

MAPPING SOIL AND REGOLITH PROPERTIES IN 3-DIMENSIONS USING ELECTROMAGNETIC IMAGING IN THE LOWER GWYDIR VALLEY, NSW, AUSTRALIA

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The clay alluvial plains of north-western New South Wales (NSW) are dominated by uniformly textured clay-rich Vertisols and are primarily used for irrigated cotton production. Unfortunately prior stream channels, characterised by Chromosols which are of a duplex nature, occupy 15 % of the landscape. In these channels, deep drainage leads to water use inefficiencies. In order to improve water management in these irrigated areas, these channels need to be mapped in terms of their areal extent and stratigraphy. In this paper we use legacy apparent electrical conductivity (σ_a) data, measured using an EM38 and EM34, from the Ashley area of the lower Gwydir valley, NSW. The EM data is modelled using a 1-dimensionally spatially constrained inversion algorithm to develop a quasi 3-d true electrical conductivity (σ) model. We calibrate σ to map the distribution of clay content and electrical conductivity of a saturated paste extract (ECe) at different depths. The EM38 provides information which assists in mapping clay content and CEC within the root-zone (0 to ~1.5 m) whilst the EM34 provides information useful for mapping these soil properties in underlying strata (>7 m).