

Soil moisture on 31 December 2018 (see back page for explanatory comments).

### Notes on period to 31 December 2018

Across the UK soil moisture is generally lower than expected for the time of year. Only in the south-east quarter of England are there some sites with soil moisture in the normal range, although at other sites in the same region soil moisture is below normal.

Provisional data for December show that rainfall was close to normal across central regions of the UK, including Northern Ireland. Rainfall was lower than average in eastern and northern Scotland, and above average in central and southern parts of both England and Wales. The end of December was generally dry with the exception of northwest Scotland where there was modest rainfall.

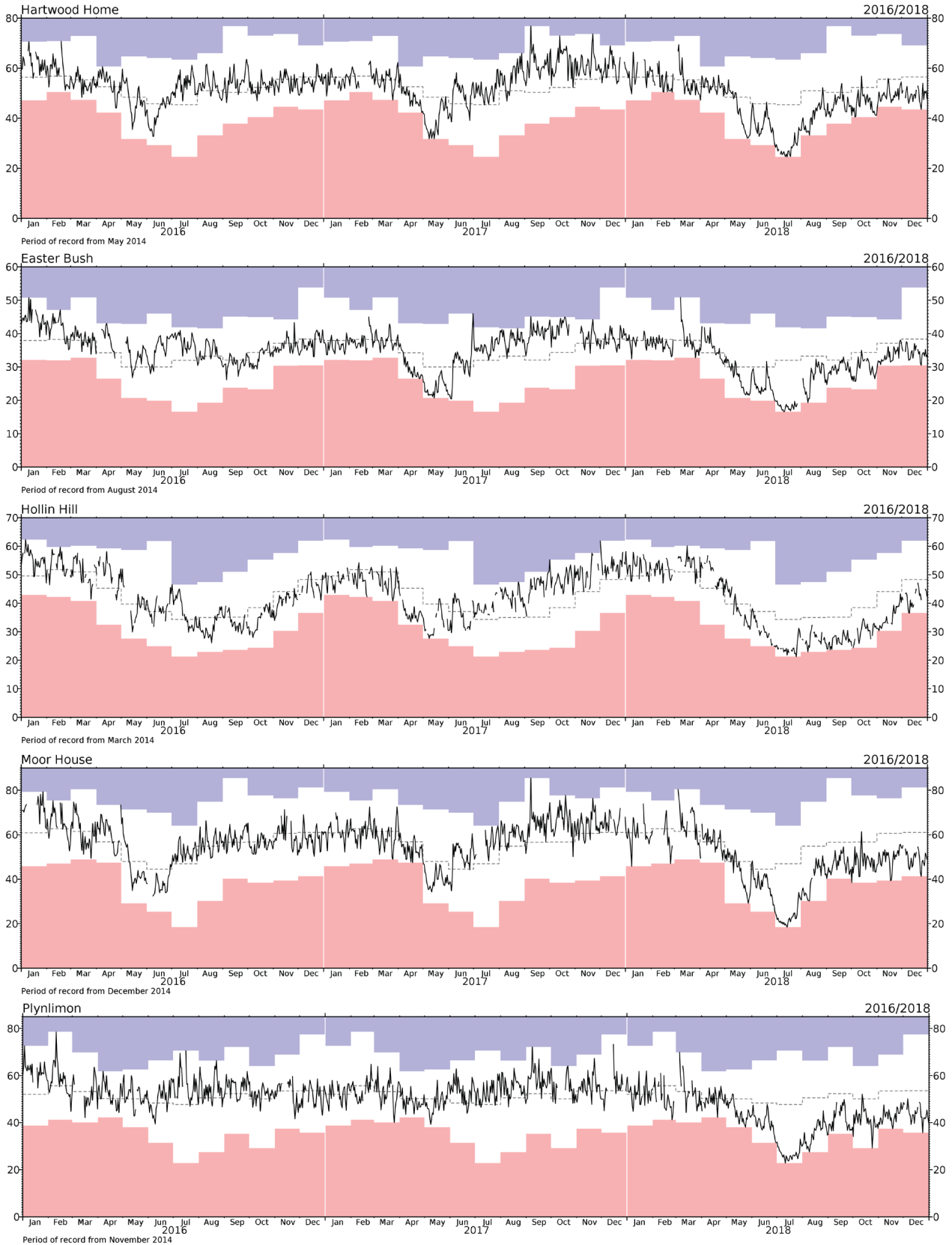
Across the UK soil moisture remains at levels below normal for the time of year as a consequence of both the very low soil moisture experienced in mid-summer, and average to below average rainfall totals in the autumn. This is seen at sites in Scotland (e.g. Hartwood Home, Easter Bush), northern England (e.g. Moor House, Hollin Hill) and Wales (e.g. Plynlimon).

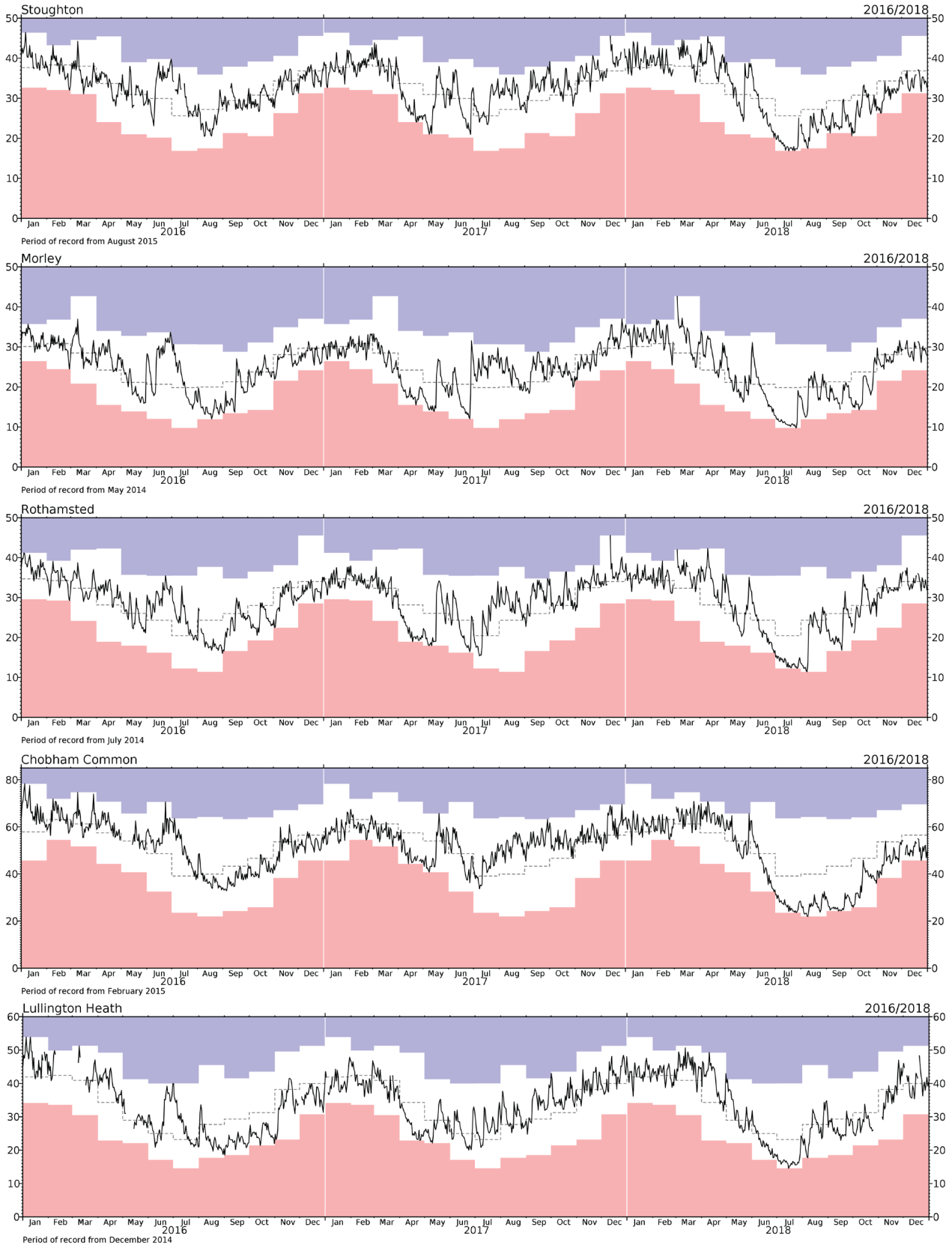
Only at a few sites in south eastern parts of England is soil moisture at normal levels for the time of year (e.g. Morley, Rothamsted, North Wyke) or perhaps slightly above normal (e.g. Lullington Heath). However other sites in the same region are still recording below average soil moisture (e.g. Chobham Common)

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.

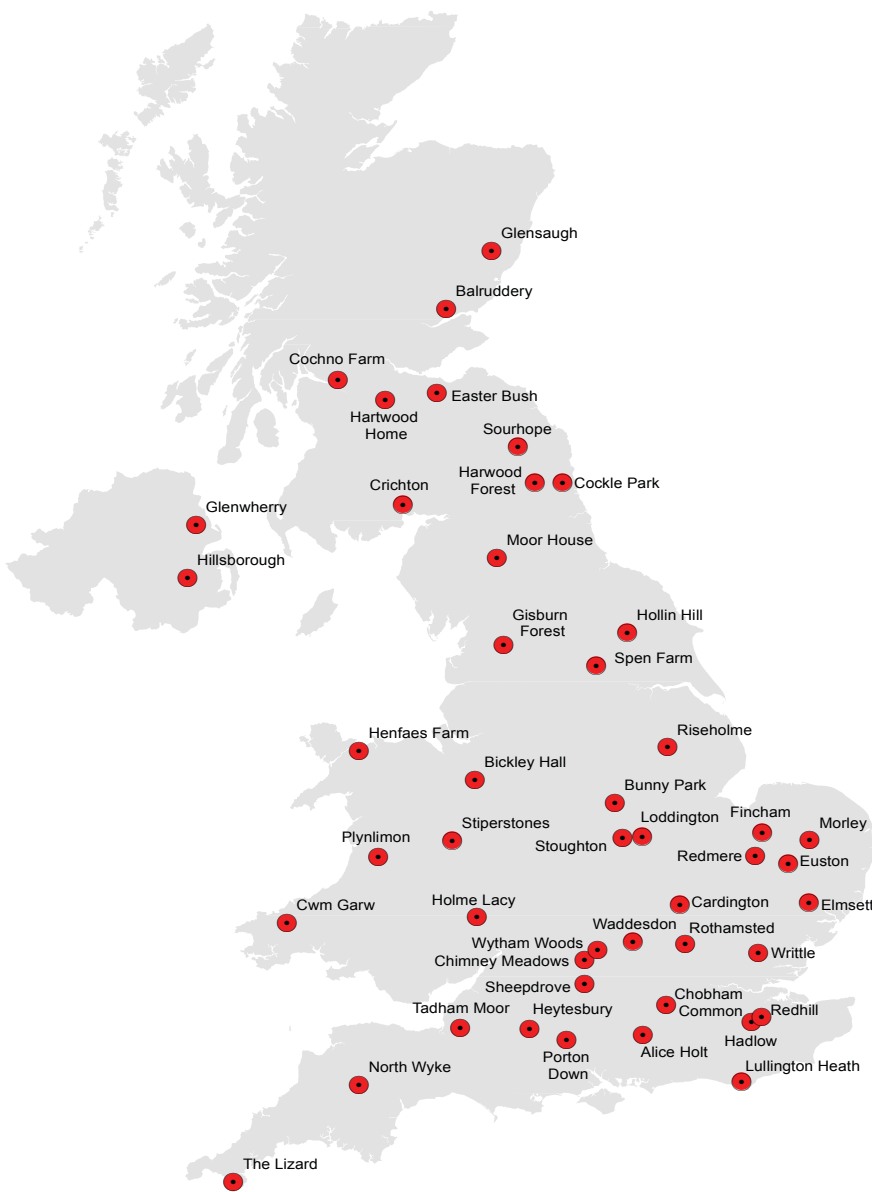
### Technical issues during December

There are a number of outstanding technical issues at the end of December, most notably telecommunications issues meaning no data from Porton Down, Euston and Cwm Garw. There were also problems with the processing of the data from the cosmos probe that mean these data are missing at all sites on the 3rd, 4th and 19th.





### 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.



**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.

The 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.