DL4-Met Datashare Data Description

Scripps Hydroclimate Network

File Extensions

*.csv.gz	Compressed CSV (comma separated values) of DL4-Met data
*.mat	MATLAB binary file with Timetable of DL4-Met data Created with MATLAB 2022b
*.png	Sensor data plots

File Formats

Data are available in two file formats. An ASCII file of comma separated values (CSV) and a MATLAB binary file (MAT) with a single timetable of the data.

DL4 Minute Data Columns

Notes:

1. Sea level pressure is calculated from the raw barometric pressure measurement by adding an offset that assumes a U.S. standard atmosphere and dry air (from Wallace, J.M. and P.V. Hobbes, 1977: *Atmospheric Science: An Introductory Survey,* Academic Press, pp. 59-61).

$$dP = 1013.25\left\{1 - \left(1 - \frac{E}{44307.69231}\right)^{5.25328}\right\}$$

   where E the station elevation.
2. AirT_0 is air temperature measured in the same housing as the RH sensor.
3. AirT_RH as measured by the humidity sensor. The humidity sensor measures its own air temperature which is used in the humidity calculation.
4. Precipitation measurements are output by the data logger as a running sum.
5. The precipitation minute sum is calculated from the difference between two running sum measurements.

CSV File

Column	Column Name	Data Type	Units
1	Time	Date/Time	UTC
2	BarometricPressure	Barometric Pressure	mbar
3	SeaLevelPressure	Sea Level Barometric Pressure	mbar
4	Wind_E	Wind East Vector	m/s

5	Wind_N	Wind West Vector	m/s
6	Wind_E_Gust	Wind East Vector Max Gust	m/s
7	Wind_N_Gust	Wind North Vector Max Gust	m/s
8	AirT_0	Air Temperature Channel 0	℃
9	AirT_1	Air Temperature Channel 1	℃
10	AirT_RH	Air Temperature from Humidity Sensor	℃
11	RH	Relative Humidity	%
12	Precip_0	Precipitation Sensor 0 (running sum)	inches
13	Precip_1	Precipitation Sensor 1 (running sum)	inches
14	SolarRadiation	Global Solar Radiation (direct and diffuse)	W/m^2
15	MinutePrecip	Precipitation Sensor 0 (minute sum)	inches

MAT File

Column	**Column Name**	**Data Type**	**Units**
	Time	Date/Time	UTC
1	BarometricPressure	Barometric Pressure	mbar
2	SeaLevelPressure	Sea Level Barometric Pressure	mbar
2	Wind_E	Wind East Vector	m/s
3	Wind_N	Wind West Vector	m/s
4	Wind_E_Gust	Wind East Vector Max Gust	m/s
5	Wind_N_Gust	Wind North Vector Max Gust	m/s
6	AirT_0	Air Temperature Channel 0	℃
7	AirT_1	Air Temperature Channel 1	℃
8	AirT_RH	Air Temperature from Humidity Sensor	℃
9	RH	Relative Humidity	%

10	Precip_0	Precipitation Sensor 0 (running sum)	inches
11	Precip_1	Precipitation Sensor 1 (running sum)	inches
12	SolarRadiation	Global Solar Radiation (direct and diffuse)	W/m^2
13	MinutePrecip	Precipitation Sensor 0 (minute sum)	inches

DL4 Hourly Data Columns

CSV File

Column	Column Name	Data Type	Units
1	Time	Date/Time	UTC
2	FuelMoisture	Fuel Moisture	%VWC
3	FuelT	Fuel Temperature	℃
4	FrequencyC	Frequency Channel C	
5	FrequencyD	Frequency Channel D	
6	SnowDepth	Snow Depth	℃
7	SnowT	Snow Sensor Temperature	℃
8	SoilMoisture_0	Soil Moisture Sensor 0	%VWC
9	SoilT_0	Soil Temperature Sensor 0	℃
10	SoilConductivity_0	Soil Conductivity Sensor 0	dS/m
11	SoilMoisture_1	Soil Moisture Sensor 1	%VWC
12	SoilT_1	Soil Temperature Sensor 1	℃
13	SoilConductivity_1	Soil Conductivity Sensor 1	dS/m
14	SoilMoisture_2	Soil Moisture Sensor 2	%VWC
15	SoilT_2	Soil Temperature Sensor 2	℃
16	SoilConductivity_2	Soil Conductivity Sensor 2	dS/m
17	SoilMoisture_3	Soil Moisture Sensor 3	%VWC

18	SoilT_3	Soil Temperature Sensor 3	℃
19	SoilConductivity_3	Soil Conductivity Sensor 3	dS/m
20	BatteryVoltage	Battery Voltage	V

MAT File

Column	Column Name	Data Type	Units
	Time	Date/Time	UTC
1	FuelMoisture	Fuel Moisture	%VWC
2	FuelT	Fuel Temperature	℃
3	FrequencyC	Frequency Channel C	
4	FrequencyD	Frequency Channel D	
5	SnowDepth	Snow Depth	℃
6	SnowT	Snow Sensor Temperature	℃
7	SoilMoisture_0	Soil Moisture Sensor 0	%VWC
8	SoilT_0	Soil Temperature Sensor 0	℃
9	SoilConductivity_0	Soil Conductivity Sensor 0	dS/m
10	SoilMoisture_1	Soil Moisture Sensor 1	%VWC
11	SoilT_1	Soil Temperature Sensor 1	℃
12	SoilConductivity_1	Soil Conductivity Sensor 1	dS/m
13	SoilMoisture_2	Soil Moisture Sensor 2	%VWC
14	SoilT_2	Soil Temperature Sensor 2	℃
15	SoilConductivity_2	Soil Conductivity Sensor 2	dS/m
16	SoilMoisture_3	Soil Moisture Sensor 3	%VWC
17	SoilT_3	Soil Temperature Sensor 3	℃
18	SoilConductivity_3	Soil Conductivity Sensor 3	dS/m
19	BatteryVoltage	Battery Voltage	V

Accessing MATLAB data

Data are easily accessible from the MATLAB command prompt

```
>>
```

A data file can be loaded into MATLAB with

```
>> load(<filename>);
```

For example, the command below will load a timetable into memory. The timetable has the name *ValleyView_m*, with the *m* noting minute data. Hourly data would have m as a suffix.

```
>> load('SIOPier_m_20200301to20200522.mat');
```

Metadata can be displayed

```
>> SIOPier_m.Properties.CustomProperties
```

Column names can be listed

```
>> SIOPier_m.Properties.VariableNames'
```

Units can be displayed

```
>> SIOPier_m.Properties.VariableUnits'
```

Data can be accessed using the column name or column number.

```
>> SIOPier_m.AirT_0
```

is equivalent to

```
>> SIOPier_m{:,6}
```

Plotting data can be accomplish as follows

```
>> plot(SIOPier_m.Time, SIOPier_m.AirT_0)
```

Multiple values can be plotted using stackedplot:

```
>> stackedplot(SIOPier_m,{'BarometricPressure', 'AirT_0', 'RH'})
```

A subset of the data can be extracted by time. Select all the rows between 1 Apr 2020 and 30 Apr 2020:

```
>> TR = timerange('2020-04-01','2020-04-30');
>> AprilData = SIOPier_m(TR,:);
```

Retime

```
>> HourlyMeans = retime(SIOPier_m,'hourly','mean');
```

Delete Columns

```
>> OnlyAFewColumns = removevars(SIOPier_m,{'BarometricPressure','Wind_E','Wind_E_Gust'});
```

Revisions

13 May 2020 - Douglas Alden

First version.

29 May 2020 - Douglas Alden

Noted that precip is a running sum.

Fixed typo (removed period)

`SIOPier_m.{:,7}` should be `SIOPier_m{:,7}`

2 May 2020 - Douglas Alden

Added info on stackedplot and how to grab data subset by time.

24 Jan 2020 - Douglas Alden

Datashare version. Adds columns for SeaLevelPressure and the MinutePrecip. Fixed FuelMoisture typo.