Bio-optical datasets: best practice and legacy datasets

Report on first meeting, 18-22 June 2012

Our first meeting drew on expertise in a wide range of applications of field spectroscopy (including inland and marine, geological, vegetation) as well as in instrumentation and calibration and of the use of spectroradiometers in validation of other remote sensing datasets. Importantly, the meeting also drew on expertise in informatics, specialist databases and metadata to consider how best archiving and exchange systems might best be designed. This expertise was drawn both internationally and from Australia.

The meeting was seen as very timely given a number of parallel international and national perspectives that are leading to widespread recognition of the need for better tools to manage spectral datasets; datasets which are often of high value but are not easily discoverable.

The following experts were present at the workshop:

Name	Institution	Role / Expertise
Tim Malthus	CSIRO Division of Land and Water, Canberra	PI, field spectroscopy, calibration and validation
John Gamon	University of Alberta, Canada	Convenor of SpecNet community
Phil Townsend	University of Wisconsin, USA	Vegetation spectroscopy
Chris MacLellan	NERC Field Spectroscopy Facility, University of Edinburgh, UK	Calibration and validation
Andy Hueni	RSL, University of Zurich, Switzerland	Writer of SPECCHIO software
Alfredo Huete	University of Technology Sydney	Spectroscopy for phenological studies
Laurie Chisholm	University of Wollongong	Field spectroscopy
Simon Jones	Royal Melbourne Institute of Technology	Vegetation spectroscopy
Stuart Phinn	University of Queensland	Terrestrial and aquatic spectroscopy
Cindy Ong	CSIRO Earth Science and Resource Engineering, Perth	Geological and mineral spectroscopy
Barbara Rasaiah	Royal Melbourne Institute of Technology	Metadata and informatics (PhD student)
Chris Roelfsma	University of Queensland	Aquatic spectroscopy
Lola Suarez	Royal Melbourne Institute of Technology	Remote sensing of vegetation
Rebecca Trevithick	Department of Science, Information Technology, Innovation and the Arts, Queensland	Informatics and data archiving
Matthew Wyatt	IVEC, Western Australia	Metadata and informatics
Carlos Aya	Intersect, NSW	Senior IT developer

The aims of the workshop were to drive best practice in field measurement and to lay the foundations for an international standard approach for the exchange of spectral datasets. Critical questions which were discussed were:

- What are the key criteria for assessing the quality and robustness of a spectral signature obtained in the field?
- What are the key components that lead to the acquisition of high quality spectra in the field?
- What is the best means by which the spectrum and its metadata can be exchanged and stored to preserve its quality and robustness?

Through four and a half days of presentations, breakout groups and general discussion, the meeting focused initially on agenda setting, then on metadata and informatics solutions to arrive at a synthesis and identification of next steps. Metadata were recognized as the key to long-term usage and sharing of field spectral data. However, standards to ensure quality in data collection are required to facilitate accurate cross comparison of data from different studies; currently there is no international backbone that ensures this.

It was recognized that a careful balance needed to be struck between three key factors: the diversity of studies undertaken using field spectroscopy, the diversity of instrumentation used and the need for some strictness in standards to ensure data quality and legacy value. Any standards developed also need to build in flexibility to cope with new innovations in the technology.

The meeting was highly successful in forming an outline of best practice to improve data collection in the field. Through breakout sessions, the group began the identification of core metadata requirements for a number of different applications (soils, underwater spectra and vegetation). A variety of methods to both exchange and store spectral data were presented and discussed as were novel tools to assist in summarising the completeness and quality of such datasets. It was recognized that tools are required to help ease the burden of input of metadata. The role of peer review in determining quality was also discussed. The need for care in the preparation of field protocols and of recording data in the field was widely recognized.

The meeting agreed that with modifications, the SPECCHIO software could meet international objectives to solve the problem. It is intended meeting outcomes will be communicated via a proposal to publish a special issue of an international remote sensing journal on field spectroscopy in support of remote sensing studies.