File Revision Date:
October 17, 2024

Data Set Description:

PI:	Ryan M. Stauffer (prior to May 2021, PI: Anne M. Thompson)
Instrument:	ECC Ozonesondes
Site:	Wallops Island, Virginia, U.S.A. (NASA Goddard Space Flight Center Wallops Flight Facility)
Latitude:	37.93N
Longitude:	75.47W
Altitude:	11m amsl

Measurement Quantities: Ozone partial pressure, Ozone mixing ratio, Pressure, Temperature, Relative humidity, Geopotential height, GPS Altitude, Latitude and Longitude of payload, and Wind.

Data Version Description: V06 data reprocessed similarly to SHADOZ reprocessing/data homogenization.
Archived Data Record Start Date: July 25, 1995
Details of V06 reprocessing are in the reference below.

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DOI:
Not at this time.

Data License:
CC0

Reference Articles:
Witte, J. C., Thompson, A. M., Schmidlin, F. J., Northam, E. T., Wolff, K. R., & Brothers, G. B. (2019). The NASA Wallops Flight Facility digital ozonesonde record: Reprocessing,uncertainties, and dual launches. Journal of Geophysical Research:Atmospheres, 124, 3565–3582. https://doi.org/10.1029/2018JD030098.

Instrument Description:
The ECC Ozonesonde (Electrochemical Concentration Cell Ozonesonde) is a lightweight, balloon-borne instrument mated to a meteorological radiosonde and flown to 30+ 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.

Project start date: May 1970
Start digital data acquisition: July 25, 1995
Digital Data record: July 25, 1995-current
Data gaps: COVID-19 shutdown, 04/2020-09/2020

Ozone sensor:
- Science Pump Corporation (SPC) ECC-5A (July 1995 to 1996; 40 records)
- Science Pump Corporation (SPC) ECC-6A (1996 to current)
- Environmental Science (EN-SCI) Corporation Z (120 records 09/1995-01/2002)

Radiosonde:
- VIZ Manufacturing Inc.: VIZ ZEEMET Mark II MICROSONDE Loran-C (07/25/1995 – 1998)
- Sippican, Inc. ZEEMET Mark II MICROSONDE Loran-C (1998 – 12/2002; 10/2010 – 09/2011)
- Sippican, Inc. VIZ ZEEMET Mark II MICROSONDE GPS (LOS) (01/2003 – 08/2006)
- Lockheed Martin Sippican: Lockheed Martin Mark IIA MICROSONDE GPS (LOS) [LMS5] (08/2006 – 07/2016)
- Lockheed Martin: Lockheed Martin LMS6 GPS (LOS) (07/2016 – 07/2022)
- Vaisala: RS41-SG (07/2022 – present)

Sensing Solution Type (SST):
- 1% KI, 1.0x (full) buffer (Entire record w/ SPC)

1% KI, 1.0x (full) buffer (120 records w/ EN-SCI, transfer function used to convert data to SPC 1%, full buffer)

Launch Frequency:
Local Launch times 1200-1400, weekly

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 factor.

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

where:
the constant is half the ratio of ideal gas constant to Faraday's constant.
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.

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

All data have been reprocessed to comply with:
"O3S-DQA-Guidelines Homogenization-V2-19November2012.pdf"
http://www-das.uwyo.edu/~deshler/NDACC_O3Sondes/O3s_DQA/O3S-DQA-Guidelines%20Homogenization-V2-19November2012.pdf

Expected Precision/Accuracy of Instrument:
Ozonesonde:

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

Radiosonde:
Pressure Accuracy:
+/- 0.5 hPa

Instrument History:
ECC Ozonesondes:

Manufacturer:	Model #	Time Period Used	Design and Changes

Science Pump	5A	1995 to 1996	Digital data acquisition
Science Pump	6A	1996-present	Pump temp. thermistor inside of pump block
EN-SCI	Z	1995-2002	Different manufacturer but same design as 6A

Solution Recipe changes:
1995-present -> 1% KI, 1.0x (full) buffer (Entire record w/ SPC)
1995-2002-> 1% KI, 1.0x (full) buffer (120 records w/ EN-SCI, transfer function used to convert data to SPC 1%, full buffer)

Radiosonde changes:
1995 -> VIZ Manufacturing Inc.: VIZ ZEEMET Mark II MICROSONDE Loran-C
1998 -> Sippican, Inc. ZEEMET Mark II MICROSONDE Loran-C
2003 -> Sippican, Inc. VIZ ZEEMET Mark II MICROSONDE GPS (LOS)
2006 -> Lockheed Martin Sippican: Lockheed Martin Mark IIA MICROSONDE GPS (LOS) [LMS5]
2016 -> Lockheed Martin LMS6 Differential GPS (LOS) 403 MHz with Ozone sensor
2022 -> Vaisala: RS41-SG (started in July)

Solution volume changes:
07/1995-02/2007 -> 2.5 cm^3 used, absorption efficiency correction applied dependent on Pressure (100 hPa < P < 1050 hPa)
02/2007 -present -> 3.0 cm^3 used, no correction needed