File Revision Date:
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Data Set Description:
PI: Dr. Rigel Kivi
Instrument: ECC Ozonesondes
Site: Sodankylä
Measurement Quantities: Ozone partial pressure, Pressure, Temperature, Relative humidity, box inside temperature, Horizontal wind speed and direction.

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DOI:
Not at this time.

Reference Articles:
Kivi, R., E. Kyrö, T. Turunen, N. R. P. Harris, P. von der Gathen, M. Rex, S. B. Andersen, and I. Wohltmann (2007), Ozonesonde observations in the Arctic during 1989–2003: Ozone variability and trends in the lower stratosphere and free troposphere, J. Geophys. Res., 112, D08306, doi:10.1029/2006JD007271.

Christiansen, B., Jepsen, N., Kivi, R., Hansen, G., Larsen, N., and Korsholm, U. S.: Trends and annual cycles in soundings of Arctic tropospheric ozone, Atmos. Chem. Phys., 17, 9347–9364, https://doi.org/10.5194/acp-17-9347-2017, 2017.

Deshler, T., Stübi, R., Schmidlin, F. J., Mercer, J. L., Smit, H. G. J., Johnson, B. J., Kivi, R., and Nardi, B.: Methods to homogenize electrochemical concentration cell (ECC) ozonesonde measurements across changes in sensing solution concentration or ozonesonde manufacturer, Atmos. Meas. Tech., 10, 2021–2043, https://doi.org/10.5194/amt-10-2021-2017, 2017.

Instrument Description:
The ECC Ozonesonde (Electrochemical Concentration Cell Ozonesonde) is a lightweight, balloon-borne instrument ínterfaced to a meteorological radiosonde and flown to 30-35 km while transmitting data back to a ground station. The heart of the ozonesonde is an electochemical concentration cell (ECC) that senses ozone as it reacts with a dilute solution of potassium iodide to produce an electrical current proportional to the ozone concentration of the air.

Algorithm Description:
Ozone is calculated as a partial pressure. PTU data from the sonde is not used directly in the calculation except in the pump correction.

PPOZ(nb) = 0.004307 * i * Temperature * t *pcf

where:
i is the current from the sensor - background in uA.
t is the time in seconds to pump 100 CCs of air through the pump.
Temperature is the pump temperature (K).
Pcf is the pump correction factor to account for loss in pump efficiency at lower pressures.

Background current is assumed to be constant.

The pump efficiency correction E(p) is interpolated from the original table:

Pressure	Correction
5.0	1.300
8.0	1.206
10.0	1.170
15.0	1.120
20.0	1.092
30.0	1.065
40.0	1.047
50.0	1.035
60.0	1.025
70.0	1.022
100.0	1.010
150.0	1.000
1000.0	1.000

Expected Precision/Accuracy of Instrument:
Ozonesonde:

hPa	Accuracy	Precision	Resolution
1000	+/- 5%	+/- 4%	0.3km
100	+/- 5%	+/- 3%	0.3km
10	+/- 5%	+/- 3%	0.4km
4	+/- 10%	+/- 10%	0.4km

Instrument History:
ECC type of ozonesondes have been flown since the start of the measurement program at Sodankyla. Until 2006 we used SPC sondes with 1% KI sensing solution. In February 2006 regular ENSCI sondes with 0.5% KI sensing solution were started. The data quality was assessed by a series of dual launches (SPC1.0/ENSCI0.5). The comparison results showed no difference in the stratosphere (Kivi et al., 2007). Change from Vaisala RS80 to RS92 radiosonde took place in November 2005.