

File Revision Date:

1 November 2024

Data Set Description:

PI: Matt Tully

Instrument: ECC Ozonesonde

Site(s): Broadmeadows

Measurement Quantities: Ozone partial pressure, Pressure, Temperature, Relative humidity, Geopotential height, GPS Altitude, Latitude and Longitude of payload , Horizontal wind speed and direction

Data Version description:

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Licence

CC-By-SA 4.0

DOI

Not at present time

Instrument Description:

The ECC Ozonesonde (Electrochemical Concentration Cell Ozonesonde) is a lightweight, balloon-borne instrument flown in conjunction with a meteorological radiosonde to 30+ km while transmitting data back to a ground station. The sensing component of the ozonesonde is an electrochemical concentration cell (ECC) that produces an electric current proportional to the number of ozone molecules per time reacting with a dilute solution of potassium iodide.

Broadmeadows continues the program begun at Aspendale (June 1965 to September 1982) and Laverton (September 1982 to February 1999).

Program start date: March 1999

Ozone sensor:

Science Pump Corporation (SPC) ECC-6A 1999 - 2024

Radiosonde:

Vaisala RS80 (March 1999 - October 2006)

Vaisala RS92 (October 2006 - September 2018)

Vaisala RS41 (September 2018 - present)

Sensing Solution Type (SST):

SST 1.0 : 1.0% KI & full buffer

Sensing Solution Volume:

3.0 cm³

Launch Frequency:

Launch time: 12:30 pm (local time) , weekly

(Flights are flown on Wednesday subject to wind conditions and staffing constraints)

Algorithm Description:

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

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

where:

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

i is the current from the sensor minus 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 are very close to GAW_201.

A constant background current is used (measured immediately prior to launch).

Pump correction factors used are Komhyr 1986.

Expected Precision/Accuracy of Instrument:

Ozonesonde:

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

Instrument History:

Since moving to Broadmeadows in March 1999, there have been no changes to the ozonesonde type (Science Pump Corporation ECC6A), or to the composition of the sensing solutions.

The radiosonde transitioned from the Vaisala RS80 to the Vaisala RS92 in October 2006, and then to the Vaisala RS41 in September 2018.

No correction has been applied so far for the radiosonde changes.