



## 7<sup>th</sup> International DOAS Workshop

6-8 July 2015

Royal Belgian  
Institute of Natural  
Sciences  
Vautier street, 29  
1000 Brussels  
Belgium

## Programme (issued 6 July 2015)

**Oral presentations:** 15 min + 5 min for questions/discussion

**Poster boards:** Portrait format with a clear dimension of **100 cm width x 200 cm height**

**WIFI access:**

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# 1. Agenda

## Day 1: 6 July 2015

- 08:30 - 09:00    **Registration & coffee**
- 09:00 - 09:10    **Welcome:** Martine De Mazière (Director a.i. of BIRA)
- 09:10 - 09:20    **Logistics:** F. Hendrick
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- 09:20 - 09:50    **M. Van Roozendael:** DOAS in 2015: status and challenges

### ***New Instrumental Concepts***                      ***Chair: U. Platt***

- 09:50 - 10:10    **U. Platt:** DOAS without Grating Spectrometers
- 10:10 - 10:30    **J. Kuhn:** Imaging SO<sub>2</sub> with a Fabry Perot interferometer: Combining advantages of DOAS and SO<sub>2</sub> Cameras
- 10:30 - 10:50    **M. Qin:** Incoherent broadband cavity-enhanced absorption spectroscopy (IBBCEAS) for simultaneous measurement of HONO and NO<sub>2</sub>
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- 10:50 - 11:20    **Coffee Break (poster room)**
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- 11:20 - 11:40    **D. Griffith:** LP-DOAS meets FTIR: Open Path Measurements of Greenhouse Gases
- 11:40 - 12:00    **J.-M. Nasse:** Improvements of LP-DOAS systems by noise reduction and new light source

### ***Improved Retrievals***                              ***Chair: M. Van Roozendael***

- 12:00 - 12:20    **S. Beirle:** Proposal for a new parameterisation of the instrumental slit function in DOAS retrievals
- 12:20 - 12:40    **J. Lampel:** How much information is hidden in residual spectra of DOAS fit ?
- 12:40 - 13:00    **R. Volkamer:** On the need for a DOAS reference spectrum: Challenges and Opportunities for retrievals
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- 13:00 - 14:00    **Lunch Break (poster room)**
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- 14:00 - 14:20    **H. Sihler:** Discrete field of view sampling of satellite and ground-based DOAS-type instruments using high-resolution imager data

- 14:20 - 14:40 **M. Tiefengraber:** The new Pandora total ozone algorithm including the retrieval of effective ozone temperature
- 14:40 - 15:00 **K. Bigge:** Radiative Transfer in Volcanic Plumes
- 15:00 - 15:30 **Discussion on New Instrumental Concepts and Improved retrievals**
- 15:30 - 16:00 **Coffee Break (poster room)**

***Aerosols and clouds***                      ***Chair: T. Wagner***

- 16:00 - 16:20 **T. Wagner:** Absolute calibration of sky radiances, colour indices and O<sub>4</sub> DSCDs obtained from MAX-DOAS measurements
- 16:20 - 16:40 **U. Friess:** The Benefit of Polarimetric Measurements for MAX-DOAS Applications
- 16:40 - 17:00 **H. Irie:** New developments for SKYNET Chiba/Japan and Phimai/Thailand sites by utilizing the MAX-DOAS technique
- 17:00 - 19:00 **Poster session with ice breaker**

NB: all lunches and coffee breaks will take place in the poster room. This will provide many other occasions for informal discussions on posters.

## **Day 2: 7 July 2015**

***Halogens***                                      ***Chair: U. Friess***

- 09:00 - 09:20 **P. Peterson:** Use of ground-based and airborne MAX-DOAS to examine horizontal and vertical BrO gradients at Barrow, Alaska
- 09:20 - 09:40 **F. Wittrock:** MAX-DOAS observations of halogen oxides at Ny-Alesund (replaced by a Halogens posters roundup)
- 09:40 - 10:00 **N. Bobrowski:** Reactive halogen chemistry in volcanic plumes – an overview on our current understanding

***Urban applications I***                      ***Chair: Y. Kanaya***

- 10:00 - 10:20 **B. Zhou:** Investigation on the atmospheric ammonia and its impacts on regional air quality over the Mega-City of Shanghai, China

- 10:20 - 10:40 **A. Richter (on behalf of S. F. Schreier):** Car DOAS measurements in Vienna: horizontal and temporal evolution of tropospheric NO<sub>2</sub> on the city scale
- 10:40 - 11:10 **Coffee Break (poster room)**
- 11:10 - 11:30 **D. Pöhler:** Using mobile CE-DOAS instruments to quantify the contribution of individual vehicles to NO<sub>2</sub> pollution
- 11:30 - 11:50 **P. Xie:** Study on distribution and transport of precursor SO<sub>2</sub> and NO<sub>2</sub> in North China Plain by using mobile DOAS
- 11:50 - 12:10 **Z. Davis:** Vertical Profiles of SO<sub>2</sub> and NO<sub>2</sub> in the Alberta Oil Sands: MAX-DOAS Measurements and Comparison to in-situ Instrumentation

***Urban applications II***      ***Chair: P. Xie***

- 12:10 - 12:30 **F. Hendrick:** Retrieval of CHOCHO from MAX-DOAS measurements in the Beijing area
- 12:30 - 12:50 **T. Wang:** The Evolution of the air pollutants over Beijing and its vicinity during an extended period of APEC 2014
- 12:50 - 13:50 **Lunch Break (poster room)**
- 13:50 - 14:10 **Y. Wang:** MAX-DOAS observations and their application to the validation of satellite and model data in Wuxi, China
- 14:10 - 14:30 **W. Liu:** Advanced monitoring technology of vehicle emission for assessing traffic management
- 14:30 - 14:50 **A. Borovski:** Measurements of formaldehyde integral content in troposphere at Moscow Region

***Airborne/Campaigns***      ***Chair: R. Volkamer***

- 14:50 - 15:10 **J. Remmers:** Azimuthal variability of trace gases and aerosols measured during the MADCAT campaign in summer 2013 in Mainz, Germany
- 15:10 - 15:30 **Y. Wang:** Intercomparison of HONO SCDs and profiles from MAX-DOAS observations during the MAD-CAT campaign and comparison to chemical model simulations
- 15:30 - 16:00 **Coffee Break (poster room)**

- 16:00 - 16:20 **E. Spinei:** Pandora trace gas profile inversion algorithms: validation from DISCOVER-AQ campaigns at multiple sites
- 16:20 - 16:40 **A. C. Meier:** Comparison of airborne imaging DOAS measurements of NO<sub>2</sub> with ground-based observations in Bucharest
- 16:40 - 17:00 **A. Merlaud:** Small Whiskbroom Imager for atmospheric composition monitoring (SWING) from an Unmanned Aerial Vehicle (UAV): Results from the 2014 AROMAT campaign
- 17:00 - 17:20 **G. Kuhlmann:** Improving the Empa NO<sub>2</sub> retrieval for the airborne APEX imaging spectrometer: first results
- 19:00 **Conference dinner at Leopold Hotel Brussels**

### Day 3: 8 July 2015

#### ***Satellite retrievals***

***Chair: A. Richter***

- 09:00 - 09:20 **L. Alvarado:** Investigating the temporal variation of VOCs using a homogenized glyoxal retrieval for different satellite platforms
- 09:20 - 09:40 **N. Theys:** Sulfur dioxide vertical column DOAS retrievals from OMI: 10 years of global observations and comparison to ground-based and satellite data
- 09:40 - 10:00 **S. V. Marchenko:** Improving the DOAS NO<sub>2</sub> retrieval for the Aura/Ozone Monitoring Instrument
- 10:00 - 10:20 **J. S. Anand:** An improved retrieval of tropospheric NO<sub>2</sub> from space over polluted regions using an Earth radiance reference
- 10:20 - 10:40 **M. Barkley:** Development and characterisation of a state-of-the-art GOME-2 formaldehyde air-mass factor algorithm
- 10:40 - 11:10 **Coffee Break (poster room)**

#### ***Satellite validation***

***Chair: A. Piters***

- 11:10 - 11:30 **Y. Kanaya:** Long-term MAX-DOAS network observations of tropospheric NO<sub>2</sub> in Russia and Asia (MADRAS) since 2007: Comparisons with satellite observations and climatology
- 11:30 - 11:50 **A. Blechschmidt:** MAX-DOAS tropospheric NO<sub>2</sub> column retrievals as a validation tool for MACC-II/III regional air quality models

- 11:50 - 12:10 **M. Gu:** A comparison study of NO<sub>2</sub> profiles among ground-based zenith sky DOAS, SCIAMACHY limb measurements and SAOZ balloon measurements over Kiruna, Sweden
- 12:10 - 12:30 **M. Gil-Ojeda:** NO<sub>2</sub> VCD stratospheric trends: Hemispheric and latitudinal dependence
- 12:30 - 13:30 **Lunch Break (poster room)**
- 13:30 - 15:30 **Discussion session (5' introduction + 25' discussion):**  
-Future challenges in MAXDOAS (Introduction by U. Friess)  
-Future challenges in imaging DOAS and cameras (Introduction by T. Wagner)  
-Future challenges in mobile (car/airborne) DOAS (Introduction by R. Volkamer)  
-Future challenges in satellite DOAS (Introduction by A. Richter)
- 15:30 **Closing remarks**
- 15:45 **Adjourn**

## 2. List of Posters:

### DOAS retrieval

**#01 T. Boesch:** On the information content of the DOAS polynomial

**#02 J. Lampel:** On the impact of Vibrational Raman Scattering of N<sub>2</sub>/O<sub>2</sub> on MAX-DOAS Measurements of atmospheric trace gases

**#03 I. Ortega:** Towards understanding the need of O<sub>4</sub> correction factor in ground based MAX-DOAS

**#04 D. Pöhler:** Correction of the O<sub>4</sub> absorption cross section derived from LP-DOAS measurements

**#05 J. Pukite:** Parameterization of non-linearity effects of absorption in scattered light observations by higher order terms ?

### LP/CE-DOAS

**#06 X. Lu:** Observation of NO<sub>3</sub> radicals by LP-DOAS over Wangdu, Hebei, China

**#07 K. Nikelski:** NO<sub>2</sub>, SO<sub>2</sub> and HONO Mixing Ratios in a Forested Region of Alberta Impacted by Oil Sands Processing Facilities

**#08 L. C. Herlyn:** In situ measurement of BrONO<sub>2</sub> in the Dead Sea Valley through thermolysis and CE-DOAS-based NO<sub>2</sub>-detection

**#09 M. Horbanski:** Quantification of Coastal Seaweed Iodine Emissions and its Spatial Variability by Combining Different LP-DOAS and CE-DOAS Systems

**#10 R. Hu:** Calibration system for OH radicals based on differential optical absorption spectroscopy

### MAX-DOAS

**#11 L. Penth:** Development of the Inertial Sensor-based Attitude compensating MAX-DOAS instrument

**#12 T. Kato:** Development of photovoltaic-driven MAX-DOAS system (Eco-MAXDOAS) and its evaluation using 4AZ-MAXDOAS system at Chiba, Japan

**#13 S. Donner:** Construction and characterization of a new compact MAX-DOAS instrument using fixed telescopes

- #14 J.-M. Nasse:** Retrieving cloud altitude and optical properties from MAX-DOAS measurements
- #15 C. Gielen:** African aerosol and trace-gas emissions from the Central-African Bujumbura station
- #16 S. Wang:** Ground-based MAX-DOAS measurements of NO<sub>2</sub> and HCHO in Madrid, Spain
- #18 Y. Wang:** MAX-DOAS observations of NO<sub>2</sub>, SO<sub>2</sub> and HCHO in the Yantzi River Delta (YRD) and their use for the validation of satellite and model data
- #19 X. Zhao:** Pandora measurements over Canadian oil sands region and Toronto
- #20 Y. Wang:** Cloud and aerosol classification for 2 ½ years of MAX-DOAS observations in Wuxi (China) and comparison to independent data sets
- #21 C. Alberti:** MAX-DOAS measurements of tropospheric NO<sub>2</sub> over San Salvador: preliminary results
- #22 J. Xu:** Study of spatial-temporal distributions and transport of gaseous NO<sub>2</sub> and SO<sub>2</sub> by MAX-DOAS in Beijing and surrounding area
- #23 R. Holla:** NO<sub>2</sub> Intercomparison Experiment and Long-Term Validation of MAX-DOAS NO<sub>2</sub> and AOD at MOHp
- #24 Z. Wang:** Long-term MAX-DOAS measurement of trace gases and aerosol in the Environmental Research Station Schneefernerhaus
- #25 J. Zörner:** Nördlinger Ries campaign on Soil Emissions (NORISE) – DOAS measurements of NO<sub>2</sub> and HCHO in an agricultural region
- #26 C. Galindez:** Air pollution measurements using a DOAS system in Santiago de Cali, Colombia
- #27 P. Wang:** Characteristics of SO<sub>2</sub> and NO<sub>2</sub> over North China Plain based on MAX-DOAS Measurements
- #28 H. Takashima:** Spatiotemporal inhomogeneity in atmospheric trace-gas over Fukuoka observed by ground-based MAX-DOAS
- #29 I. Bruchkouski:** Catadioptric MAX-DOAS instrument – first observations results
- #30 M. Yela González:** MAXDOAS halogen observations at Antarctic station of Belgrano (78°S)
- #31 G. Garzon:** DOAS applications for surveillance of volcanic activity in Colombia
- #32 A. Argüelles:** DOAS for atmospheric surveillance of an agricultural-industrial region of the geographic Valley of Cauca (Colombia)



**#33 J. Chong:** Optical remote sensing measurements of aerosol using MAX-DOAS in the west coastal areas of Korean peninsula

**#34 N. Hao:** Two years of MAXDOAS measurements of air pollutants at SORPES station in Nanjing, China

**#35 O. Postlyakov:** Estimation of cloud height using ground-based stereophotography

#### **Airborne DOAS**

**#36 C. Liu:** Characterization and Verification of ACAM Slit Functions for Trace Gas Retrievals during the 2011 DISCOVER-AQ Flight Campaign

**#37 L. Penth:** DOAS measurements of atmospheric trace gases during long-distance flights within the CARIBIC project

**#38 J. White:** Airborne Measurements of NO<sub>2</sub> using imaging DOAS with the Atmospheric Nitrogen Dioxide Imager: 2013 Test-flight

**#39 D.-E. Constantin :** DOAS observations of tropospheric NO<sub>2</sub> using an UltraLight Trike (ULT)

**#40 F. Tack:** High resolution mapping of the tropospheric NO<sub>2</sub> distribution in three Belgian cities based on airborne APEX remote sensing

#### **Ship**

**#41 J. Lampel:** Observations of Reactive Halogen Species in the Marine Boundary Layer during ship cruises in the Pacific and Atlantic

**#42 H. Takashima:** Trace gas and aerosol measurements over ocean by ship-borne MAX-DOAS on a Japanese research vessel, Mirai

**#43 A. Seyler:** MAX-DOAS Measurements of Shipping Emissions

#### **Car**

**#44 A. Li:** Observations of SO<sub>2</sub> and NO<sub>2</sub> in Beijing and surrounding area using mobile DOAS during the HOPE J3A field campaign

## Combined applications

**#45 M. Wenig:** A DOAS System to Measure 3-Dimensional Distributions of NO<sub>2</sub> in Munich

**#45bis S. Li:** Reconstruction of spatial distributions of industrial emissions basing on scanning multi-axis DOAS tomography

**#46 A. Li:** Study on variation of temporal and spatial patterns of NO<sub>2</sub> in Beijing using OMI and mobile DOAS

**#47 M. Razi:** Estimation of NO<sub>2</sub> emissions from Lahore and Islamabad using Car MAX-DOAS observations and comparison with OMI satellite data

**#48 D. Pöhler:** Reactive Halogen Species in the Marine Boundary Layer: A global picture observed from ship cruises and coastal measurements

**#49 K. L. Chan:** Intercomparison of MAX-DOAS, sun-photometer and ceilometer aerosol measurement in urban environment

## Satellite

**#50 T. Muto:** Trend analysis of satellite-observed tropospheric NO<sub>2</sub> vertical column densities over East Asia for 2005-2014

**#51 E. Peters:** Intercomparison of NO<sub>2</sub> satellite retrievals

**#52 E. Celarier:** Effect of bias removal in OMI DOAS NO<sub>2</sub> retrieval on vertical column densities

**#53 L. Behrens:** A UV NO<sub>2</sub> DOAS retrieval for satellite data from GOME-2/MetOp-A – A possibility to detect NO<sub>2</sub> vertical distribution

**#54 A. Richter:** Do we understand high NO<sub>2</sub> episodes over the Atlantic?

**#55 H. Yu:** Intercomparison of tropospheric NO<sub>2</sub> retrievals from the GOME-2 and OMI sensors

**#56 G. Pinardi:** Sentinel-5 Precursor NO<sub>2</sub> and HCHO validation using NDACC and complementary FTIR and UV-Vis DOAS systems

**#57 M. Barkley:** Development and characterisation of a state-of-the-art GOME-2 formaldehyde air-mass factor algorithm

**#58 I. De Smedt:** Validation of satellite formaldehyde observations using MAX-DOAS measurements

**#59 C. Lerot:** Glyoxal vertical column retrievals from the OMI and GOME-2B sensors and comparison with simulations by the IMAGES model

**#60 C. Hörmann:** Seasonal variation of bromine monoxide over the Rann of Kutch salt marsh seen from space

**#61 J.-P. Pommereau:** SAOZ and satellites total ozone differences in the tropics

**#62 T. Verhoelst:** Validating satellite total ozone data with NDACC/UV-Visible ZSL-DOAS measurements: Error budget closure of the data comparison

**#63 A. Hilboll:** The influence of polarization on box air mass factors for UV/vis nadir satellite observations

**#64 Y. J. Kim:** Atmospheric Trace Gases and Aerosol Monitoring with Geostationary Environmental Monitoring Spectrometer (GEMS) onboard MP-GEOSAT

#### **Miscellaneous**

**#65 T. Danckaert:** QDOAS: a user-friendly DOAS retrieval software

### 3. List of participants:

Title	First Name	Name	Institution
Mr.	Carlos	ALBERTI	Satellite Remote Sensing, Max Planck Institute for Chemistry
Mr.	Leonardo	ALVARADO BONILLA	Institute of Environmental Physics, University of Bremen
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Dr.	Edward	CELARIER	USRA and NASA/GSFC
Mr.	Ka Lok	CHAN	Meteorological Institute, Ludwig-Maximilians-Universität München
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Dr.	Daniel Eduard	CONSTANTIN	Dunarea de Jos University of Galati
Mr.	Thomas	DANCKAERT	BIRA-IASB
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Mr.	Sebastian	DONNER	Max-Planck-Institute for Chemistry
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