AN INTEGRATED HYDROGEOPHYSICAL APPROACH TO EXPLORING FOR GROUNDWATER RESOURCES IN SOUTHERN NORTHERN TERRITORY

Laura Gow[1], Niels B. Christensen[2], John Wischusen[3], Ken Lawrie[1], Donna Cathro[1], Sam Buchanan[1], Martin Smith[1], & KokPiang Tan[1]*

[1]Geoscience Australia, laura.gow@ga.gov.au; ken.lawrie@ga.gov.au; sam.buchanan@ga.gov.au; kokpiang.tan@ga.gov.au
[2]Aarhus University, nbc@geo.au.dk
[3]Northern Territory Department of Environment and Natural Resources, john.wischusen@nt.gov.au

In Australia's semi-arid and arid interior, groundwater resources provide water supply security for agriculture and community consumptive use and are critical for underpinning economic development. . The Southern Stuart Corridor Project in central Australia, is an inter-disciplinary study which aims to better characterise regional groundwater systems and identify the location, quantity and quality of new groundwater resources. The main aims of the project are(1) to de-risk investment in development of a potential agricultural precinct in the Western Davenport Basin, and expansion of horticulture in Ti-Tree Basin, (2) to identify future water supplies for Alice Springs and Tennant Creek, and (3) for regional water supplies for mineral resource development.

The project is funded by Geoscience Australia (GA) as part of the Exploring for the Future (EFTF) Programme. The project integrates airborne electromagnetic (AEM), ground geophysics (ground magnetic resonance (GMR) and borehole geophysics (Induction, gamma and nuclear Magnetic Resonance (NMR)) with drilling and pump testing; hydrochemistry and geochronology; and geomorphic, geological, hydrogeological and structural mapping and modelling. Advancements in temporal remote sensing technologies for surface hydrology, vegetation and landscape mapping are also used to facilitate the identification of recharge and discharge zones and groundwater-dependent vegetation.

This paper reports on initial AEM inversion results for the Alice Springs, Ti-Tree Basin, Western Davenport and Tennant Creek areas and the use of a machine learning approach for rapid geological and hydrogeological interpretation of the AEM data. These machine learning approaches have the potential to significantly reduce interpretation time and facilitate the rapid delivery of project results.