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# Geophysical and geochemical characterisation of groundwater resources in Western Zambia

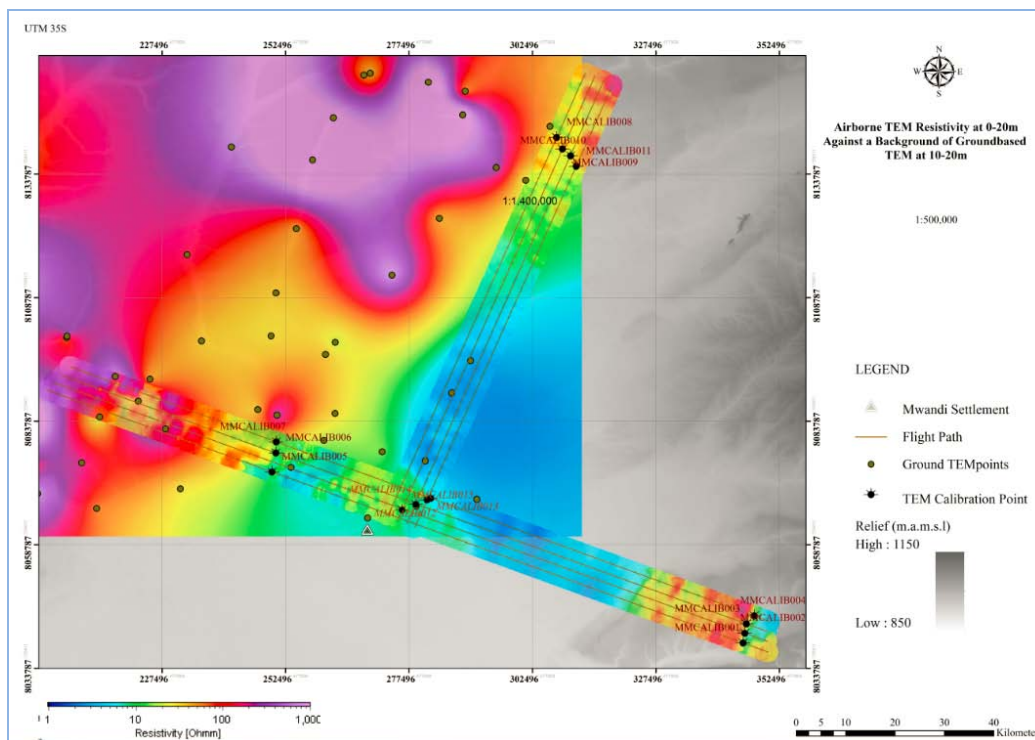
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## Abstract

Zambia's rural water supply system depends on groundwater resources to a large extent. However, groundwater resources are variable in both quantity and quality across the country and a national groundwater resources assessment and mapping program is presently not in place. In the Machile area in South-Western Zambia, groundwater quality problems are particularly acute. Saline groundwater occurrence is widespread and affects rural water supply, which is mainly based on shallow groundwater abstraction using hand pumps.

This study has mapped groundwater quality variations in the Machile area using both ground-based and airborne geophysical methods as well as extensive water quality sampling. The occurrence of saline groundwater follows a clear spatial pattern and appears to be related to the palaeo Lake Makgadikgadi, whose northernmost extension reached into the Machile area. Because the lake was a closed endorheic system over at least parts of its geologic history, evapo-concentration caused high lake water salinity and deposition of saline sediments. Those saline sediments are presently exposed at the land surface. Surface water – groundwater interaction as well as local recharge from precipitation has formed limited freshwater reservoirs in a generally saline area, which need to be sustainably managed.

We will present initial results from the geophysical and geochemical surveys conducted over the past few years. We will interpret these findings in terms of the geologic history of Southern Africa and link them to Lake Palaeo Makgadikgadi. Finally, we will discuss implications for sustainable groundwater resources management in the area.



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