



# **Scientific Assessment Panel Report**

**32<sup>nd</sup> Meeting of the Parties  
to the Montreal Protocol**

**12<sup>th</sup> Meeting of the Conference of the  
Parties to the Vienna Convention**



27 November 2020

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## **Cochairs:**

**Bonfils Safari (Rwanda)**

**Paul A. Newman (USA)**

**John A. Pyle (UK)**

**David W. Fahey (USA)**

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## **Status of:**

- **Scientific Assessment of Ozone Depletion: 2022**
- **CFC-11 Report**



# Scientific Assessment of Ozone Depletion: 2022



# **The 2022 Science Assessment**



**November 2019: Parties define terms of reference  
(31<sup>st</sup> MOP [Rome], Decision XXXI/2)**

**Fall 2018: Preparatory work has begun**

- **Multiple meetings of SAP Cochairs on-line**
- **Steering committee formed:**
  - Julie Arblaster (Australia), Lucy Carpenter (UK), David Fahey (USA)
  - Jianxin Hu (China), Ken Jucks (USA), Paul A. Newman (USA)
  - David Plummer (Canada), John Pyle (UK), Bonfils Safari (Rwanda)
- **Discussion paper on assessment contents circulated to international science community for comment (28 Oct. 2020)**
- **Communication from SAP Co-chairs and UNEP to the Parties, seeking nominations of participants**
  - **Replies requested by December 18**
  - **Previous participants need not be renominated; they will be considered again. Replies to be sent to UNEP contact:  
Sophia.Mylona@unep.org**



# The 2022 Science Assessment

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## Decision XXXI/2:

1. To request the Scientific Assessment Panel, the Environmental Effects Assessment Panel and the Technology and Economic Assessment Panel to prepare **quadrennial assessment** reports and submit them **to the Secretariat by 31 December 2022** for consideration by the Open-ended Working Group and the Meeting of the Parties in 2023, and to present a **synthesis report by 30 April 2023**, noting that the panels should continue to exchange information, during the process of developing their respective reports in order to avoid duplication and provide comprehensive information to the parties to the Montreal Protocol;
2. To request the assessment panels to bring to the notice of the parties any significant developments which, in their opinion, deserve such notice, in accordance with decision IV/13;
3. To encourage the assessment **panels to closely involve relevant scientists from Article 5 parties** with a view to promoting gender and regional balance, to the best of their ability, in producing the reports;



# The 2022 Science Assessment (Contd.)

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## Decision XXXI/2:

5. That the 2022 report of the Scientific Assessment Panel should include:
  - (a) An assessment of **the state of the ozone layer** and its future evolution;
  - (b) An **evaluation of global and polar stratospheric ozone**, including the Antarctic ozone hole and Arctic winter/spring ozone depletion and the predicted changes in those phenomena;
  - (c) An **evaluation of trends in the top-down derived emissions, abundances and fate in the atmosphere of trace gases of relevance to the Montreal Protocol** on Substances that Deplete the Ozone Layer, in particular controlled substances and other substances of importance to the ozone layer, which should include a comparison of bottom-up and top-down estimations of such emissions with a view to addressing unidentified emission sources and discrepancies between reported emissions and observed atmospheric concentrations;
  - (d) An evaluation of **consistency with reported production and consumption** of those substances and the likely implications for the state of the ozone layer, including its interaction with the climate system;

...



# The 2022 Science Assessment (Contd.)

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## Decision XXXI/2:

5. That the 2022 report of the Scientific Assessment Panel should include:

- ...
- (e) An assessment of the interaction between changes in **stratospheric ozone and the climate system**, including possible future policy scenarios relating to ozone depletion and climate impacts;
  - (f) **Early identification and quantification**, where possible, **of any other issues** of importance to the ozone layer and the climate system consistent with the objectives of the Vienna Convention for the Protection of the Ozone Layer and the Montreal Protocol;
  - (g) An assessment of information and research related to **solar radiation management and its potential effect on the stratospheric ozone layer**;
  - (h) Relevant information on any **newly detected substances** that are relevant for the Montreal Protocol;



# 2022 Assessment Timeline

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2020

- Discussion Paper circulated for comments by scientific community
- Lead Authors and Chapter Editors established
- Chapter author teams assembled, early preparation steps begin
- 1<sup>st</sup> order drafts (FODs) of Chapters due (Apr.)**
- SSC / Review Editors review FODs (May)

2021

- 2<sup>nd</sup> order drafts (SODs) of Chapters due (Feb.)**
- Internal Review of SODs (Aug.)
- External Review of SODs (Sept.)
- 1<sup>st</sup> draft of updated 20 Q&As
- 3<sup>rd</sup> order drafts (TODs) of Chapters due (Dec.)**
- Mtg. to finalize report & draft Exec. Summary messages (Jan.)**

2022

- Final draft of Core Assessment completed (Apr.)**
- Executive Summary draft due (Apr.)
- 2<sup>nd</sup> draft of updated 20 Q&As
- Panel Review Meeting for Exec. Summary (Les Diablerets, July)



# **SAP Report on increased CFC-11 emissions**

## **CFC-11 Report Advisory Group:**

Paul Fraser (Australia), Neil Harris (UK),  
Jianxin Hu (China), Michelle Santee (USA),  
David Fahey (SAP), Paul A. Newman (SAP),  
John Pyle (SAP), Bonfils Safari (SAP)



## Decision XXX/3: Unexpected emissions of trichlorofluoromethane (CFC-11)

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“To request the Scientific Assessment Panel to provide to the parties a **summary report on the unexpected increase of CFC-11 emissions**, which would supplement the information in the quadrennial assessment, including additional information **regarding atmospheric monitoring and modelling, including underlying assumptions, with respect to such emissions; ...**”



# CFC-11 Report Delay

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- Two papers updating global and regional CFC-11 emissions were submitted to a peer-reviewed journal in July 2020. They suggest substantial changes to the trends in earlier years and so are critical to the report. Anticipated publication date is approximately Jan.-Feb. 2021.
- Delay of Report delivery requested in early August 2020
- Updated paper on CFC-11 regional emissions through 2018-19
  - Sunyoung Park (Korea), L. Western (UK), T. Saito (Japan), A. Redington (UK), S. Henne (Switzerland), X. Fang (China), R. Prinn (US), A. Manning (US), S. Montzka (US), P. Fraser (Australia), A. Ganesan (UK), C. Harth (US), J. Kim (US), P. Krummel (Australia), Q. Liang (US), J. Mühle (US), S. O'Doherty (UK), H. Park (Korea), M. Park (Korea), S. Reimann (Switzerland), P. Salameh, R. Weiss (US), M. Rigby (UK)
- Updated paper on CFC-11 global emissions through 2018-19
  - Stephen A. Montzka (US), G. Dutton (US), R. Portmann (US), M. Chipperfield (UK), S. Davis (US), W. Feng (US), A. Manning (UK), E. Ray (US), M. Rigby (UK), B. Hall (US), C. Siso (US), J. Nance (US), P. Krummel (Australia), J. Mühle (US), D. Young (UK), S. O'Doherty (UK), P. Salameh (US), C. Harth (US), R. Prinn (US), R. Weiss (US), J. Elkin (US), H. Walter-Terrinoni (US), C. Theodoridi (US)
- Release of information on both papers currently embargoed under the journal's rules



# Structure and Authors

- 1. Executive Summary:** All
- 2. Introduction:** All
- 3. Observations:** Stefan Reimann (Switzerland), Bo Yao (China)
- 4. Global emissions:** Steve Montzka (USA), Sunyoung Park (South Korea)
- 5. Regional emissions:** Matt Rigby (UK), Andreas Stohl (Norway).
- 6. Scenarios:** Guus Velders (Netherlands), Helen Walter-Terrinoni (USA).
- 7. Modeling:** Martyn Chipperfield (UK), Michaela Hegglin (UK)



# CFC-11 Report Schedule

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- ✓ 2019, Mar. 25 International Symposium on CFC-11, Vienna
- ✓ 2019, Jun. 1 Discussion outline completed
- ✓ 2019, Aug. 19 Schedule formulated
- ✓ 2019, Aug. 23 Author Team formed
- ✓ 2019, Aug. 30 Introduction telecon with SAP co-chairs
  
- ✓ 2019, Oct. 21 Extended outline sent out for review by Advisory Group
- ✓ 2019, Nov. 4 Interim Report submitted for MOP
- ✓ 2019, Dec. 3 1<sup>st</sup> draft begun
- ✓ 2019, Dec. 11 AGU Special Session on CFC-11
- ✓ 2020, Feb. 21 1<sup>st</sup> draft sent for review
- ✓ 2020, Apr. 3 2<sup>nd</sup> draft begun
- ✓ 2020, Aug. 7 **2<sup>nd</sup> draft put on hold pending new publications**
- ☐ 2020, Dec. 2nd order draft completed, sent for review
- ☐ 2021, Jan-Feb. 2<sup>nd</sup> order review completed, revisions begin
- ☐ 2021, Feb. Report finalized
- ☐ 2021, Mar. Report delivered to Parties and e-published



# SAP report summary

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- Preparatory work for the “Scientific Assessment of Ozone Depletion: 2022” has begun. The SAP co-chairs request that the Parties nominate expert participants.
- CFC-11 Report’s 2<sup>nd</sup> draft is complete, but waiting to revise after inclusion of two new papers (both now accepted and to be published in Jan.-Feb. 2021) updating global and regional emissions



# Science nugget: The ozone hole's spring break-up is delayed

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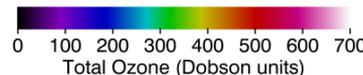
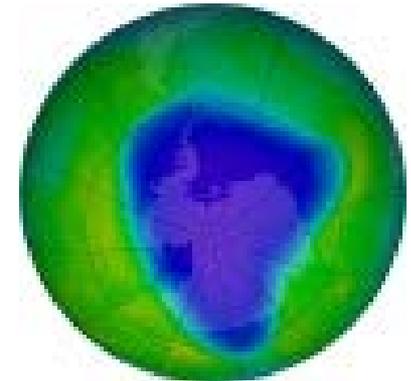
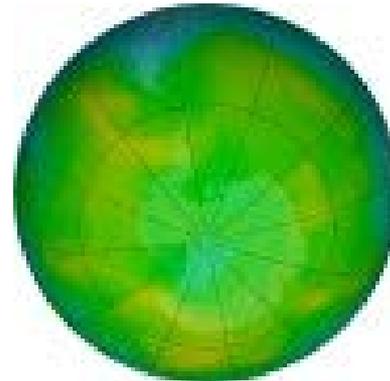
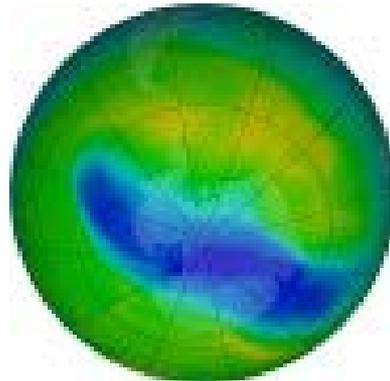
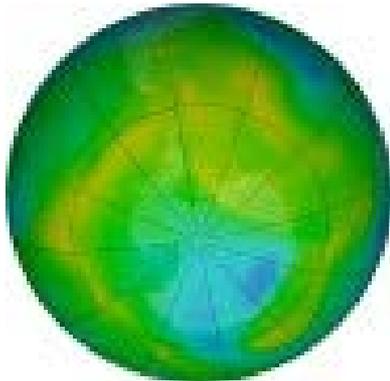
## November 23

2017

2018

2019

2020



- The 2020 ozone hole (12<sup>th</sup> largest in the 40+ year record) is persisting well into the southern hemisphere spring.
- This persistence is a record in our 1978 to presents satellite observation record
- This is not evidence of worsening ozone depletion, but a result of the unusual weather in the southern hemisphere



**The End**  
Thank you for your attention



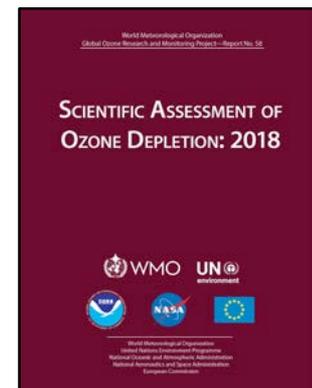
# CFC-11 in the Executive Summary

## WMO/UNEP [2019]

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**There has been an unexpected increase in global total emissions of CFC-11.**

- Global CFC-11 emissions derived from measurements by two independent networks increased after 2012, thereby slowing the steady decrease in atmospheric concentrations reported in previous Assessments.
- The global concentration decline over 2014 to 2016 was only two-thirds as fast as it was from 2002 to 2012.
- While the emissions of CFC-11 from eastern Asia have increased since 2012, the contribution of this region to the global emission rise is not well known. The country or countries in which emissions have increased have not been identified. [ES Section 1]





# TEAP [2019] estimated bottom-up emissions do not agree with top-down in recent years

TEAP Figure 6-10  
Estimated  
Bottom-up  
emissions

