File Revision Date:

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September 3, 2025

Data Set Description:

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PI:	Bogumil Kois
Co-I:	Julita Biszczuk-Jakubowska
Instrument:	ECC Ozonesondes
Site:	Legionowo, Poland (Institute of Meteorology and Water Management - IMGW-PIB)
Latitude:	52.40N
Longitude:	20.97E
Altitude:	96m amsl

Measurement Quantities: Ozone partial pressure, Pressure, Temperature, Relative humidity, Geopotential height, and Wind.

Data Version Description: Data processed with Vaisala DigiCORA software systems.
Archived Data Record Start Date: January 1979 (digital since June 1993).

Contact Information:

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DOI:

Not at this time.

Data License:

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Reference Articles:

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Steinbrecht, W., et al., COVID-19 Crisis Reduces Free Tropospheric Ozone Across the Northern Hemisphere, Geophys. Res. Lett., 48, e2020GL091987, 2021, doi:10.1029/2020GL091987
Stauffer, R.M., Thompson, A.M., Kollonige, D.E., Witte, J.C., Tarasick, D.W., Davies, J., Kois, B., et al., A post-2013 drop off in total ozone at a third of global ozonesonde stations: Electrochemical concentration cell instrument artifacts?, Geophys. Res. Lett., 47, e2019GL086791, 2020, doi:10.1029/2019GL086791
Huang, G., Liu, X., Chance, K., Kois, B., et al., Validation of 10-year SAO OMI Ozone Profile (PROFOZ) product using ozonesonde observations, Atmos. Meas. Tech., 10, 2455–2475, 2017, doi:10.5194/amt-10-2455-2017

Instrument Description:

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The ECC Ozonesonde (Electrochemical Concentration Cell) is a balloon-borne instrument interfaced to a meteorological radiosonde and flown to 30–35 km while transmitting data to a ground station. Ozone reacts with a dilute KI solution, producing an electrical current proportional to ozone concentration.

Project start date: January 1979
Start digital data acquisition: June 1993
Digital Data record: 1995–present.

Launch frequency: Weekly, on Wednesdays, at 12:00 UTC; extras during MATCH and satellite validation
Data gaps: minor interruptions due to technical/operational constraints.

Ozone sensors and Radiosondes:

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Ozone sensors:

- GDR Brewer-Mast sondes (1979 – May 1993)
- SPC ECC-5A (June 1993 – November 1997)
- SPC ECC-6A (December 1997 – present)

Radiosondes:
- RKZ-5, MARZ-2 (1979–1992)
- Vaisala RS80 (1993–2006)
- Vaisala RS92 (2007–2015)
- Vaisala RS41 (2015–present)

Sensing Solution Type (SST):

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- BM sondes: 0.1% KI solution (2.0 cm^3) (1979–May 1993)
- SPC ECC: 1% KI solution (3.0 cm^3), full buffer (since June 1993)

Algorithm Description:

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Ozone is calculated as partial pressure:
POZ(nb) = 0.0043087 * (i – ib) * Tp * t * pcf

where:
i = sensor current (μA)
ib = background current
Tp = pump temperature (K)
t = mean flow rate (s to pump 100 ml)
pcf = pump efficiency correction table

Pre-flight procedures comply with:
"WMO/GAW Report 201"
https://library.wmo.int/doc_num.php?explnum_id=7167

"WMO/GAW Report 268"
https://library.wmo.int/index.php?lvl=notice_display&id=21986#.YaFNSbpOlc8

Expected Precision/Accuracy of Instrument:

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Ozonesonde:

Accuracy	Precision	Resolution
+/- 5%	+/- 4%	~150m

Radiosonde:
Pressure Accuracy:
+/- 0.5 hPa

Instrument History:

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Regular weekly ozone soundings at Legionowo began in 1979 using GDR Brewer-Mast sondes. A major upgrade occurred in 1993 with installation of the Vaisala DigiCORA system, enabling use of SPC ECC sondes. Further transitions followed:
- ECC-5A to ECC-6A sondes in 1997
- Radiosonde upgrades: RS80 (1993–2006), RS92 (2007–2015), RS41 (2015–present)
- Navigation systems: Omega (1993–96), Loran C (1997–2006), GPS (2007–present)

Since 2013, only new ECC sondes are used. Measurements continue under IMGW-PIB, with long-term support from Polish State Inspectorate of Environment Protection.

Recent Updates:

- 2024-09 – RS41-SGP (with integrated pressure sensor) paired with ECC-6A ozonesondes.

- 2024-09 – Data processing: Ozone partial pressure derived using constant background current.