Increased incidence, intensity and duration of groundwater drought in the Chalk of the UK associated with anthropogenic warming

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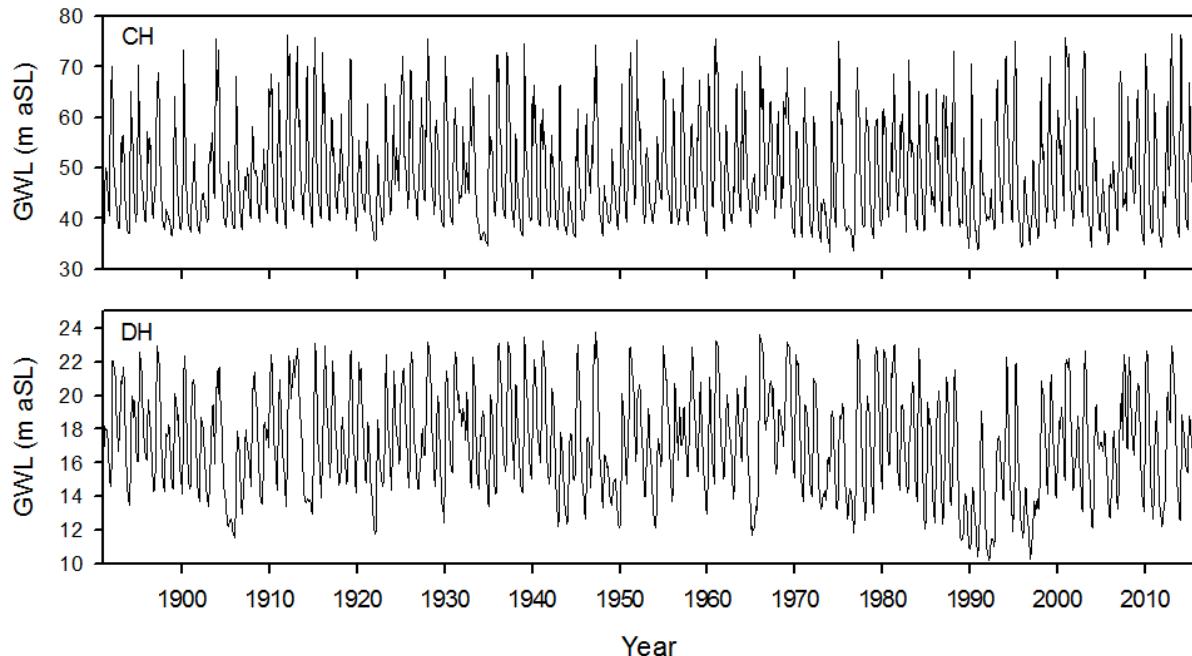
Supplementary information

Figures

Figure S1. Monthly groundwater levels at CH and DH.

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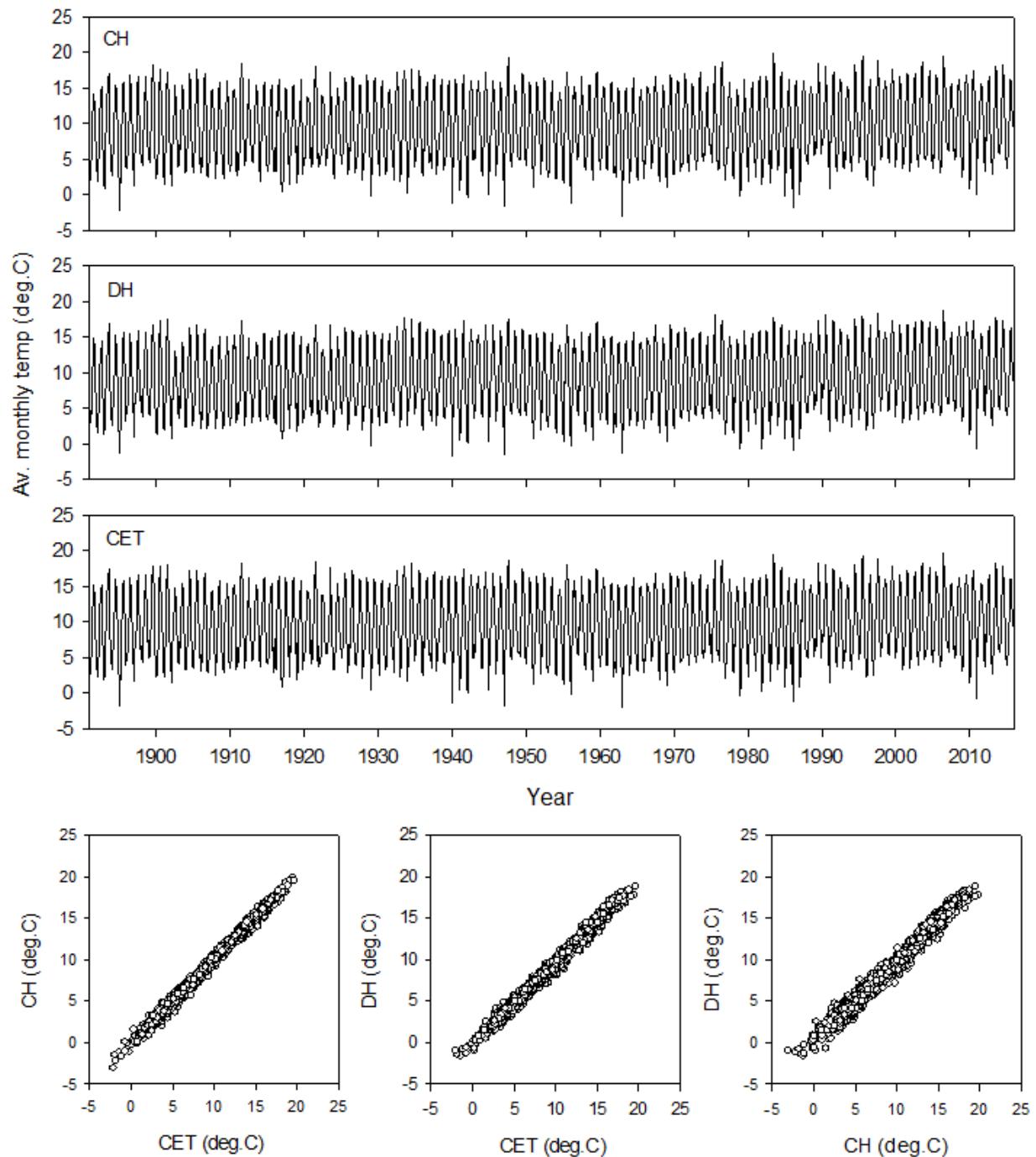
Figure S2. Monthly average air temperature at CH and DH and monthly CET. Cross plots of Monthly average air temperature at CH and DH and monthly CET.

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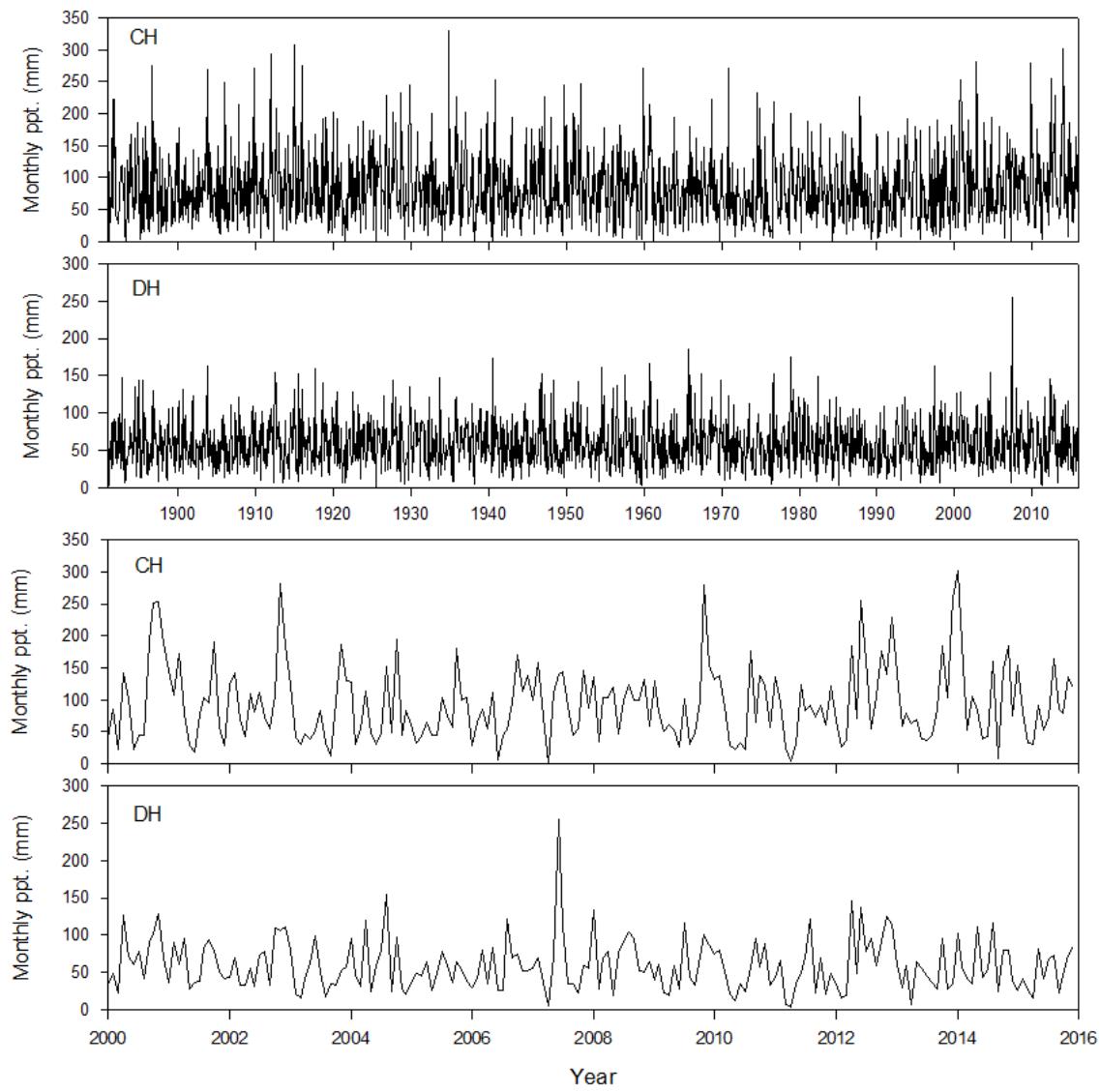
Figure S3. Monthly total precipitation at CH and DH (for the full observation record from 1891 to 2015 and for the last 15 years of the record).

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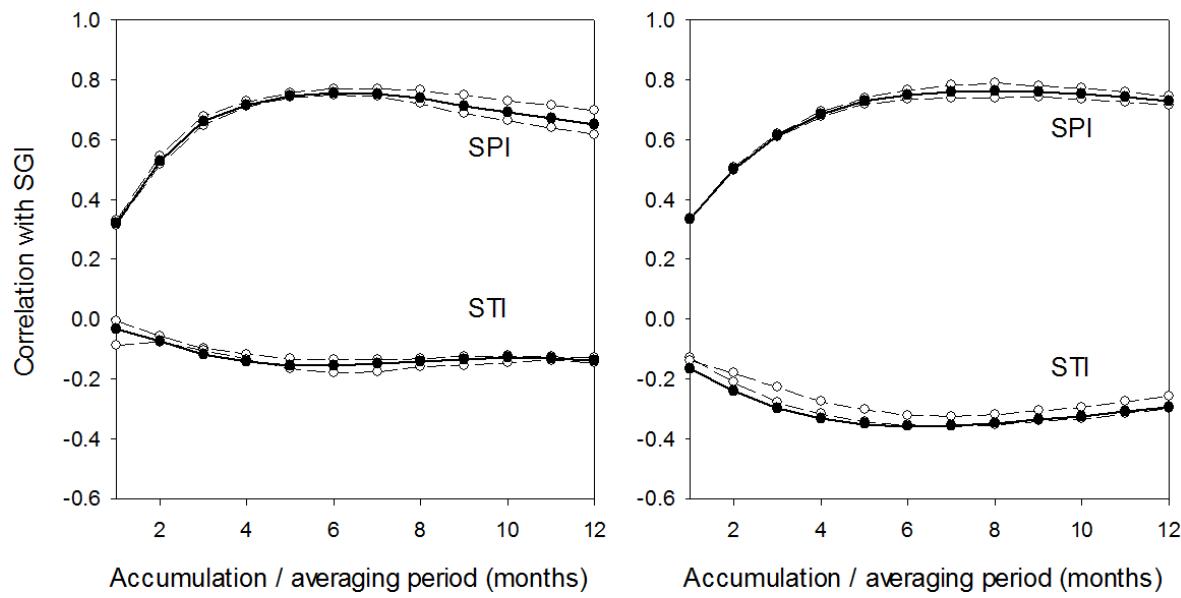
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Figure S4. Variation in Pearson correlation coefficient between SGI and SPI for a range of SPI accumulation periods and between SGI and STI for a range of STI averaging periods. Solid lines show the correlation for the entire time series, the dashed lines indicate correlations for first and last third of the record.

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Tables

Table S1. Percentage of months of SGI in a given standardised range for the whole record and for each third of the observational record

Period	CH SGI						DH SGI					
	SGI <=-2	SGI <=-1 & >-2	SGI <=-0 & >-1	SG I>0 & <1	SGI >=1 & <2	SGI >=2	SGI <=-2	SGI <=-1 & >-2	SGI <=-0 & >-1	SG I>0 & <1	SGI >=1 & <2	SGI >=2
1890-2015	1.6	14.3	35.2	34.4	13.6	1.6	1.6	14.3	35.2	34.4	13.6	1.6
1890-1932	0.2	10.1	37.3	36.7	13.9	1.8	0.4	9.5	32.5	42.5	14.1	1
1933-1973	1.8	14.6	34.8	33.9	13.6	1.2	0.2	11.8	33.5	34.1	17.7	2.6
1974-2015	2.8	18.3	31.2	30.4	15.5	1.8	4.2	21.7	37.2	26.6	9.1	1.2

Period	CH SPI6						DH SPI7					
	SGI <=-2	SGI <=-1 & >-2	SGI <=-0 & >-1	SG I>0 & <1	SGI >=1 & <2	SGI >=2	SGI <=-2	SGI <=-1 & >-2	SGI <=-0 & >-1	SG I>0 & <1	SGI >=1 & <2	SGI >=2
1890-2015	1.6	14.3	35.2	34.4	13.6	1.6	1.6	14.3	35.2	34.4	13.6	1.6
1890-1932	1.6	13.7	36.1	31.5	16.7	0.4	1.4	12.9	31.2	41.7	11.5	1.4
1933-1973	1.2	17.9	33.9	33.3	12.6	1.0	1.6	12.6	38.2	26	19.7	1.8
1974-2015	2.0	11.5	33.2	36.2	13.7	3.4	1.8	17.5	34	35.4	9.7	1.6

Period	CH STI6						DH STI7					
	SGI <=-2	SGI <=-1 & >-2	SGI <=-0 & >-1	SG I>0 & <1	SGI >=1 & <2	SGI >=2	SGI <=-2	SGI <=-1 & >-2	SGI <=-0 & >-1	SG I>0 & <1	SGI >=1 & <2	SGI >=2
1890-2015	1.6	14.3	35.2	34.4	13.6	1.6	1.6	14.3	35.2	34.4	13.6	1.6
1890-1932	0	4.8	29	42.1	21.8	2.4	0	1.8	21.8	48	25	3.4
1933-1973	0	8.5	38.4	34.8	16.5	1.8	0.2	10	43.7	32.1	12.6	1.4
1974-2015	4.8	29.6	36	24.3	4.8	0.6	4.6	31.2	38	23.1	3.2	0

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46 **Table S2. Percentage of groundwater drought months associated with SPI<=-1, STI>=1, and SPI<=-1 and STI>=0 for**
47 **three time periods and for CH and DH.**

Period	CH			DH		
	SPI<=-1	STI>=1	SPI<=-1 & STI >=1	SPI<=-1	STI>=1	SPI<=-1 & STI >=1
1890-1932	67.3%	7.7%	7.7%	71.2%	11.5%	9.6%
1933-1973	67.9%	11.1%	6.2%	37.0%	16.0%	8.6%
1974-2015	50.0%	48.1%	22.6%	67.0%	51.9%	29.2%

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49 **Table S3.** Summary statistics for episodes of groundwater drought at CH and DH

Site & period	Total no. drought episodes	No. episodes where SGI intensity <-1	Average duration of all episodes (months)	Average SGI intensity of all episodes	Average SPI of all episodes	Average STI of all episodes
CH						
1891-2015	45	16	10.7	-0.91	-0.72	0.15
1891-1932	12	2	10.9	-0.71	-0.72	-0.26
1933-1973	14	5	11.8	-0.94	-0.84	-0.20
1974-2015	19	9	9.8	-1.00	-0.64	0.67
DH						
1891-2015	33	8	16.4	-1.51	-0.71	0.23
1891-1932	9	2	14.2	-1.20	-0.90	-0.27
1933-1973	8	3	17.3	-1.29	-0.80	0.05
1974-2015	16	4	17.3	-1.51	-0.55	0.60

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