

File Revision Date:

August 25, 2025

Data Set Description:

PI: Roeland Van Malderen  
Instrument: ozonesondes  
Site(s): Uccle (Belgium), headquarters of Royal Meteorological Institute  
50°48'N, 4°21'E, 100m asl.  
The site is in a residential suburb at the south of Brussels.  
Launch frequency: 3 times a week (Mon-Wed-Fri) at 11h30 UTC  
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 et al. [2016, 2021], see references  
below.

Contact Information:

Name: Roeland Van Malderen  
Address: KMI-IRM, Avenue Circulaire 3, B-1180 Brussels (Uccle), Belgium  
Phone: +32 2 373 05 95  
Email: roeland.vanmalderen@meteo.be

DOI:

Not available yet.

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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, H., D. De Muer, and G. De Sadelaer (1998), Comparison of ozone profiles obtained with Brewer-Mast and Z-ECC sensors during simultaneous ascents, J. Geophys. Res., 103(D16), 19641–19648, <https://doi.org/10.1029/98JD01711>.
- 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/uploads/media/5fd8f51c93852/uccle-presto-debacker1999.pdf?token=/uploads/media/5fd8f51c93852/uccle-presto-debacker1999.pdf>)
- Lemoine, R., and H. De Backer (2001), Assessment of the Uccle ozone sounding time series quality using SAGEII data, J. Geophys. Res., 106(D13), 14515–14523, <https://doi.org/10.1029/2001JD900122>

- Van Malderen, R., De Backer, H., Delcloo, A., & Allaart, M. (2014). Identifying the Origin of Anomalous High Tropospheric Ozone in the Ozonesonde Data at Uccle by Comparison with Nearby De Bilt. *Atmosphere-Ocean*, 53(1), 102–116.  
<https://doi.org/10.1080/07055900.2014.886552>
- 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, <https://doi.org/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. W., 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.*, 21, 12385–12411, <https://doi.org/10.5194/acp-21-12385-2021>, 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-SGP 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, 2021]. 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)

**Ozonesondes:**

|                      |                                                                                                |
|----------------------|------------------------------------------------------------------------------------------------|
| Jan 1969 – Mar 1997: | Brewer-Mast                                                                                    |
| Apr 1997 – present:  | Z-ECC ozonesondes (En-Sci) with 0.5% KI, 0.5x (half) buffer (SST0.5), 3 ml of cathode solution |

**Radiosondes:**

|                          |                  |
|--------------------------|------------------|
| 1969 – 1990:             | VIZ radiosondes  |
| 1990 – Aug 2007:         | Vaisala RS80     |
| Sep 2007 – mid Jun 2016: | Vaisala RS92-SGP |
| mid Jun 2006 – present:  | Vaisala RS41-SGP |

More details and the description of changes in the type of radiosonde, and preparation procedures can be found in De Backer [1999] and Van Malderen et al. [2014,2016, 2021].