File Revision Date:
September 13, 2019

Thule (Greenland) ozone soundings, starting in October, 1991 and onward.

Science Pump, 5a, 6a, and ENSCI z-sondes have been used together with Vaisala RSA11 interface cards and RS80-18NE radiosondes. The Vaisala receiver, MARWIN MW12, and the Vaisala 'ozone' program have been used to receive and record the data.

Until the end of 1995 a home-made calibration unit has been used to prepare the ozone sensors. Unfortunately the high ozone level generated by the unit to clean the pump, tubes and empty cathode cell is far too low (25 mPa). The effect of this reduced cleaning is not known, but may have caused a 5% reduction in the measured ozone level according to private conversations with W. Komhyr. It has not been possible to detect such an effect by comparing the Thule soundings to other soundings, part of the Match data, according to M. Rex (private communication). The home-made unit did not allow a check of the sensor response time. Since 1996 the ozonizer/test unit, KTU-2, (Komhyr) has been used. In August 1999 KTU-2 has been replaced by a new home-made unit with a better micro-ampere meter, allowing accurate determinations of the sensor background.

The pump time, measured during the preparation by a gilibrator (Gilian Instrument Corp.), has been used in the data reduction. The measured pump rate is not corrected for the saturated water vapor pressure resulting from the passage of the air of the cathode solution. Starting in August 1999 the room temperature and humidity is recorded to make this correction possible.

In all soundings Oct 1991-August 1999, the following 1% cathode solution has been used:
10 g KI
25 g KBr
1.25 g $NaH_2PO_4*H_2O$
3.73 g $Na_2HPO_4*7H_2O$
(from the Science Pump and ENSCI instruction manuals, amounts are per liter water),

and the 'New Stoic 89' pump effeciency correction table has been used.

Until February, 1999 only one type of background current has been recorded during the preparation, the background current after extended ventilation of the cathode cell by clean air. This background current, without any altitude correction, has been subtracted from the measured sensor current. The current has been measured after connection to the interface/radiosonde to obtain sufficient accuracy (0.01 microA).

Starting in August 1999, the other type of background current will be recorded during the preparation and stored in the NASA/Ames file. This current is measured after 10 minutes ventilation of the sensor by an ozone level corresponding to a 5microA current, followed by 20 minutes of clean air ventilation.
At the same time the old Vaisala 'ozone' data recording program is replaced by the Vaisala 'metgraph' program.

The raw 1.6 s data, the interface card parameters, and a preliminary file in the NASA/Ames format have been stored in three separate files. The raw data have been edited manually to remove glitches in the sensor current, and intervals of strong noise. Also, if the pump stops at the upper part of the sounding, the sensor current has been set undefined in this part. A local program, originally based upon the NILU 'convert' program, has been used to reduce the raw data. The data reduction has been cross-checked by E. Kyro, The Finnish Meteorological Institute.

10-s values of the horizontal wind, retrieved separately in the MARWIN receiver, have been merged into the NASA/ Ames files using the air-pressure as independent parameter.
After the closure of the Omega navigation system in October 1997, no winds have been recorded in the Thule ozone soundings. There are no plans (1999) to upgrade the MARWIN to the required GPS system to resume the wind recording.

Ib Steen Mikkelsen
Danish Meteorological Institute
ism@dmi.dk

After 1999 the same buffer as above has been used regardless of which type of ozonesonde was used. In this way it was avoided to have different sets of buffers available at the station. This eliminated the possibility of using a wrong buffer in a given ozonesonde.

In 2012 a transfer function was established to calculate from one buffer type to another (Smit et al.: O3S-DQA Activity:Guide Lines for Homogenization of Ozone Sonde Data, 2012/13).
If applied a note on the recalculation is inserted in the data file.

The last ozonesonde was launched in Thule on December 26th 2016 as a preparation for a Match Campaign in 2017. However, the vortex broke up early in 2017 and the Campaign was cancelled.

DMI shut down all of its activities at Thule Airbase in Spring 2017.

Nis Jepsen
DMI
nje@dmi.dk