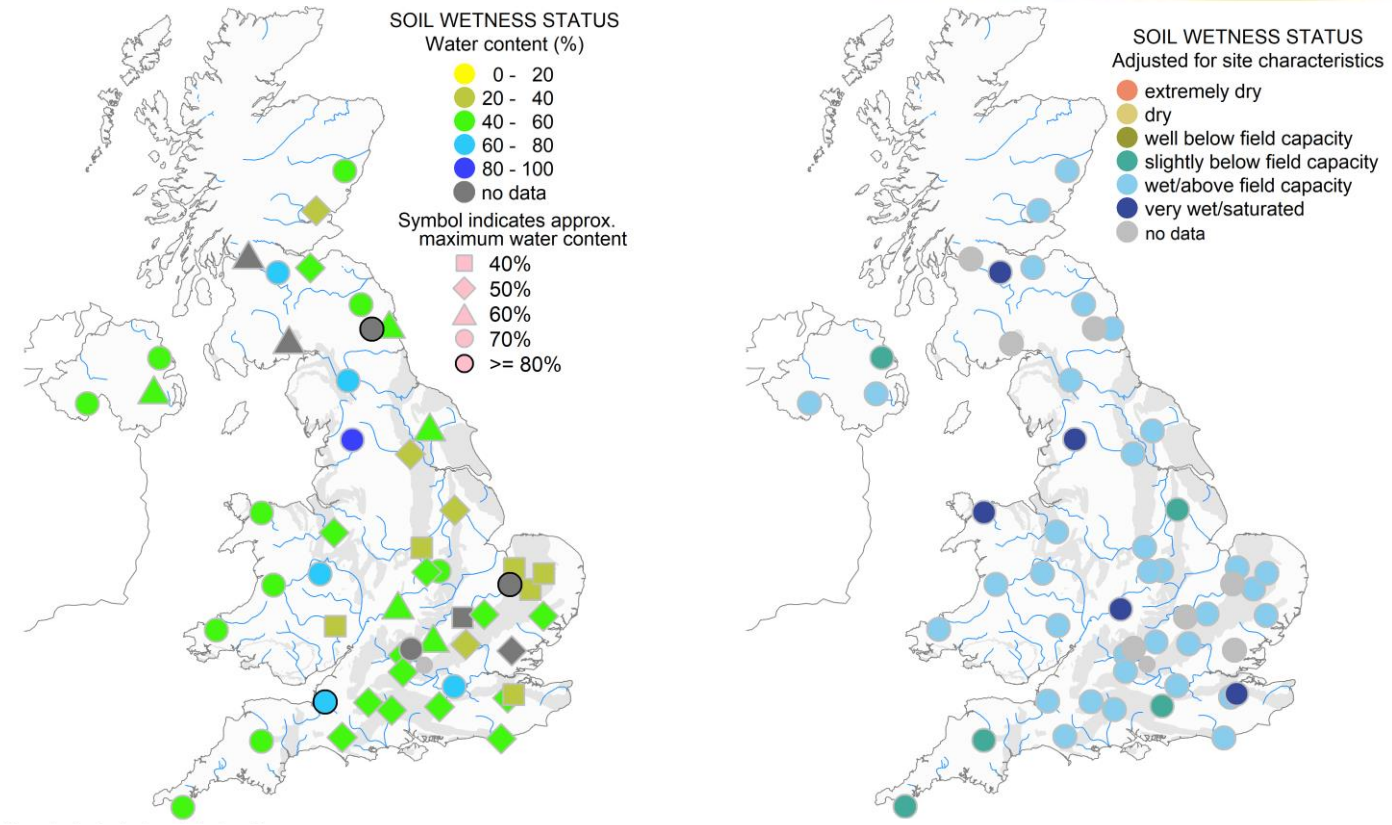
COSMOS-UK | soil moisture

Issued on 13 March 2025



Soil moisture on 28 February 2025 (see back page for explanatory comments).

At the end of February, soil moisture levels remain in the normal to high range, despite below average rainfall across the UK.

February 2025 saw a mix of weather conditions, starting off with more settled conditions with low rainfall and below average temperatures. Towards the end of the month, the weather turned more unsettled, with heavy frontal rain (particularly in Wales and Western England) and milder temperatures. Provisional data indicate rainfall was below the long-term average (76%) over the UK as a whole. Northern England was particularly dry, with around half of its normal February rainfall total.

Despite the generally drier meteorological conditions, soil moisture levels across the COSMOS-UK network remain high, with conditions at many sites toward the wet/saturated range. The antecedent wet soil moisture conditions mean that the dry start to the month wasn't enough to dry the soils out, and when there were heavy rainfall events towards the end of the month, soil moisture levels can rise again quickly (e.g. Euston, Hadlow). Where it was drier throughout the full month, soil moisture levels remained more stable (e.g. Hillsborough, Holme Lacy, Moor House, Spen Farm).

Overall, soil moisture levels remain in the normal to high range at many COSMOS-UK sites, despite the drier weather in places. The wet conditions over the winter remain important to the system, with soil conditions sensitive to heavy rainfall events.

Network news

Planned preventative maintenance was carried out at Porton Down, during which the radiometer was fixed. Cardington was decommissioned on 11th February. We are currently testing new data loggers in anticipation of the end of life of our current loggers.

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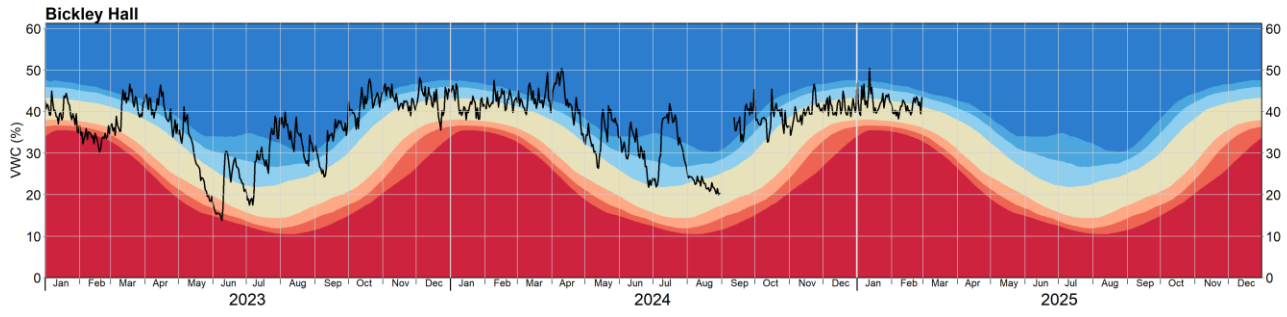

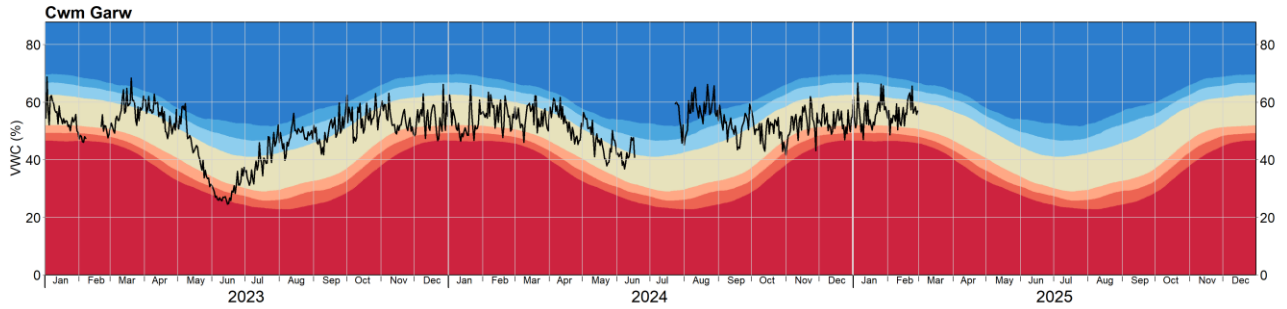

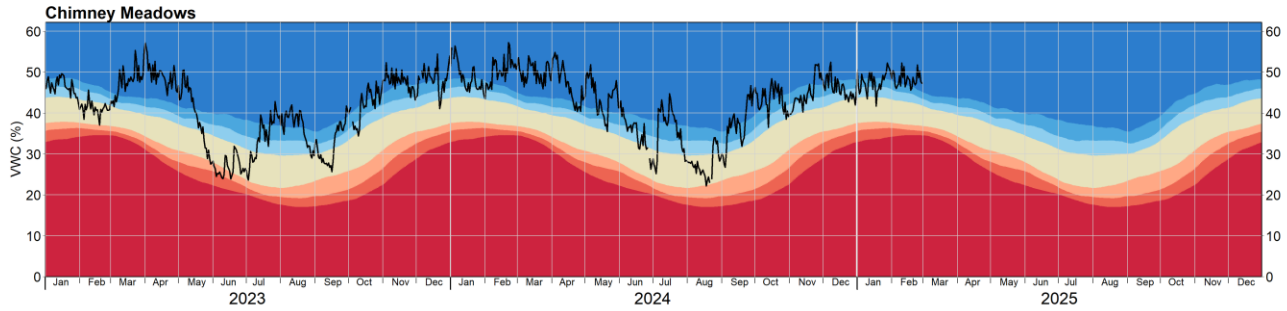

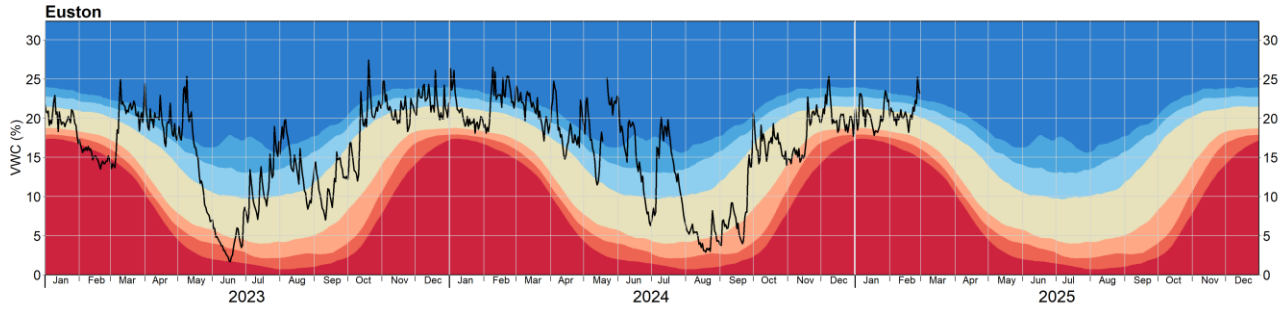

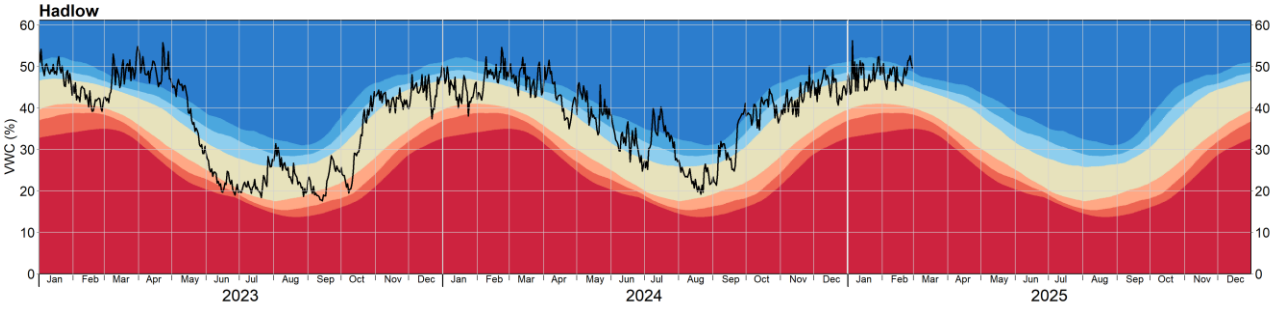

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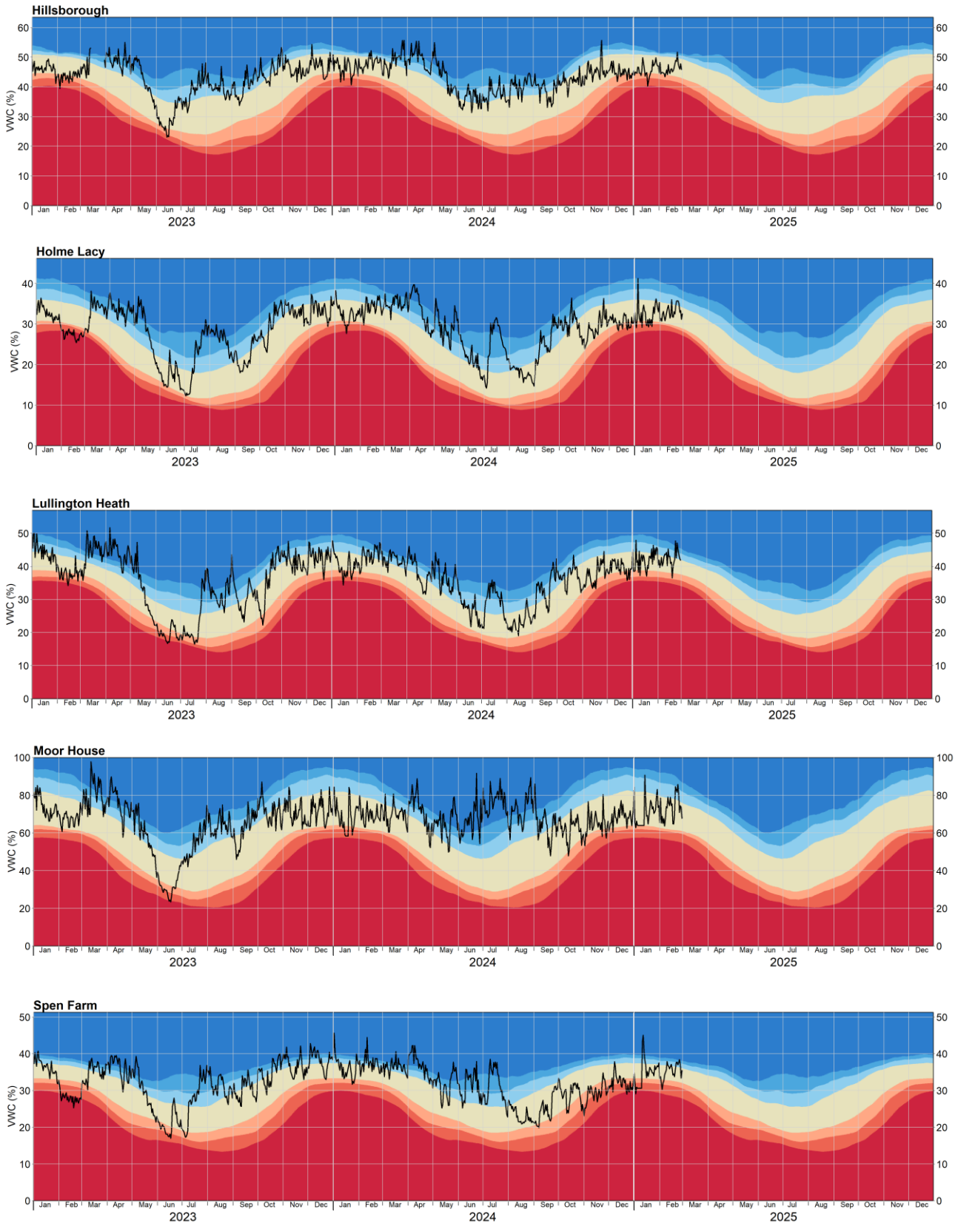

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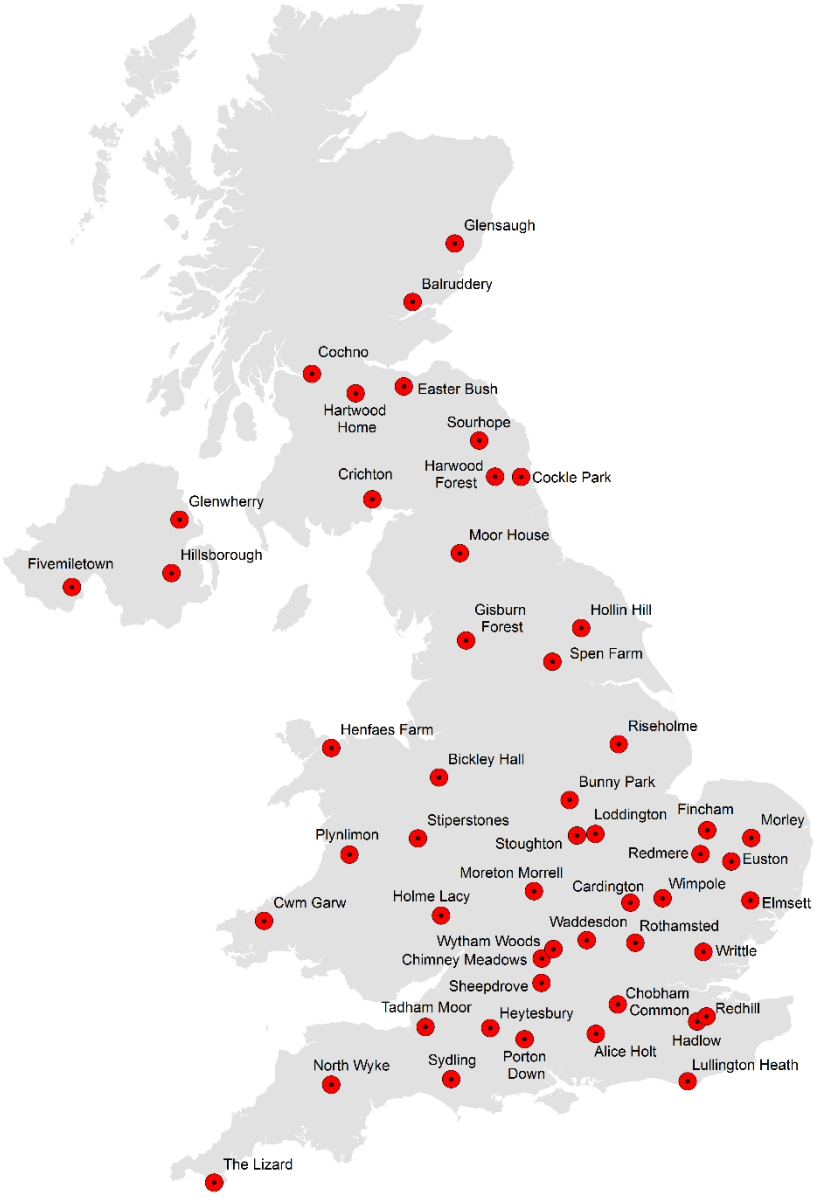

About the maps on page 1: The maps show daily mean soil moisture on the last day of the month. Colours indicate wetness as in the legends.

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/Y006208/1 as part of the UKCEH NC-UK programme delivering National Capability.

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