

OPTIMISE



Innovative Optical Tools For Proximal Sensing
Of Ecophysiological Processes

COST Action ES1309
Earth System Science and Environmental Management (ESSEM)

Workshop to Develop draft cal/val and NG EO science plan in the
OPTIMISE context to support ESA FLEX

@ the National Institute for Laser, Plasma and Radiation Physics,
Center for Advanced Laser Technologies,
Center for Science Education and Training,
Magurele, Romania

Dr Alasdair Mac Arthur
Senior researcher in passive Earth observation,
GeoSciences, U. of Edinburgh
Chair COST Action ES1309 'OPTIMISE'



COST is supported by the EU
Framework Programme Horizon 2020



Measurement and instrument inter-comparisons



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Remote Sensing of Environment 103 (2006) 274–285
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of spectral indices obtained using multiple spectroradiometers

K.L. Castro
Remote Sensing of Environment 103 (2006) 274–285
Received 14 April 2002

of spectral sensor configurations on the FLD retrieval accuracy

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Received 14 April 2002



Comparison of Sun-Induced Chlorophyll Fluorescence Estimates Obtained from Four Portable Field Spectroradiometers

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Abstract: Remote sensing of Sun-induced chlorophyll fluorescence (SIF) is a research field of growing interest because it offers the potential to quantify actual photosynthesis and to monitor plant status. New satellite missions from the European Space Agency, such as the Earth Explorer-3 Fluorescence Explorer (FLEX) mission—scheduled to launch in 2022 and aiming at SIF mapping—and from the National Aeronautics and Space Administration (NASA) such as the Orbiting Carbon Observatory-2 (OCO-2) sampling mission launched in July 2014, provide the capability to measure SIF from space. The development of SIF signal from airborne and satellite platforms in difficult outdoor ground level data are needed for calibration/validation. This study presents a comparison between SIF measurements from four spectroradiometers to retrieve SIF. The results show that an accurate far-red SIF estimation can be achieved using spectroradiometers with an ultrafine resolution (less than 1 nm), while the mid-SIF estimation requires even higher spectral resolutions (less than 0.5 nm). Moreover, it is shown that the Signal-to-Noise Ratio (SNR) plays a significant role in the precision of the far-red SIF measurements.

Keywords: sun-induced chlorophyll fluorescence (SIF); field spectroscopy; sensor characteristics; SIF retrieval methods; Fm and/or line depth (FLD); spectral resolution; signal to noise ratio (SNR); SIF calibration/validation

Inter-comparison of hemispherical conical reflectance factors (HCRF) measured with four fibre-based spectrometers

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Abstract: We describe the results of an experiment designed to compare the radiometric performance of four different spectroradiometers in ideal field conditions. A carefully designed experiment where instruments were simultaneously triggered was used to measure the Hemispherical Conical Reflectance Factors (HCRF) of four targets of varying reflectance. The experiment was in two parts. Stage 1 covered a 2-hour period finishing at target noon, where 50 measurements of the targets were collected in the sequence. Stage 2 comprised 10 rapid sequential measurements over each variability in the raw data. The work allowed us to determine data reproducibility, and we found that lower-cost instruments (Ocean Optics and PP Systems) produced data of similar quality to more expensive instruments (Analytical Spectral Devices (ASD) and Ocean Optics FieldSpec Pro) in the spectral range 400–850 nm, where we used the ASD vegetation dynamics. Over the longer time-series there were changes in HCRF caused by the structural and spectral characteristics of some targets.

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OCIS codes: (280.2020) Remote sensing and sensors; (280.4780) Optical sensing and sensors.
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Received 22 Aug 2012; revised 2 Nov 2012; accepted 4 Nov 2012; published 7 Jan 2013
14 January 2013 / Vol. 21, No. 1 / OPTICS EXPRESS 665



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Instruments need to be calibrated and characterised by common standards, methods and protocols

Field spectrometer calibration needs to be validated in the field and repeated during temporal sampling periods

- Proximal hyperspectral measurements to support FLEX need to be able to resolve changes $< 2\%$ of TOC calibrated radiances and do so over extended periods logging in the field
- Calibration to a common standard will be required
- A field calibration validation system is need

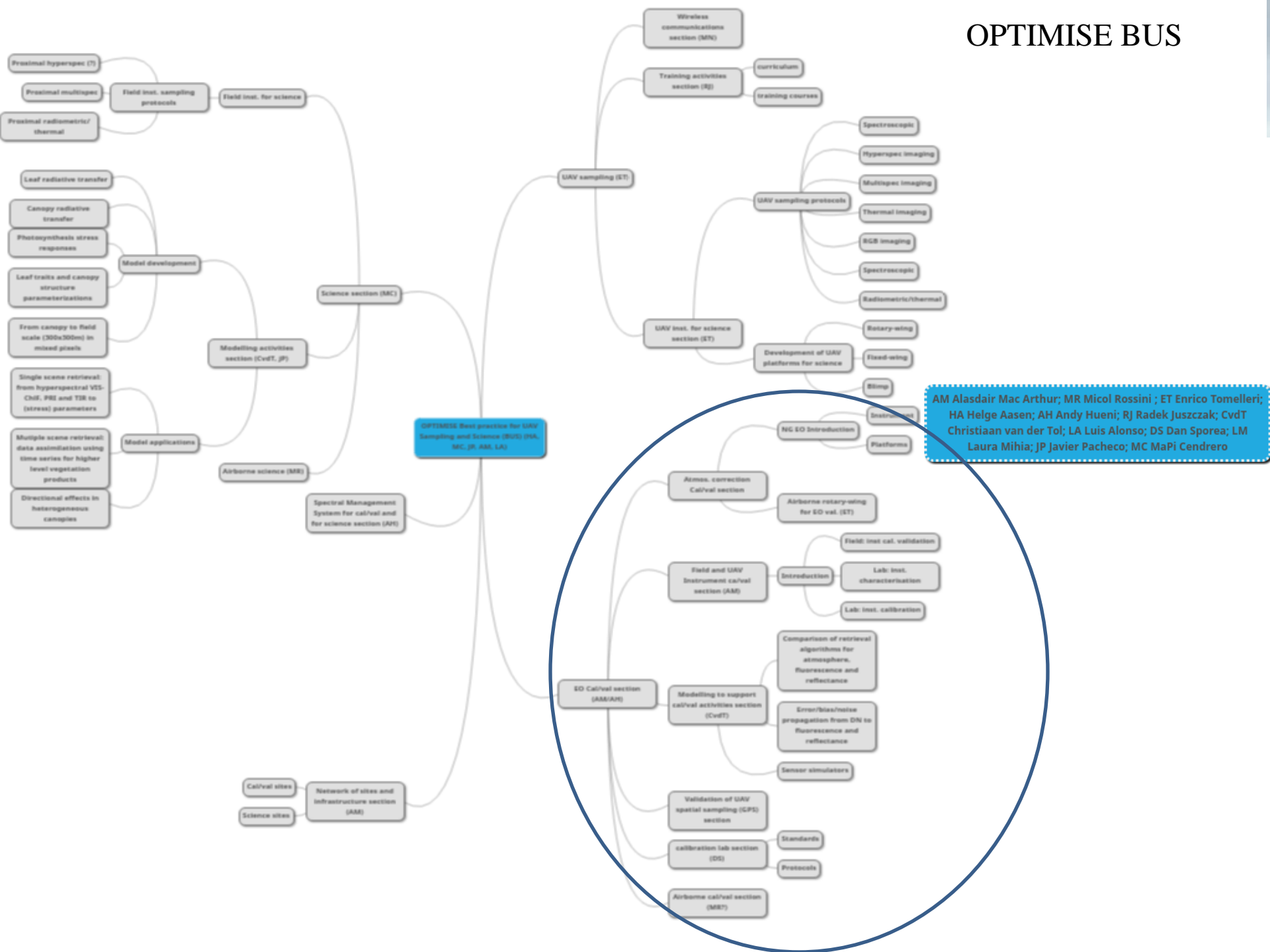


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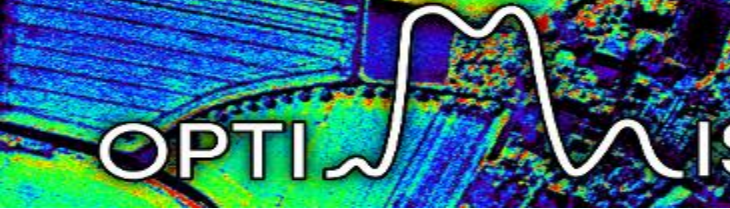
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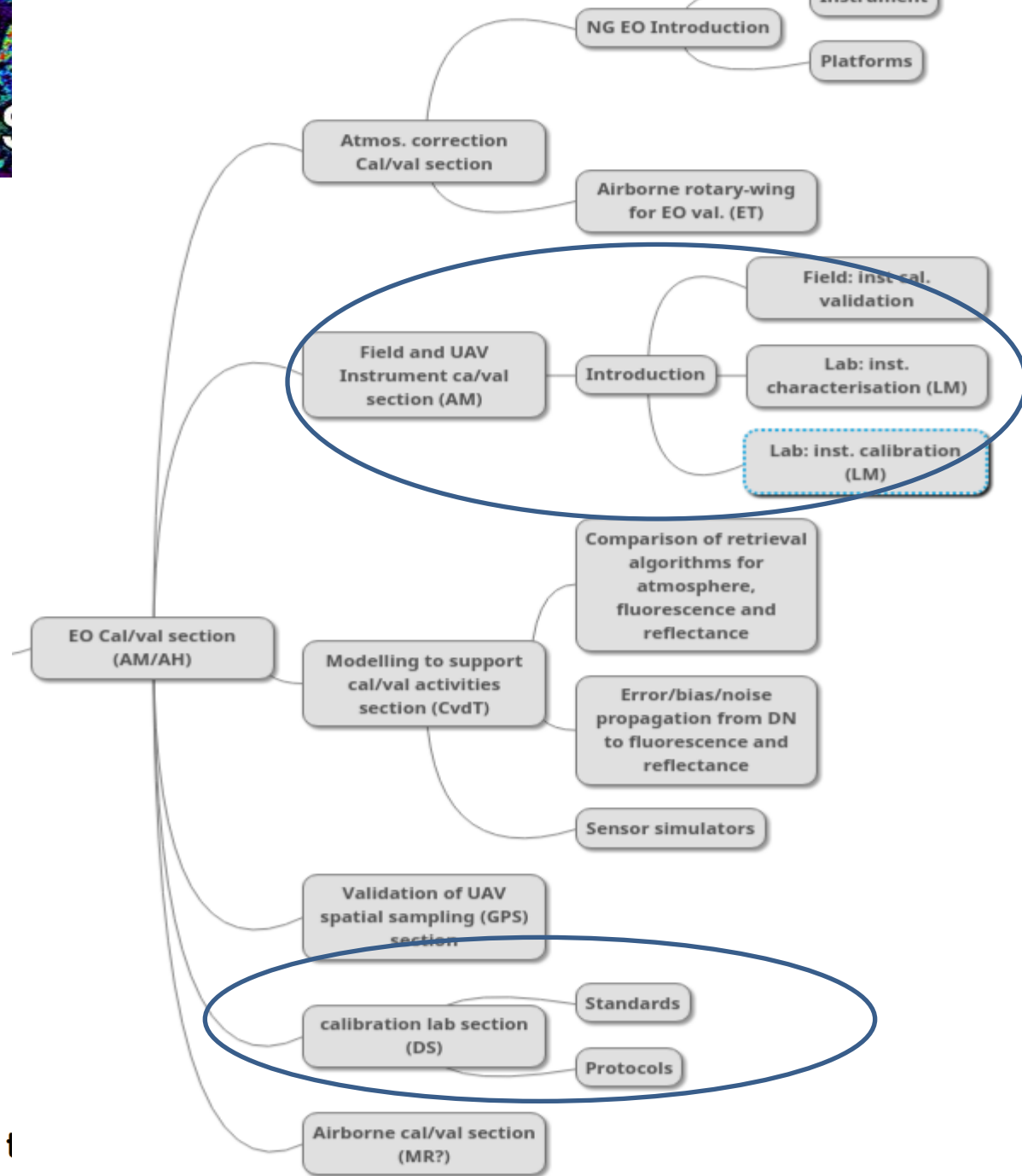
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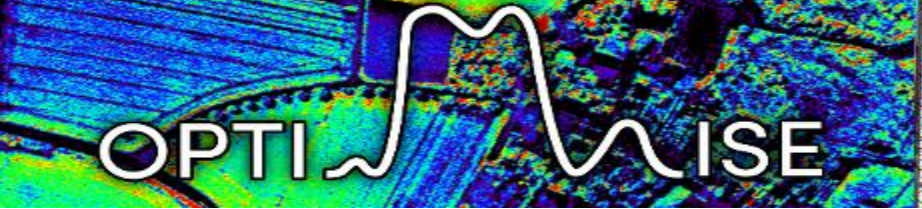
AM Alasdair Mac Arthur; MR Micol Rossini; ET Enrico Tomelleri; HA Helge Aasen; AH Andy Hueni; RJ Radek Juszczak; CvdT Christiaan van der Tol; LA Luis Alonso; DS Dan Sporea; LM Laura Mihia; JP Javier Pacheco; MC MaPi Cendrero



2 areas of primary interest for this workshop



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Thank you for coming

Remember to sign the attendance sheet every day – no signature no expenses!

MaPi, Javier, and Helge will now lead the workshop



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