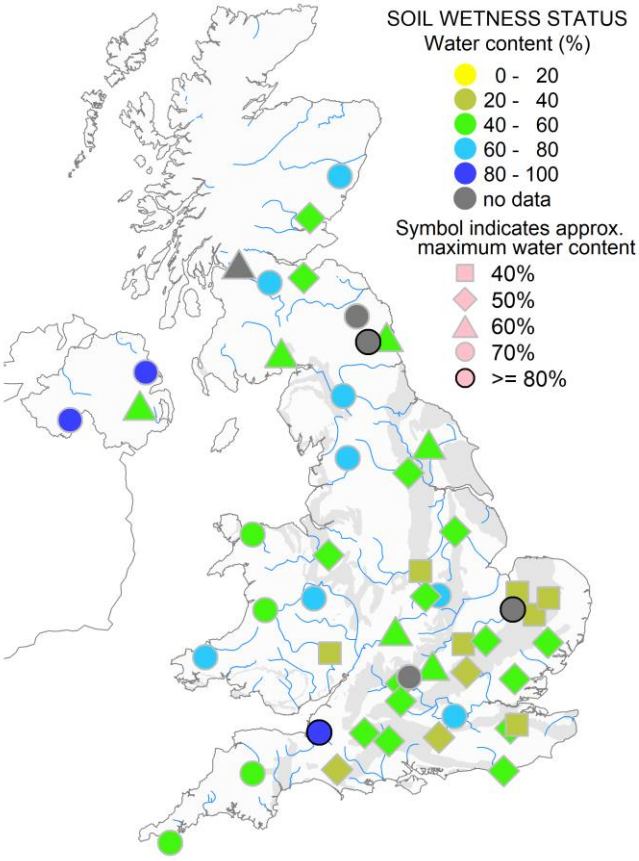
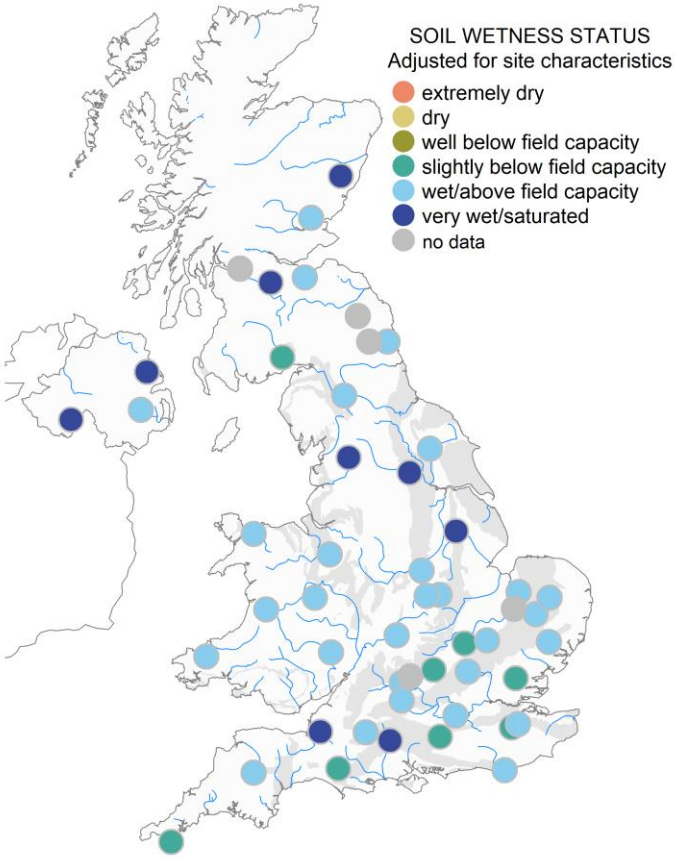
COSMOS-UK | soil moisture

Issued on 08 November 2023





Soil moisture on 31 October 2023 (see back page for explanatory comments).

Notes on period to 01 November 2023

October has been a particularly wet month for much of the UK, which has resulted in the majority of COSMOS-UK sites being above field capacity by the end of the month.
Provisional Met Office data indicate many UK regions experienced above-average rainfall, especially in the second half of October. Central England and Northeast Scotland were wetter than previously recorded for much of October, receiving over twice as much precipitation as the long-term average. On average, temperatures were 1°C higher than the long-term average for most of the UK, except Scotland, which was close to the long-term average for this time of year.

At the end of the month, soil moisture was above field capacity for most COSMOS-UK sites. Eight sites were just below field capacity, seven in Southern England. Alice Holt, under tree cover, was approaching saturation towards the end of October. Except for June, some sites have been saturated for most of the year (e.g. Fivemiletown, Gisburn, Glensaugh and Glenwherry), whereas other places such as Tadham Moor, Moor House, Crichton, Plynlimon and The Lizard fluctuated between normal and near-saturated conditions throughout the month.

Network news
The annual planned preventative maintenance is being reviewed to maintain the quality of the network service. Also, trends in the soil moisture data are being analysed to investigate the effects of the current position in the solar cycle, which affects the incoming cosmic ray neutron flux used to measure soil moisture.

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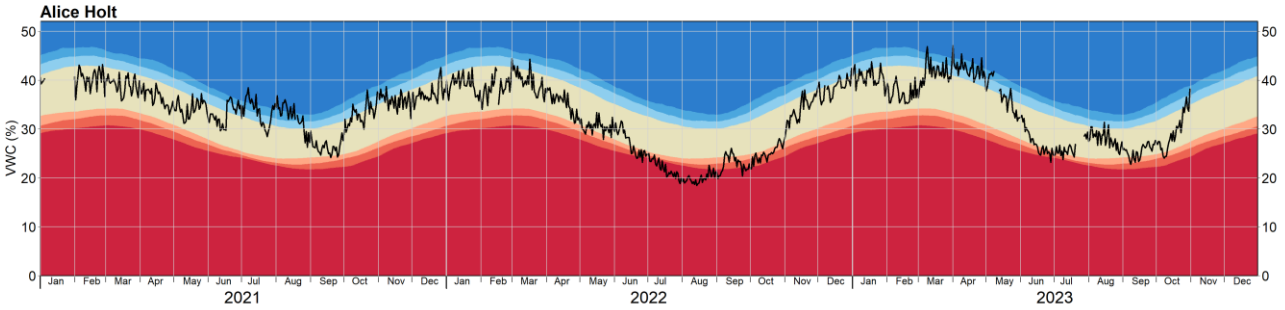

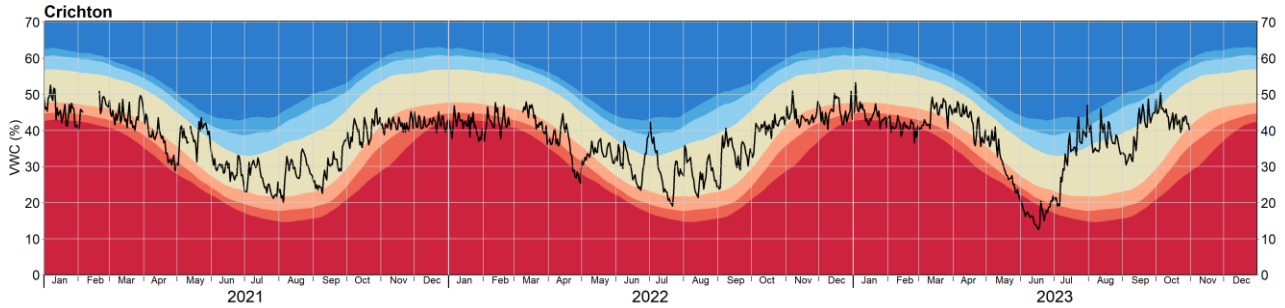

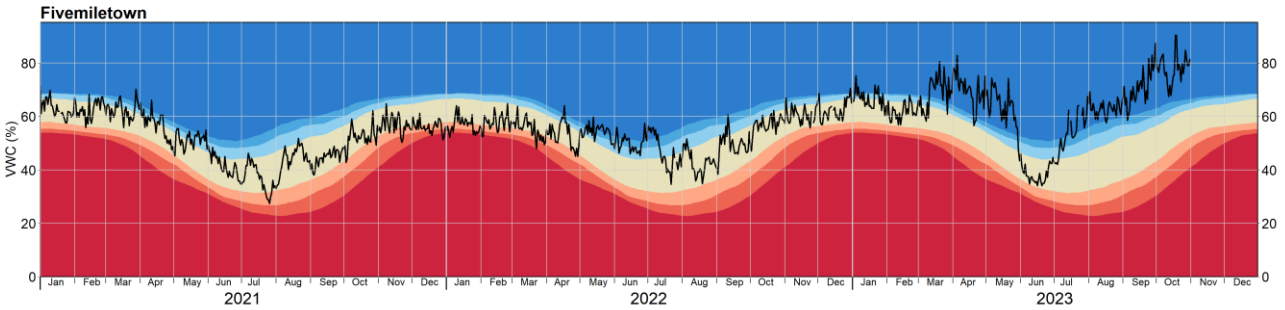

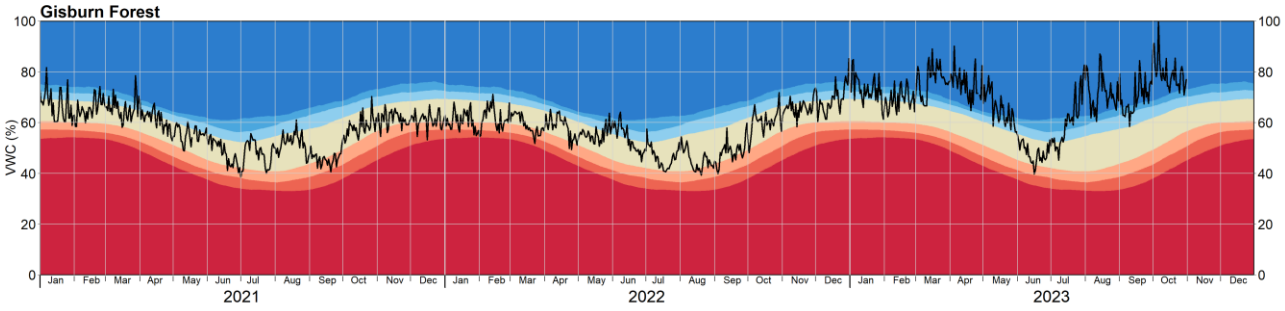

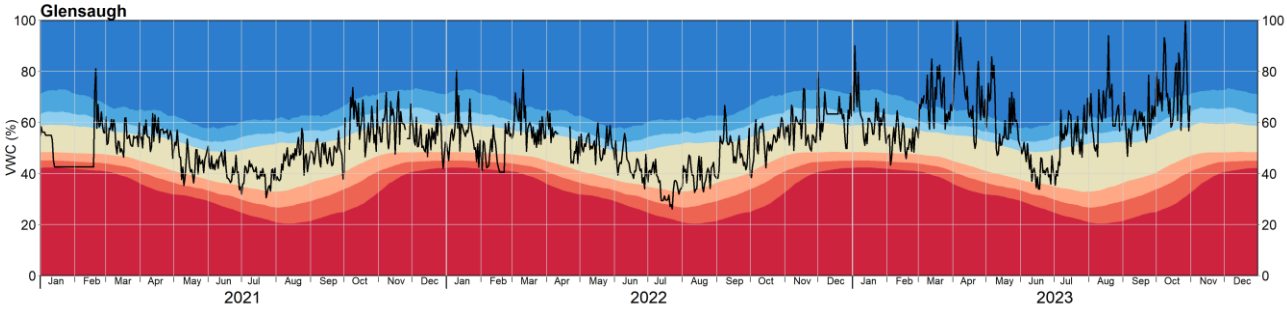

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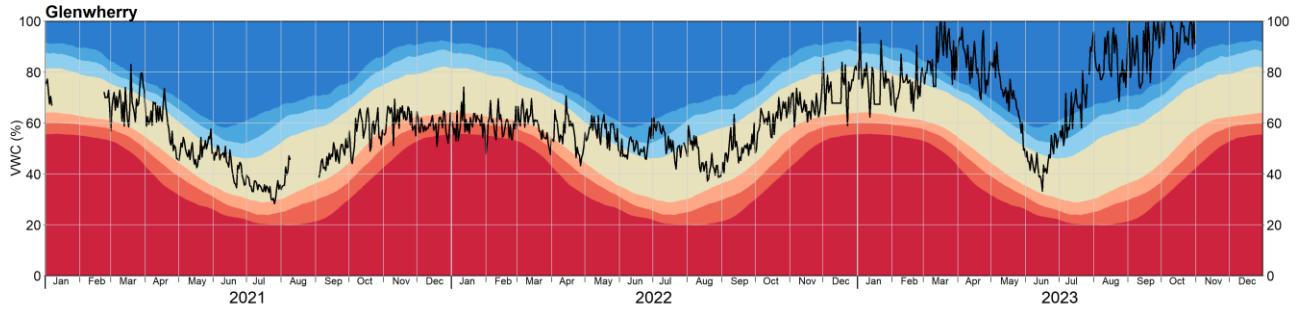

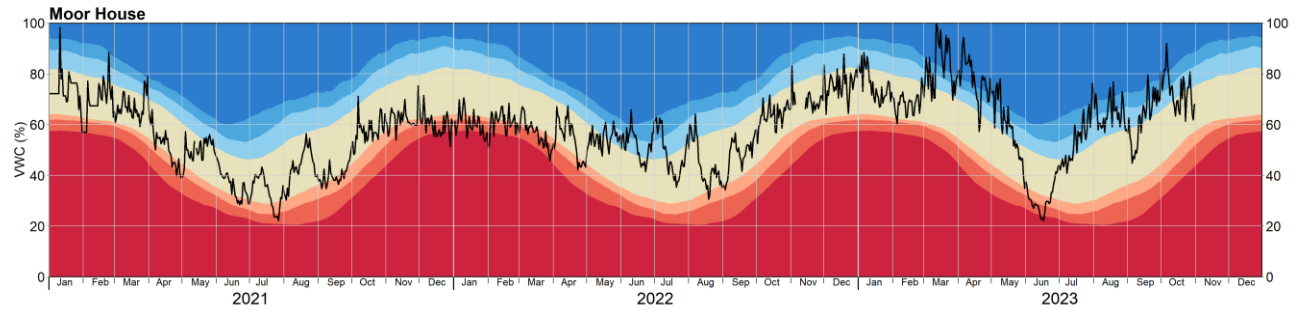

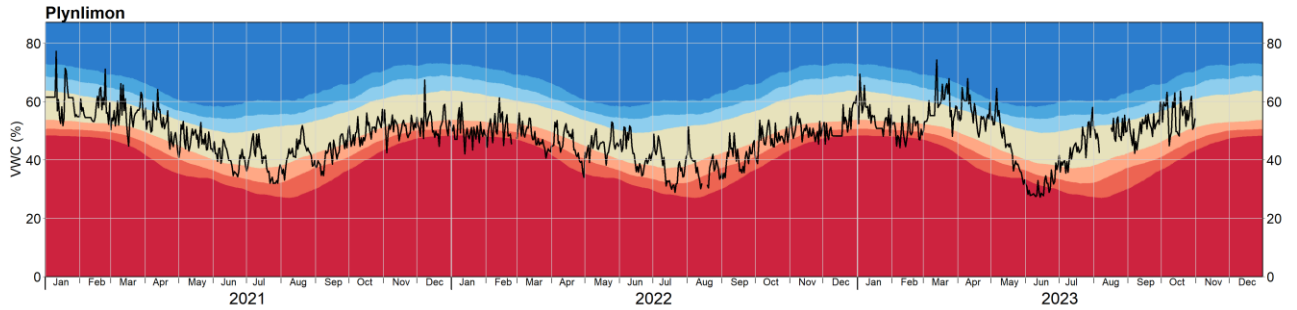

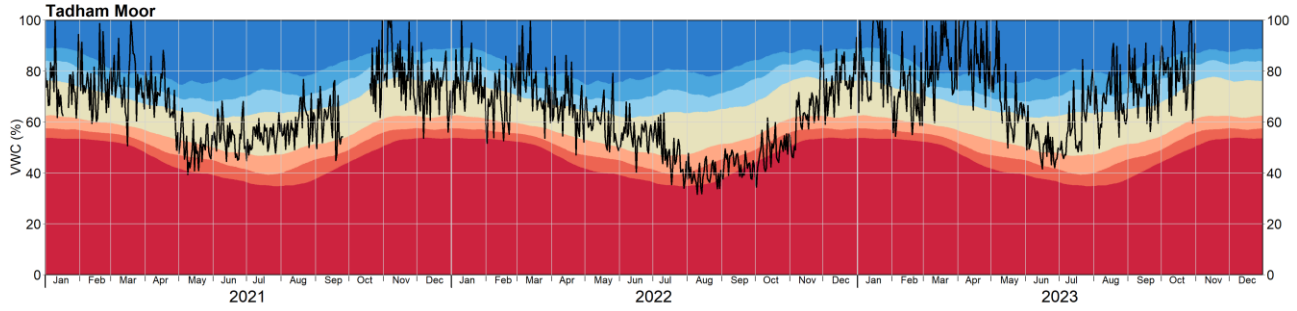

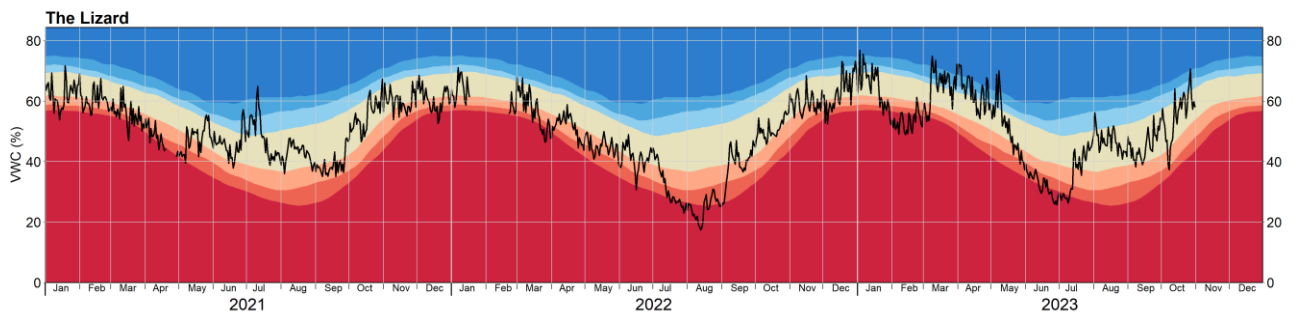

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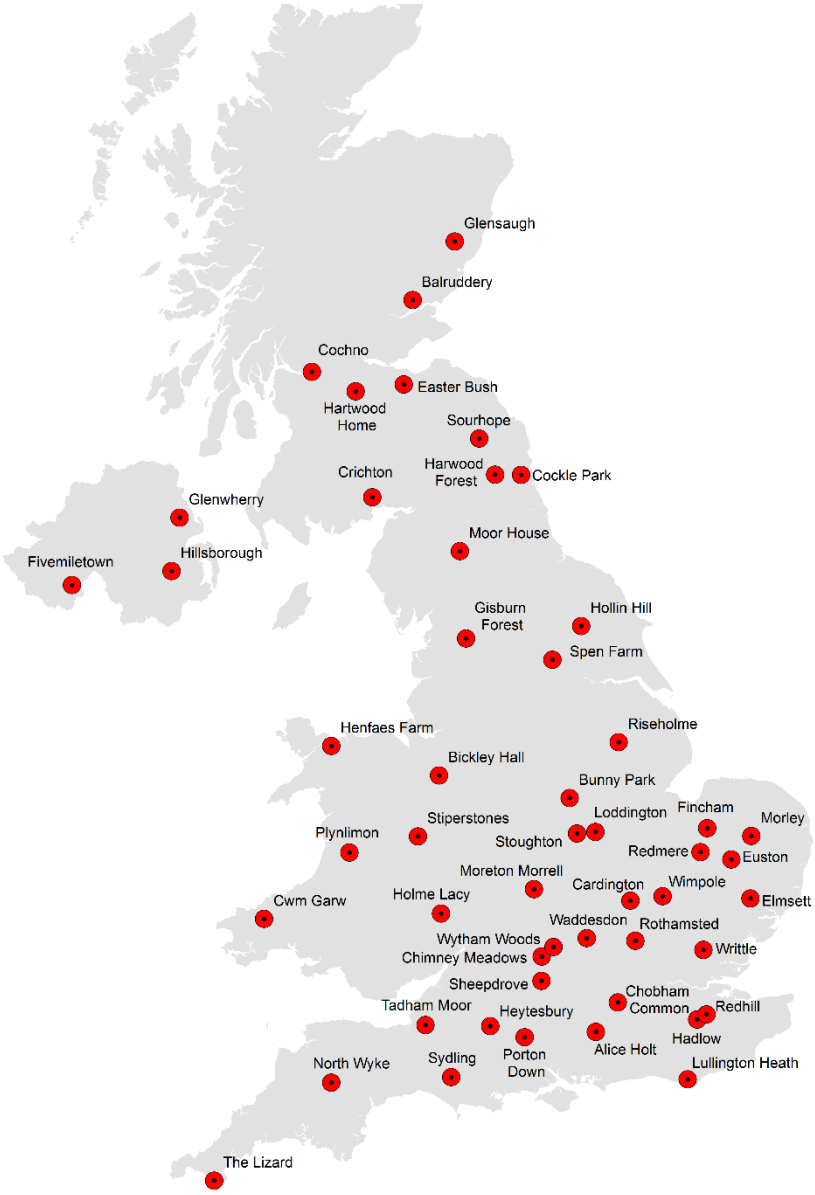

About the maps on page 1: The maps show daily mean soil moisture on the last day of the month. Colours indicate wetness as in the legends.

The map on the left shows wetness as the volumetric water content (VWC) of the soil which is constrained by soil type, i.e. some soils are able to hold more water than others as indicated by the shape of the symbol.

The map on the right presents soil wetness adjusted for site specific characteristics, i.e. taking account of the possible range of soil wetness at each site. Field capacity (FC) is a key point in this range. When soil moisture is below FC soil moisture is said to be in deficit, i.e. there is a (positive) soil moisture deficit (SMD).

Grey shaded areas on these two maps represent principal aquifers.

About the graphs on pages 2 and 3: The black line shows VWC. The coloured bands indicate how VWC compares to historical variability for the site and time of year.

- exceptionally dry
- notably dry
- drier than normal
- normal
- wetter than normal
- notably wet
- exceptionally wet

About soil moisture: Soil moisture varies in the short term (hours to days) with rainfall and as water drains through the soil. Longer term variation is driven by the seasonal difference between rainfall and evaporation. Thus soil moisture decreases in the summer when evaporation exceeds rainfall but increases when this is reversed. In most winters under UK conditions, soil moisture reaches a relatively constant value, known as the field capacity. Field capacity is a measure of how much water the soil can hold against gravity and is strongly dependent on the soil type. Soils are expected to be around field capacity after being wetted to above field capacity and the excess water (e.g. from macropores) has drained away under gravity, which can take several days after heavy rain, to reach a near steady state. Differences in soil type and weather patterns cause variations in soil moisture between sites including when the soil returns to field capacity in autumn/winter and when soil moisture decreases in the spring/summer.

About COSMOS-UK: COSMOS-UK is supported by the Natural Environment Research Council award number NE/R016429/1 as part of the UK-SCAPE programme delivering National Capability.

UK Centre for Ecology & Hydrology

CosmosUK@ceh.ac.uk
cosmos.ceh.ac.uk