Pockets of resistive material in the top ~1km may represent volcanic intrusions. Between 0.65 and 2.25km depth, there are resistive zones (but with lower resistivity) to the west of the most westerly sites. Satellite images and ground mapping indicate a linear, approximately N-S feature whose position is coincident with the eastern edge of these resistors. In the centre of the region, we do not have sites sufficiently far west to resolve this part of the model, and thus it is possible that the two resistors are part of a continuous feature. They could also be volcanic intrusions, or resistive sandstone as occurs in the Turkana region to the south, or the model could be sensing (but not able to resolve) a shallower basement to the west. Although E-W vertical cross-sections (Figure 7) indicate an approximately flat sediment-basin interface, the western side of the basin is not well constrained because of the site coverage, and so the model does not preclude a half-graben structure.

Conclusions

We have obtained, robustly processed and 3D modelled MT data at 31 sites in the eastern part of the Omo basin. 26 of these sites have data over a broad frequency range; at the remaining 5, the frequency cut-off is higher, restricting the penetration depth. The region is characterised by low resistivities, which also restrict the penetration depth. The dominant geoelectrical strike direction is approximately N-S, in agreement with the geological strike. The 3D model suggests a basin structure with maximum 4km of sediments in the south, 2km in the north. Only the basin closure to the east is imaged. Local pockets of high resistivity in the shallow sub-surface, and a more extensive resistive area at depths of around 1.5km on the western edge of the model, may be associated with volcanic intrusions in the sediments, although resistive sandstones or basement might indicate a half-graben structure. With further analysis, especially in conjunction with other geophysical and geological data from the region, we expect MT to be pivotal in forming structural and tectonic models and predicting the evolution of the rift in this area.

Publications

We have produced two reports (on the phase 1 acquisition and modelling, and a final report) for the Petroleum Operations Department of the Ethiopian Ministry of Mines and Energy, and White Nile Ltd. We intend to write a manuscript for publication in an international, peer-reviewed journal.

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