

## Ozone layer, 1980-2020

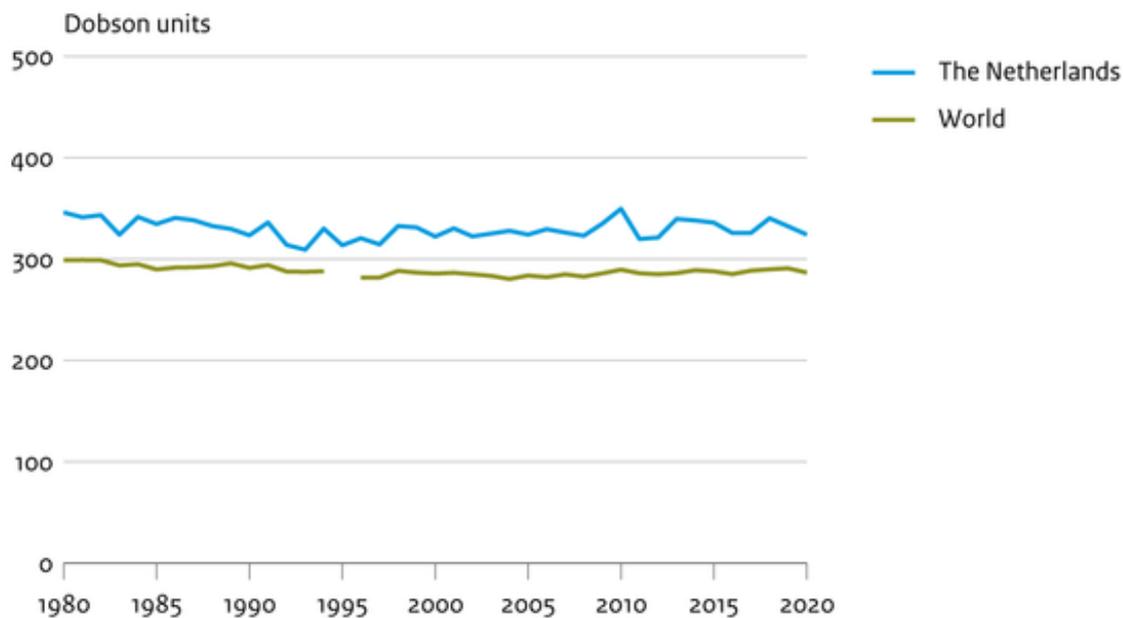
Indicator | 31 August 2021

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The thickness of the ozone layer has decreased by 5% worldwide during the last 25 years, with most depletion taking place between 1980 and 1990. Since the early 1990s, it has remained stable at this lower level.

[figuurgroep]

### Ozone layer thickness

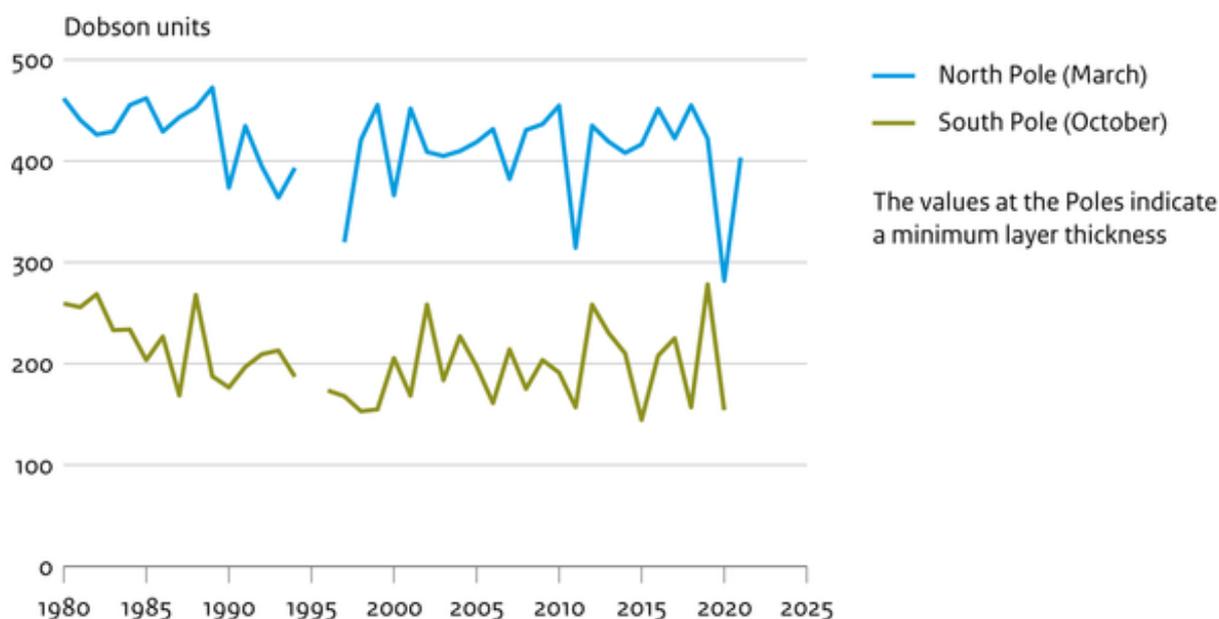


Source: KMI, KNMI, NASA, 2021

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## Ozone layer thickness on North and South Pole



Source: KMI, KNMI, NASA, 2021

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## Thickness of ozone layer worldwide and above The Netherlands

Measurements show that the thickness of the ozone layer has decreased both worldwide and above the Netherlands since 1980. This is due to increasing concentrations of ozone-depleting substances in the atmosphere. The layer thinned in particular between 1980 and 1990. Since the early 1990s, the thickness has remained stable at this lower level. In the period 2000-2004, the ozone layer was about 5% thinner than prior to 1980, both worldwide and at temperate latitudes such as the Netherlands. Ozone layer depletion is a seasonal phenomenon: depletion is greater in the winter and spring than in the summer and autumn.

## Thickness of ozone layer above the poles

Since 1980, the ozone layer has become especially thinner above the poles, although no further depletion has taken place above the South Pole since the early 1990s. In the month of October, when the ozone hole is largest above the South Pole, the ozone layer is 40% thinner than in October months prior to 1980. In several recent years, in which there have been cold winters in the North Pole area, the ozone layer above the North Pole has also been up to about 25% thinner in the spring. The temperature in the stratosphere above the North Pole was unusually low in the spring of 2011 and again in the spring of 2020, with the result that the ozone layer was thinner than previously observed (Manney et al., 2011). However, the ozone layer at the North Pole is thicker than at the South Pole, because the supply of ozone-rich air at the North Pole is greater than at the South Pole. The ozone layer above the South Pole was much less depleted in the autumn of 2019 than in the

years before. This was due to rapid warming of the air in the stratosphere in September, which also occurred in 1988 and 2002, and is not an indication of an accelerated recovery of the ozone layer.

## Recovery of ozone layer

The concentration of ozone-depleting substances in the stratosphere has passed its maximum level. This will allow recovery of the ozone layer to take place. However, natural variability makes it difficult to detect the start of such recovery, and complete recovery is expected to occur around the middle of the 21st century. In addition, the increase in greenhouse gases in the atmosphere causes cooling of the stratosphere and could affect recovery of the ozone layer. The expectation, therefore, is that ozone will be broken down less rapidly in the higher stratosphere. However, uncertainties about the effect of cooling on ozone in the lower stratosphere mean that the effect on the ozone layer as a whole is as yet unknown. Furthermore, the recovery of the ozone layer will be affected by the future emissions of methane and nitrous oxide.

## References

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- WMO (2020), <https://public.wmo.int/en/media/news/arctic-ozone-depletion-reached-record-level> [9].

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CBS, PBL, RIVM, WUR (2021). [Ozone layer, 1980-2020](#) [10] (indicator 0218, version 18 , 31 August 2021 ). [www.environmentaldata.nl](http://www.environmentaldata.nl). Statistics Netherlands (CBS), The Hague; PBL Netherlands Environmental Assessment Agency, The Hague; RIVM National Institute for Public Health and the Environment, Bilthoven; and Wageningen University and Research, Wageningen.

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