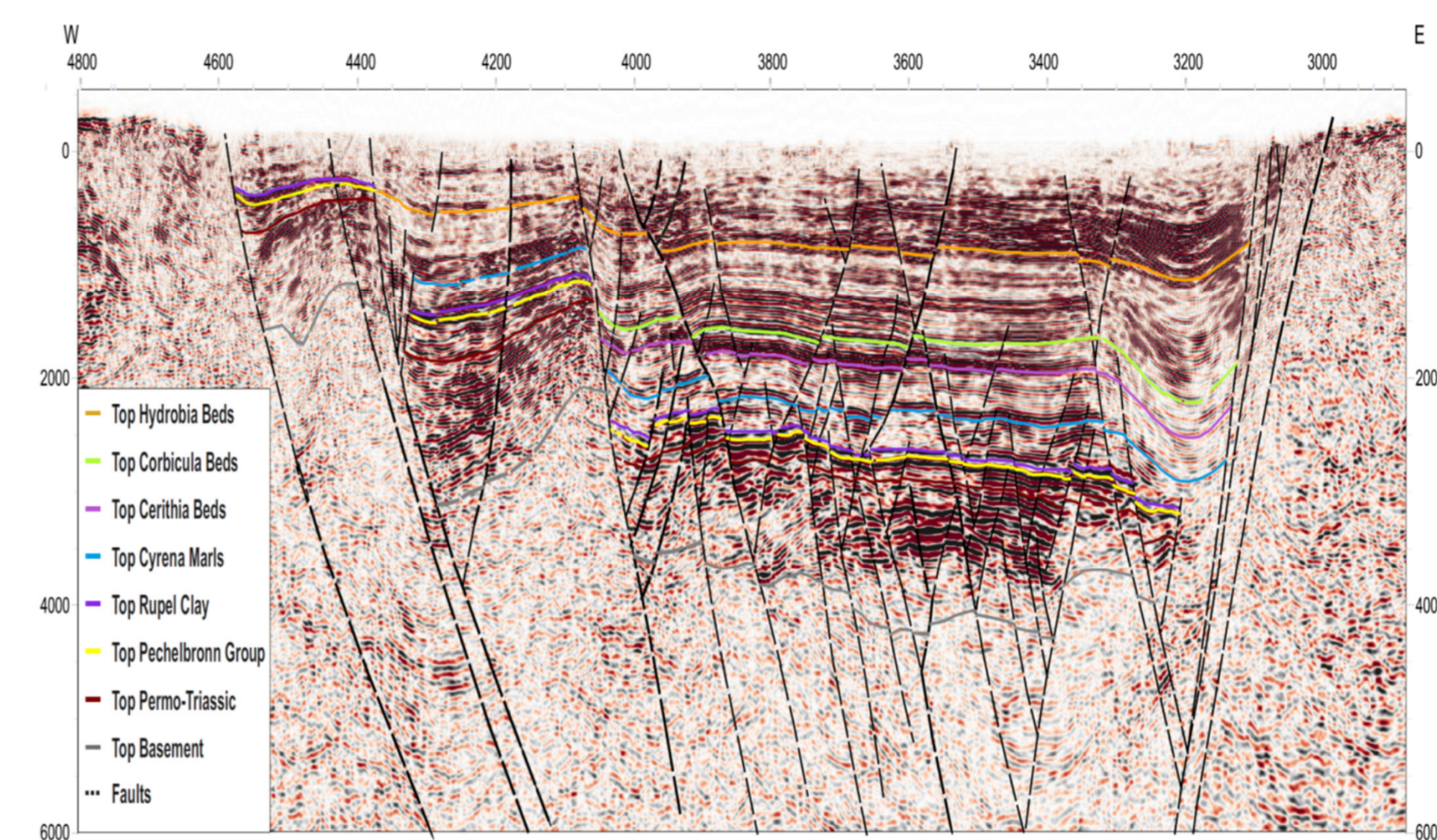
**Fig. 3:** Reprocessed CRS stack of the DEKORP'88-9N profile with clear improvement of the signal quality.



**Fig. 4:** Reprocessed PostStack TimeMigration of the CRS stack showing the reflectors with their correct position and shape for the DEKORP'88-9N profile.



**Fig. 5:** Final reprocessed PreStack DepthMigration of the DEKORP-9N profile based on the CRS gathers. a) Molasse sediments of the Saar-Nahe Basin, b) Rhyolites of the Donnersberg volcanic complex, c) Triassic sediments of the Mainz basin, d) Sediments of the Upper Rhine Graben, e) plutonic rocks of the Odenwald, f) transition from upper to lower crust, g) Moho, h) upper mantle reflections.



**Fig. 6:** Interpretation of faults and seismic reflectors in the PreStack DepthMigration of the DEKORP'88-9N profile. A zoom in the area of the Upper Rhine Graben is shown, where compared to previous interpretations additional horizons and the fault network were mapped in unprecedented detail.

An important new finding is the presence of the Permo-Triassic layer which is significantly thicker than previously mapped (> 600 m) and thus the upper edge of the basement is situated over 600 m deeper than in previous interpretations. All horizons were mapped with the help of well markers from the wells Worms 3, Nordheim 1 and 2 as well as Hofheim 4 and 5.

**Conclusion:** New structures and faults were identified in the DEKORP-9N profile throughout the interpretation of the reprocessed data. Similar gains in knowledge are expected from the other reprocessed profiles.  
**Outlook:** The results for the DEKORP-9N profile are currently in preparation for publication, the other profiles will be published in the near future. Data publications are planned for the reprocessed seismic data.

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**References:** Meissner, R. & Bortfeld, R. K. (1990): DEKORP-Atlas. DOI: 10.1007/978-3-642-75662-7.

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