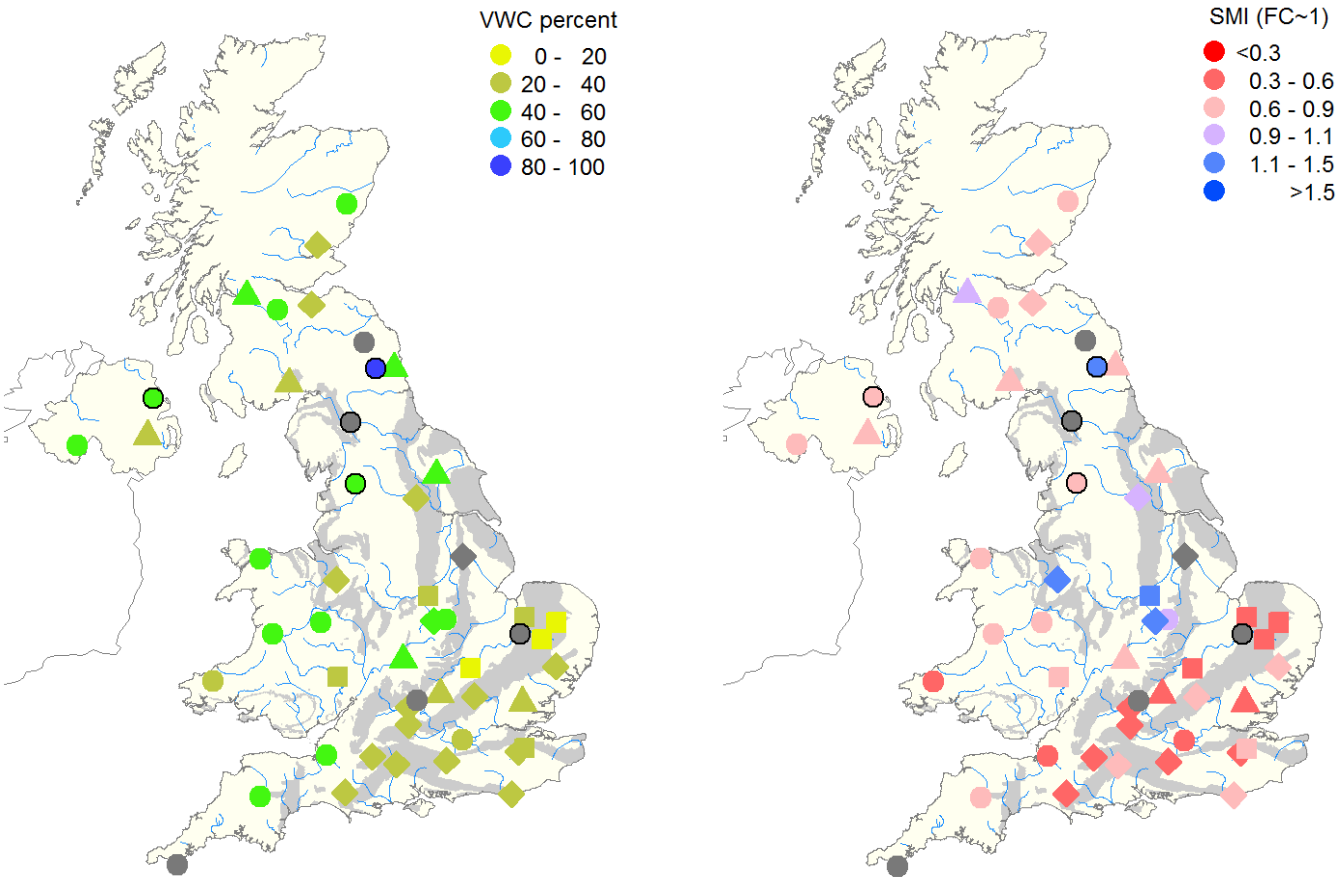
COSMOS-UK | soil moisture

UK Soil Moisture Monitoring Network

Issued on 1 August 2019



Soil moisture on 31 July 2019 (see back page for explanatory comments).

Notes on period to 31 July 2019

At the end of July soil moisture is close to normal for the time of year across the UK except for central and northern England where soils are very much wetter than normal.

Provisional rainfall data indicate that July as a whole was wetter than average, with the exception of southwest England which received below average rainfall. The first half of the month was generally dry in England and Wales, however particularly heavy rain occurred later in the month which caused localized flooding. There was also a short heatwave with record-breaking temperatures on the 25th July.

At the start of July soils were normal for the time of year across the UK. In Scotland, Northern Ireland, Wales and southern England daily soil moisture data were again normal at the end of the month for many sites. F or some of these sites there was large variation in soil moisture throughout July due to drying conditions followed by substantial rainfall (e.g. Balruddery, Hillsborough). Other sites however remained relatively stable with no dramatic changes throughout the month (e.g. Stiperstones, Waddesdon).

The heavy rainfall towards the end of July led to significant changes in soil moisture in central and northern England. By the end of the month some sites, for example Bickley, Bunny Park and Stoughton, reached soil moisture levels similar to, or greater than, what is normal for winter. This has led to a significant contrast between north and central England and the rest of the UK.

Note that the COSMOS-UK records are too short to reliably estimate long-term monthly averages and departures from them; it is therefore only possible to give qualitative indications about averages and what is typical for the time of year.

Network News

Several sites recorded their highest air temperature on COSMOS-UK record on 25th July. Cardington recorded the highest temperature of 37.3°C. The Met Office recorded 38.7°C at Cambridge Botanic Garden.

There were five site visits to repair and maintain instruments, including resolving the telemetry fault at Sourhope.

At several sites there are ongoing faults with the rain gauges.

The Rothamsted site has now been running for five years.

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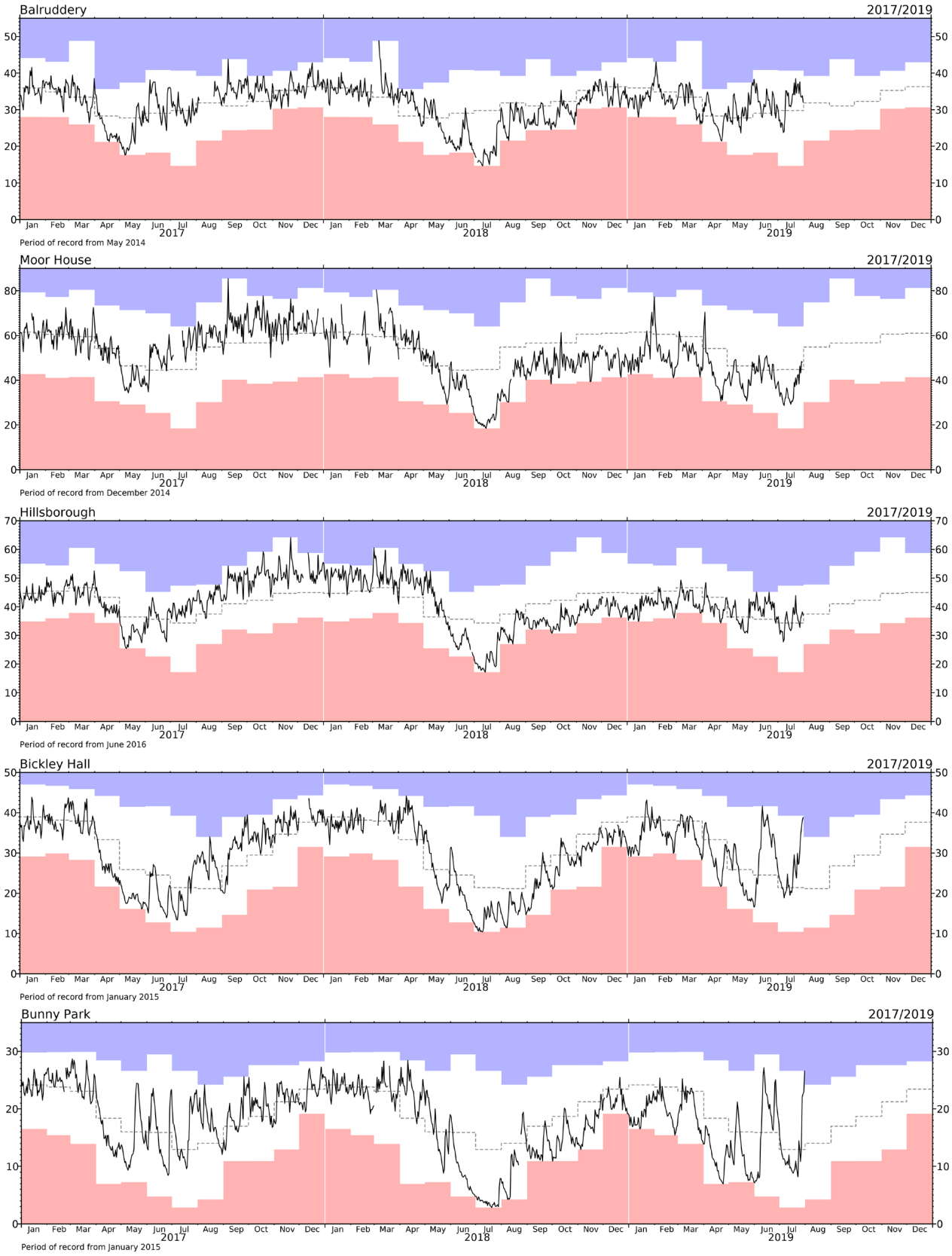

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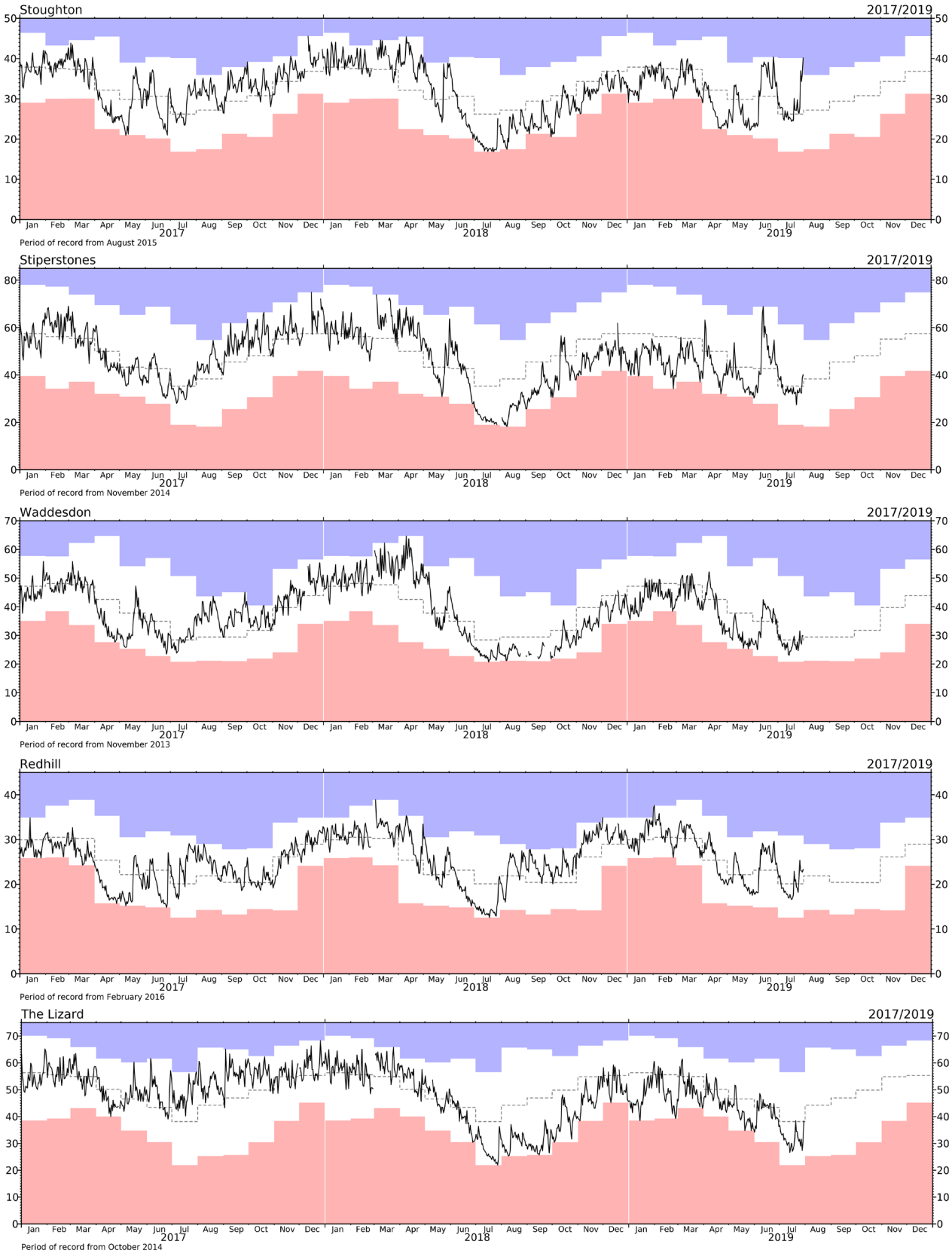

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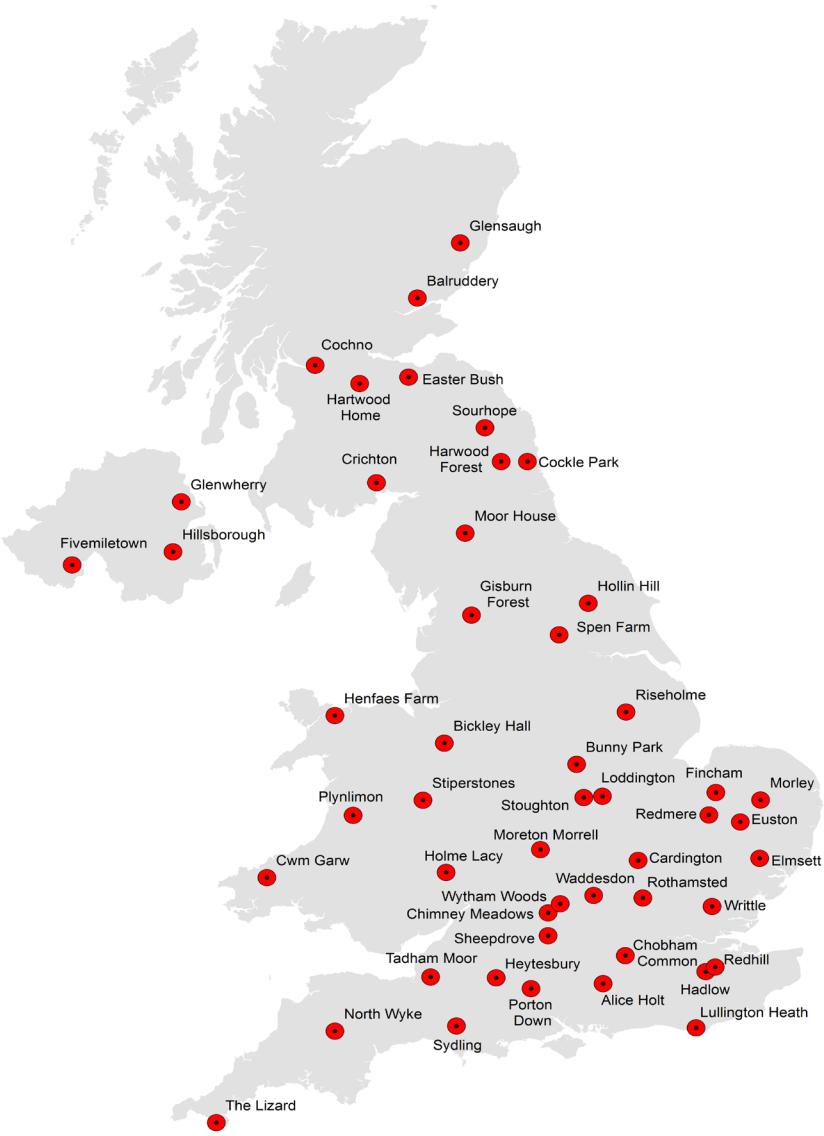
COSMOS-UK site locations



About the maps on page 1: The maps of volumetric water content (VWC) and soil moisture index (SMI) show average daily soil moisture at the end of the month. Colours indicate wetness as in the keys. Grey symbols represent missing data.

The symbols represent groups of sites with similar soil maximum water content, i.e.

~ 30%	■
~ 40%	◆
~ 50%	▲
~ 60%	●
>=~ 70%	●

VWC – This is the percentage water content and reflects both capacity of the soil to store water as well as actual moisture content.

SMI – This is an index of soil moisture that is adjusted for the capacity of the soil to store water. A value of around 1.0 represents field capacity (FC) which is typical moisture content in late autumn and early spring. SMI will generally be lower than this in the summer and higher in the winter.

Nearby sites with the same symbol (i.e. similar rainfall and soils) should be in similar VWC and SMI classes; however neighbouring sites with different symbols (i.e. similar rainfall but different soils) can be in different VWC and SMI classes. Sites represented by circles with an outline are generally poorly draining and wet, and therefore often have VWC and SMI values different from their neighbours; data from these sites are less reliable than from other sites.

Grey shaded areas represent principal aquifers.

About the graphs on pages 2 and 3: These show the VWC over a three year period. The black line shows the daily soil moisture, the shaded areas show the monthly minima (pink) and maxima (blue) from the period of record, and the dashed grey line indicates the period of record monthly mean. These extremes and means are currently derived from very short records; they do nevertheless give some indication of the seasonal variability of the moisture content.

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 field capacity; additional rainfall either cannot enter the already saturated soil and flows across the land surface as overland flow, or infiltrates but drains quickly through the soil.

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 funded as part of the NERC's National Capability.

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