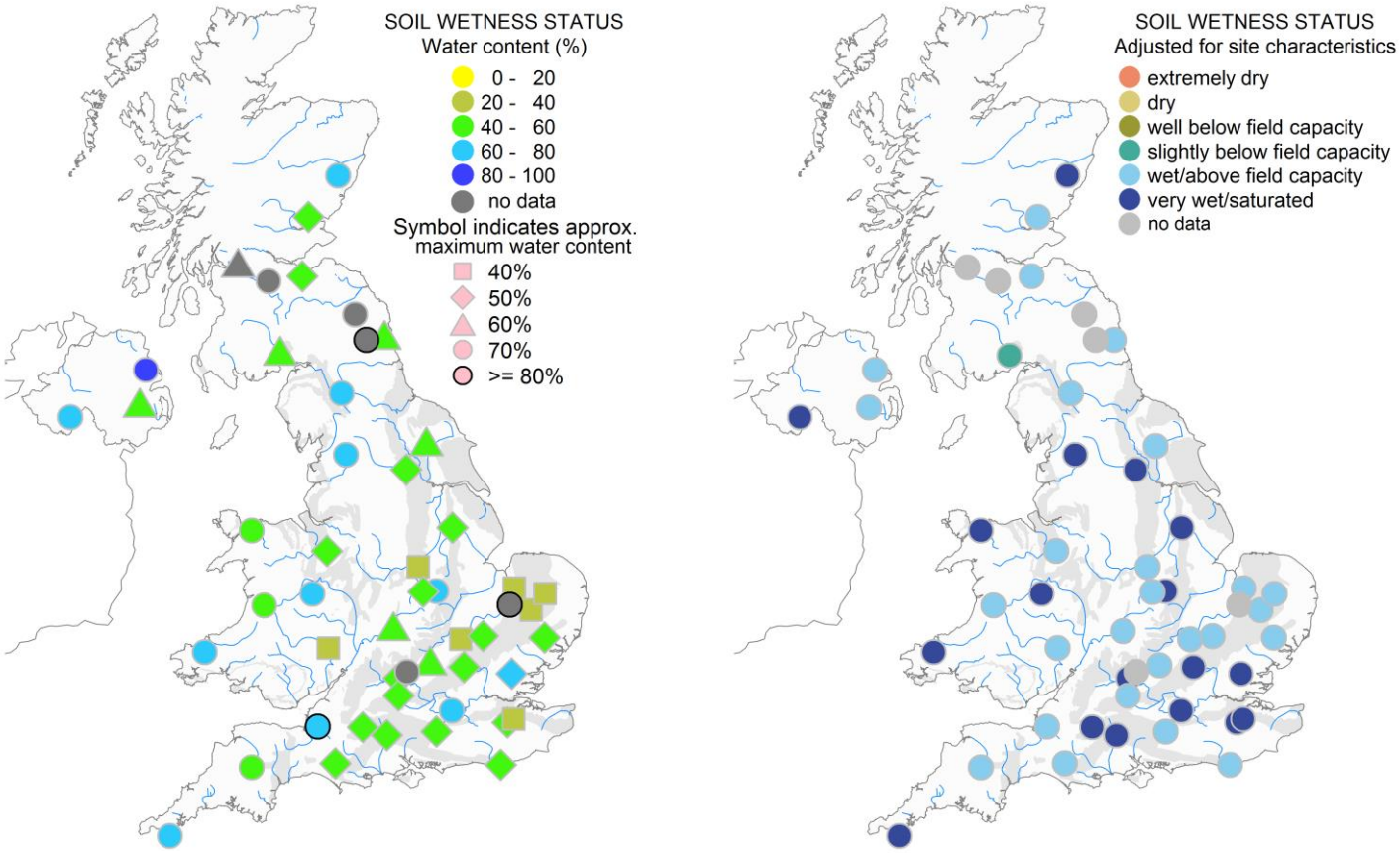
COSMOS-UK | soil moisture

Issued on 06 April 2023



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

Notes on period to 01 April 2023

Widespread rain in March saw soil moisture increase at most COSMOS-UK sites, recovering from dry soil moisture levels from the previous month.

Provisional data for March indicate a very wet month for most of the UK, with England and Wales reporting their wettest Marches in over 40 years. Northern Ireland also saw very high precipitation, reporting its third wettest March on record. In Scotland, precipitation was closer to average for the month, with a contrast between a drier Northern Scotland and a wetter Southern and Eastern Scotland. Monthly temperatures were colder than average in Northern Scotland, whereas across the rest of the UK they were generally in line with the long-term average.

Soil moisture increased from the previous month across most of the COSMOS-UK network. Sites in Northern Ireland (e.g. Glenwherry and Fivemiletown), Eastern Scotland (e.g. Balruddery), and most of England (e.g. Redhill and Moorhouse) recorded very high soil moisture. At some sites in southern England such as Sydling, the high levels of precipitation returned soil moisture to within the normal range. Similarly, in northern Wales and Western Scotland, Haenfaes and Crichton returned close to their normal soil moisture levels in March.

Overall, soil moisture increased from the low levels of the previous month, reflecting the higher amount of precipitation. This resulted in wetter than normal soils at some sites, whereas at other sites, soil moisture recovered to within its normal range following a dry February.

Network News

The logger and card reader were replaced at Sydling to improve site connectivity and the collection of flux data.

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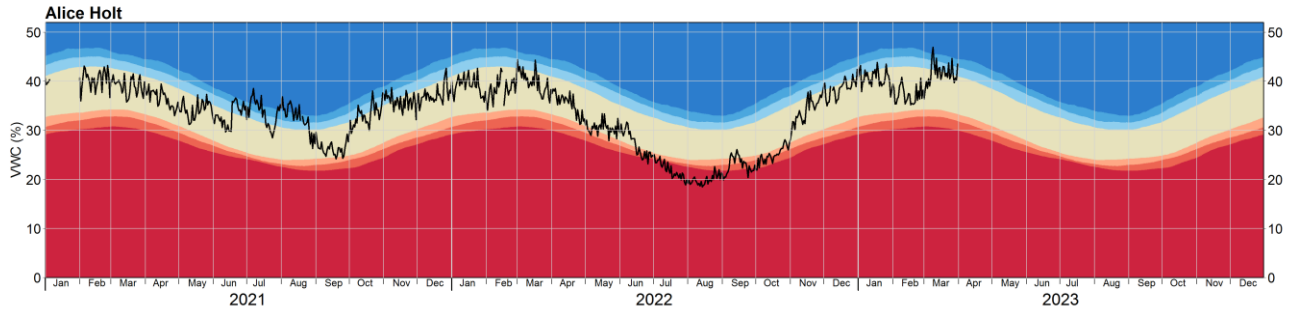

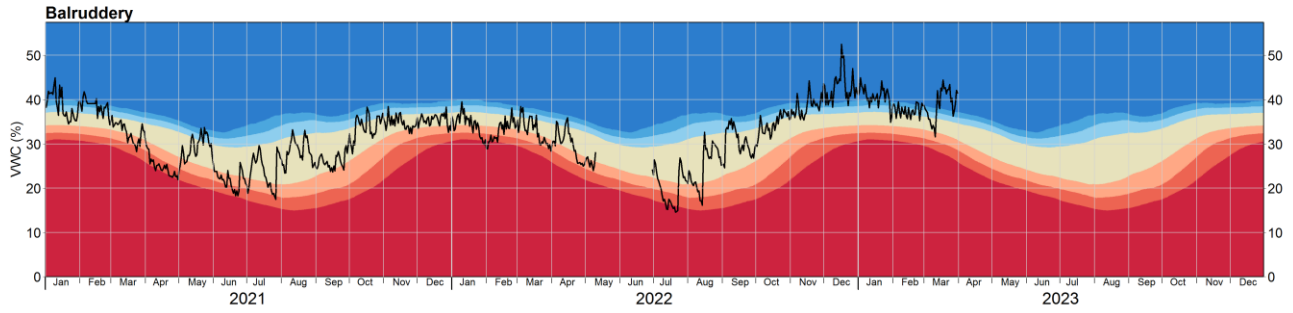

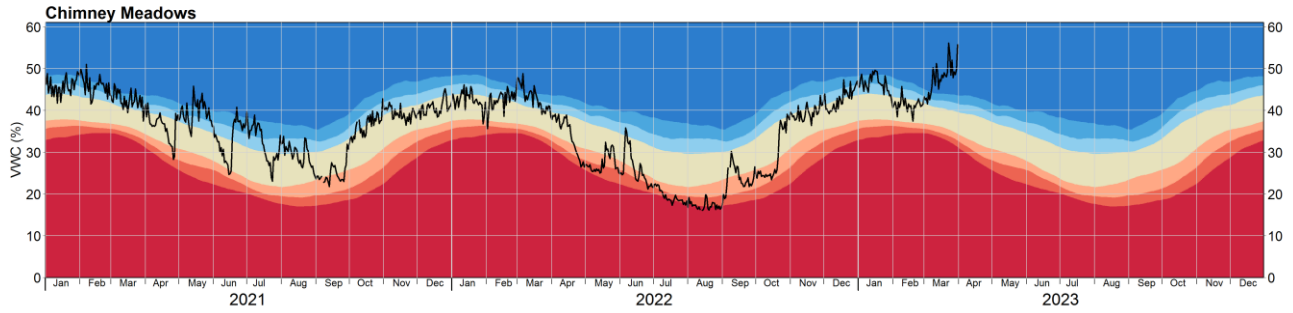

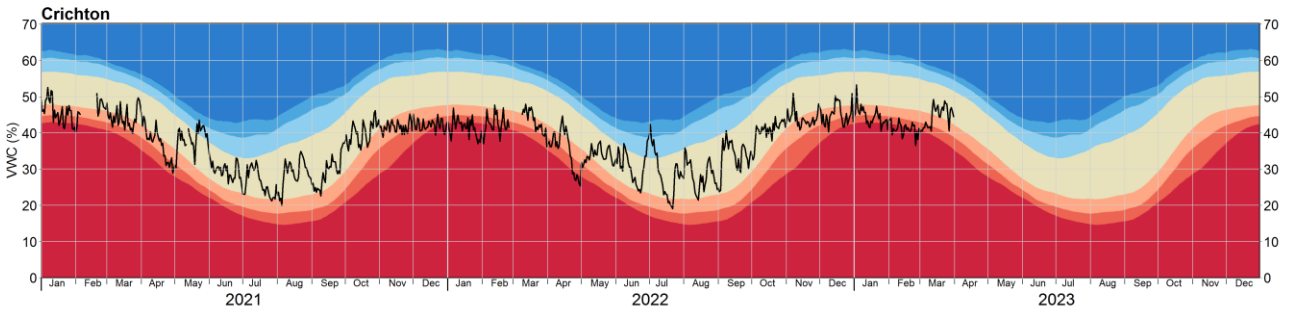

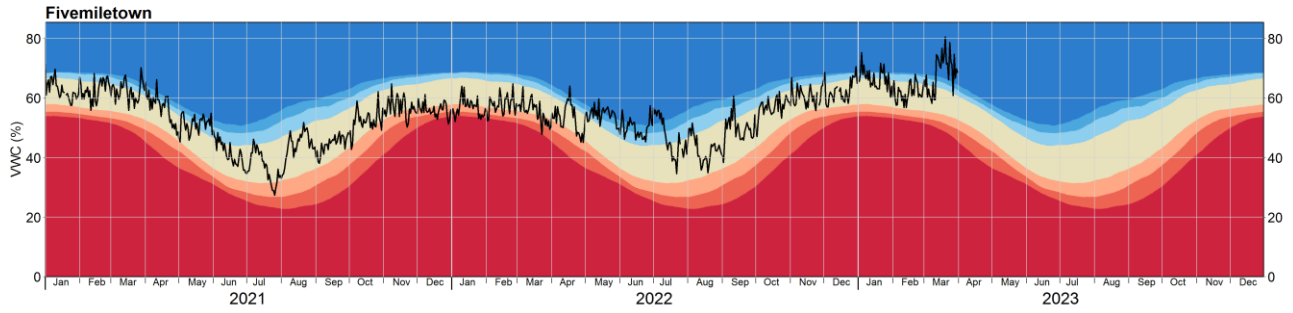

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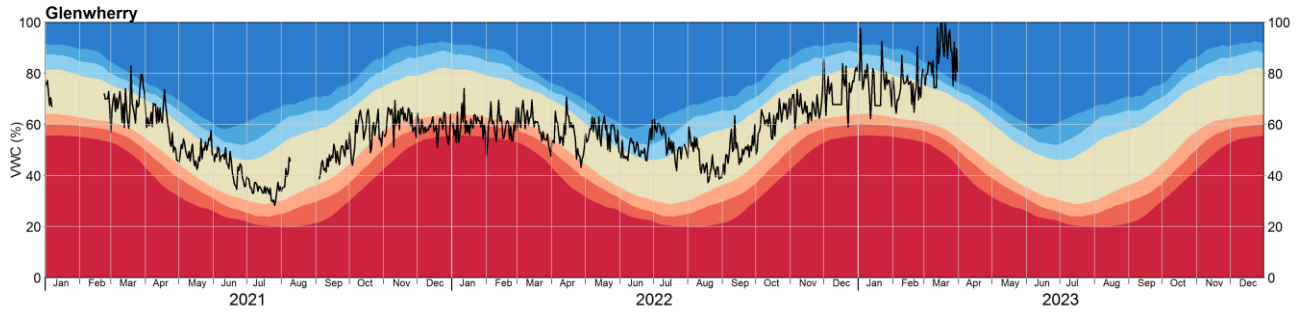

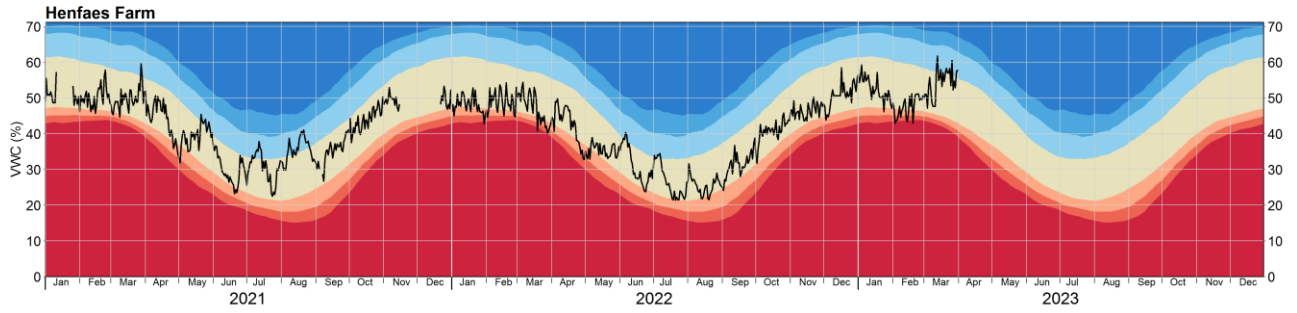

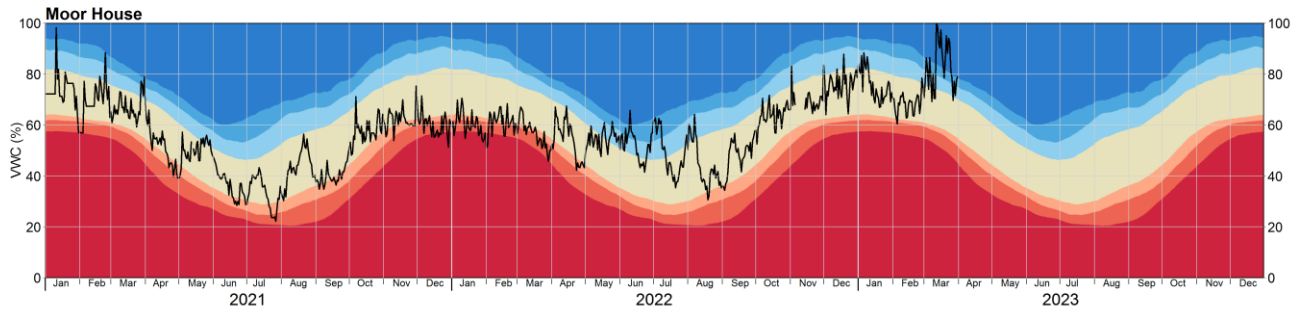

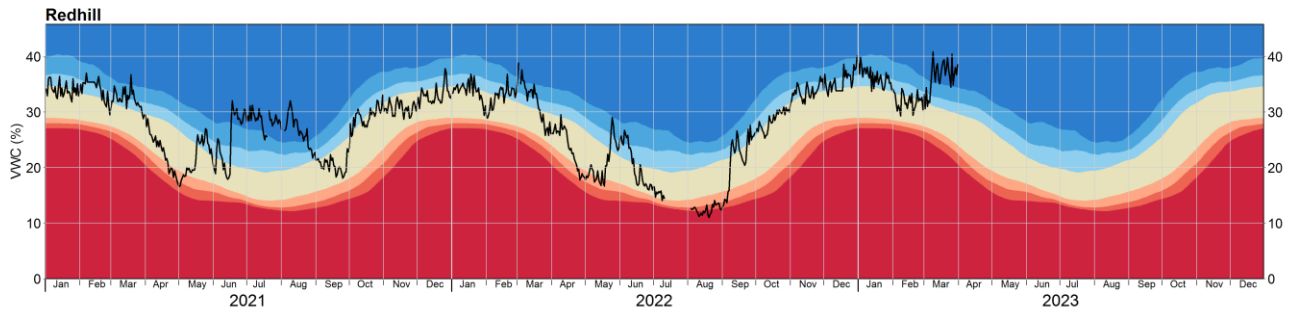

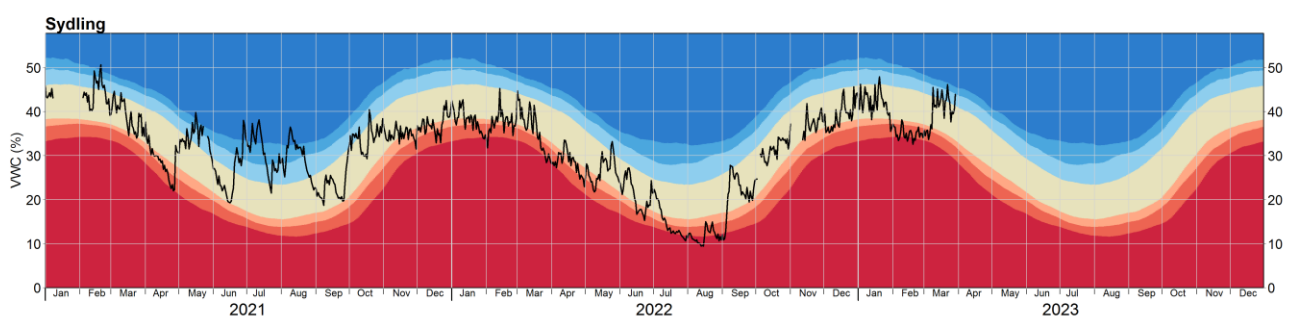

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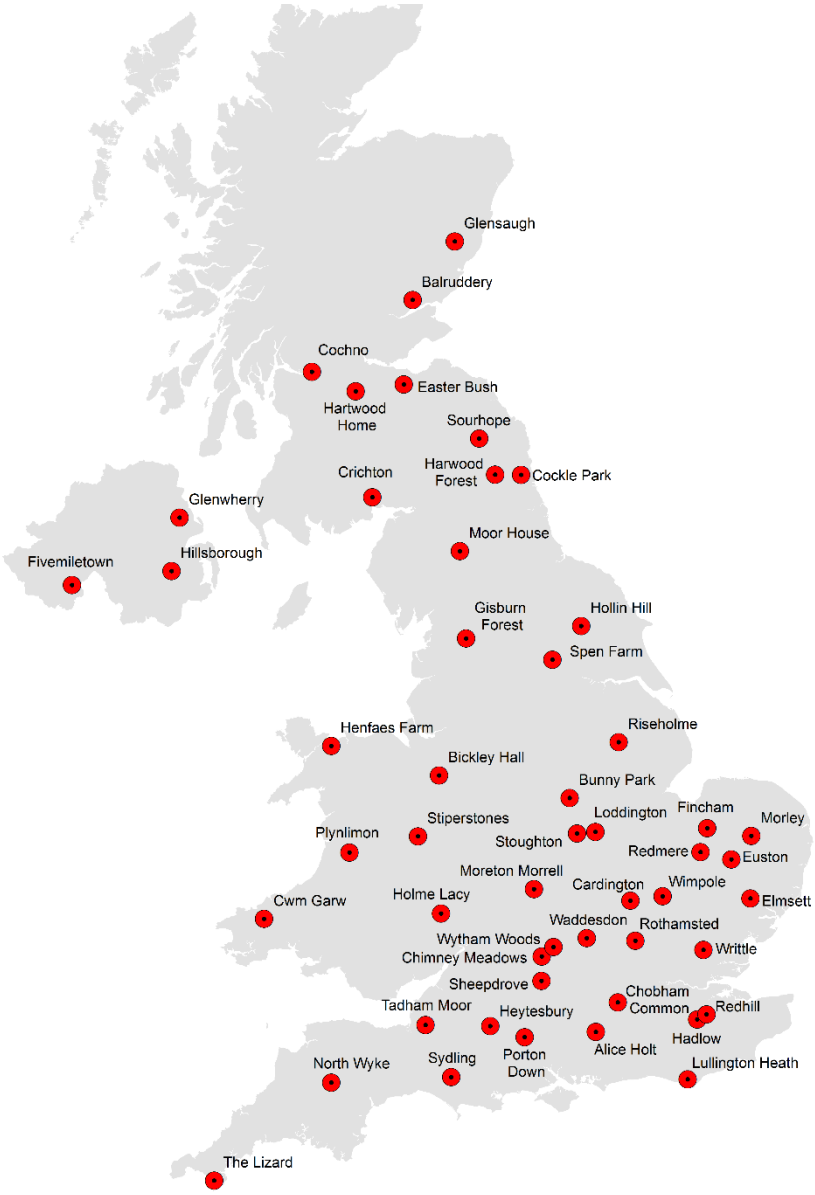

About the maps on page 1: The maps show daily mean soil moisture on the last day of the month. Colours indicate wetness as in the legends.

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.

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