

File Revision Date:

August 16, 2021

Data Set Description:

PI: Carlos Torres
Co-I: Natalia Prats
Instrument: ECC Ozonesondes
Site(s) Izaña, Tenerife, Spain, Izaña Atmospheric Research Center (IARC) - State meteorological Agency of Spain (AEMET).
Izaña Observatory: 28.30N, 16.48W, 2367m a.s.l.
Santa Cruz Station: 28.46N, 16.26W, 36m a.s.l.
Botanic Observatory: 28.41N, 16.53W, 114m a.s.l.

Measurement Quantities: Ozone partial pressure, Pressure, Geopotential height, Temperature, Relative humidity, Temperature pump, Horizontal wind direction, and Horizontal wind speed.

Data Version description: Data processed with Vaisala Software.

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DOI:

Not at this time.

Data License:

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Reference Articles:

Andrey, J., E. Cuevas, M.C. Parrondo, S. Alonso-Pérez, A. Redondas, M. Gil-Ojeda,: Quantification of ozone reductions within the Saharan air layer through a 13-year climatologic analysis of ozone profiles, *Atmospheric Environment*, 84, 28-34, 2014.

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Huang, G., Liu, X., Chance, K., Yang, K., Bhartia, P. K., Cai, Z., Allaart, M., Ancellet, G., Calpini, B., Coetzee, G. J. R., CuevasAgulló, E., Cupeiro, M., De Backer, H., Dubey, M. K., Fuelberg, H. E., Fujiwara, M., Godin-Beekmann, S., Hall, T. J., Johnson, B., Joseph, E., Kivi, R., Kois, B., Komala, N., KönigLanglo, G., Laneve, G., Leblanc, T., Marchand, M., Minschwaner, K. R., Morris, G., Newchurch, M. J., Ogino, S.Y., Ohkawara, N., Piders, A. J. M., Posny, F., Querel, R., Scheele, R., Schmidlin, F. J., Schnell, R. C., Schrems, O., Selkirk, H., Shiotani, M., Skrivánková, P., Stübi, R., Taha, G., Tarasick, D. W., Thompson, A. M., Thouret, V., Tully, M. B., Van Malderen, R., Vömel, H., von der Gathen, P., Witte, J. C., and Yela, M.: Validation of 10-year SAO OMI Ozone Profile (PROFOZ) product using ozonesonde observations, *Atmos. Meas. Tech.*, 10, 2455-2475, <https://doi.org/10.5194/amt-10-2455-2017>, 2017.

Rodriguez-Franco, J. J., and Cuevas, E., Characteristics of the subtropical tropopause region based on long-term highly-resolved sonde records over Tenerife, *J. Geophys. Res. Atmos.*, 118, doi:10.1002/jgrd.50839, 2013.

Sancho, J.M., S. Afonso, E. Cuevas, Programa de Ozonosondeos del Observatorio Atmosférico de Izaña, Nota Técnica nº 3 del Observatorio Atmosférico de Izaña, Centro de Publicaciones, Ministerio de Medio Ambiente, I.S.B.N. 84-8320-196-8, Madrid, 2001.

Smit, H.G.J., W. Sträter, D. Kley, E. Cuevas, Ozone Profiles at Jülich, Germany during 1993/1994 and at Santa Cruz de Tenerife, Spain in August 1993, Berichte des Forschungszentrums Jülich GmbH KFA, 3078, Germany, 1995.

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 electrochemical 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: November 1992

Start digital data acquisition: November 1992

Data record: January 1995-current

Ozone sensor:

Science Pump Corporation (SPC) ECC-5A (11/11/1992-10/09/1997)

Science Pump Corporation (SPC) ECC-6A (17/09/1997-present)

Radiosonde:

VAISALA RS80-15NE, Omega Wind Data (11/11/1992-15/10/1997)

VAISALA RS80-15GE, GPS Wind Data (22/10/1997-06/09/2006)

VAISALA RS92-SGP, GPS Wind Data (13/09/2006-13/12/2018)

VAISALA RS41-SGP, GPS Wind Data (19/12/2018-present)

Sensing Solution Type (SST):

SST1.0: 1.0% KI & full buffer (Entire record)

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.

$$PPo3(\text{mPa}) = 0.00043087 * (I - I_{bg}) * T_p * t * PCF$$

where:

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

I is the current from the sensor (uA).

I_{bg} is the background current (uA).

T_p is the pump temperature (K).

t is the time in seconds to pump 100 ml of air through the pump.

PCF is the pump correction factor to account for loss in pump efficiency at lower pressures.

Pre-flight procedures comply with: "GAW Report No.201"

All data are being reprocessed to comply with: "O3S-DQA, Guidelines for Homogenization of Ozone Sonde Data, V2-19 November 2012"

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%

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

Instrument History:

The ozone programme at Izaña was began at the end of 1992. At the start of the programme, the ozonesondes were launched from Santa Cruz (28.46N, 16.26W, 36m a.s.l.) and since 2011 they have

been launched from Botanic Garden in Puerto de la Cruz (24.41N, 16.53W, 114m a.s.l.). In the period October 2010 - February 2011, alternative launchings were performed between both locations. The study of this alternative launchings indicate that there was no important changes/deviations in the time series, only that concerning to the lowest levels. The first measurements registered in NDACC database were in January 1995 to assure the quality of the O3S. Measurement procedures and instrument preparations have been very stable all this years.