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Spectral information system for Australian spectroscopy data

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Abstract

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TITLE: Spectral Information System for Australian Spectroscopy Data

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ABSTRACT BODY: Inherently field spectroscopy involves the study of the interrelationships between the spectral characteristics of objects and their biophysical attributes in the field environment (Bauer et al., 1986; Milton, 1987). Spectroscopy measurements taken of vegetated surfaces provide spectral characteristics indicative of the status, composition and structure of the components measured. However, additional elements are present that add undesired effects to the overall signal such as the soil background or the viewing and illumination geometry (Suarez etal 2013). Further, the leaf spectrum is affected by several factors including leaf age, phenology, a highly variable range of stressors, any of which may be the actual focus of study, and additionally influenced by a range of environmental conditions. There is a critical need to use acquired spectra to infer vegetation function, understand phenological cycles, characterise biodiversity or as part of the process to assess biogeochemical processes. However the collection of leaf spectra during field campaigns is undertaken on a project basis, where a large number of spectra tend to be collected, yet the value and ability to share and confidently re-use such collections is often restricted. Often this is because the data are stored in disparate silos with little, if any, consistency in formatting and content, and most importantly, lack metadata to aid their discovery and re-use. These datasets have significant potential for vegetation scientists but also benefit the wider earth observation remote sensing and other earth science communities. In Australia this problem has been addressed by the adoption and enhancement of the existing SPECCHIO system (Hueni et al. 2009) as a suitable standard for spectral data exchange. As a spectral database, the system provides storage of spectra and associated metadata, retrieval of spectral data using metadata space queries, information on provenance, all of which facilitate repeatability of data processing. When associated with intelligent software, data is not only retrievable and usable by other users or systems, but additional processing functionalities become available which further transform the data/information held by the information system (Chisholm et al 2013). The Australian remote sensing community has moved towards a system that can support scientists in analysing their data using the full potential of combined metadata spaces (Wason and Wiley, 2000) and spectral spaces (Hueni et al 2012). Combined with efforts towards establishing a metadata standard, the development of best practice protocols, and conceptualisation of the spectroscopy data life cycle, a series of operational case studies from operational testing serve to highlight the capacity of the system to capture and manage an expanding range of spectroscopy research data. This paper will summarise case studies to illustrate the use of the system as data repository and as a platform for post-processing and storage of according results in the database. This approach will address the use of the system to characterize vegetation attributes which infer function, and uses which demonstrate the generic nature of the SPECCHIO system for the handling of

in-situ spectral data and metadata, and as a platform for post-processing and storage of according results in the database.

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