

Current Ozone Monitoring at the Danish Meteorological Institute 2024

1. OBSERVATIONAL ACTIVITIES

1.1 Column measurements of ozone and other gases/variables relevant to ozone loss

Ozone is monitored from 3 different sites: Copenhagen (DK), Kangerlussuaq (GL) and Ittoqqortoormiit (GL). In Copenhagen using a Brewer mkIII (ozone (and SO₂)); in Kangerlussuaq using a Brewer mkIII and a Brewer mkII (ozone (and SO₂)) along with a SAOZ spectrometer (ozone) and an Aeronet Photometer; in Ittoqqortoormiit a SAOZ spectrometer (ozone) and an Aeronet Photometer. Besides, an Aeronet Photometer is installed Narsarsuaq (GL).

1.2 Profile measurements of ozone and other gases/variables relevant to ozone loss

In Ittoqqortoormiit ozonesoundings are performed once a week and possibly more often when requested (during an ozone loss event). Otherwise the station is part of the usual radiosounding network.

1.3 UV measurements

The Brewer spectrometers in Copenhagen and Kangerlussuaq also makes UV scans. In Copenhagen a Yes UV index instruments is also mounted.

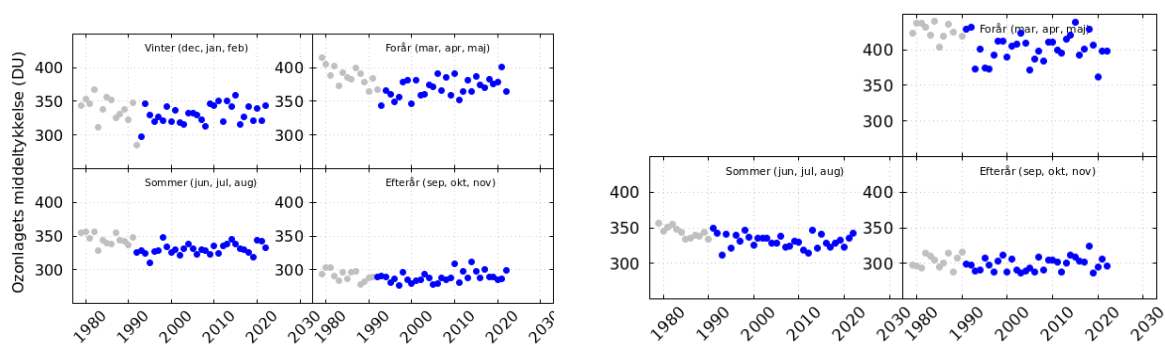
1.4 Measurements of substances controlled under the Montreal Protocol

No measurements are done with respect to monitoring hydrofluorocarbons

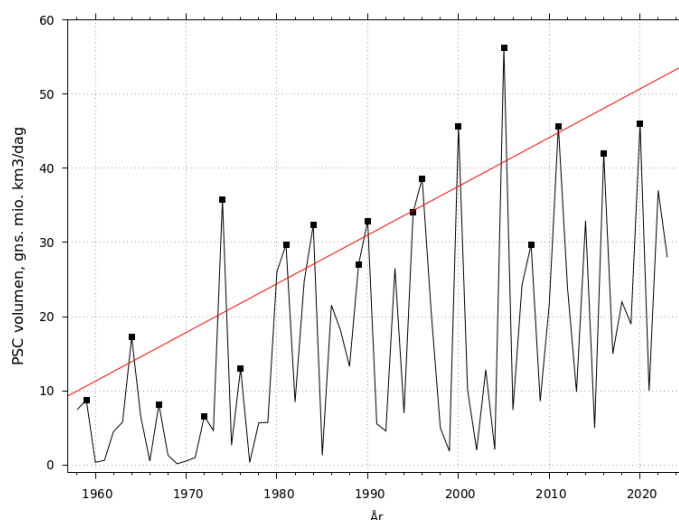
1.5 Calibration activities

The Brewer mkIII instruments are calibrated in Spain every 2 years using a reference Brewer from Izana. UV calibration is done with UV standard bulb.

2. RESULTS FROM OBSERVATIONS AND ANALYSIS



The figures show the average ozone layer thickness in DU for Copenhagen (left) and Kangerlussuaq (right). The figure is divided into the 4 seasons: winter, spring, summer and fall. For Kangerlussuaq there is virtually no sunlight in the winter season so this one is omitted. Blue dots are Brewer measurements and grey dots are values from the Toms satellite.



The Figure above shows the psc volume in the arctic vortex. The black dots is 'all time high' in a 5 year period. The regression line is based on these dots. As is seen the cold winters are getting colder as the psc volume is increasing over the years.

3. THEORY, MODELLING, AND OTHER OZONE RELATED RESEARCH

Some years ago it was suggested to investigate the possibility of using drones for the ozonesoundings. The idea being to use a motorless 'winged' drone to be lifted into the stratosphere using a balloon. The sounding equipment is installed in the drone to perform the sounding during the ascend. Once the balloon bursts it is released from the drone, the drone will fall towards the ground and once the buoyancy is large enough the drone will 'circle' towards the ground. Besides the economic advantages of using this method (reuse of some of the sounding equipment), environmental advantages would also be achieved since sounding residues would no longer end on the ground/in the ocean. Funding for the preliminary flights is not in place at the moment.

4. DISSEMINATION OF RESULTS

4.1 Brewer Data are fetched by the EUBrew Network. From here data are forwarded to NDACC. Brewer ozone data are manually uploaded to WOUDC. Ozonesonde data are uploaded to the databases at NILU, NDACC and WOUDC. SAOZ data are sent to Latmos via FTP.

4.2 Information to the public

The UV index is part of the daily weather forecast. The ozone layer thickness may be found on a secondary website.

4.3 Relevant scientific papers

A yearly report about the ozone layer is published at DMI (in Danish). DMI is coauthoring a number of papers every year due to the use of our data.

5. PROJECTS, COLLABORATION, TWINNING AND CAPACITY BUILDING

In case of a depletion event the launch of ozonesondes from Ittoqqortoormiit is coordinated with AWI (DE).

6. IMPLEMENTATION OF THE RECOMMENDATIONS OF THE 11th OZONE RESEARCH MANAGERS MEETING

Currently, the recommendations of the 11th ORM are not implemented in the ozone monitoring at DMI.

7. FUTURE PLANS

It is uncertain if the recommendations will be implemented. The monitoring is funded by the Danish EPA (Environment Protection Agency or MST), and it is uncertain if they are willing to extend the monitoring program. Secondly, DMI is increasingly focused on that research done at DMI should be usable in the weather forecasting and/or climate change prediction. So it is uncertain to which extent DMI is willing to run or even expand the monitoring.

8. NEEDS AND RECOMMENDATIONS

As mentioned, the ozone monitoring is dependent of funding from the Danish EPA. Funding is usual for a 1-3 year period. In 2024 a new funding application is required.

