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3D thermo-rheological model under Yellowstone Caldera

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In order to investigate the rheological features of the crust beneath Yellowstone caldera, we performed a 3D thermal model followed by a 3D rheological model. To do this, we performed a 3D finite element stationary conductive model, by inverting the tomography model, and optimizing the geothermal heat source parameters.
We were able to characterize the structural domains in terms of thermal variations and brittle–ductile behaviour. In this contest, we generated several forward models consisting in a 3D stationary conductive solution of the thermal regime of the crust beneath Yellowstone caldera. We remark that the achieved results, relevant to the temperature distribution and the heat flow distribution, are also in agreement with previous studies (e.g. Hurwitz and Lowenstern, 2014; smith et al., 2009; Farrell et al., 2014) (fig. 36).
Finally, we use of the depth distribution of the iso-Curie surface computed using spectral analysis methods from aeromagnetic data, and a full earthquakes catalog to constrain and to validate our results. The absence of the deep geothermal well data were replaced by the presence of the few yet, representing heat flow measurements that converge with our heat flow result.