Application of the modified indirect EM geothermometer based on the joint using of the available MT and TEM data enabled constructing of the deep three-dimensional temperature model of the Hengill volcanic complex. Basing on the temperature model it is possible to guess that extremely high temperatures determined in the studied area originate from the molten liquid magma (with temperatures higher than basalt liquidus) upwelling from the mantle and accumulating in the shallow magma chamber located at the western margin of the studied area. It further leakages in the upper crust as two magma flows with the diameter around 3-5km: the northern arm is extending towards the Nesjavellir field and the southern one – to the Hellisheidiu and Hveraverdi fields.

The temperature distribution in the studied area enabled to detect a small-scale temperature anomaly located at the depth 15km beneath the Mt Hengill. It has a horizontal diameter 2.5-3km and maximal temperature reaching the basalt solidus. It is connected with the extensive and even hotter area located at depths 15-20km beneath the adjacent Nesjavellir geothermal filed.

The presence of a local heat source in the studied area explains the results of MT soundings, which have determined extremely well conducting layers at the depths corresponding to the locations of the high temperature intrusions. On the other hand, our results obtained for the Hengill volcanic complex are in agreement with the hypothesis that shear wave attenuation in Icelandic crust is caused by volcanoes and is not diagnostic of the crust as a whole.