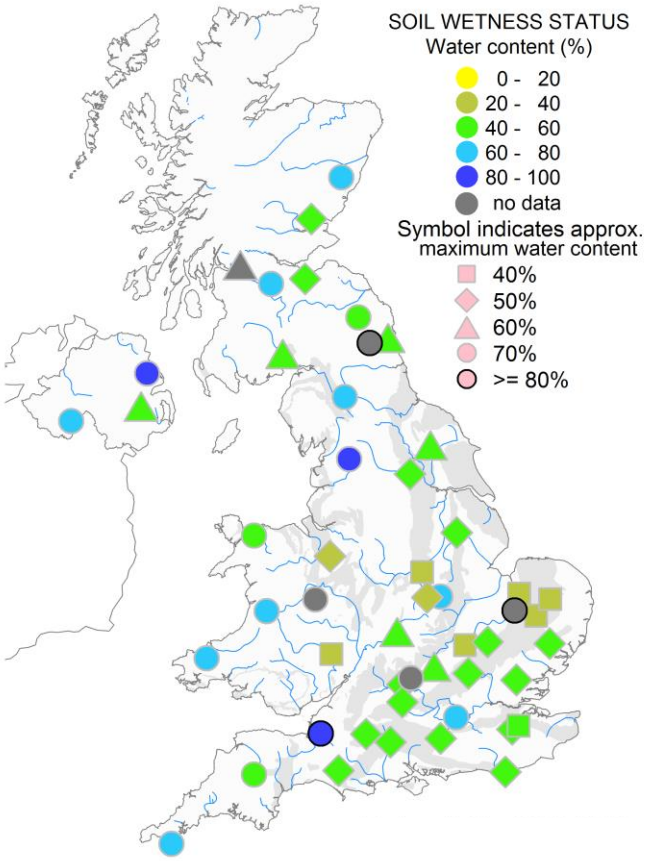
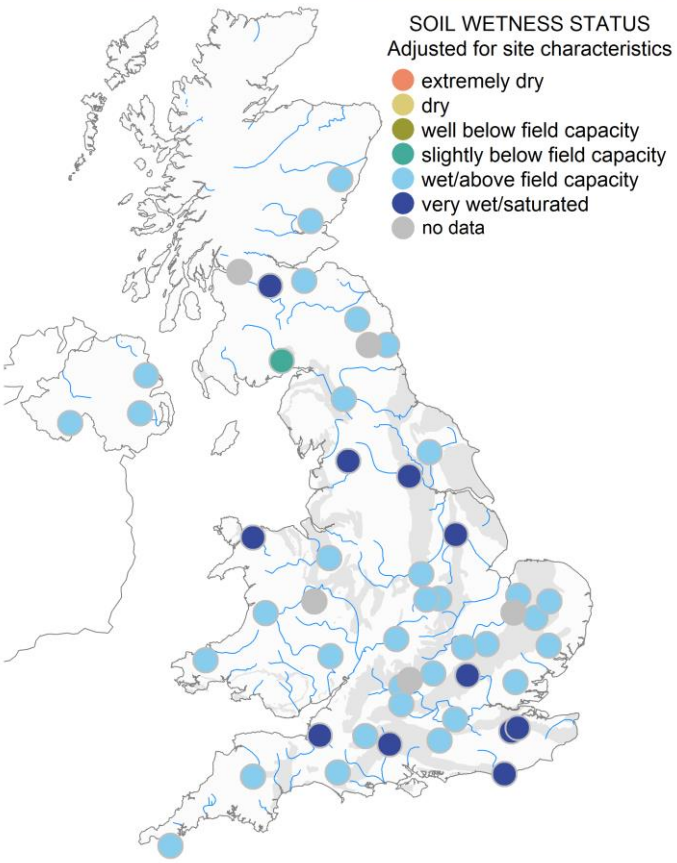
COSMOS-UK | soil moisture

Issued on 06 January 2023





Soil moisture on 31 December 2022 (see back page for explanatory comments).

Notes on period to 31 December 2022

December was drier than average for most of the UK, but low temperatures meant most COSMOS-UK sites remained wet.

Provisional data indicate that precipitation in most of the UK was below the long-term average for December. Eastern Scotland and North-east England were closer to the long-term average than other regions, whereas westerly areas were often drier. The second half of the month saw increased precipitation in most regions. Air temperatures steadily declined in the first half of the month, with some stations recording 30-minute averages as low as -10°C. After that, temperatures rose above freezing, with milder temperatures recorded by the end of the month.

Most COSMOS-UK sites exhibited soil moisture within the normal range over December, with easterly sites such as Glensaugh and Balruddery becoming very wet. In contrast, sites in western regions were slightly drier than usual for much of the month. Crichton was one of the driest sites, whereas other western sites, such as Plynlimon and The Lizard, fluctuated between dry and normal/wet conditions. Porton Down was dry at the start of the month and wetted up by the end of the month.

Generally, high soil moisture has been retained after a wet November and a cool December. The low temperatures in December meant that much of the moisture would not have been lost through evaporation.

Network News

Data continues to be transmitted from Sydling after several interruptions in December; a site visit is planned for early January. A mobile network outage occurred at Rothamsted. The COSMOS tube at Stiperstones has stopped recording neutron counts; a site visit is being scheduled ASAP.

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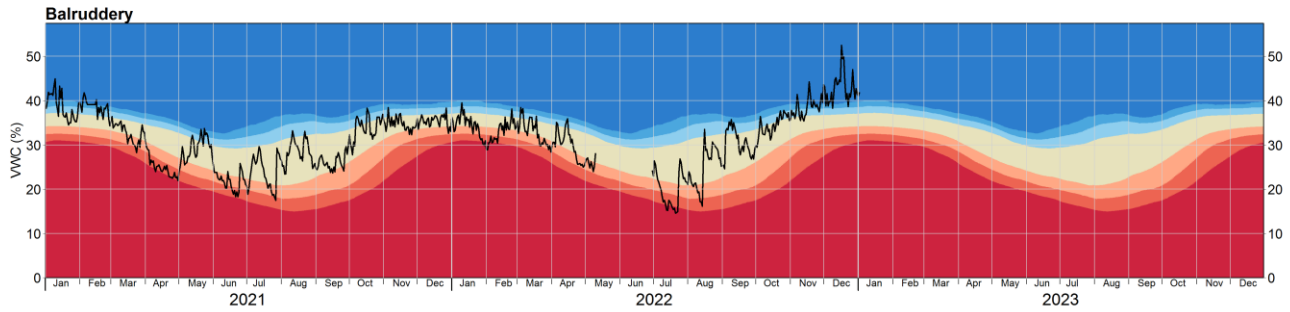

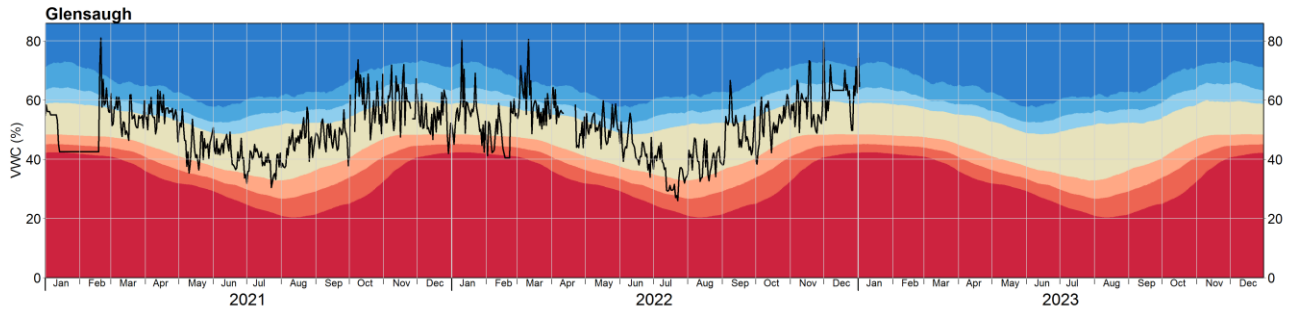

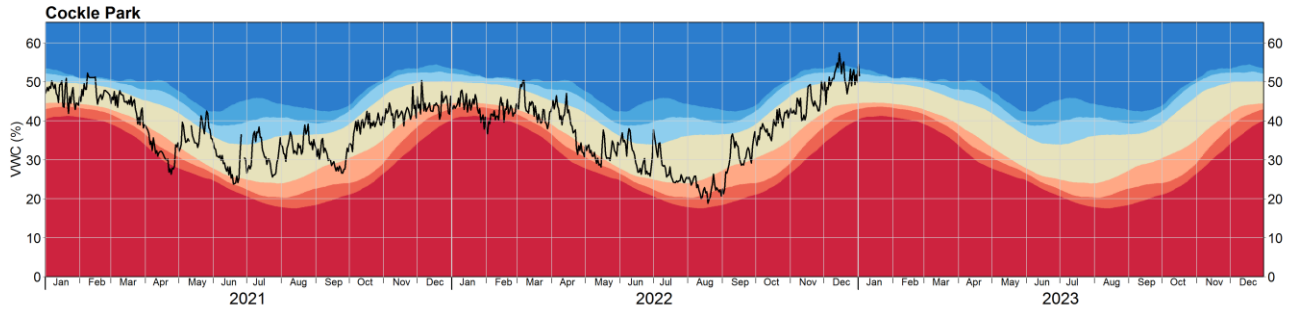

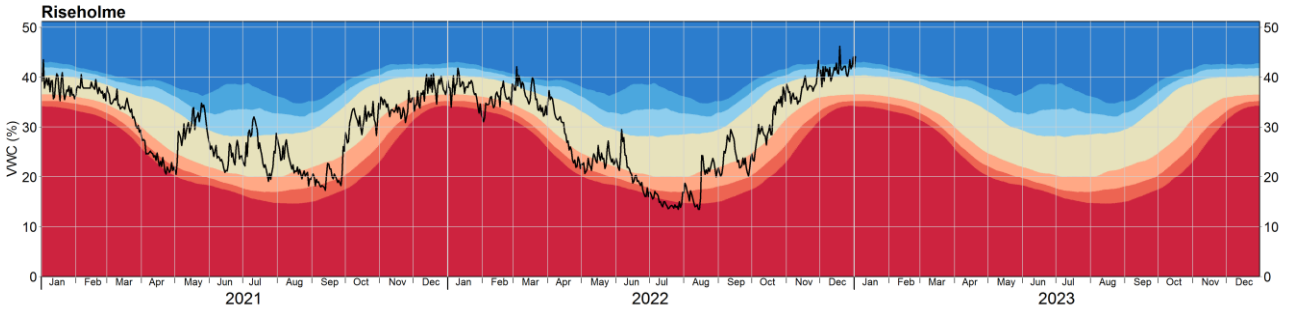

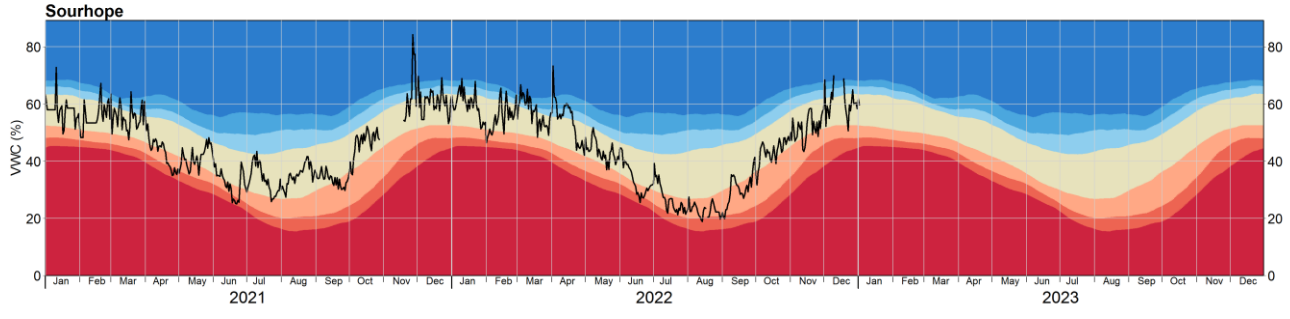

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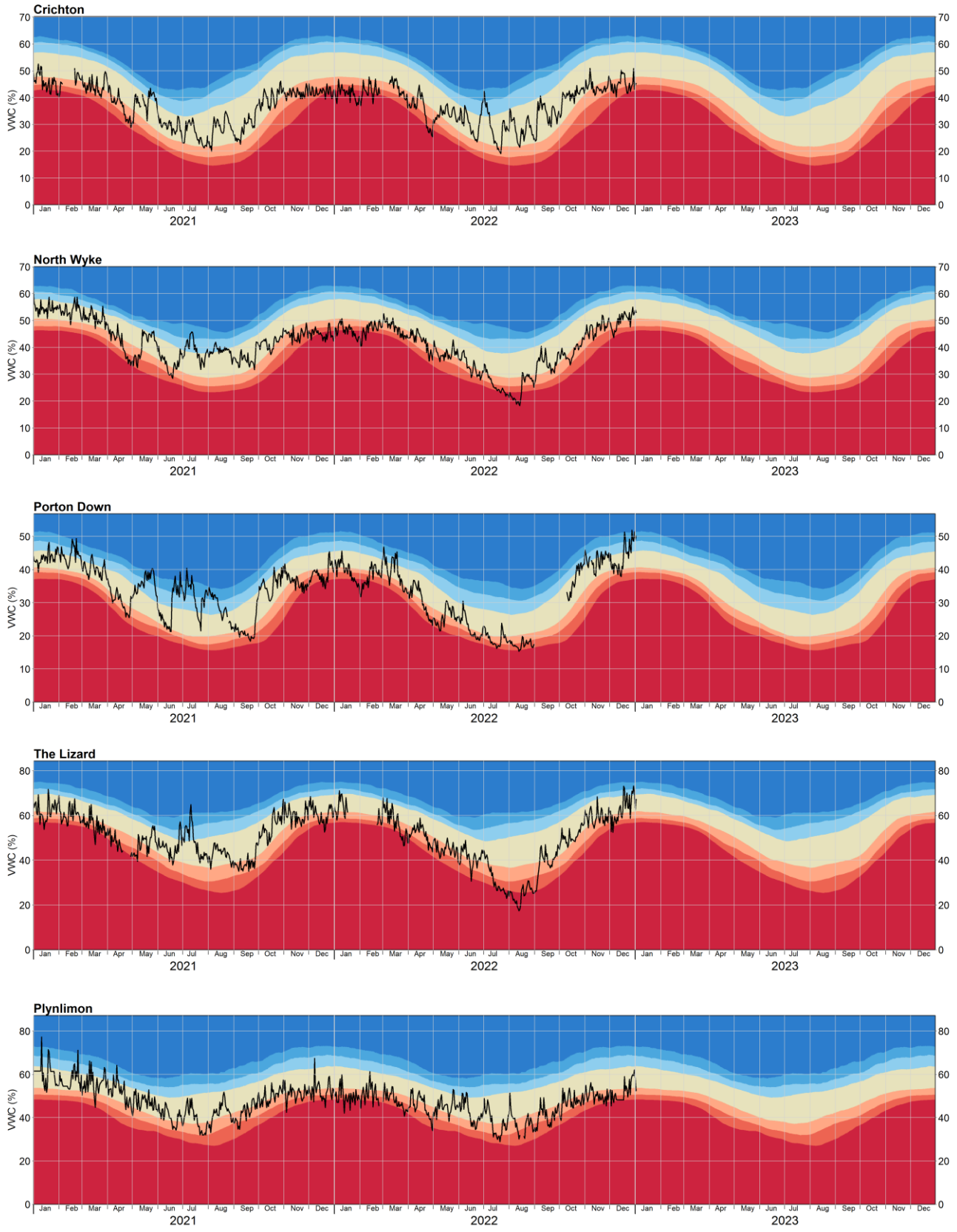

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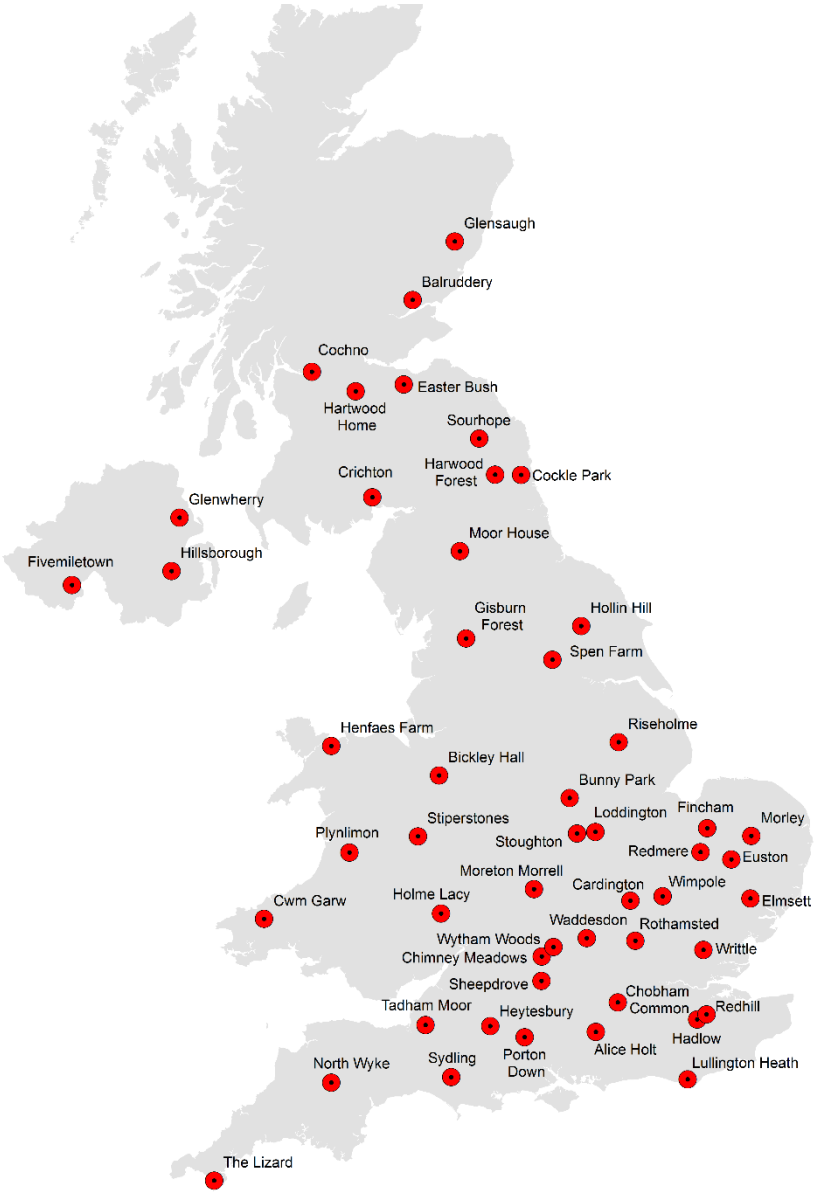

About the maps on page 1: The maps show daily mean soil moisture on the last day of the month. Colours indicate wetness as in the legends.

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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