Geophysical Research Abstracts, Vol. 8, 00377, 2006
SRef-ID:

Perennial vegetation growth differentiated by depth to silcrete layer and modelled using geophysical and topographic data at the hillslope scale.

Pracilio G.* (1)., Smettem K.R.J. (1), Harper R.J. (1,2), and Adams M.L.(3)

(1) Co-operative Research Centre for Plant-based Management of Dryland Salinity, University of Western Australia, Crawley WA, Australia (*pracilio@cwr.uwa.edu.au) (2) Forest Products Commission, Rivervale, WA, Aust. (3) Department of Land Information, Floreat, WA Aust.

Reestablishment of a perennial vegetation system, in dryland agricultural areas of Australia, is gaining momentum due to the perceived benefits for salinity control. Salinity control requires in part higher water use by perennial plants (compared to annual cropping systems) to reduce shallow water tables. In planning for a future sustainable farming system, understanding the soil, plant, and climate continuum is particularly important to maximise plant growth rates to increase water use and economic returns. In environments where annual pan evaporation greatly exceeds rainfall, water is a limiting factor to vegetation growth. For a property located north east of Perth, Western Australia, variability in plant growth at the hillslope scale was observed by continuously measuring tree height (Eucalyptus polybractea) of an established agro forestry system. Subsurface features important to plant growth were measured by drilling. The variability in growth was related to depth to a silcrete hardpan, representing variable water storage. Maximum growth was associated with a depth to silcrete of 4 to 6 m. Geophysical and topographic data were collected to spatially represent to the soil continuum and an empirical regression tree model of tree height with these spatial data was used to identify remotely measured properties that influenced vegetation growth. Total count from radiometric data was suitable for identifying the sand plain landform as a site which includes the best growth and suitable soil depths. Within the sandplain, elevation was a suitable surrogate for identifying the down slope edge of the sandplain associated with shallow depths to silcrete and susceptibility to drought death. This study illustrates how the spatial pattern of plant growth can be modeled at the hillslope scale using a combination of remotely sensed parameters augmented

with a field drilling program. The results may be applicable for identifying landforms suitable for maximizing perennial plant growth in water limiting environments.