This dataset (ALL\_DATA\_SM\_OLF\_Rain\_Flow.xlsx and Sensors\_location.pdf) represents the raw data associated with the paper 'Upland grassland management influences organo-mineral soil properties and their hydrological function' by Bond, S., Kirkby, M.J. and Holden, J. (2021). A summary table containing a descriptor for each variable is given below.

The relative location of the sensors is shown in Sensors\_location.pdf. The sensor ‘address’ (letter/number) is the name used to refer to each sensor in the raw dataset (ALL\_DATA\_SM\_OLF\_Rain\_Flow.xlsx). The overland flow sensors were made using the design by Goulsbra (2011).

When referring to the SM and OLF sensors, individual sensors are referred to by the location for which they were assigned (see Sensors\_location.pdf) where E represents the Excluded habitat, RG represents Rough Grazing, B represents Bracken and GG represents Good Grazing. The number following each habitat abbreviation represents its position.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Variable | Description | Associated habitat | Associated sensor depth (cm) | Data units | Other |
| fifteen | The timestep in 15 minute intervals between 29/05/2019 12:00:00 and 02/03/2020 15:45:00 |  |  | dd/mm/yyyy hh:mm:ss |  |
| SMPercent\_SE | Calibrated soil moisture (%). Sensor E | E1 | 5 | Percentage (%) |  |
| SMPercent\_Sf | Calibrated soil moisture (%). Sensor f | E1 | 10 | Percentage (%) |  |
| SMPercent\_Sg | Calibrated soil moisture (%). Sensor g | E1 | 15 | Percentage (%) |  |
| SMPercent\_Sh | Calibrated soil moisture (%). Sensor h | RG1 | 5 | Percentage (%) |  |
| SMPercent\_Si | Calibrated soil moisture (%). Sensor i | RG1 | 10 | Percentage (%) |  |
| SMPercent\_Sj | Calibrated soil moisture (%). Sensor j | RG1 | 15 | Percentage (%) |  |
| SMPercent\_Sk | Calibrated soil moisture (%). Sensor k | RG2 | 5 | Percentage (%) |  |
| SMPercent\_Sl | Calibrated soil moisture (%). Sensor l | RG2 | 10 | Percentage (%) |  |
| SMPercent\_Sm | Calibrated soil moisture (%). Sensor m | RG2 | 15 | Percentage (%) |  |
| SMPercent\_Sn | Calibrated soil moisture (%). Sensor n | B1 | 5 | Percentage (%) |  |
| SMPercent\_So | Calibrated soil moisture (%). Sensor o | B1 | 10 | Percentage (%) |  |
| SMPercent\_Sp | Calibrated soil moisture (%). Sensor p | B2 | 15 | Percentage (%) |  |
| SMPercent\_Sq | Calibrated soil moisture (%). Sensor q | B2 | 5 | Percentage (%) |  |
| SMPercent\_Sr | Calibrated soil moisture (%). Sensor r | B2 | 10 | Percentage (%) |  |
| SMPercent\_Ss | Calibrated soil moisture (%). Sensor s | B2 | 15 | Percentage (%) |  |
| SMPercent\_St | Calibrated soil moisture (%). Sensor t | E2 | 5 | Percentage (%) |  |
| SMPercent\_Su | Calibrated soil moisture (%). Sensor u | E2 | 10 | Percentage (%) |  |
| SMPercent\_Sv | Calibrated soil moisture (%). Sensor v | E2 | 15 | Percentage (%) |  |
| SMPercent\_Sz | Calibrated soil moisture (%). Sensor z | GG1 | 5 | Percentage (%) |  |
| SMPercent\_S1 | Calibrated soil moisture (%). Sensor 1 | GG1 | 10 | Percentage (%) |  |
| SMPercent\_S2 | Calibrated soil moisture (%). Sensor 2 | GG1 | 15 | Percentage (%) |  |
| SMPercent\_S3 | Calibrated soil moisture (%). Sensor 3 | GG2 | 5 | Percentage (%) | Excluded from analysis. Unreliable results. |
| SMPercent\_S4 | Calibrated soil moisture (%). Sensor 4 | GG2 | 10 | Percentage (%) |  |
| SMPercent\_S5 | Calibrated soil moisture (%). Sensor 5 | GG2 | 15 | Percentage (%) |  |
| SMPercent\_S6 | Calibrated soil moisture (%). Sensor 6 | GG3 | 5 | Percentage (%) |  |
| SMPercent\_S7 | Calibrated soil moisture (%). Sensor 7 | GG3 | 10 | Percentage (%) |  |
| SMPercent\_S8 | Calibrated soil moisture (%). Sensor 8 | GG3 | 15 | Percentage (%) |  |
| SMPercent\_S9 | Calibrated soil moisture (%). Sensor 9 | E4 | 5 | Percentage (%) |  |
| SMPercent\_SA | Calibrated soil moisture (%). Sensor A | E4 | 10 | Percentage (%) |  |
| SMPercent\_SB | Calibrated soil moisture (%). Sensor B | E4 | 15 | Percentage (%) |  |
| SMPercent\_Sw | Calibrated soil moisture (%). Sensor w | E3 | 5 | Percentage (%) |  |
| SMPercent\_Sx | Calibrated soil moisture (%). Sensor x | E3 | 10 | Percentage (%) |  |
| SMPercent\_Sy | Calibrated soil moisture (%). Sensor y | E3 | 15 | Percentage (%) |  |
| OLF\_1 | Raw data for OLF sensors. -84.771 represents absence of moisture (aka dry). >-84.771 shows the presence of water. Value varies based on electrical resistance. Sensor 1 | E1 | Surface | Relative electrical resistance |  |
| OLF\_abs\_1 | Processed raw data where 0 shows the absence of water (-84.771, dry) and 1 shows the presence of water (>-84.771, wet). Sensor 1 | E1 | Surface | Binary absence (0) or presence (1) |  |
| OLF\_2 | Raw data for OLF sensors. -84.771 represents absence of moisture (aka dry). >-84.771 shows the presence of water. Value varies based on electrical resistance. Sensor 2 | RG1 | Surface | Relative electrical resistance |  |
| OLF\_abs\_2 | Processed raw data where 0 shows the absence of water (-84.771, dry) and 1 shows the presence of water (>-84.771, wet). Sensor 2 | RG1 | Surface | Binary absence (0) or presence (1) |  |
| OLF\_3 | Raw data for OLF sensors. -84.771 represents absence of moisture (aka dry). >-84.771 shows the presence of water. Value varies based on electrical resistance. Sensor 3 | RG2 | Surface | Relative electrical resistance |  |
| OLF\_abs\_3 | Processed raw data where 0 shows the absence of water (-84.771, dry) and 1 shows the presence of water (>-84.771, wet). Sensor 3 | RG2 | Surface | Binary absence (0) or presence (1) |  |
| OLF\_4 | Raw data for OLF sensors. -84.771 represents absence of moisture (aka dry). >-84.771 shows the presence of water. Value varies based on electrical resistance. Sensor 4 | B1 | Surface | Relative electrical resistance | Excluded from equal-records analysis |
| OLF\_abs\_4 | Processed raw data where 0 shows the absence of water (-84.771, dry) and 1 shows the presence of water (>-84.771, wet). Sensor 4 | B1 | Surface | Binary absence (0) or presence (1) | Excluded from equal-records analysis |
| OLF\_5 | Raw data for OLF sensors. -84.771 represents absence of moisture (aka dry). >-84.771 shows the presence of water. Value varies based on electrical resistance. Sensor 5 | B2 | Surface | Relative electrical resistance |  |
| OLF\_abs\_5 | Processed raw data where 0 shows the absence of water (-84.771, dry) and 1 shows the presence of water (>-84.771, wet). Sensor 5 | B2 | Surface | Binary absence (0) or presence (1) |  |
| OLF\_6 | Raw data for OLF sensors. -84.771 represents absence of moisture (aka dry). >-84.771 shows the presence of water. Value varies based on electrical resistance. Sensor 6 | E2 | Surface | Relative electrical resistance |  |
| OLF\_abs\_6 | Processed raw data where 0 shows the absence of water (-84.771, dry) and 1 shows the presence of water (>-84.771, wet). Sensor 6 | E2 | Surface | Binary absence (0) or presence (1) |  |
| OLF\_7 | Raw data for OLF sensors. -84.771 represents absence of moisture (aka dry). >-84.771 shows the presence of water. Value varies based on electrical resistance. Sensor 7 | E3 | Surface | Relative electrical resistance |  |
| OLF\_abs\_7 | Processed raw data where 0 shows the absence of water (-84.771, dry) and 1 shows the presence of water (>-84.771, wet). Sensor 7 | E3 | Surface | Binary absence (0) or presence (1) |  |
| OLF\_8 | Raw data for OLF sensors. -84.771 represents absence of moisture (aka dry). >-84.771 shows the presence of water. Value varies based on electrical resistance. Sensor 8 | GG1 | Surface | Relative electrical resistance |  |
| OLF\_abs\_8 | Processed raw data where 0 shows the absence of water (-84.771, dry) and 1 shows the presence of water (>-84.771, wet). Sensor 8 | GG1 | Surface | Binary absence (0) or presence (1) |  |
| OLF\_9 | Raw data for OLF sensors. -84.771 represents absence of moisture (aka dry). >-84.771 shows the presence of water. Value varies based on electrical resistance. Sensor 9 | GG2 | Surface | Relative electrical resistance |  |
| OLF\_abs\_9 | Processed raw data where 0 shows the absence of water (-84.771, dry) and 1 shows the presence of water (>-84.771, wet). Sensor 9 | GG2 | Surface | Binary absence (0) or presence (1) |  |
| OLF\_10 | Raw data for OLF sensors. -84.771 represents absence of moisture (aka dry). >-84.771 shows the presence of water. Value varies based on electrical resistance. Sensor 10 | GG3 | Surface | Relative electrical resistance |  |
| OLF\_abs\_10 | Processed raw data where 0 shows the absence of water (-84.771, dry) and 1 shows the presence of water (>-84.771, wet). Sensor 10 | GG3 | Surface | Binary absence (0) or presence (1) |  |
| OLF\_11 | Raw data for OLF sensors. -84.771 represents absence of moisture (aka dry). >-84.771 shows the presence of water. Value varies based on electrical resistance. Sensor 11 | E4 | Surface | Relative electrical resistance |  |
| OLF\_abs\_11 | Processed raw data where 0 shows the absence of water (-84.771, dry) and 1 shows the presence of water (>-84.771, wet). Sensor 11 | E4 | Surface | Binary absence (0) or presence (1) |  |
| Date | Date |  |  | dd/mm/yyyy |  |
| Time | Time |  |  | hh:mm:ss |  |
| year | Year |  |  | yyyy |  |
| month | Month |  |  | Number 1 to 12 where 1=Jan, 2=Feb etc |  |
| Season | Season (UK based. Equal number of months per season) |  |  | Spring/Summer/Autumn/Winter where Spring is March, April and May; Summer is June, July and August; Autumn is September, October and November; and Winter is December, January and February.  |  |
| Rain\_mm | Rain from Mickleden telemetry station |  |  | millimetres | Source: Environment Agency. Mickleden Precipitation. Station number 586820. Middle Fell Farm Telemetry.  |
| Flow\_m3s | Swindale Beck flow data |  |  | Cumecs: metres cubed per second | Source: United Utilities  |
| Flow\_mm | Swindale Beck flow data |  |  | millimetres | Source: United Utilities  |