WP11: Improving the accuracy of aerosol light absorption determinations (JRA1)

Nicolas Bukowiecki, PSI (JRA1 and Task 11.1), PSI
Lucas Alados Arboledas (Task 11.2), UGR
Vassilis Amoiridis (Task 11.3), NOA

PSI, CNR, CNRS, TROPOS, NOA, JRC, UGR, KNMI, CyI, UNIVLEEDS

ACTRIS-2 WP3 Workshop

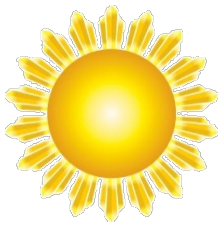
Athens

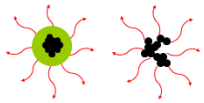
November 10, 2015

Outline

- General overview and status update (N. Bukowiecki)
- A few picture impressions from UAV tests in Cyprus (Jean Sciare, CyI)
- Task 11.1: In-situ and airborne absorption measurements during Melpitz Column Experiment 2015 (N. Bukowiecki on behalf of Joel Corbin, PSI)
- Task 11.3: Status update about combining in-situ and remote sensing measurements , Athens field campaign (Alexandra Tsekeri, NOA)
- Task 11.2: Status update on improvement of absorption retrieval algorithms in remote sensing (Lucas Alados Arboledas, UGR)
- Main findings from previous Athens Campaigns (Vangelis Gerasopoulos, NOA)

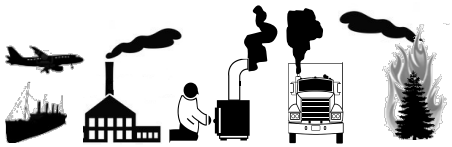
WP11: Improving the accuracy of aerosol light absorption determinations (JRA1)



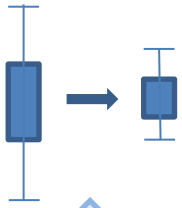


light absorption by black carbon:

- causes positive radiative forcing
- has mainly anthropogenic sources
- absorption coefficient (b_{abs}) and mass absorption cross section (MAC) are major sources of uncertainty



MAC, b_{abs}, SSA

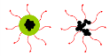


Satellite retrievals

Modelling

$b_{abs} = MAC \cdot m_{BC}$
Improvement of ground-based and airborne b_{abs} and MAC measurement methods

UAV

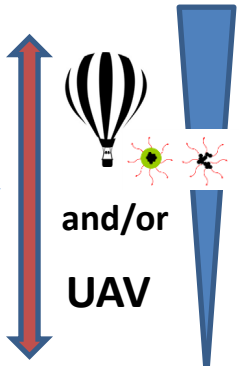


In-situ

MAC
b_{abs}

Task 11.1

b_{abs} and SSA remote vs vertically resolved in-situ



and/or

UAV

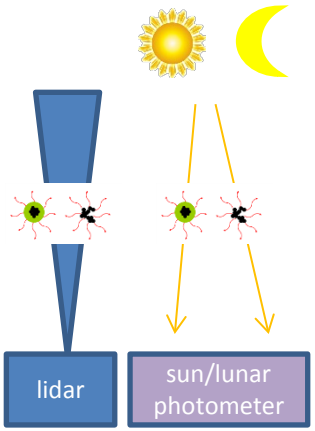
In-situ

lidar

sun/lunar photometer

Task 11.3

24h absorption profiling: Improvement of b_{abs} and SSA retrievals



lidar

sun/lunar photometer

Task 11.2

WP11 timeline

Task	Action		Year 1	Year 2	Year 3	Year 4
1	Mini-aethalometer Evaluation		MS11.1 Cyl; D11.1 Cyl			
1	In-situ closure (MAC)			MS11.4 PSI/TROPOS		D11.4 PSI/TROPOS
2	Remote sensing optimization			MS11.2 UGR; D11.2 UGR		
2,3	Analysis of remote sensing studies			D11.3 NOA		D11.5 NOA
1,2,3	In-situ and remote sensing closure			MS11.3 NOA		MS11.5 NOA; D11.6 NOA
1,2,3	Meetings					
Field work:						
1,3	Melpitz	**In-situ, balloon, UAV, lidar, AOD**	May / June 2015			
1	Bologna	**In-situ**	CNR will inform us asap			
1	Cabauw	**In-situ**		Anytime in 2016		
1,3	Athens	**In-situ, balloon, UAV, lidar, AOD**		Nov 2015 – Feb 2016		
1,3	Finokalia	**In-situ, UAV, lidar, AOD**			April 2017	
1,2,3	Granada	**In-situ, lidar, AOD,UAV**		May/June 2016		
2	Potenza	**AOD**		Anytime after March 2016		

JRA1 Related Announcements

- 2nd ACTRIS-2 general meeting in Frascati (29 Feb – 4 March 2016):
  - Technical JRA1 side meeting (campaign planning, coordination etc.) scheduled either for first morning (Mon) or last morning (Fri). Doodle is still open, if you intend to participate and have not received the doodle link, contact Nicolas Bukowiecki
  - There will be a full day reserved for scientific presentations related to the JRAs. We are currently putting together a list of possible talks related to JRA1. If you are interested in presenting your work, please contact Nicolas Bukowiecki.
  - The ACTRIS2 website (www.actris.eu) is an ideal platform for external outreach and internal information. If you have information that you want to share, let us know.

Task 11.1 – Expected Contributions

Partner	Campaign Responsibility	Instrument Contribution	Analysis and Reporting	Other
PSI		CAPS SP2 (3 campaigns, in coordination with CNRS)	CAPS evaluation together with TROPOS	**Task lead, MS11.4, D11.4 (jointly with TROPOS)**
CNR	Bologna	Standard on-site instrumentation		
CNRS		SP2 (3 campaigns, in coordination with PSI)		
TROPOS	Melpitz	CAPS, standard on-site instrumentation	CAPS evaluation together with PSI, b_{abs} intercomparison	**MS11.4, D11.4 (jointly with PSI)**
NOA	Athens, Finokalia	Regular on-site instrumentation		
JRC			OC/EC off-line analysis	
UGR	Granada	Standard on-site instrumentation		
KNMI	Cabauw	Standard on-site instrumentation		
CyI		Mini-Aeth, UAV	Mini-Aeth evaluation	**MS11.1, D11.1**

Task 11.2 – Expected Contributions

Partner	
UGR	• **lead the activity** • test star-photometry solutions, • test the retrieval algorithms using local measurements of lunar/star photometer and multiwavelength Raman lidar, • coordinate reporting of the activities in Task 11.2 (**MS11.3**, **D11.2**)
CNR	• test different **methodologies** applied to lunar photometry for accurately determining the night-time AOD • test the different **retrieval schemes** using lunar photometer and multi-wavelength Raman lidar measurements.
CNRS	• Based on GRASP, LOA will develop a **new algorithm for the night-time retrievals** of the aerosol absorption coefficient and SSA profiles, **combining the AODs** from the lunar/star photometers with the elastic lidar measurements.
UNIVLEEDS	• Hertfordshire will constrain the lidar stand-alone night-time retrievals based on the so-called 3+2 approach(named after the 3+2 available wavelengths for backscatter and extinction) with lunar/star photometric AODs. • Alternatives, based on a reduced number of channels (i.e., 2+1 or 1+1, 3+0), will be tested.

Task 11.3 – Expected Contributions

Partner	Campaign Responsibility	Instrument Contribution	Analysis and Reporting	Other
NOA	Athens, Finokalia	Standard on-site instrumentation	Perform the remote sensing retrievals and the closure studies with collocated in-situ measurements	• **Lead the activity** • Campaign organization (jointly with site providers) : **MS11.3, MS11.5** • Coordinate reporting of the activities in Task 11.3 : **D11.3, D11.5**
Cyl		Operate UAVs during the campaigns.		
CNRS		SP2 (in coordination with PSI)	Develop the inversion algorithm	
UGR	Granada	Standard on-site instrumentation		
TROPOS	Melpitz	• CAPS • Standard on-site instrumentation • ACTOS		
PSI		• CAPS • SP2 (in coordination with CNRS)		

….to be discussed: tethered ballons, other airborne platforms?

Metrology is interested in BC standardization

Bureau International des Poids et Mesures – the intergovernmental organization through which Member States act together on matters related to measurement science and measurement standards.

Search facility:

| Site map | News | Contact us

ABOUT US | WORLDWIDE METROLOGY | INTERNATIONAL EQUIVALENCE | MEASUREMENT UNITS | SERVICES | PUBLICATIONS | MEETINGS

> You are here: worldwide metrology: committee structure > Consultative Committees > CCQM > GAWG

CCQM Working Group on Gas Analysis (GAWG)

Mission | Members' area | CCQM

Chair: Dr J.-S. Kim, KRISS

Remit:

1. To carry out Key Comparisons, and where necessary pilot studies, to critically evaluate and benchmark NMI/DI claimed competences for standards and capabilities for gas composition (including binary and multicomponent mixtures); gas/liquid mixture composition; nanoparticle and aerosol concentration; isotope ratio measurement; concentration of dissolved gases in liquid or solid matrices;

2. To assist in identifying and establishing inter-laboratory work, pilot studies and research activities to provide SI traceable measurement results with reduced uncertainties for new measurement technologies in gas analysis such as dynamic dilution techniques for unstable gases, as well as spectroscopic techniques with the potential to be used as primary methods.

CCQM summary

- General information
- CCQM members
- CCQM working groups
- CCQM pilot studies
- CCQM strategy
- CCQM workshops
- CCQM publications and forms
- Photographs of the CCQM
- Key comparisons KCDB
- Summary of CCQM Key Comparisons and Pilot Studies

Open documents

- CCQM documents
- GAWG documents

Governance

http://www.bipm.org/en/committees/cc/wg/gawg.html

Task 1.1

- MS11.1: **New light-weight aethalometer** for airborne measurements of the light absorption coefficient at several wavelengths **validated** against other methods (Jean Sciare, CyI, Mihalis Vrekoussis, CyI, Grisa Mocnik)