APPENDIX

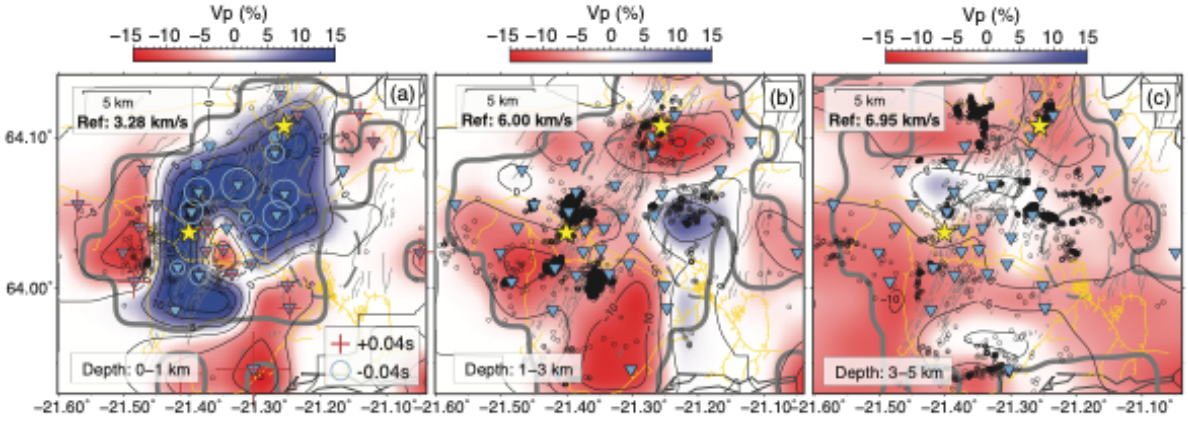

Figure A1. *Horizontal cross-sections of the Vp velocity models from the joint Vp+Vp/Vs inversion at 0, 2 and 4 km depth presented as relative change (in %) with respect to the reference 1-D model. The reference velocity of each layer is shown on the upper left-hand side of each figure. The thin black lines show velocity contour lines. The yellow and white lines mark the major roads that are important for orientation. The thick line marks the well-resolved areas with an RDE>0.7.*

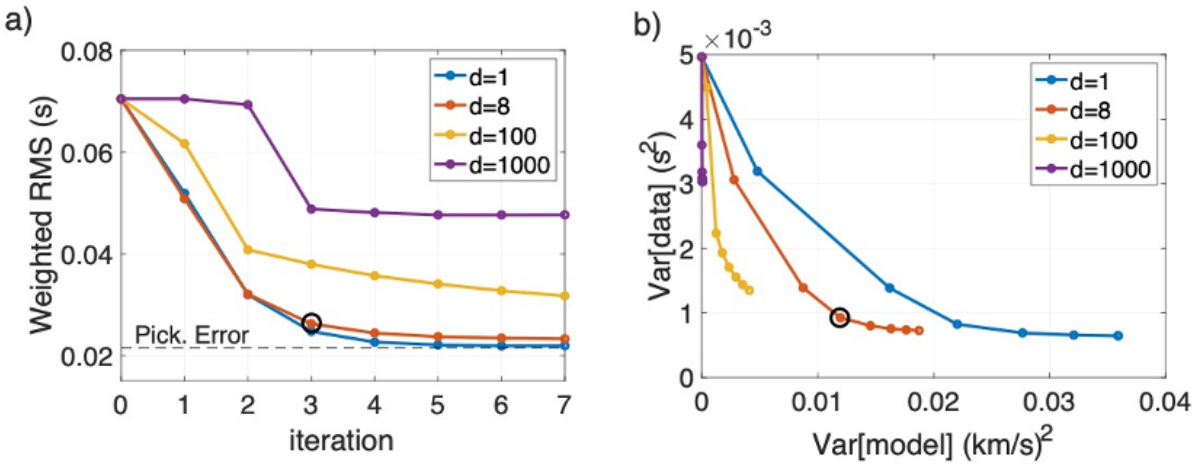

Figure A2. *Trade-off curves for P-wave data in combination with a 3kmx3kmx2km model parameterization, used to determine optimum damping parameters and number of inversion iterations. a) Weighted RMS values after seven iterations using various damping parameters. The dashed line corresponds to the average Pg-phase picking error. b) Data variance plotted against model variance using various damping parameters. Each dot in the curve corresponds to one iteration. A damping value of 8 with 3 iterations (black circle on figure) shows a good compromise between RMS misfit reduction and data variance.*

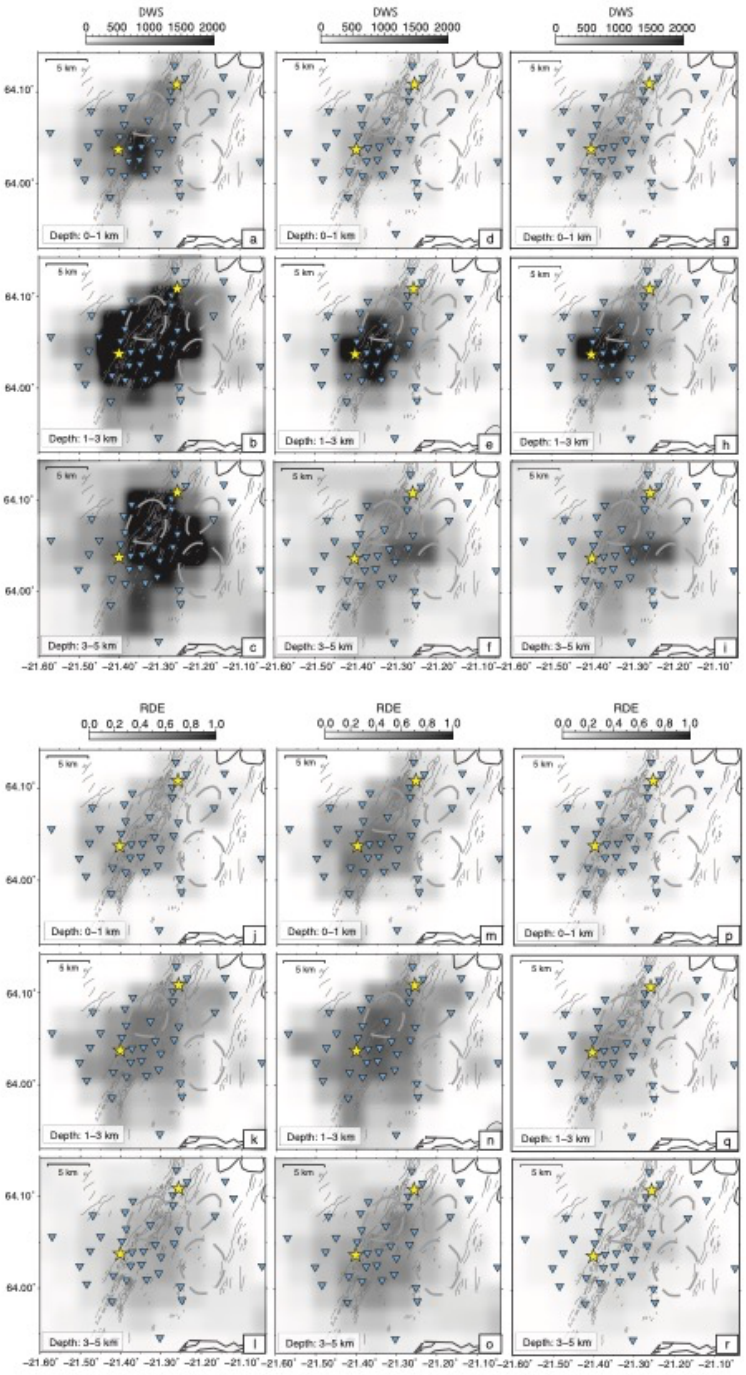

Figure A3. *Derivative Weight Sum (DWS) and Resolution Diagonal Elements (RDE) for the Vp, Vs and Vp/Vs inversions, respectively, at 0, 2 and 4 km depth. Yellow stars mark the power plants at Hellisheiði (south) and Nesjavellir (north). Blue inverted triangles are the seismic stations and gray dotted lines mark the three volcanic centers (Árnason et al., 1986).*

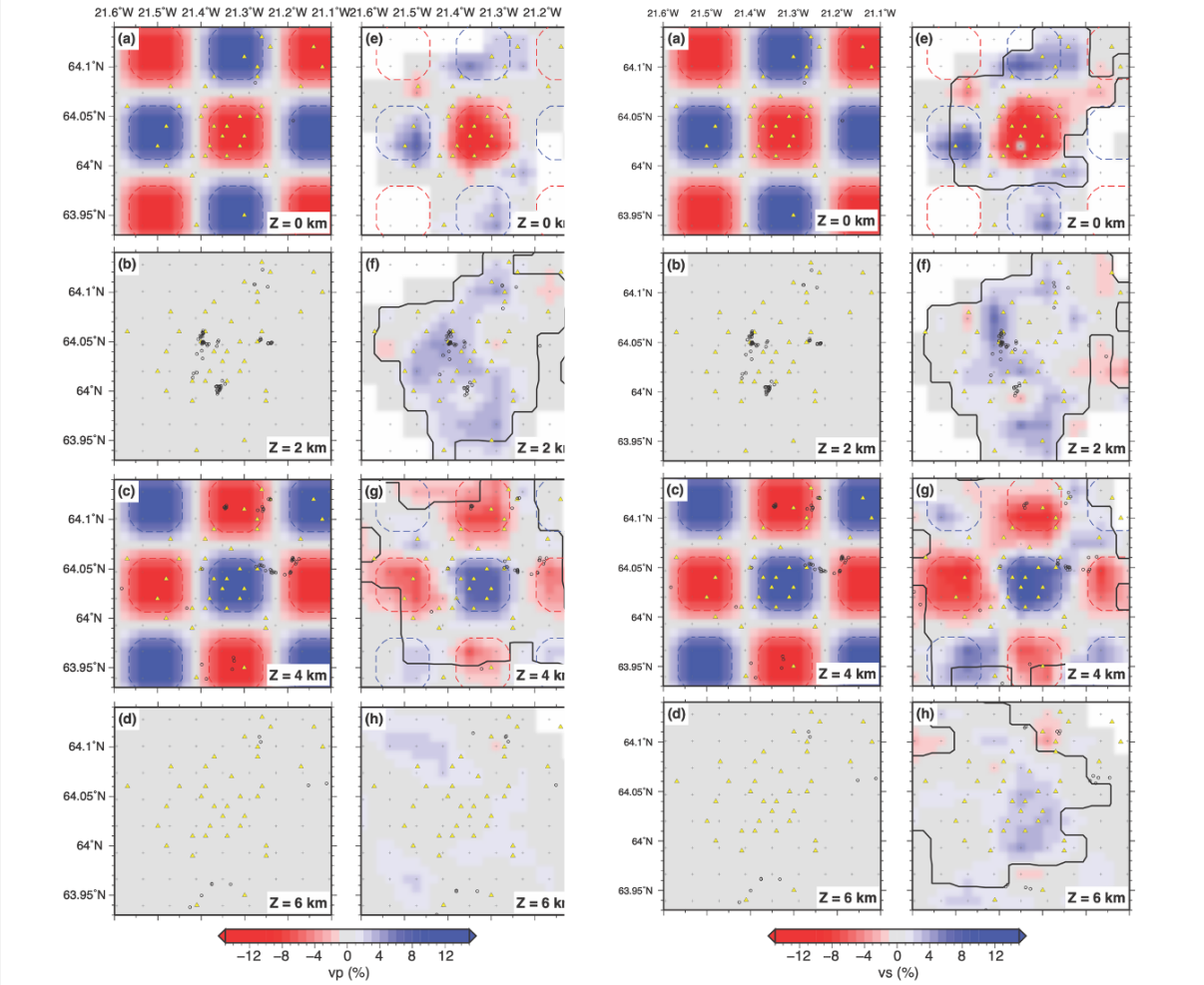

Figure A4 *Checkerboard tests for Vp (left side) and Vs (right side). A-d) show the introduced anomalies at depth of 0,2,4 and 6 km respectively. E-h show the recovered inversion. The black line indicates RDE>0.07.*

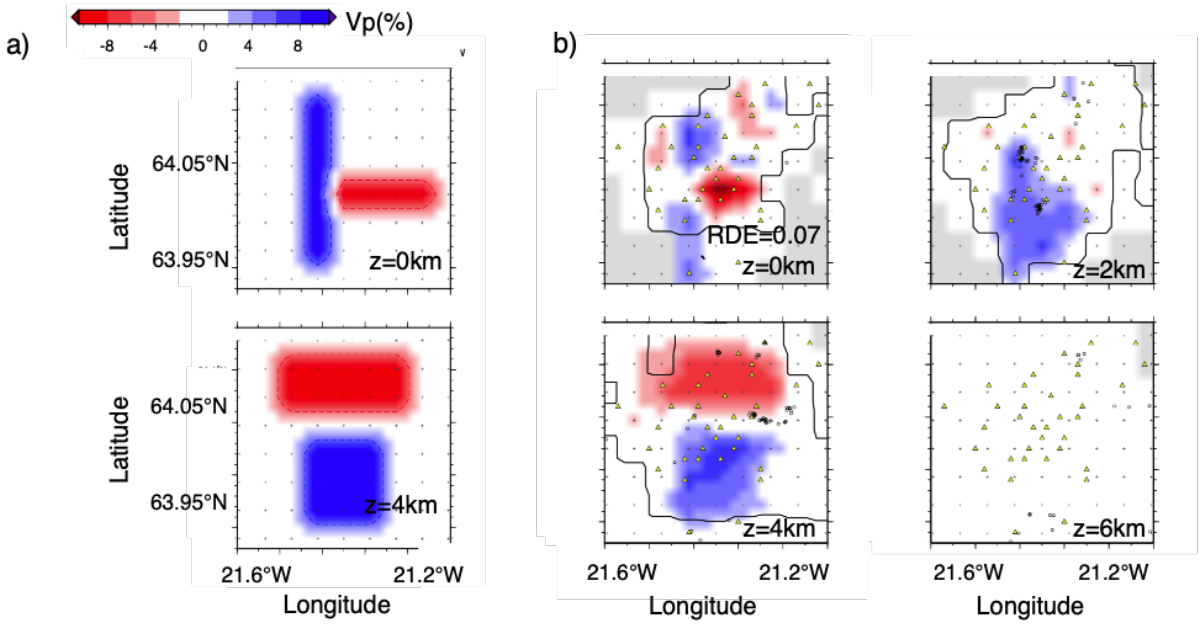

Figure A5. *a) Synthetic input model using ±10% Vp anomalies at 0±1 km and 4±1 km depth. B) Inversion obtained using the respective synthetic data outlined by the RDE=0.7 contour. The structures at 0 and 4 km depth are fairly*

well resolved in location and amplitude, while we observed leakage of the positive velocity anomaly at 3-5 km depth to shallower depth (2 km). The thin points mark the grid spacing.

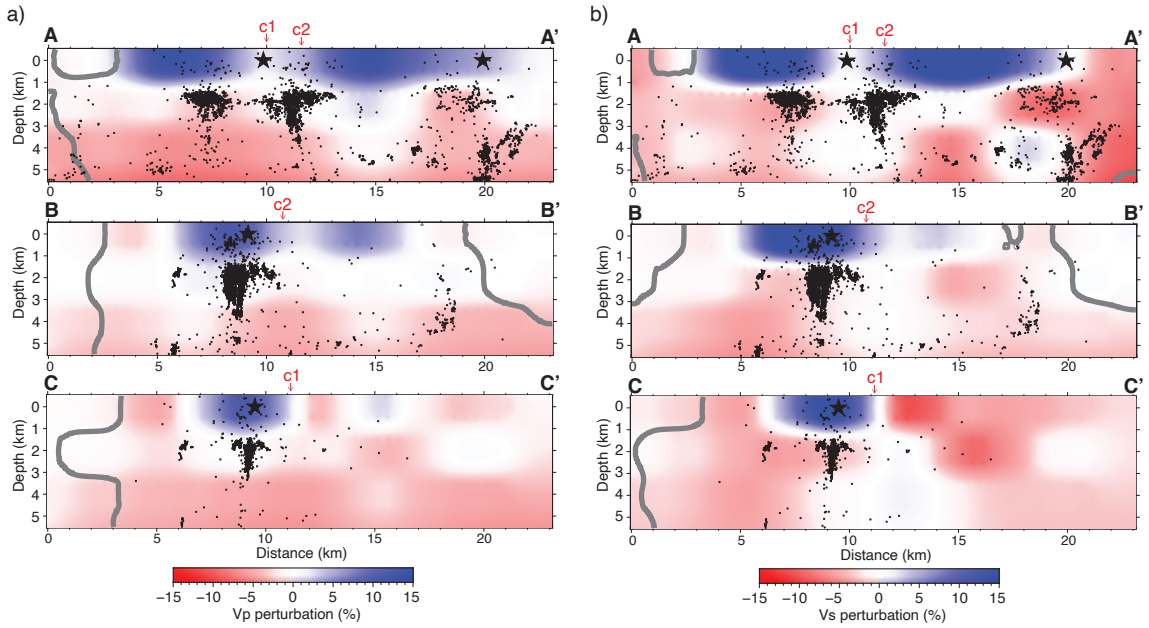

Figure A6: *Vertical cross-sections through (a) the Vp and (b) Vs models along the paths shown in Figure 6 a. The stars mark the location of the power plants. The seismicity 2 km around each transect is superimposed on the figures and shown as black dots. The grey line marks the well-resolved area with an RDE>0.7.*

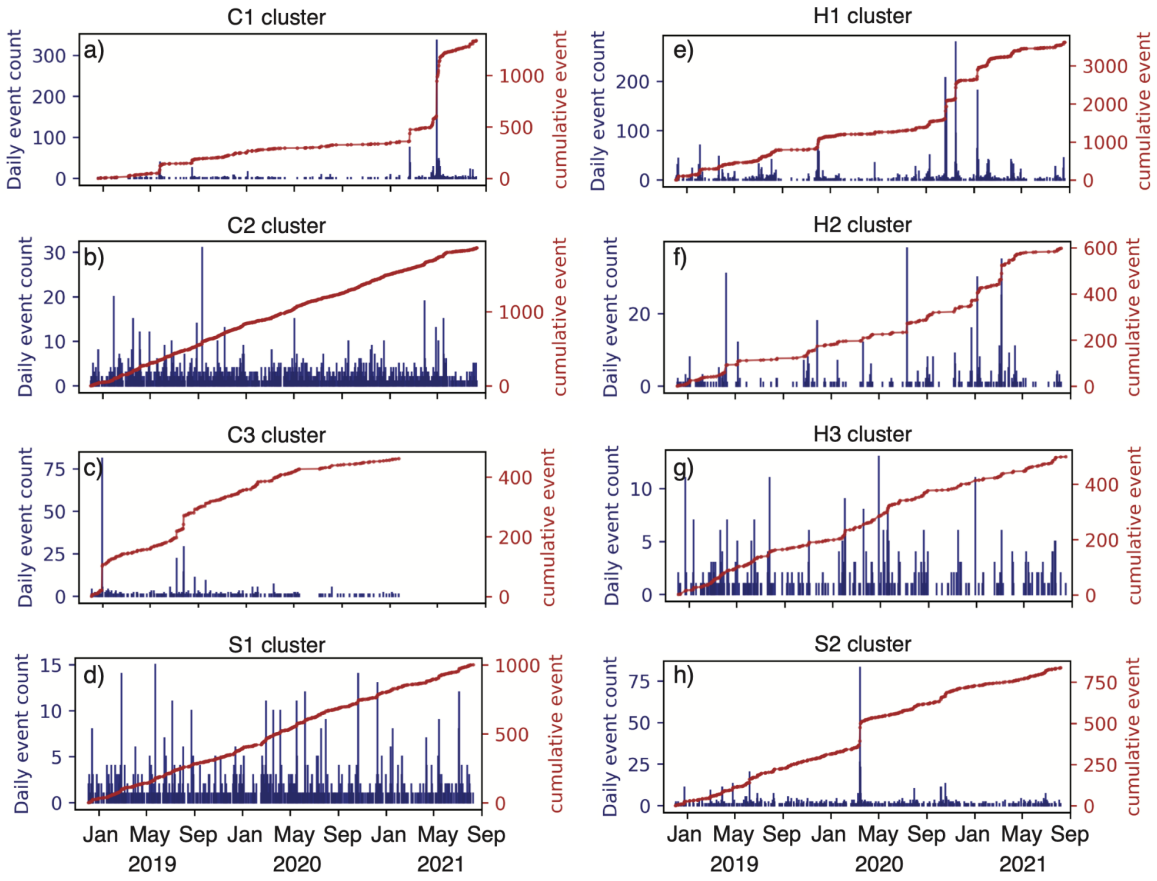

Figure A7: *Earthquake rates (blue bars) and cumulative event numbers (red lines) for each of the seismic clusters.*

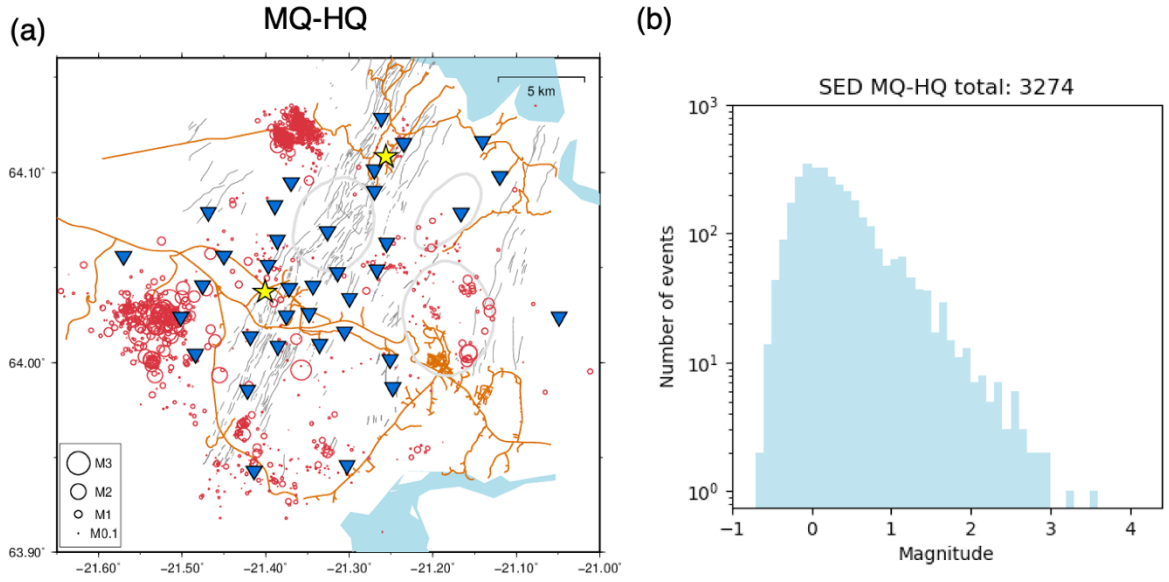

Figure A8: *Spatial (a) and statistical (b) difference between the MQ and HQ catalogues.*

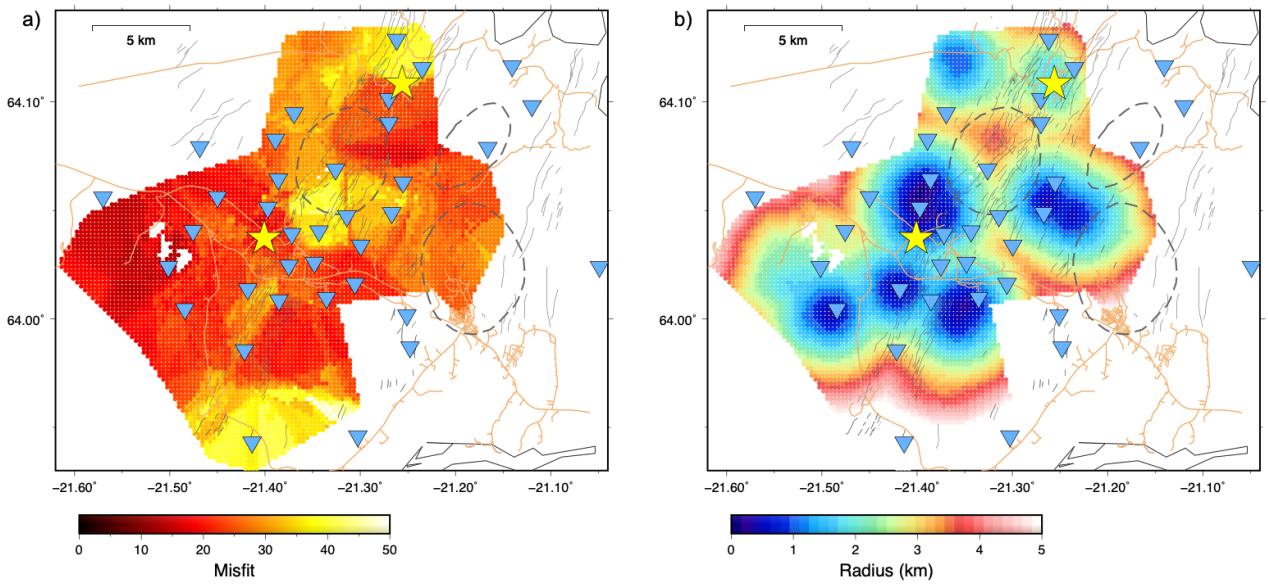

Figure A9: *a) the error associated to the b-value estimation. b) the spatial extension of the radius used to select 150 events.*