

Krzyścin, J., 2020: Is the Antarctic ozone hole recovering faster than changing the stratospheric halogen changes? *J. Meteor. Soc. Japan*, **98**, 1083-1091. <https://doi.org/10.2151/jmsj.2020-055>

**Plain language summary:** Large ozone deficit over Antarctica has been observed regularly in austral spring since the early 1980s. The size and depth of the ozone hole vary considerably from year-to-year. The hole appears to have lost strength in the past 20 years because of declining levels of the man-made ozone-depleting chemicals in the stratosphere. This paper introduces indices for tracing the hole recovery: percentage of the healed amount of the ozone hole metric (total column ozone, hole area, and mass of ozone loss within the hole) by 2019, and the metric recovery year. In late winter and early spring, the metrics show stronger hole recovery than expected based on recent changes in ozone-depleting substances in the stratosphere.

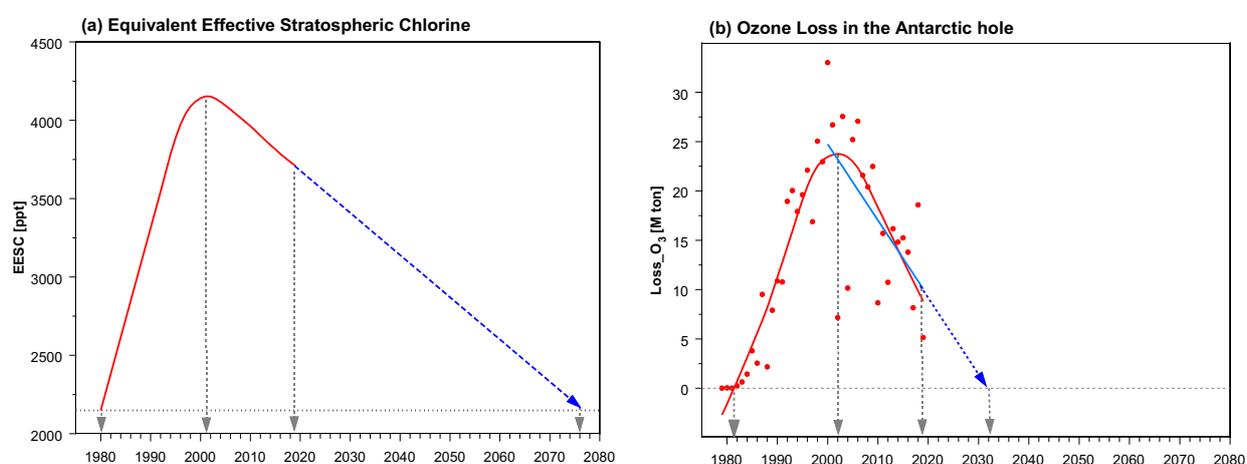


Figure 1. (a) Amount of the ozone-depleting substances in the Antarctic stratosphere based on the equivalent effective stratospheric chlorine (EESC) load in ppt. (b) Mass of the ozone loss within the hole (M ton) in September. Red curve shows the smoothed time series for the period 1979-2019. Blue dashed line shows the extrapolated regression line obtained for the period 2000-2019 (blue solid line). Note the difference in the recovery years (blue arrows).

### Highlights:

- Indicators to monitor the Antarctic ozone hole recovery are proposed: percentage of the healed amount of the hole metric (total column ozone, hole area, and mass of ozone loss within the hole) by 2019, and the metric recovery year.
- The statistically significant recovery is found from beginning of September up to mid-November based on mass of the ozone loss within the hole.
- In late austral winter and early spring, the recovery inferred from mass of the ozone loss within the hole is significantly stronger than expected based on changes in the stratospheric halogen loading alone.