1. ABOUT THE DATASET

Title: Tonga eruption atmospheric pressure wave data

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Description: The eruption of the Hunga Tonga-Hunga Ha'apai volcano on 15th January 2022 generated a pressure wave which propagated around the world multiple times. Its passage was recorded at the University of Reading Atmospheric Observatory in the routine precision barometer data. Using additional data from roadside measurement sites, the initial pressure disturbances could be seen to propagate north-south across the UK (having travelled via the north pole), and subsequently south-north (having travelled via the south pole). The first passage at Reading disturbed the low cloud which was then present. Subsequent passages of the pressure wave diminished in amplitude. This archive contains the roadside atmospheric pressure data, and the Reading University atmospheric pressure and cloud base data.

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Related publication: Harrison, R.G., *Pressure anomalies from the January 2022 Hunga Tonga-Hunga Ha'apai eruption* (*Weather* https://doi.org.10.1002/wea.4170)

2. TERMS OF USE

3. PROJECT AND FUNDING INFORMATION

This dataset was generated as part of routine measurements made at the Reading University Atmospheric Observatory (https://research.reading.ac.uk/meteorology/atmospheric-observatory/ and processed specially following the Hunga Tonga-Hunga Ha'apai eruption. The roadside pressure data was provided by David Bullock of Vaisala (David.Bullock@vaisala.com) obtained as part of routine measurement network activity, processed further by Giles Harrison to derive the data file provided. All data was electronically recorded.

4. CONTENTS

The data set contains three files:

filename	duration	contents	Table describing format
Roadside_Jan1516_2022.csv	15th to 16th Jan 2022	Processed roadside pressure data from selected sites in UK and Ireland	1
ReadingUKPressure_Jan2022_15-23.csv	15th to 20th Jan 2022	Pressure data from Reading University	2
20220115_1min.csv	15th Jan 2022	Cloud base height from Reading University	3

Data format

Table 1 – Roadside pressure data

This is comma-separated file containing pressure data from multiple measurement sites across the UK and Ireland. These sites using WXT530 pressure sensors, uncorrected for sea level. The data was recorded at 10min intervals, and, to produce this data file, has been interpolated onto the same regular time grid for all sites. The first row of the datafile contains the name of the site, and rows 3 and 4 the associated longitude and latitude respectively. Each column gives the sequence of pressure values from a particular site, at the time given in the first column.

Column	Quantity	units
A	Time UTC (first three rows blank)	UTC decimal day of 2022
B	Atmospheric pressure values from site specified in rows 1 to 3 (Norton Ash for column B)	hPa
…	Atmospheric pressure values from site specified in rows 1 to 3	hPa
W	Atmospheric pressure values from site specified in rows 1 to 3 (Loughrea for column W)	hPa

Row		
1	Name of site	
2	Longitude West	degrees
3	Latitude North	degrees
4 to 133	Pressure values	hPa

Table 2 – Pressure data from Reading University Atmospheric Observatory

The University of Reading Observatory operates a Druck DPI140 precision barometer, sampled digitally at 1s intervals (see also https://research.reading.ac.uk/meteorology/atmospheric-observatory/barometric-pressure/). This data file contains values from the precision barometer. The

file is comma-separated, and contains 1s samples from the start of 15th Jan 2022 to 23rd Jan 2022. There are no header lines.

Column	quantity	units
1	Value count	(integer)
2	Decimal day of 2022	UTC day number
3	Decimal hour of day	UTC hour
4	Station pressure (uncorrected for sea level)	hPa

Table 3 – Cloud base data from Reading University Atmospheric Observatory

A Vaisala CL31 laser ceilometer is used at the University of Reading Observatory to record cloud base height. 1min average values are determined from the instrument's internal cloud base detection algorithm. This data file is comma-separated, with three header lines.

Column	quantity	units
1	date	yyyymmdd UTC
2	Time of day UTC	hhmm UTC
3	Lowest cloud base height (mean value over 1min)	metres
4	Standard deviation of lowest cloud base height (over 1min)	metres
5…	(Second and third lowest cloud base)	