Programme Overview

Edinburgh International Conference Centre
4-9 September 2016
The local organisers, the NERC Centre for Ecology & Hydrology and the University of Edinburgh, gratefully acknowledge the financial and in kind support of the sponsors listed on this page.
Overview

The Quadrennial Ozone Symposium 2016 is organised by the NERC Centre for Ecology & Hydrology (CEH) and the University of Edinburgh, under the auspices of the International Ozone Commission (IO3C). The main event is held at the Edinburgh International Conference Centre (EICC), while side events and social activities take place at different locations in central Edinburgh (see map below).

This programme brochure provides key information and locations for the events throughout the week. For more details, access to the abstracts of all talks and posters and the full programme, please see the QOS website:

http://www.ozone-symposium-2016.org

Locations of QOS2016 venues and main transport hubs

![Map of Edinburgh showing QOS2016 venues and transport hubs](image-url)
# Programme at a glance

## Sunday, 4 September
- **1800 - 2000** Pre-registration
- **1000 - 1900** EUBrewNet Training
- **1000 - 1500** EUBrewNet WG Meeting
- **1800 - 2000** Pre-registration
- **From 1800** Icebreaker

## Monday, 5 September
- **From 0815** Registration
- **1000 - 1500** EUBrewNet WG Meeting
- **1700 - 1900** EUBrewNet Training
- **1800 - 2000** Welcome reception/Posters

## Tuesday, 6 September
- **From 0815** Registration
- **0845 - 1000** Session 1: Stratospheric ozone
- **1030 - 1700** Session 2: Tropospheric ozone
- **1730 - 1900** EUBrewNet Training
- **1800 - 2000** IO3C Board Meeting

## Wednesday, 7 September
- **From 0815** Registration
- **0845 - 1000** Session 3: Ozone chemistry-climate interactions
- **1330 - 1800** Field Site visit, Ad-hoc meetings
- **1515 - 1600** Closing session & Farewell
- **1600 - 1800** SI2N Side-event on ozone trends (continues 10 September morning)

## Thursday, 8 September
- **From 0815** Registration
- **0845 - 1700** Session 4: Global ozone observations & measurement techniques
- **1030 - 1230** Session 5: Ozone effects
- **1330 - 1515** Future Ozone Challenges
  - Presentations & Panel Discussion
- **1815 - 2000** Dobson Ad-Hoc Committee
- **2000 - 2300** Early Career Researchers Ceilidh

## Friday, 9 September
- **0845 - 1000** Session 4: Global ozone observations & measurement techniques
- **1030 - 1230** Session 5: Ozone effects
- **1330 - 1515** Future Ozone Challenges
  - Presentations & Panel Discussion
- **1515 - 1600** Closing session & Farewell
- **1600 - 1800** SI2N Side-event on ozone trends (continues 10 September morning)
Oral presentations
1 Stratospheric Ozone

**Monday**

09:30–10:00: QOS2016-310
Ozone depletion: chemistry, trends and dynamics, the extent of recovery and prospects through the 21st century (*keynote*)

10:30–10:45: QOS2016-82
Controls on the Past and Future Depletion of Antarctic Ozone

10:45–11:00: QOS2016-11
The Antarctic Ozone Hole: unequivocal detection of the onset of ozone recovery
de Laat A.T.J., van der A R.J., van Weele M.

11:00–11:15: QOS2016-235
The observed sensitivities of Antarctic Ozone loss to chlorine and temperature: why attribution remains a challenge
Strahan S.E., Douglass A.R., Oman L.D.

11:15–11:30: QOS2016-342
Interannual Variability in MLS Trace Gas Observations in the Antarctic Polar Vortex: Issues in Detection and Attribution of Trends
Schwartz M. J., Santee M. L., Manney G. L., Livesey N. J.

11:30–11:45: QOS2016-45
A climatology of PSC composition for the northern and southern hemisphere observed between 2002 and 2012 by MIPAS/Envisat
Spang R., Hoffmann L., Groos J.-U., Höpfner M., Müller R., Pitts M. C., Orr A. M. W., Riese M.

11:45–12:00: QOS2016-47
A Decade of Polar Stratospheric Cloud Observations from CALIPSO
Pitts M. C., Poole L. R.

13:30–13:45: QOS2016-234
The Polar Stratosphere in a Changing Climate (POLSTRACC): First results from the extraordinary Arctic winter 2015/16
Oelhaf H., Sinnhuber B.-M., Woiwode W. and the POLSTRACC Team

13:45–14:00: QOS2016-90
Denitrification, dehydration and ozone loss during the Arctic winter 2015/2016

14:00–14:15: QOS2016-292
Arctic ozone loss during the exceptionally cold winter 2015/16 as determined by Match and the ATLAS model
Rex M. and the Match Team

14:15–14:30: QOS2016-241
Future Arctic ozone recovery: the importance of chemistry and dynamics
Bednarz E.M., Maycock A.C., Abraham N.L., Braesicke P., Dessens O., Pyle J.A.

14:30–14:45: QOS2016-174
Chlorine activation in the dark polar vortices
Groß J.-U., Müller R.

14:45–15:00: QOS2016-247
Re-examination of Ozone Recovery: Lessons Learned
Weatherhead E., Petropavlovskikh I., Long C., Flynn L.

15:00–15:15: QOS2016-133
Ozone Profile Trends: An SBUV/2 Perspective
Wild J. D., Yang S.-K., Long C. S.

15:15–15:30: QOS2016-251
Updated trends in stratospheric ozone from pointing corrected Odin-OSIRIS observations
Bourassa A.E., Roth C.Z., Degenstein D.A.

16:00–16:15: QOS2016-232
Use of Ground-Based and Satellite Observations of HNO₃, HCl and N₂O to Quantify Ozone Sensitivity to Stratospheric Circulation Change
Douglass A., Strahan S., Stolarski R.
1 Stratospheric Ozone

Monday

16:30–16:45: QOS2016-121
Decadal changes in ozone and ozone-depleting substances and their link to stratospheric circulation changes

16:45–17:00: QOS2016-138
The longitude dependence of ozone trends in the Northern Hemisphere winter for the period 1979-2010
Zhang J., Tian W., Xie F.

Tuesday

08:45–09:00: QOS2016-240
Growth in the stratospheric loading of halogenated very short-lived substances and their impact on ozone and climate
Hossaini R., Chipperfield M., Montzka S., Dhomse S.

09:00–09:15: QOS2016-365
Have we underestimated the role of short-lived chlorine compounds in ozone depletion?

09:15–09:30: QOS2016-1
The uncertainty in stratospheric ozone trends
Hubert D., Lambert J.-C., Verhoelst T., Keppens A., Harris N., Hassler B., Petropavlovskikh I., Steinbrecht W., Tummon F.

09:30–09:45: QOS2016-257
Ozone variations in the tropical upper troposphere and lower stratosphere based on Aura MLS and sonde data
Froidevaux L., Schwartz M. J., Read W. G., Livesey N. J., Thompson A. M.

09:45–10:00: QOS2016-228
Unlocking the puzzle of tropical ozone changes
Hegglin M. I.

2 Tropospheric Ozone

Tuesday

10:30–11:00: QOS2016-80
The Tropospheric Ozone Assessment Report: A community-wide effort to quantify tropospheric ozone in a rapidly changing world (keynote)
Cooper O. R.

11:00–11:15: QOS2016-361
The Stratospheric Contribution to Tropospheric Ozone Variability and Trends

11:15–11:30: QOS2016-55
Using Self-Organizing Map (SOM) Clusters to Create Ozonesonde-based Climatologies and Characterize Linkages among US Ozone Profile Variability and Pollution
Stauffer R. M., Thompson A. M., Young G. S., Oltmans S. J., Johnson B. J.

11:30–11:45: QOS2016-183
Tropospheric ozone over Central Siberia: observations and balance
Skorokhod A., Belikov I., Moiseenko K., Shtabkin Yu., Heimann M.

11:45–12:00: QOS2016-197
Status of Tropospheric Emissions: Monitoring of Pollution (TEMPO)

13:30–13:45: QOS2016-63
Observation characteristics and their influence factors of photochemical pollution in Pearl River Delta region, China
2 Tropospheric Ozone

Tuesday

13:45–14:00: QOS2016-189
Photochemical Ozone Production Rates and Limiting Factors over East Asia: Impact of Radical Chemistry Mechanism and Ozone-Control Implications

14:00–14:15: QOS2016-363
Significant Tropospheric O₃ Production from Extratropical Forest Fires: When? When Not?
Chatfield R. and the NASA ARCTAS and SEAC4RS Science Teams Team

14:15–14:30: QOS2016-343
Assessing the Ability of Satellites to Provide Air Quality Relevant Information: Analysis of DISCOVER-AQ Ozone and Precursor Data
Pickering K., Follette-Cook M., Flynn C., Loughner C., Pfister G., Weinheimer A., Fried A., Crawford J.

14:30–14:45: QOS2016-72
Tropospheric Ozone from GOME_2 in combination with other stratospheric ozone measurements
Heue K.-P., Valks P., Loyola D.

14:45–15:00: QOS2016-287
Ozone trends (1995-2013) in the UTLS as seen by MOZAIC-IAGOS over northern mid-latitudes
Cohen Y., Thouret V., Petetin H., Marelle V., Josse B., Nedelec P., Fontaine A., Boulanger D.

15:30–15:45: QOS2016-126
How well do we know global long-term tropospheric ozone changes?
Tarasick D., Galbally I. and the TOAR Chapter 2 Team

15:45–16:00: QOS2016-299
O₃ variability in the troposphere from IASI observations in 2008–2015
Wespes C., Hurtmans D., Boynard A., Clerbaux C., Coheur P.-F.

16:00–16:15: QOS2016-101
Twenty years of ozone air quality in Europe: trends in models and measurements

16:15–16:30: QOS2016-185
Analysis of tropospheric ozone long-term lidar and surface measurements at the JPL-Table Mountain Facility site, California
Granados-Muñoz M. J., Leblanc T.

16:30–16:45: QOS2016-203
The Tropospheric Ozone Assessment Report: Trends in ozone and ozone metrics relevant for human health

16:45–17:00: QOS2016-277
LUAMI - Tomography of a Deep Stratospheric Air Intrusion

3 Ozone Chemistry-Climate Interactions

Wednesday

08:45–09:15: QOS2016-120
Interannual variability and long-term trends in global tropospheric ozone and related chemistry during recent decades (keynote)
Sudo K.

09:15–09:30: QOS2016-20
The changing ozone depletion potential of nitrous oxide in a future climate
Revell L. E., Tummon F., Salawitch R. J., Stenke A., Peter T.

09:30–09:45: QOS2016-39
The Ozone Radiative Seasonal Cycle and its Contributions to Tropical Cyclone Potential Intensities
Gilford D. M., Solomon S., Emanuel K. A.

09:45–10:00: QOS2016-141
Diverse policy implications for future ozone and surface UV in a changing climate
Butler AH, Daniel JS, Portmann RW, Ravishankara AR, Young PJ, Fahey DW, Rosenlof KH
3 Ozone Chemistry-Climate Interactions

Wednesday

10:30–10:45: QOS2016-172
The transient response of the Southern Ocean to stratospheric ozone depletion
Seviour W. J. M., Gnanadesikan A., Waugh D. W.

10:45–11:00: QOS2016-199
21st century U.S. surface ozone extremes: influence of climate warming, rising methane and reductions in nitrogen oxide emissions
Rieder H.E., Fiore A.M., Correa G., Clifton O., Horowitz L.W., Naik V.

11:00–11:15: QOS2016-297
How ozone affects precipitation
Collins W.J., MacIntosh C.R., Shine K.P., Baker L.H.

11:15–11:30: QOS2016-319
Temperature as a driver of ground-level ozone concentration in Europe
Butler T., Otero N., Coates J., Mar K.

11:30–11:45: QOS2016-357
The role of ozone feedback in modulating the atmospheric response to the solar cycle forcing
Bednarz E.M., Maycock A.C., Braesicke P., Telford P.J., Abraham N.L., Pyle J.A.

4 Global ozone observations and measurement techniques

Thursday

08:45–09:15: QOS2016-333
In-service Aircraft for Global Monitoring: 20 Years of MOZAIC-IAGOS ozone measurements (keynote)
Thouret V.

09:15–09:30: QOS2016-7
ALTIUS: a forthcoming stratospheric ozone profiler

09:30–09:45: QOS2016-23
Ozone Comparison between Pandora 34, the Dobson 061, OMI, and OMPS at Boulder Colorado for the period Dec 2013 - June 2016.
Herman J., Evans R., Cede A., Abuhassan N., Petropavlovskikh I., McConville G

09:45–10:00: QOS2016-86
Validation of GOME-2A and GOME-2B Ozone Profiles and Tropospheric Ozone Column Products, Using Balloon Sounding Data
Delcloo A.W., Tuinder O.N.E., Heue K.P., Valks P., Loyola D.

10:30–10:45: QOS2016-280
Stability requirements on long-term (satellite) ozone observations and their implication for trend detection
Weber M., Rahpoe N., Burrows J. P.

10:45–11:00: QOS2016-139
Overview and highlights of the EMRP project ATMOZ "Traceability for atmospheric total column ozone"
Egli L., Gröbner J. and the EMRP-ENV59 JRP Consortium Team

11:00–11:15: QOS2016-170
The GOME-type Total Ozone Essential Climate Variable - the first 20 years of an accurate global ozone data record (1995-2015)
Coldewey-Egbers M., Loyola D., van Roozendael M., Lerot C., Braesicke P., Dameris M., Koukouli M., Balis D., Zehner C.

11:15–11:30: QOS2016-188
Measuring ozone and related species from space with the Atmospheric Chemistry Experiment (ACE)
Walker K. A., Boone C. D., Bernath P. F., McElroy C. T.

11:30–11:45: QOS2016-253
The looming chasm in spaceborne limb sounding observations of atmospheric composition, and some possibilities for filling it.

11:45–12:00: QOS2016-210
Evaluation of the MERRA-2 Assimilated Ozone Product
Labow G.J., Wargan K., Frith S.M., Pawson S.

13:30–14:00: QOS2016-97
Ground-based Measurements of Ozone and Related Trace Gases: Status of Networks and Recent Developments in Ozone Instrumentation (keynote)
Thompson A. M.
4 Global ozone observations and measurement techniques

Thursday

14:00–14:15: QOS2016-83
Ozone measurements at Arosa (Switzerland): Scientific value and history
Staehelin J., Tummon F., Viatte P., Stübi R., Peter T.

14:15–14:30: QOS2016-214
Evaluation of OMPS Limb Profiler retrievals by studying ozone distribution inside the 2015 Antarctic ozone hole

14:30–14:45: QOS2016-246
Ozone Data Quality Assessment (O3S-DQA): Resolving inhomogeneities in long term ozone sounding records and assessing their uncertainties

14:45–15:00: QOS2016-227
EUBREWNET - A European Brewer Network, COST Action ES1207
Rimmer J.

15:30–15:45: QOS2016-231
Long-term stability of stratospheric and mesospheric ozone profile data records from limb/occultation sounders
Hubert D., Lambert J.-C., Verhoelst T., Granville J., Keppens A., Compernolle S. and the Satellite and Ground-based O3 profile measurement Team

15:45–16:00: QOS2016-252
Reanalysed Ozone Profiles from Australian Historical Umkehr Data
Schofield R., Stone K., Rhodes S., Tully M. J.-C.

16:00–16:15: QOS2016-146
Measurements of ozone and other trace gases using small low cost sensors and networks
Fleming Z.L., Monks P.S., Raventos T., Peterson P., Leigh R.J.

16:15–16:30: QOS2016-169
Evaluation of ozone profile and tropospheric ozone retrievals from GEMS and OMI spectra

16:30–16:45: QOS2016-320
Proposed standardized definitions and approaches for vertical resolution and uncertainty in the NDACC ozone DIAL algorithms

16:45–17:00: QOS2016-326
The effect of natural variability on atmospheric ozone measurements and their intercomparison

Friday

08:45–09:00: QOS2016-329
The TICOSONDE Balloon Sounding Project: 11 years of continuous Frostpoint Hygrometer and Ozonesonde Profiling in Costa Rica

09:00–09:15: QOS2016-370
Measuring ozone fluxes to terrestrial surfaces by eddy co-variance and aerodynamic methods
Coyle M., Nemitz E., Fowler D.

09:15–09:30: QOS2016-276
ESA Ozone Climate Change Initiative: combined use of satellite ozone profile measurements

09:30–09:45: QOS2016-330
Extended and refined Multi Sensor Reanalysis of Total Ozone for the period 1970-2012
van der A R.J., Eskes H.J., Allaart M.A.F.

09:45–10:00: QOS2016-276
GOMOS measurements of O3, NO2 and NO3 compared to specified-dynamics WACCM simulations
5 Effects of ozone on climate, human health, ecosystems and food production

Friday

10:30–11:00: QOS2016-180
The development of modelling methods to assess the combined threat of ozone and climate extremes on ecosystems (keynote)
Emerson L., Bueker P., Osborne S., Mills G.

11:00–11:15: QOS2016-284
The climate in a world without ozone
Selten F., Bintanja R., van Delden A., Le Bars D, de Vries H, van Weele M

11:15–11:30: QOS2016-308
Assessing the health impacts of short-term exposure to ground-level ozone in the UK from 2001-2014

11:30–11:45: QOS2016-155
Transport of low ozone air masses to South America middle latitudes: impact on solar UV irradiances

11:45–12:00: QOS2016-35
Satellite- and model-based decadal surface UV reconstructions: Extremes in northern mid-latitude UV index as prevented by 25 years of the Montreal Protocol

12:00–12:15: QOS2016-10
An epidemiological assessment of stomatal ozone flux-based critical levels for visible ozone injury in Southern European forests
Sicard P., De Marco A., Dalstein-Richier L., Tagliaferro F., Paoletti E.

12:15–12:30: QOS2016-6
AOTX Indices - A Tool for Assessment of Impact of Ozone on Plants
Saxena P

Panel Discussion & Close

13:30–14:15
Invited talks highlighting future ozone challenges Frank Dentener & John Pyle

14:15–15:15
Moderated panel discussion on future research needs with panellists comprising speakers of the previous session and members of the International Ozone Commission.

15:15–16:00
Observations and future challenges for policy makers
Iain Boyd, Chief Scientific Adviser at the Department of Environment, Food and Rural Affairs

Formal close of the Symposium & farewell
Stefan Reis, Chair Local Organising Committee
Side Events & Social Activities

WMO-GAW-SHADOZ-NDACC Ozone Sonde Expert Workshop (1-3 September 2016)
The University of Edinburgh Outreach Centre, Holyrood Road, Edinburgh, EH8 8AQ (Bldg. 64, B.1.11-1)
Organiser: Herman Smit

Under the auspices of WMO/GAW, NDACC and SHADOZ, a 3 day ozone sonde expert workshop addresses: (1) outstanding instrumental and operational issues (2) progress made in O₃S-DQA with the homogenisation of long-term ozone sounding records (3) Preparation of design of JOSIE 2017/2018 experiments.

EuBrewNet Training School (4-8 September 2016)
EICC, The Exchange Edinburgh, 150 Morrison St, Edinburgh EH3 8EE
Organiser: John Rimmer

This training school is primarily intended for Brewer Ozone Spectrophotometer operators and managers. It will focus on set up and basic maintenance, data handling and submission, and diagnosing problems. It is part of COST Action ES1207, supported by COST (European Cooperation in Science and Technology).

QOS2016 Gala Dinner (7 September 2016, from 19:30)
National Museum of Scotland, Chambers Street, Edinburgh, EH1 1JF

The Gala Dinner is organised, with kind support by the Scottish Government, in the Grand Gallery of the National Museum of Scotland. During the dinner, the Dobson Awards of the International Ozone Commission will be announced.

Dobson Ad Hoc committee meeting (8 September 2016, 18:15-20:00)
EICC, The Exchange Edinburgh, 150 Morrison St, Edinburgh EH3 8EE
Organiser: Robert Evans

After 90 Years of monitoring the ozone layer – what does the future hold for the ground based network of Dobson ozone spectrophotometers a world with expanding instrumentation and needs. There are multiple topics to consider.

Early Career Researcher’s Ceilidh (8 September 2016, from 20:00)
The Caves, 8-10 Niddry Street South, Edinburgh, EH1 1NS

A traditional Gaelic social gathering, as well known as a ‘Ceilidh’, will take place in a very special venue, The Caves, that makes up the sub-structure of the 18th Century South Bridge.

SI2N Side-event on ozone trends (9 September, 16:00-18:00 & 10 September 2016, 9:00 -12:00)
EICC, The Exchange Edinburgh, 150 Morrison St, Edinburgh EH3 8EE & The University of Edinburgh Outreach Centre, Holyrood Road, Edinburgh, EH8 8AQ, (Bldg. 64, B.1.11-1)
Organisers: Irina Petropavlovskikh, Sophie Godin-Beekmann, Elizabeth C Weatherhead, Richard Stolarski, Paul Newman, Neil Harris

The discussion will address the fundamental question "Whether the positive trend in ozone in the post-2000 period is statistically significant or not?" Among topics for discussion are uncertainties of ozone trend estimates, statistical tools, comparison between observation and model trend estimates, and next steps for the upcoming WMO ozone assessment of 2018. This meeting is a follow up of the 2011-2014 SPARC/IO3C/IGACo initiative (SI2N, http://igaco-o3.fmi.fi/VDO/)
EICC - Directions to meeting rooms

Registration: *Strathblane Hall*

Side events: *Carrick, Harris, Ochill*

Main Auditorium: *Pentland Suite*

QOS2016 Lunch, tea and coffee breaks, as well as the poster sessions, will be in *Cromdale Hall* on Level -2