Analysis of the temperature field around salt diapirs

The temperature field around salt diapirs has been calculated with a finite-element method, whose accuracy is estimated by comparing simulation results with analytical solutions. Temperature, anomaly, and heat flux are calculated in cross-sections through two-dimensional (2D) and axisymmetric (3D) structures. The anomalous temperature field extends to a lateral distance of about 3 diapir radii from the diapir center. At depth the anomaly disappears at about 2.5 times the depth to the base of the diapir. It appears that 3D structures focus the heat flux stronger than 2D structures. Thus the highest heat flux should be higher over 3D structures. On the other hand the areal extent of the temperature anomaly around the salt structures is less in the 3D case. Calculation examples indicate that low temperature geothermal energy exploitation of the formations around the top of a salt diapir can be favoured by a reduced drilling depth of 30% compared with the diapir-free case. It is further concluded that surface heat flow measurements in profiles across the diapir may be used in distinguishing between salt and shale diapirs.