Geophysical Research Abstracts, Vol. 9, 10668, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-10668

Combining high-resolution LiDAR elevation model, airborne electromagnetic data and petrophysical results of drill cores to determine the salt budget of the Chowilla Floodplain, South Australia

K.P. Tan (1), T. Munday (2), A. Fitzpatrick (2) and K. C. Lawrie (1)

1. Cooperative Research Centre for Landscape, Environments & Mineral Exploration (CRC LEME), c/o Geoscience Australia, GPO Box 378, ACT 2601. Tel: 02 6249 9847; Fax: 02 6249 9930; e-mail: ken.lawrie@ga.gov.au
2. CRC LEME, c/o CSIRO Exploration and Mining, PO Box 1130, Bentley, WA 6012, Australia

The Murray River in SE Australia is the main source of water for irrigation in the Murray Basin, and is the water supply for numerous towns and the city of Adelaide. Water quality in the Murray River is threatened by salt inflows from groundwaters on a large scale along several reaches of the river, and numerous salt interception schemes have been engineered to reduce these salt inflows. In the last few decades, reductions in river flow have seen a substantive decrease in the magnitude and frequency of flood events in the River Murray Corridor. As a result, there are concerns about the build up of salt in the floodplain, and the potential for salts stored in the unsaturated zone to be mobilised during less frequent floods, either natural or during engineered environmental flows. There is also a need to delineate the hydrodynamic interactions between the saline groundwater and the river and shallow freshwater lenses in the floodplain.

In 2005-06 a number of high-resolution geophysical and remotely sensed datasets were acquired to assist with assessing these issues in the Chowilla reach of the Murray floodplain (South Australia). Datasets included a helicopter-borne frequency domain airborne electromagnetic (AEM) survey and a laser altimetry (LiDAR) survey. The latter provides a centimetre-resolution digital elevation dataset. This elevation data is a basis for interpreting the floodplain geomorphic units. Together with drill-hole

information, sedimentary textures and thicknesses can be inferred and mapped and the subsequent electrical conductivity values from AEM data can be interpreted more accurately.

The digital elevation model draped over the conductivity depth slice intervals (CDI) shows the presence of the resistive and unsaturated mallee plains, lunettes and some elevated terraces. In the saturated zone, a distinct resistive flush zone is present along the Murray River, extending laterally to approximately 1km on both side of the river. A drilling program is being planned and aimed at obtaining uncontaminated sediment cores and pore fluids. The permeability and salt budget of the sediment will be calculated and a model of the amount of salt stored in the floodplain produced. This product will help determine the risk of the river from salinisation following a massive flood event.