File Revision Date:
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Data Set Description:

PI: Roeland Van Malderen
Instrument: ozone sondes
Site(s): Uccle (Belgium), headquarters of Royal Meteorological Institute of Belgium
50°48'N, 4°21'E, 100m asl
The site is in a residential suburb at the south of Brussels.
Measurement Quantities: ozone, temperature, rel. humidity and wind profiles, pressure/geopotential altitude.
Data Version description: Pressure and Temperature Dependent Total Ozone normalization (PRESTO), a site-specific operational processing. Details can be found in the De Backer [1999] & Van Malderen [2016], see below.

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DOI:
Not available yet.

Data License:

Reference Articles:

De Backer, Hugo, D. De Muer, E. Schoubs and M. Allaart, A new pump correction profile for Brewer-Mast ozonesondes, in Proceedings of the 18th Quadrennial Ozone symposium, edited by R. Bojkov and G. Visconti, Parco Scientifico e Tecnologico d'Abruzzo, Italy, 891-894, 1998.

De Backer, Hugo, D. De Muer and G. De Sadelaer, Comparison of ozone profiles obtained with Brewer-Mast and Z-ECC sensors during simultaneous ascents, J. Geophys. Res. 103, 19641-19648, 1998.

De Backer, Hugo, Homogenisation of ozone vertical profile measurements at Uccle, Wetenschappelijke en technische publicaties van het K.M.I. no 7, ISSN D1999/0224/007, K.M.I., 26pp, Ukkel, 1999. (https://ozone.meteo.be/instruments-and-observation-techniques/ozonesondes)

Lemoine, Rene and H. De Backer, Assessment of the Uccle ozone sounding time series quality using SAGE II data, J. Geophys. Res., 106, 14515-14523, 2001.

Van Malderen, R., De Backer, H., Delcloo, A. and Allaart, M.: Identifying the Origin of Anomalous High Tropospheric Ozone in the Ozonesonde Data at Uccle by Comparison with Nearby De Bilt, Atmosphere-Ocean, Ozone Special Issue, doi: 10.1080/07055900.2014.886552, 2014

Van Malderen, R., Allaart, M. A. F., De Backer, H., Smit, H. G. J., and De Muer, D.: On instrumental errors and related correction strategies of ozonesondes: possible effect on calculated ozone trends for the nearby sites Uccle and De Bilt, Atmos. Meas. Tech., 9, 3793-3816, doi: 10.5194/amt-9-3793-2016, 2016

Van Malderen, R., De Muer, D., De Backer, H., Poyraz, D., Verstraeten, W. W., De Bock, V., Delcloo, A., Mangold, A., Laffineur, Q., Allaart, M., Fierens, F., and Thouret, V.: Fifty years of balloon-borne ozone profile measurements at Uccle, Belgium: a short history, the scientific relevance and the achievements in understanding the vertical ozone distribution, Atmos. Chem. Phys., https://doi.org/10.5194/acp-2020-724, 2021.

Instrument Description:
Ozone is measured in an electrolytic cell with KI. Ambient air is bubbled through the solution, where, if present, ozone reacts with the KI to produce a current, which is measured and transmitted through a meteorological radio sonde. The instrument is lifted together with the radiosonde by a balloon. The meteorological parameters are measured with Vaisala RS41 radiosondes.

Algorithm Description:
The details of the PRESTO algorithm for the data reduction and homogenisation of the data are in De Backer [1999] and Van Malderen et al. [2016]. Handling of meteorological data, including wind analysis, is done within the Vaisala Digicora software.

Expected Precision/Accuracy of Instrument:
PTU values for RS41 Radiosonde

Pressure:

Resolution	0.01 hPa
Uncertainty	0.6-1 hPa for p in 100-3 hPa and p > 100 hPa resp.

Temperature:

Resolution	0.01 C
Uncertainty	0.3-0.4 C

Humidity:

Resolution	0.1% RH
Uncertainty	4% RH

Geopotential Height:
Uses Pressure and Temperature profile.
Errors due to uncertainty in these values.

Wind speed:

Resolution	0.1 m/s
Uncertainty	0.15 m/s

Wind direction:

Resolution	0.1 degree
Uncertainty	2 degrees

Pump Temperature:

Resolution	0.01 C
Uncertainty	0.2 C

Ozone Partial Pressure:

Resolution	0.01 mPa
Accuracy	5-6% (see Fig. 3 in Van Malderen et al. [2016])

The main sources of error are the pump correction at high altitudes and background current in the troposphere.

Instrument History:

(dates and description of significant changes in instrument or algorithm)

Before 1990 the VIZ radiosondes were used, Vaisala RS80 radiosondes have been used from 1990 until end of August 2007. From September 2007 until mid June 2016, Vaisala RS92 radiosondes have been used. All Vaisala radiosonde types (also the current RS41) are equipped with a pressure sensor. Until end of March 1997, Brewer-Mast ozone sondes are used. After that date ECC sondes (En-Sci corp) are used. More details and also the description of changes in the type of radiosonde, and preparation procedure are in De Backer [1999] and Van Malderen et al. [2014,2016].