Description of 30-min data collected at Ashley Dene (irrigated and non-irrigated lucerne sites)

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Column (Variable) Description (for units see second row in the data file)

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Date\_Time\_End Time at which the recorded 30-min period ended.

Days\_sinceStart2015 Continuous numerical time variable, in days since 1/1/2015 00:00.

Time\_of\_Day Hours since midnight (at the end of the 30-min period).

Meteo\_gapfilled Flag indicating when the datalogger for meteorological and soil variables did not record data. Short gaps were linearly interpolated. Longer gaps were filled with data from the other site (if available), either by direct substitution or by linear regression of one site against the other, dependent on the variable.

Standing\_Biomass Standing biomass (lucerne & weeds) was manually sampled (10 replicates with a 0.5 m x 0.5 m frame) every 4 to 6 weeks, as well as shortly before and after harvest and grazing events. For one week following removal events, standing biomass is assumed constant. Data outside such “recovery periods” are linearly interpolated between sampling dates.

Net\_Radiation Sum of the following four components. Each of those was consistency-checked and gap-filled individually.

Shortwave\_In Shortwave (visible & UV) radiation received from the sky above.

Shortwave\_Out Shortwave (visible & UV) radiation received from the ground surface below.

Longwave\_In Longwave (infra-red) radiation received from the sky above.

Longwave\_Out Longwave (infra-red) radiation received from the ground surface below.

PPFD Photosynthetic photon-flux density, drift-corrected by comparison between sites, and consistency-checked against incoming shortwave radiation.

NDVI Normalised-difference vegetation index. Solar-angle dependence was reduced by using only data from 2 hours either side of midday.   
For much of 2019 (discovered and fixed on 7 November), there was a shaky cable connection at the irrigated site between NDVI sensor and datalogger, causing intermittent data.

Surface\_Temperature As derived from net-radiometer data.

Air\_Temperature Measured with combined temperature/relative humidity sensor (Campbell EE-181 at 1.25 m height).

Vapour\_Pressure Measured with EE-181 (converted from relative humidity).

Soil\_HeatFlux Mean of three replicate heat flux plates for each site, plus correction for storage in layer between ground surface and heat flux plate (using surface temperature and soil temperature at 2 to 6 cm).

Soil\_2to6cm\_Temperature Paired thermocouple probe buried at 2 and 6 cm.

Rain\_Plus\_Irrigation Total recorded by raingauge at irrigated site.

Rain Mean of raingauges of the two sites, excluding times of irrigation events.

Air\_Pressure Recorded with eddy-covariance systems. Value from irrigated site used as default.

Sensible\_HeatFlux Measured with sonic anemometer.

Sensible\_HeatFlux\_gapfilled Gapfilling with marginal distribution sampling (package REddyProc).

Latent\_HeatFlux Measured with sonic anemometer and infrared gas analyser. Units are W m−2. To convert to rates of ET, divide by latent heat of vapourisation, *L* (J/g) with *L* = 2500 – 2.3 *T* (where *T* is air temperature in deg C). This gives units of g m−2 s−1. Multiply by 1.8 to get mm per half-hour (which can then be summed to daily values).

Latent\_HeatFlux\_gapfilled Gapfilling with marginal distribution sampling (package REddyProc).