



International Association of Meteorology and Atmospheric Sciences (IAMAS)

## International Ozone Commission (IO<sub>3</sub>C)

President

Dr. Sophie Godin-Beekmann  
Tel: +33 1 80 28 54 99  
Fax: +33 1 80 28 53 30  
[sophie.godin-beekmann@latmos.ipsl.fr](mailto:sophie.godin-beekmann@latmos.ipsl.fr)

Secretary

Dr. Irina Petropavlovskikh  
Tel. +1 303 497 62 79  
Fax; +1 303 497 55 90  
[Irina.petro@noaa.gov](mailto:Irina.petro@noaa.gov)

Vice President

Dr. Paul Newman  
Tel: +1 301 614 59 85  
Fax: +1 301 614 59 03  
[Paul.A.Newman@nasa.gov](mailto:Paul.A.Newman@nasa.gov)

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## Press Release

### **The International Ozone Commission, on the 30<sup>th</sup> anniversary of the Montreal Protocol, reports signs of healing of the ozone hole in Antarctica.**

September 16<sup>th</sup> is the International Day for the Preservation of the Ozone Layer, commemorating the 1987 anniversary of the signing of the Montreal Protocol on Substances that Deplete the Ozone Layer. The 1985 Vienna Convention was the framework agreement under which the Montreal Protocol was negotiated. Hailed as an example of exceptional international cooperation for the protection of the ozone layer, the Montreal Protocol became in 2010 the first international treaty to achieve universal ratification. The Montreal Protocol expanded in October 2016 with the addition of the Kigali amendment. This amendment mitigates the impact on the Earth's climate of ozone depleting substances substitutes, which are powerful greenhouse gases.

The theme of the International Day for the Preservation of the Ozone Layer on **16 September 2017 is: "Caring for all life under the sun."**

In celebration of this 30<sup>th</sup> anniversary the International Ozone Commission has collaborated with the French Academy of Science, the Observatoire de Versailles Saint-Quentin en Yvelines, the Institut Pierre-Simon Laplace, the World Meteorological Organization, The United Nations Environmental Programme, the World Climate Research Programme (Stratosphere – Troposphere processes and their role in climate), and NASA to organize an international Symposium to be held on 19-20 September 2017 at Foundation Del Duca, Paris, France. The theme of the Symposium is "From the safeguard of the ozone layer to the protection of the Earth climate".

Global stratospheric ozone amounts stopped decreasing in the late-1990s, and have stabilized at levels about 2-3 % less than those observed in 1980. The latest international assessment of stratospheric ozone (WMO, 2014)<sup>2</sup> has reported a small increase of ozone around 35-40 km since 2000, which has been attributed to both a decrease of ODSs and the cooling of the stratosphere by increased abundance of greenhouse gases. A new Ozone Assessment, as mandated by the Montreal Protocol, is being written for release in December 2018. Since 2014, ground-based and satellite data records have been extended, and global datasets now cover several decades for assessing ozone recovery. However, due to the long lifetimes of ODSs in the atmosphere, full stratospheric ozone recovery will take several decades. Stratospheric ozone recovery will also be impacted by climate change.

A recent study<sup>3</sup> reports that the Montreal Protocol has significantly reduced climate-altering

1 Please visit the web site of the Ozone Secretariat for the Vienna Convention <http://ozone.unep.org/en/precious-ozone> where you will find a description of worldwide activities on the 2017 International Ozone Day.

2 <http://www.esrl.noaa.gov/csd/assessments/ozone/2014/report.html>

3 Hu, L., et al. (2017), Considerable contribution of the Montreal Protocol to declining greenhouse gas emissions from the United States, *Geophys. Res. Lett.*, 44, 8075–8083, doi:10.1002/2017GL074388.

greenhouse gas emissions in the United States. The ozone depleting substances banned under the Montreal protocol are also powerful greenhouse gases. The reduction in these gases between 2008 and 2014 is equivalent to the removal of 170 million tons of carbon dioxide emissions each year. This is about 50 percent of the US-only reductions in greenhouse gases emission over the same time period.

A major disruption of the tropical stratospheric circulation was observed in 2016. This event was unprecedented in the observed record since 1953. It impacted ozone and water vapor in the tropics and at middle latitudes, as well as UV levels in the southern and northern subtropics. The exact mechanism of the disruption is not well understood, which creates a concern with its impact on ozone recovery.

Ground, balloon, and satellite observations showed that the Antarctic ozone hole reappeared in the last few weeks, as expected. The hole typically reaches its maximum depletion by early October 2017, with the 2017 ozone hole's area exceeding 10 million square kilometers on September 5. The ozone hole is caused by the release of man-made chemicals containing chlorine and bromine. Levels of these chemicals over Antarctica, 80% from human-produced compounds, are projected to decline back to 1980 levels in approximately the 2070 time period.

In 2016, a weaker than averaged ozone hole was observed compared to the 1991–2006 average, a period corresponding to the maximum load of ODSs in the stratosphere. Since 2009, averaged ozone columns during the maximum depletion period have been higher than this 1991–2006 average. While the weaker ozone depletion 2016 was also due to higher than average temperatures within the vortex, observations of the ozone hole in recent years add to our confidence that Antarctic ozone levels are increasing, as noted in Newman et al. (2015), Nash et al. (2016), and Solomon et al. (2016).

Considering the current chlorine and bromine levels in the stratosphere, polar ozone depletion can also occur over the Arctic but with a smaller magnitude compared to Antarctica. Arctic ozone depletion is highly variable and strongly dependent on stratospheric meteorological conditions. Relatively small depletion occurred in the winter 2016-2017, due to lack of very cold conditions during the winter compared to previous winters.

Our ability to follow future ozone levels is crucially dependent on satellite, balloon, and ground-based ozone observing systems. The maintenance and continuation of ozone observations is necessary for improving our scientific understanding of interactions between climate change and ozone depletion, for measuring the ongoing recovery impact of the Montreal Protocol, and for observing the ozone layer under changing climate conditions. The International Ozone Commission (IO<sub>3</sub>C) of IAMS-UUGG urges national and international agencies to continue their support of measurements of ozone and related species, in order to understand and observe the evolution of atmospheric ozone over the 21<sup>st</sup> century.

***This text was last reviewed by the IO<sub>3</sub>C members on September 15<sup>th</sup> 2017***

*For more information: Dr. Irina Petropavlovskikh, Secretary of the International Ozone Commission, CIRES/NOAA, 325 Broadway R/GMD, Boulder, CO, 80305-3328, phone: 303-497-6279, fax: 303-497-5590, irina.petro@noaa.gov*

IO<sub>3</sub>C: <http://www.io3c.org>

WMO Northern Hemisphere Ozone Mapping Center: <http://lap.physics.auth.gr/ozonemaps> WMO

Antarctic Ozone Bulletin: <http://www.wmo.int/pages/prog/arep/gaw/ozone/index.htm> World Ozone

and Ultraviolet Data Center: <http://www.woudc.org>

Ozone Hole Watch: <http://ozonewatch.gsfc.nasa.gov/>

Assessments on the state of the ozone layer: <http://ozone.unep.org/en/assessment-panels/scientific-assessment-panel>

Who is who in the Montreal Protocol: <http://www.unep.fr/ozonaction/montrealprotocolwhoswho/PageFlip.asp>

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