Datasets accompanying the paper entitled *Meteorological responses in the atmospheric boundary layer over southern England to the deep partial eclipse of 20 March 2015* by Stephen Burt, Department of Meteorology, University of Reading, Reading RG6 7BE, UK

Filename 20150320_ObsData1.csv

Contains 1 Hz resolution instrumental data logged at the University of Reading's Atmospheric Observatory in central southern England (latitude 51.441°N, longitude 0.938°W, altitude 66 m above mean sea level) during the deep partial eclipse on the morning of 20 March 2015. Data for 24 hours previously, 19 March 2015, are also included within this file for comparison.

All sensors were polled in real time and logged at 5 minute intervals using a Campbell Scientific CR9000 logger. More details on the instruments, exposure and calibration can be found on the Department of Meteorology's website pages: http://www.met.reading.ac.uk/weatherdata/

More information on the standard exposure and calibration of the meteorological sensors used can be found from:

Burt, S. 2012. *The Weather Observer's Handbook*. Cambridge University Press

Harrison, R.G. 2014. *Meteorological Measurements and Instrumentation*. Wiley-Blackwell.

Column no	*Variable name*	*Description and units*	*Notes*
1	**TimeStamp UTC**	Timestamp, in UTC	*1 Hz resolution*
2	**Tdry °C**	Dry-bulb or screen temperature in °C. Sensor: platinum resistance thermometer (PRT) exposed in standard Stevenson screen at 1.25 m above short grass.	
3	**Twet °C**	Wet-bulb temperature in °C. Sensor: platinum resistance thermometer (PRT) exposed in standard Stevenson screen at 1.25 m above short grass, adjacent to the dry-bulb PRT.	*Note that the Relative Humidity, RH, is derived from a capacitance sensor and not from the dry- and wet-bulb combination in this case.*
4	**RH %**	Relative Humidity (RH), %. Sensor: Rotronic capacitance sensor exposed in standard Stevenson screen at 1.25 m above short grass, adjacent to the dry-bulb PRT.	
5	**Tgrass °C**	Grass tip temperature in °C. Sensor: platinum resistance thermometer (PRT)	

		exposed just above the tips of short-mown grass within the enclosure.	
6	**Sdur sec**	Duration of sunshine, seconds. Sensor: Kipp & Zonen CSD3 electronic sunshine duration sensor.	*The threshold for 'sunshine' is defined by WMO as the intensity of the direct solar beam reaching 120 W/m2 or more.*
7	**Sb W/m2**	Intensity of the direct solar beam, W/m2. Sensor: Kipp & Zonen pyrheliometer on Sun tracker.	
8	**Rn W/m2**	Net radiation on a horizontal surface, W/m2. Sensor: Kipp & Zonen net radiometer.	
9	**Sg W/m2**	Global solar radiation intensity on a horizontal surface, Sensor: Kipp & Zonen CMP11 pyranometer.	
10	**Sd W/m2**	Intensity of diffuse solar radiation, W/m2. Sensor: shaded Kipp & Zonen CMP11 pyranometer on Sun tracker.	
11	**G W/m2**	Ground heat flux, W/m2. Sensor: Hukseflux ground heat flux plate.	
12	**PG V/m**	Atmospheric potential gradient, V/m. Sensor: Chubb JCI 131 Electrostatic field meter (field mill), mounted at ~ 3 m above ground level.	
13	**U2 m/s**	Wind speed at 2 m above ground level, m/s. Sensor: Vector Instruments pulse chopper cup anemometer.	
14	**U5 m/s**	Wind speed at 5 m above ground level, m/s. Sensor: Vector Instruments pulse chopper cup anemometer.	
15	**U10 m/s**	Wind speed at 10 m above ground level, m/s. Sensor: Vector Instruments pulse chopper cup anemometer.	
16	**P hPa**	Station level barometric pressure, hPa. Sensor: Druck precision barometer.	

Filename 20150320_ObsData2.csv

Contains 1 minute resolution instrumental data logged at the University of Reading's Atmospheric Observatory in central southern England (latitude 51.441°N, longitude 0.938°W, altitude 66 m above mean sea level) during the deep partial eclipse on the morning of 20 March 2015. Data for 24 hours previously, 19 March 2015, are also included within this file for comparison.

These data are 1 minute averages and/or extremes of a subset of the 1 Hz data in the previous file, using Microsoft Excel's Pivot Table functions. The 1 minute data were used for ease of plotting and analysis.

Column no	*Variable name*	*Description and units*	*Notes*
1	**Date**	Date	
2	**Time**	Time, UTC ended (i.e. observations shown for 2344 UTC are the averages over the 60 seconds data 23:43:00 to 23:43:59 UTC)	
2	**Average of Tdry °C**	1 minute average of Dry-bulb or screen temperature in °C. Sensor: platinum resistance thermometer (PRT) exposed in standard Stevenson screen at 1.25 m above short grass.	
3	**Average of RH %**	1 minute average of Relative Humidity (RH), %. Sensor: Rotronic capacitance sensor exposed in standard Stevenson screen at 1.25 m above short grass, adjacent to the dry-bulb PRT.	*Note that the Relative Humidity, RH, is derived from a capacitance sensor and not from the dry- and wet-bulb combination in this case.*
4	**Rn**	1 minute average of Net radiation on a horizontal surface, W/m2. Sensor: Kipp & Zonen net radiometer.	
5	**Sg**	1 minute average of Global solar radiation intensity on a horizontal surface, Sensor: Kipp & Zonen CMP11 pyranometer.	
6	**Sg (min0)**	1 minute average of Global solar radiation intensity on a horizontal surface, Sensor: Kipp & Zonen CMP11 pyranometer.	*As Sg, but with negative values during darkness (offsets) set to zero for improved solar radiation integration calculations*
7	**Pressure**	1 minute average of Station level barometric pressure, hPa. Sensor: Druck precision barometer.	
8	**U10gust**	1 minute maximum 1 Hz wind speed at 10 m above ground level, m/s. Sensor:	*Normally the 'highest gust' is defined as the*

		Vector Instruments pulse chopper cup anemometer.	*highest 3 s running mean (WMO), but here for simplicity it is taken as the highest 1 Hz value*
9	**U10_lull**	1 minute minimum 1 Hz wind speed at 10 m above ground level, m/s. Sensor: Vector Instruments pulse chopper cup anemometer.	
10	**U10mean**	1 minute average of 1 Hz wind speed at 10 m above ground level, m/s. Sensor: Vector Instruments pulse chopper cup anemometer.	
11	**10 min U10 mean**	10 minute running average of 1 minute mean wind speed at 10 m above ground level, m/s. Sensor: Vector Instruments pulse chopper cup anemometer.	
12	**dd (at 00 sec)**	Wind direction at 10 m above ground, degrees True, veer from North, at 00 second (exact minute). Sensor: Vector Instruments potentiometer wind vane.	
13	**Sg TOA**	Calculated astronomical global solar radiation on a horizontal surface at the top of the atmosphere for 20 March. (Calculations courtesy of Professor Giles Harrison).	
14	**Eclipse day Sg TOA**	Calculated astronomical global solar radiation on a horizontal surface at the top of the atmosphere for 20 March 2015, including the partial eclipse circumstances. (Calculations courtesy of Professor Giles Harrison).	
15	**Minutes into eclipse**	Minutes from first contact	
16	**No eclipse Sg estimate**	The estimated global solar radiation, assuming a linear trend between the values at start and end of the partial eclipse.	*This provides an estimate of the 'missing' solar radiation receipts integrated across the eclipse duration.*

Filename 20150320_ObsData3.csv

Contains high-resolution radiosonde data (2 s sample interval, ~ 5 m vertical interval) from the radiosonde ascent launched from the University of Reading's Atmospheric Observatory in central southern England (latitude 51.441°N, longitude 0.938°W, altitude 66 m above mean sea level) at 0845 UTC on 20 March 2015.

Column no	*Variable name*	*Description and units*	*Notes*
1	Elapsed time s	Time elapsed since start of ascent, s	
2	T K	Ambient temperature from sonde sensor, K	
3	Tdry Celsius	Ambient temperature from sonde sensor, °C	*Obtained by subtraction from col 2*
4	RH	Relative Humidity %, from sonde capacitance sensor	
5	v	Easterly wind component, m/s	*The wind components are derived from GPS position tracking*
6	u	Northerly wind component, m/s	
7	Height	Sonde height above mean sea level, m	
8	Height AGL	Sonde height above ground level, m	*Observatory altitude = 66 m AMSL*
9	P	Ambient pressure, hPa	
10	TD K	Ambient dew point temperature, K	*Derived from ambient temperature and RH %*
11	Td Celsius	Ambient dew point temperature, °C	*Derived from ambient temperature and RH %*
11	MR	Humidity mixing ratio, g/kg	*Derived from ambient temperature and RH %*
12	DD	Ambient wind direction, degrees True	*The wind components are derived from GPS position tracking*
13	FF	Wind speed, m/s	
14	AZ	Sonde azimuth from launch site, degrees True	
15	Range	Sonde horizontal range from launch site, m (100 m steps)	*Derived from GPS position tracking*
16	Lon	Sonde longitude	
17	Lat	Sonde latitude	

Filename 20150320_ObsData4.csv

Contains 5 minute resolution ceilometer (LIDAR) cloud base data logged at the University of Reading's Atmospheric Observatory in central southern England (latitude 51.441°N, longitude 0.938°W, altitude 66 m above mean sea level) during the deep partial eclipse on the morning of 20 March 2015.

Column no	*Variable name*	*Description and units*	*Notes*
1	Date yyyymmdd	Date, yyyymmdd format	
2	Time hhmm	Time UTC, hhmm format	
3	Base1_mean	Average cloud base height (1 min samples) over the 5 min ending at the time shown, m	
4	Base1_sd	Standard deviation of the mean cloud base height (1 min samples) over the 5 min ending at the time shown, m	
5	Base1_min	Minimum cloud base height (1 min samples) over the 5 min ending at the time shown, m	