Supplement

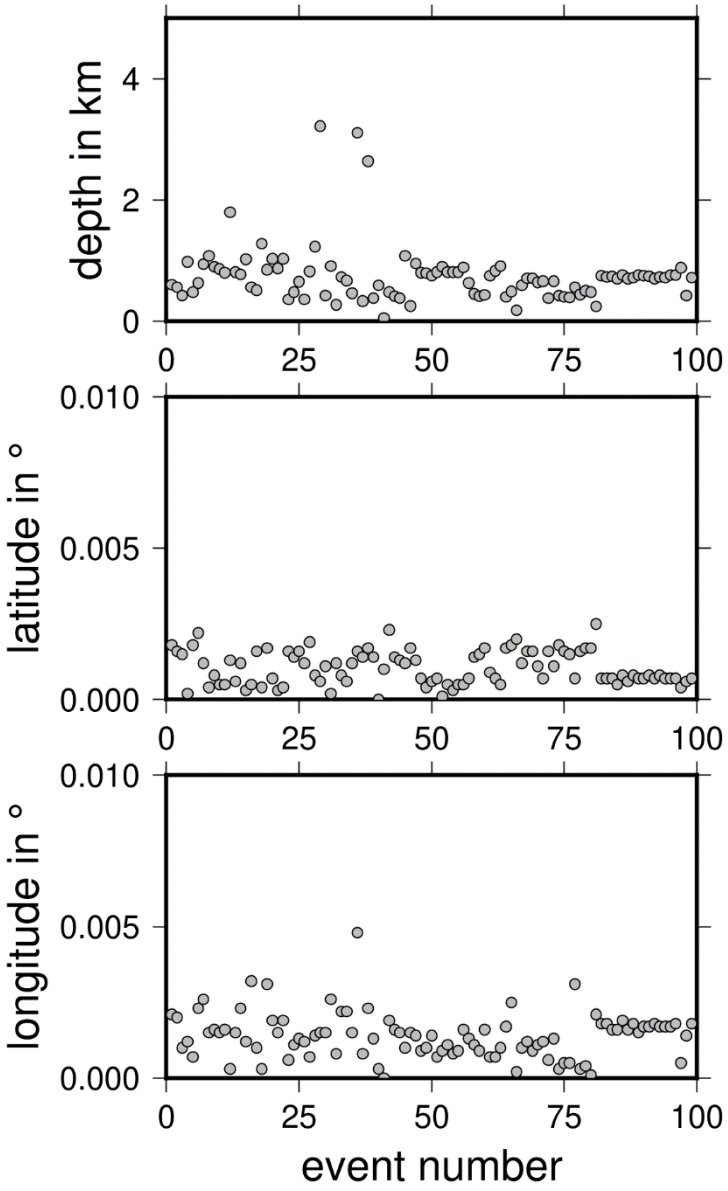

Fig. S1 Deviation of hypocenter locations after the shifttest with VELEST.

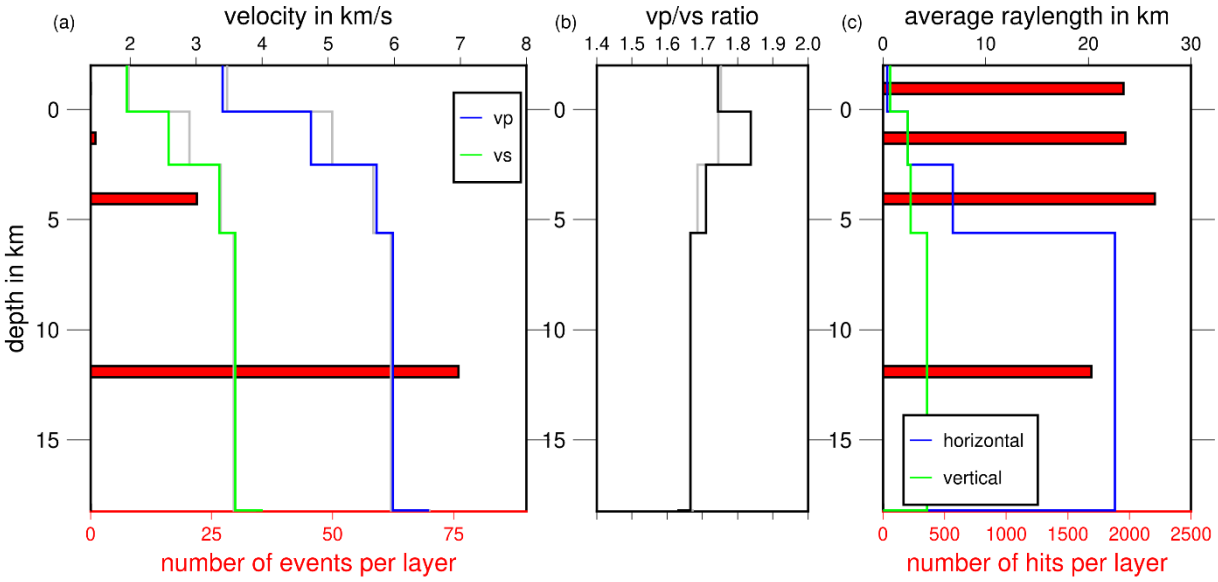

Fig. S2 a) Velocity models after the shifttest (green and blue). Grey lines represent input model ASZmod1. Red bars are scaled with the number of events in each layer of the velocity model.

b) *vp/v*-ratio after the shifttest.

c) Ray statistics of used ray paths. Red bars display number of hits per layer. Blue and green line give the average horizontal and vertical raylength.

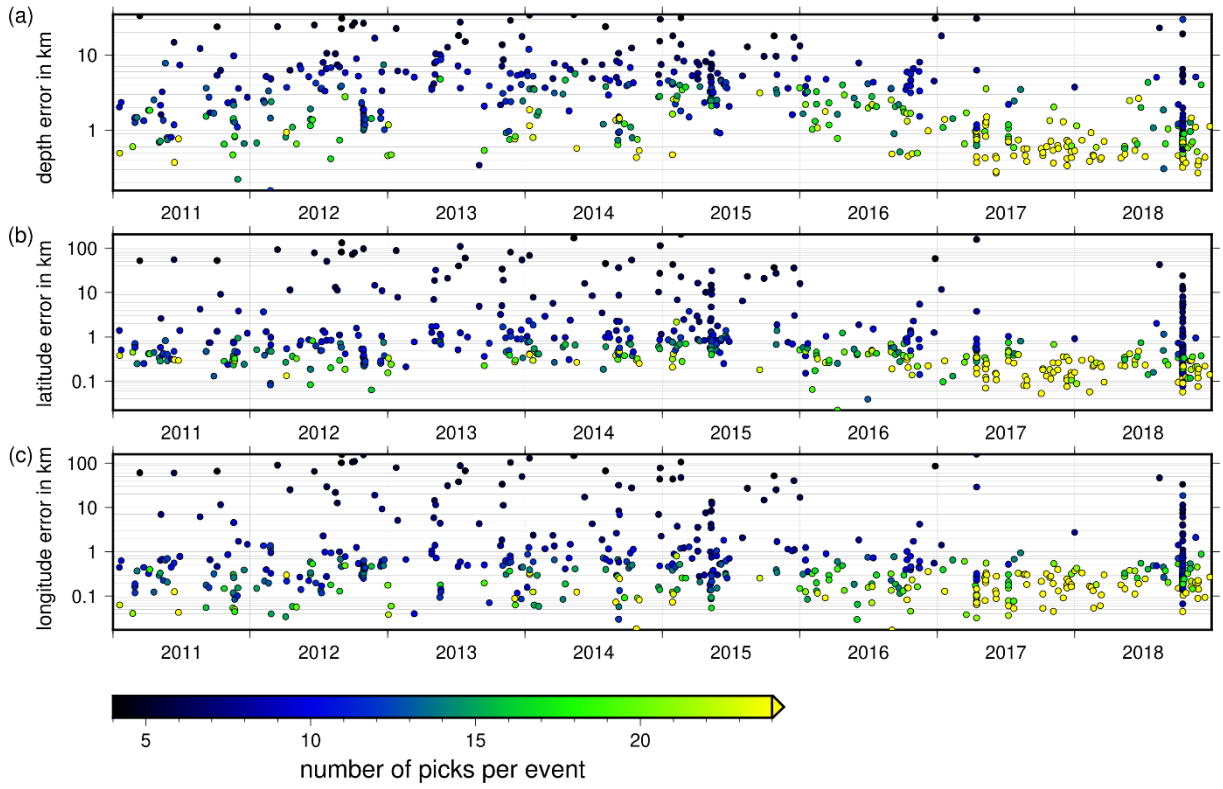

Fig. S3 Errors calculated from the 68% confidence ellipsoid from NLL with EDT for each event in the catalog for (a) depth, (b) latitude, and (c) longitude. The error values are color-coded with the number of picks, with dark colors indicating few picks and bright colors indicating many picks. Earthquakes with many observations can be located with smaller errors in depth and horizontally.

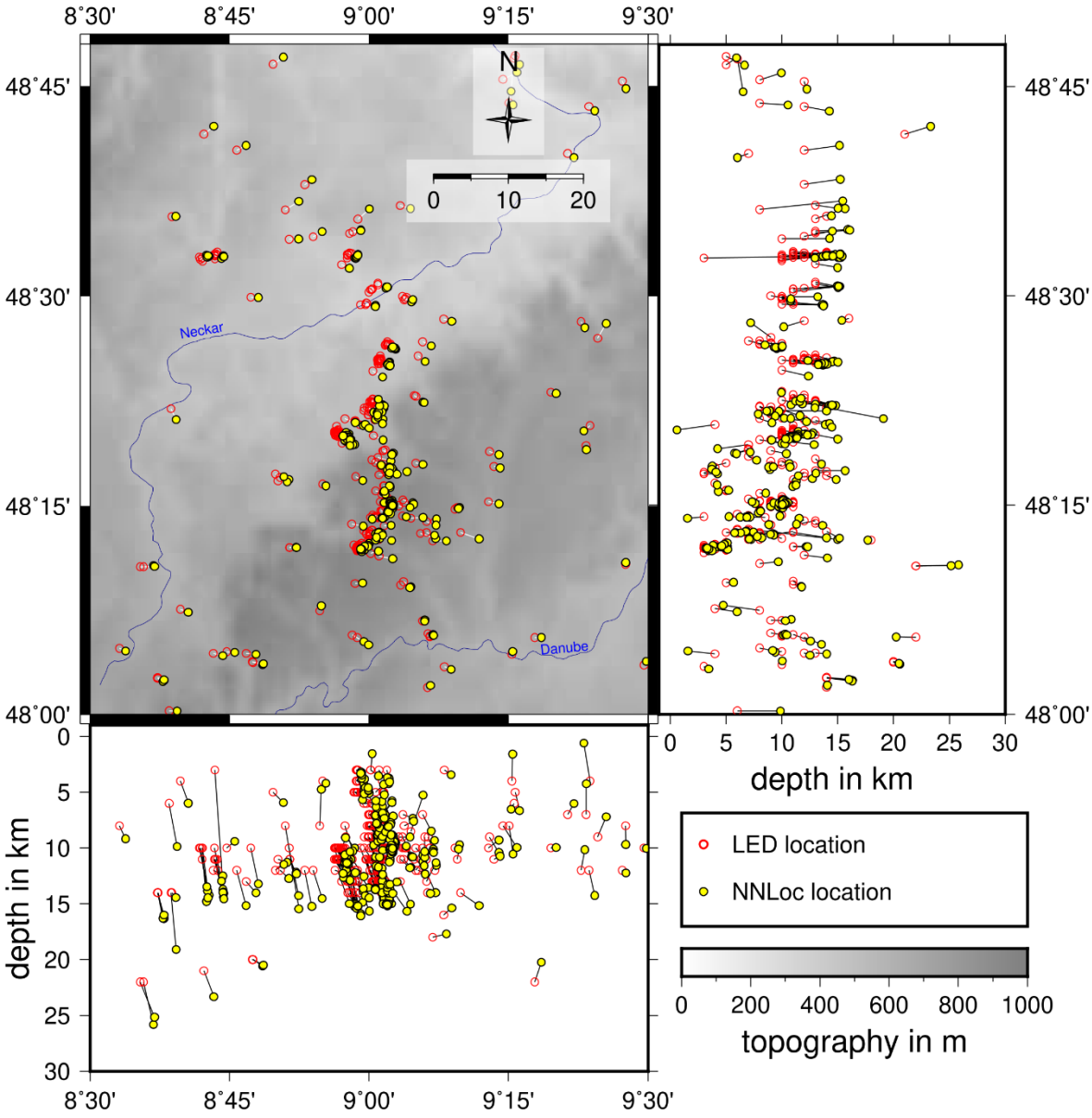

Fig. S4 Comparison of our well located events (yellow filled circles with more than eight travel time picks, a GAP smaller than 180°, a horizontal error estimate of less than 1 km, and a depth error of less than 2 km) with the LED routine event locations (red circles). For some events there is a large deviation in depth. Topography is based on the ETOPO1 Global Relief Model (Amante and Eakins, 2009).

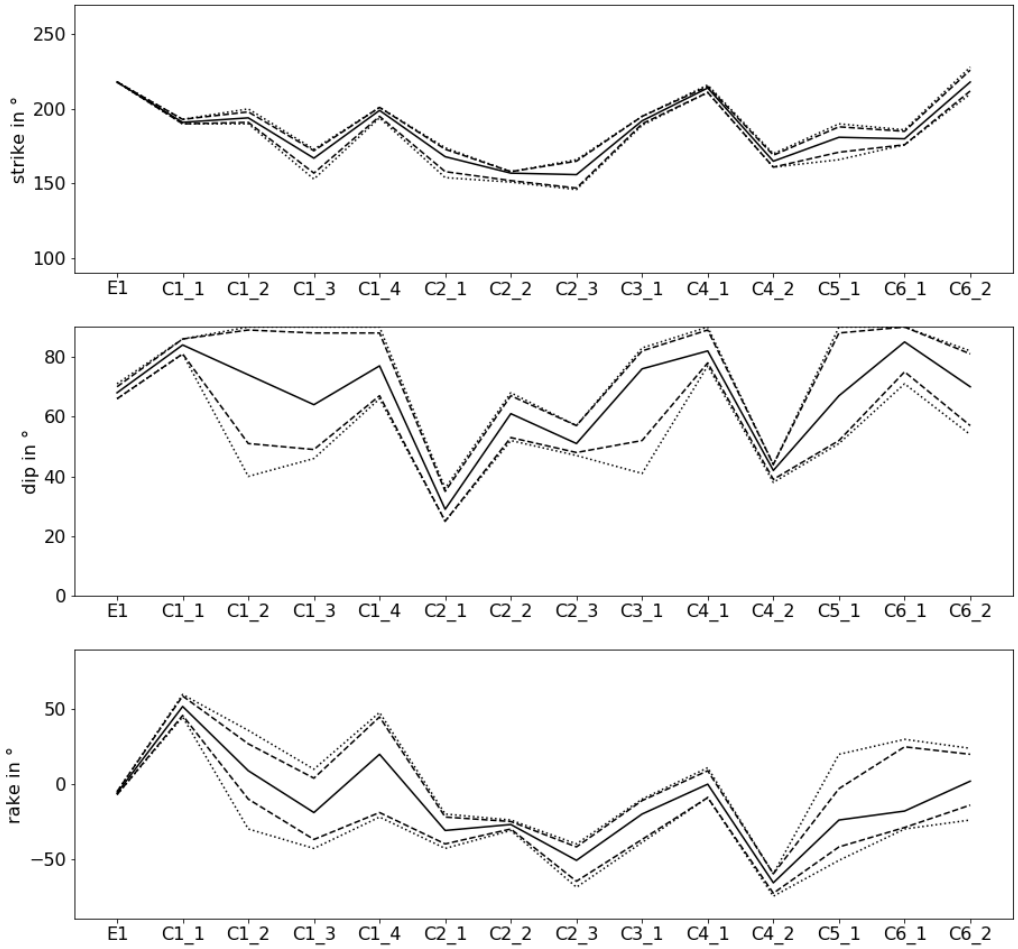

Fig. S5 Strike, dip, and rake of each cluster with minimum and maximum (dotted), 5 % and 95 % percentiles (dashed), and median (solid) of all solutions.

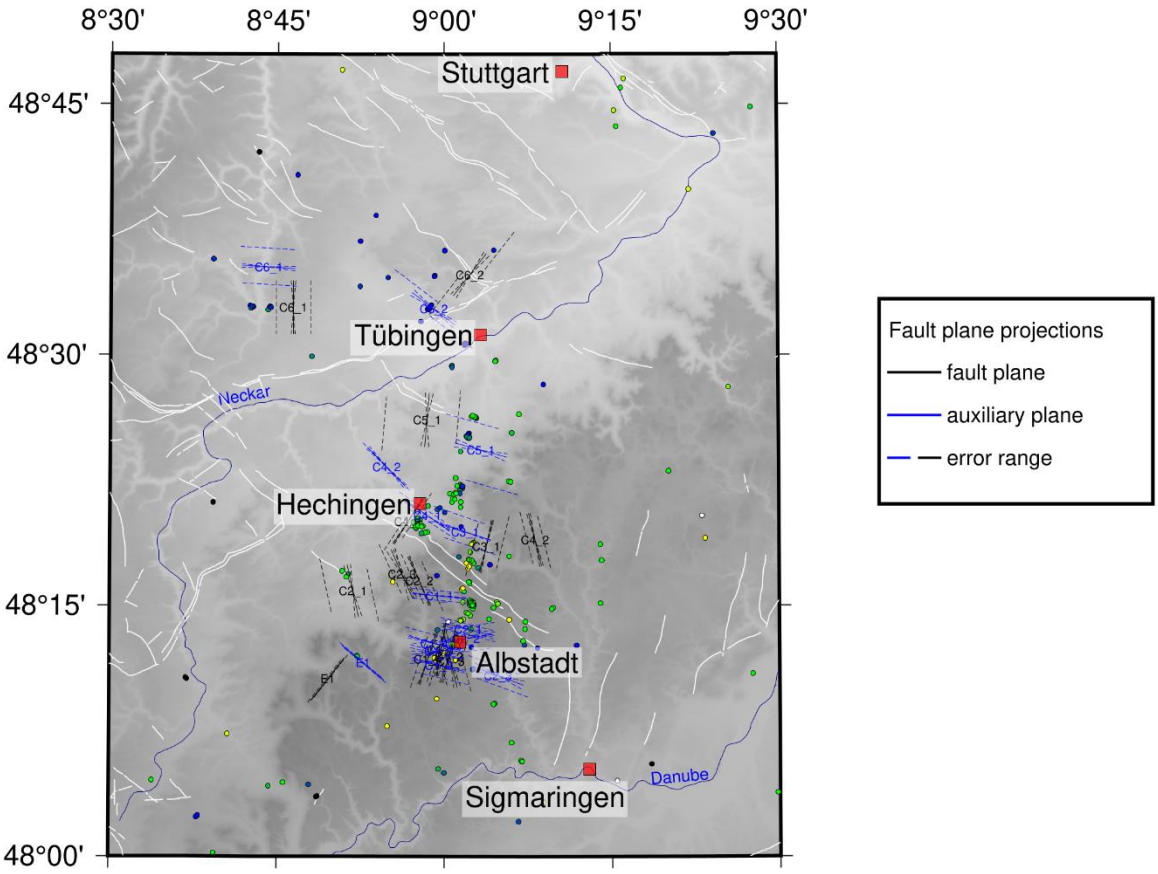

Fig. S6 Hypocenters of the 337 best located events with a horizontal error of less than 1 km and a depth error of less than 2 km. Only events with a GAP smaller than 180° and more than eight travel time picks are included. Hypocenters are pictured as circles, color-coded with depth (like Fig. 7). For all 36 focal mechanisms the fault and auxiliary plane projections are displayed together with the error range, estimated for strike and dip. Cluster codes are placed next to the fault projections. White lines indicate known and assumed faults (Regierungspräsidium Freiburg, Landesamt für Geologie, Rohstoffe und Bergbau (Hrsg.), 2019). Topography is based on the LIDAR Data (Geobasisdaten © LGL, www.lgl-bw.de).

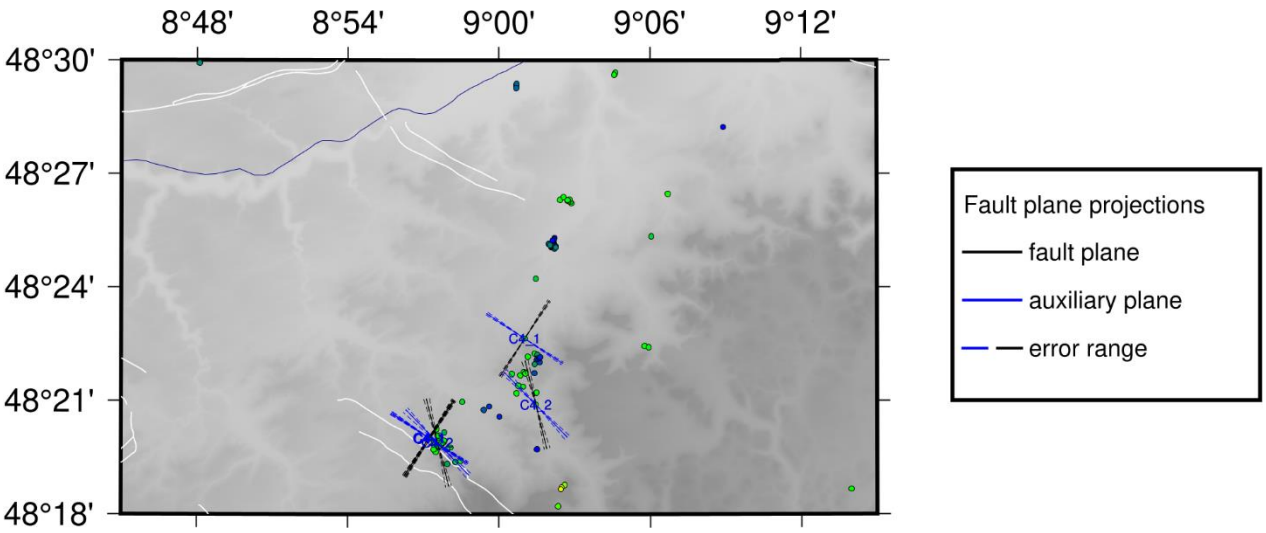

Fig. S7 Close up to the area of the Hechingen clusters C4_1 and C4_2. Fault line projections to the surface are based on the single hypocenter locations and not the cluster center. The auxiliary planes of the events close to the HZG have a similar strike as the HZG and are located directly at the northern HZG boundary fault. (symbols and colors like in Fig. 7 and S6)