

DLR'S CURRENT AND PLANNED OCR CAL/CHAR ACTIVITIES

Second FRM4SOC-2 Workshop on Cal/Char, Tartu Observatory, Estonia, 20-22 May 2025

Peter Gege, Stefan Plattner, Ian Somlai

DLR, Remote Sensing Technology Institute, Germany



Motivation for having OCR cal/char capabilities

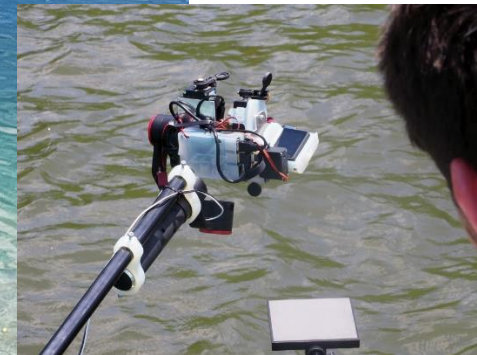
- **Development of compact and versatile sensor systems for measuring R_{rs}**
- Selection of suitable mini spectrometers; characterization
 - Minimize measurement time
 - Determine linear range
 - Determine stray light
- **Absolute radiometric calibration has second priority for us**
 - L_{up} and E_d with same instrument or calibrated with same light source
 - E_d , L_{sky} for aerosols intended



Autonomous surface vehicle LimnoVIS



Field spectrometer IBSEN



Spectrometer system OOSS

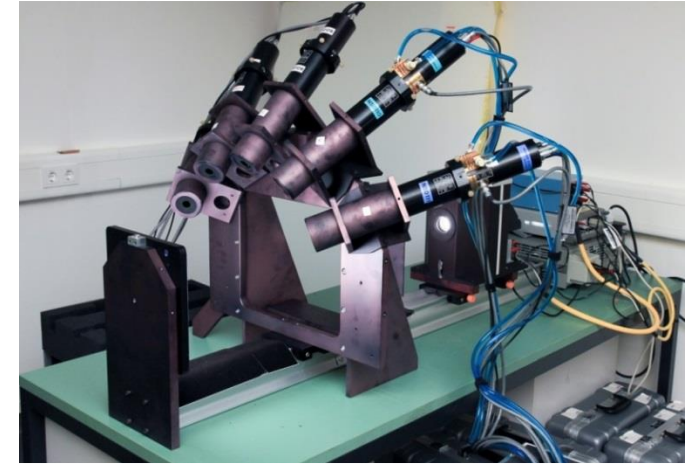


Off the shelf mini spectrometers

Realisation and traceability of radiometric scale

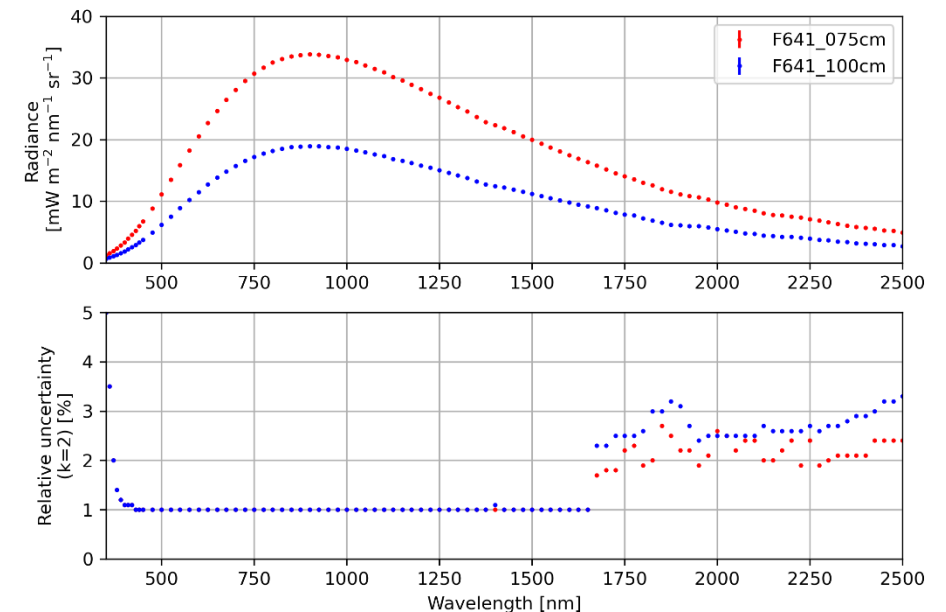
Radiance Standard RASTA

- Developed at DLR
- 1000 Watt FEL lamp
- 250 x 250 mm² spectralon panel
- 5 radiometers monitor stability



Traceability

- Calibrated at PTB for lamp distances of 75 cm and 100 cm
- Uncertainty (k=2) ~1 % in the VIS-NIR
- Re-calibration when changes > ~0.5 %
- Next calibration in autumn 2025



Available cal/char capabilities

Calibration Home Base CHB

- for imaging spectrometers (APEX, HySpex, ...)
- more capabilities, but overkill for OCR

Lab equipment

- Double-beam spectrophotometer
 - transmission
 - reflection
 - absorption
- Monochromator
- Spectral lamps
- Many filters, e.g. ND, pol, short/long/band pass

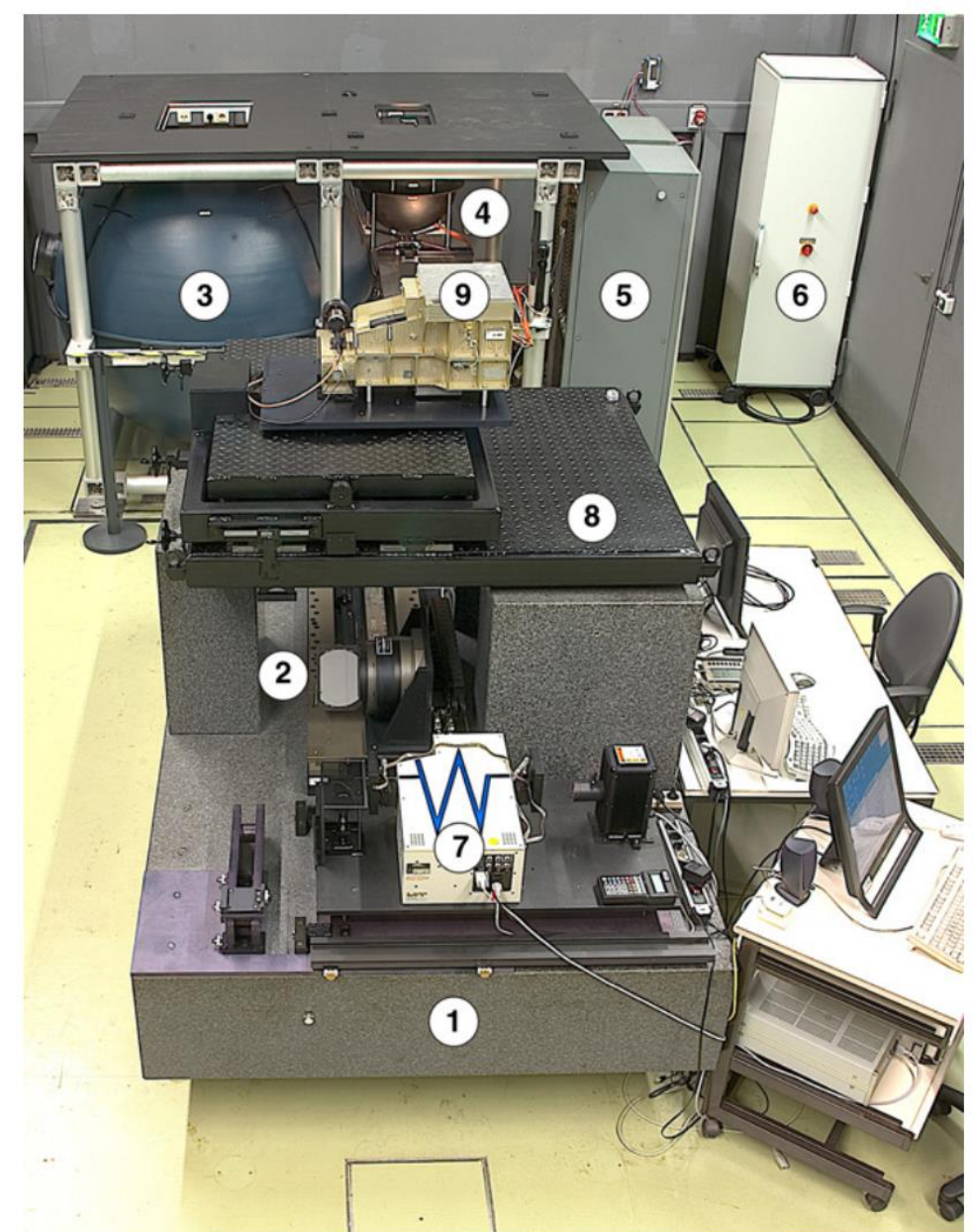


Fig. 1. Calibration Home Base (CHB). 1 = Calibration bench, 2 = Folding mirror, 3 = Large integrating sphere, 4 = Small integrating sphere, 5 = Power supplies of large integrating sphere, 6 = Control electronics of folding mirror, 7 = Monochromator, 8 = CHB adapter, 9 = Sensor (ROSIS).

Intercomparison and validation activities



- FRM4SOC-1
- Characterization of field spectrometers
- Rrs validation of EnMAP



Full mission evaluation of EnMAP water leaving reflectance products using three atmospheric correction processors

MARIANA A. SOPPA,¹ , MAXIMILIAN BRELL,²
SABINE CHABRILLAT,^{2,3} LEONARDO M. A. ALVARADO,^{1,4}
PETER GEGE,⁵ , STEFAN PLATTNER,⁵
IAN SOMLAI-SCHWEIGER,⁵ THOMAS SCHROEDER,⁶
FRANCOIS STEINMETZ,⁷ DANIEL SCHEFFLER,²
VITTORIO E. BRANDO,⁸ MARIANO BRESCIANI,⁹
CLAUDIA GIARDINO,⁹ SIMONE COLELLA,⁸
DIETER VANSTEENWEGEN,¹⁰ MAXIMILIAN LANGHEINRICH,¹¹
EMILIANO CARMONA,¹¹ MARTIN BACHMANN,¹¹
MIGUEL PATO,¹¹ SEBASTIAN FISCHER,¹²
AND ASTRID BRACHER^{1,13,*}

<https://doi.org/10.1364/OE.523813>

Peter Gege, 21 May 2025



remote sensing



Article

Results from Verification of Reference Irradiance and Radiance Sources Laboratory Calibration Experiment Campaign

Agnieszka Białek^{1,*} , Teresa Goodman¹, Emma Woolliams¹ , Johannes F. S. Brachmann²,
Thomas Schwarzmaier², Joel Kuusk³ , Ilmar Ansko³, Viktor Vabson³ , Ian C. Lau⁴ ,
Christopher MacLellan⁵ , Sabine Marty⁶ , Michael Ondrusek⁷, William Servantes¹,
Sarah Taylor¹, Ronnie Van Dommelen⁸, Andrew Barnard⁸, Vincenzo Vellucci⁹ ,
Andrew C. Banks¹ , Nigel Fox¹ , Riho Vendt³ , Craig Donlon¹⁰ and Tânia Casal¹⁰

<https://www.mdpi.com/2072-4292/12/14/2220>

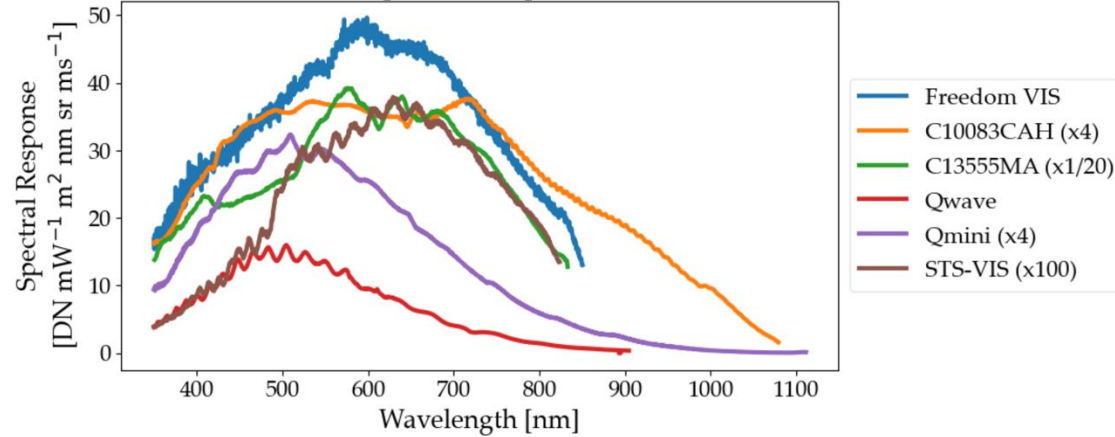
Intercomparison of field spectrometers: characterization methodology for suitability assessment towards water reflectance measurements

Ian Somlai-Schweiger^{1,*}, Stefan Plattner¹ and Peter Gege¹

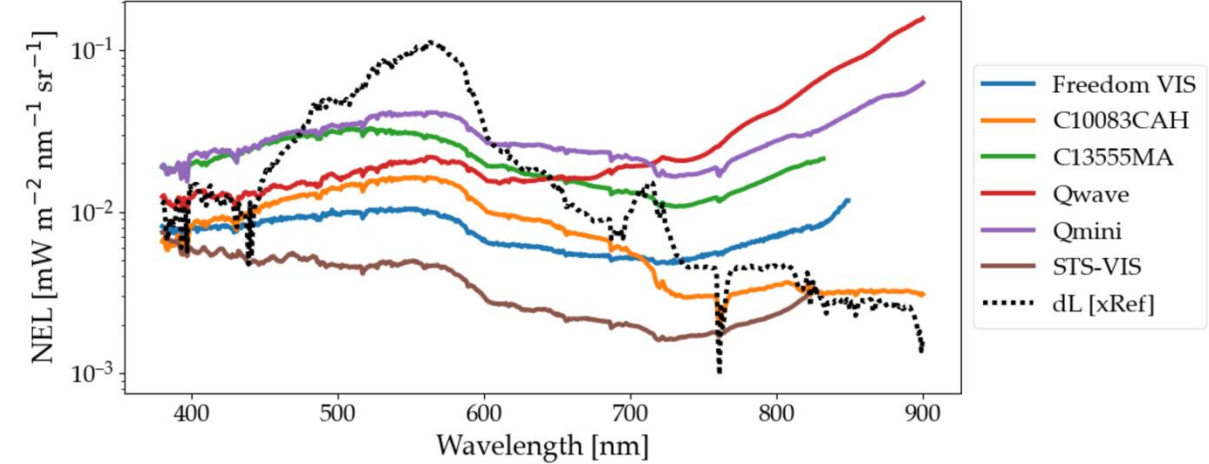
In preparation

Examples from mini spectrometer comparison

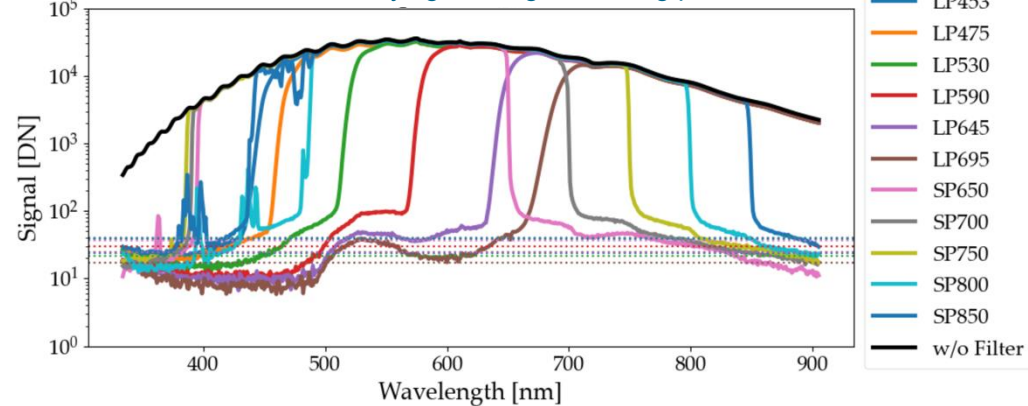
Spectral response (scaled for comparison)



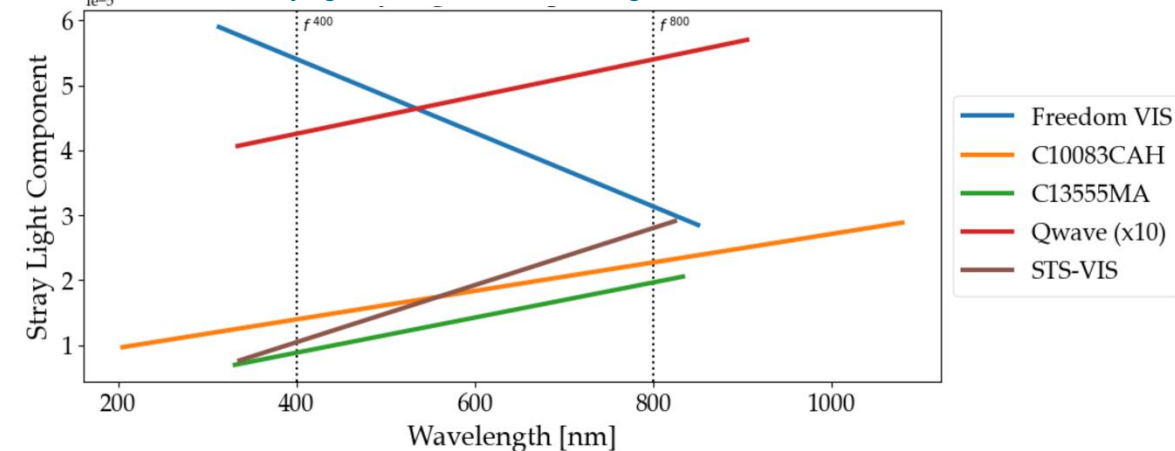
Sensor noise under field conditions at optimal integration time



Measurement of stray light using short/long pass filters



Stray light relative to the total signal of all bands



Funding, human resources and challenges



- Focus of Institute is on airborne and spaceborne activities
- CHB is a prestige activity for our Institute with sufficient funding and human resources
- RASTA is part of CHB, hence maintaining a well-calibrated radiance source is ensured
- Field spectrometer calibration is a side activity with no extra staff
- Team too small to further develop OCR cal/char, e.g. to set up irradiance calibration
- No necessity for absolute radiometric calibration of our field instruments