

Ensemble meteorological reconstruction using circulation analogues of 1781—1785. Supplementary Material.

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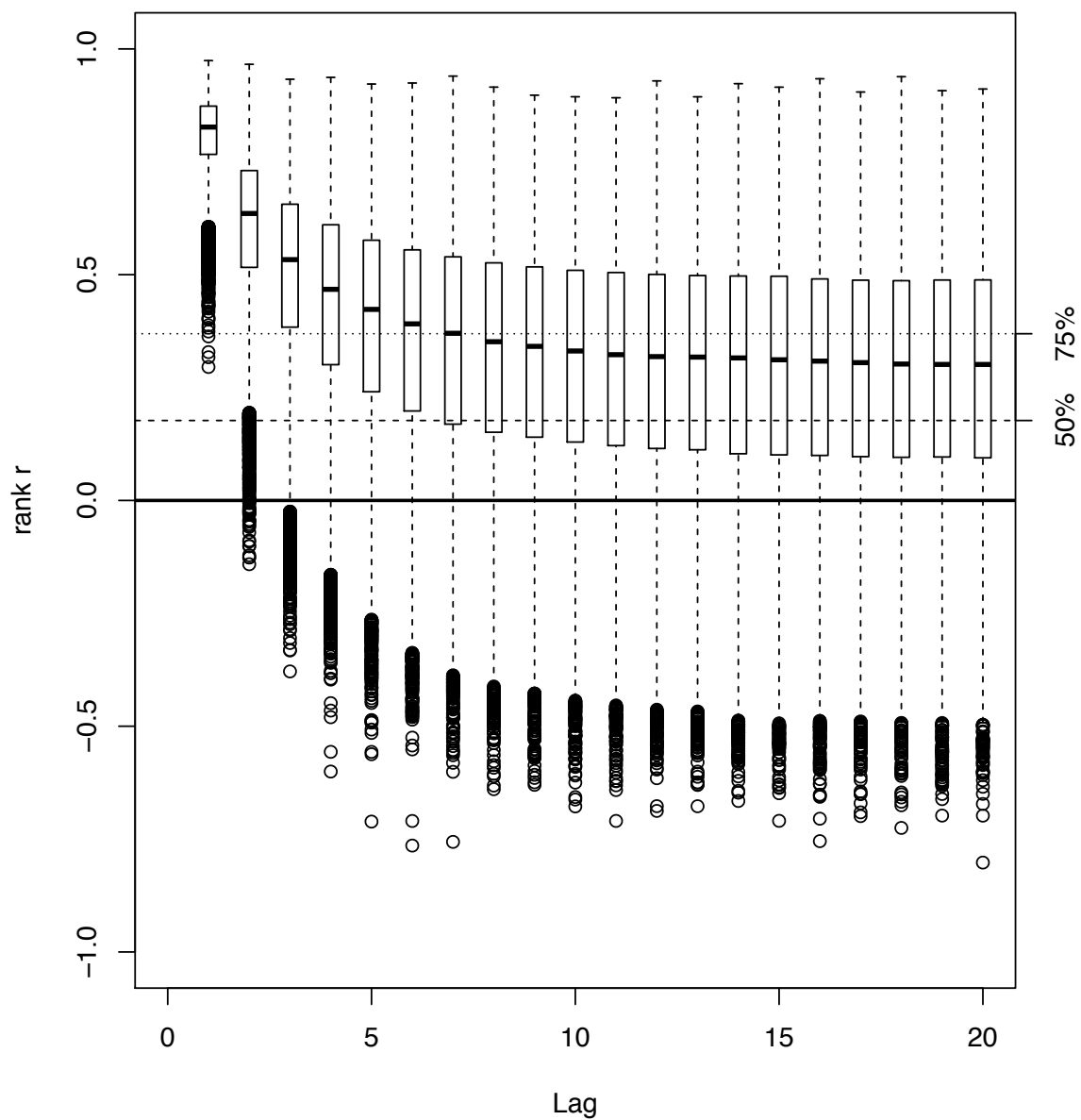
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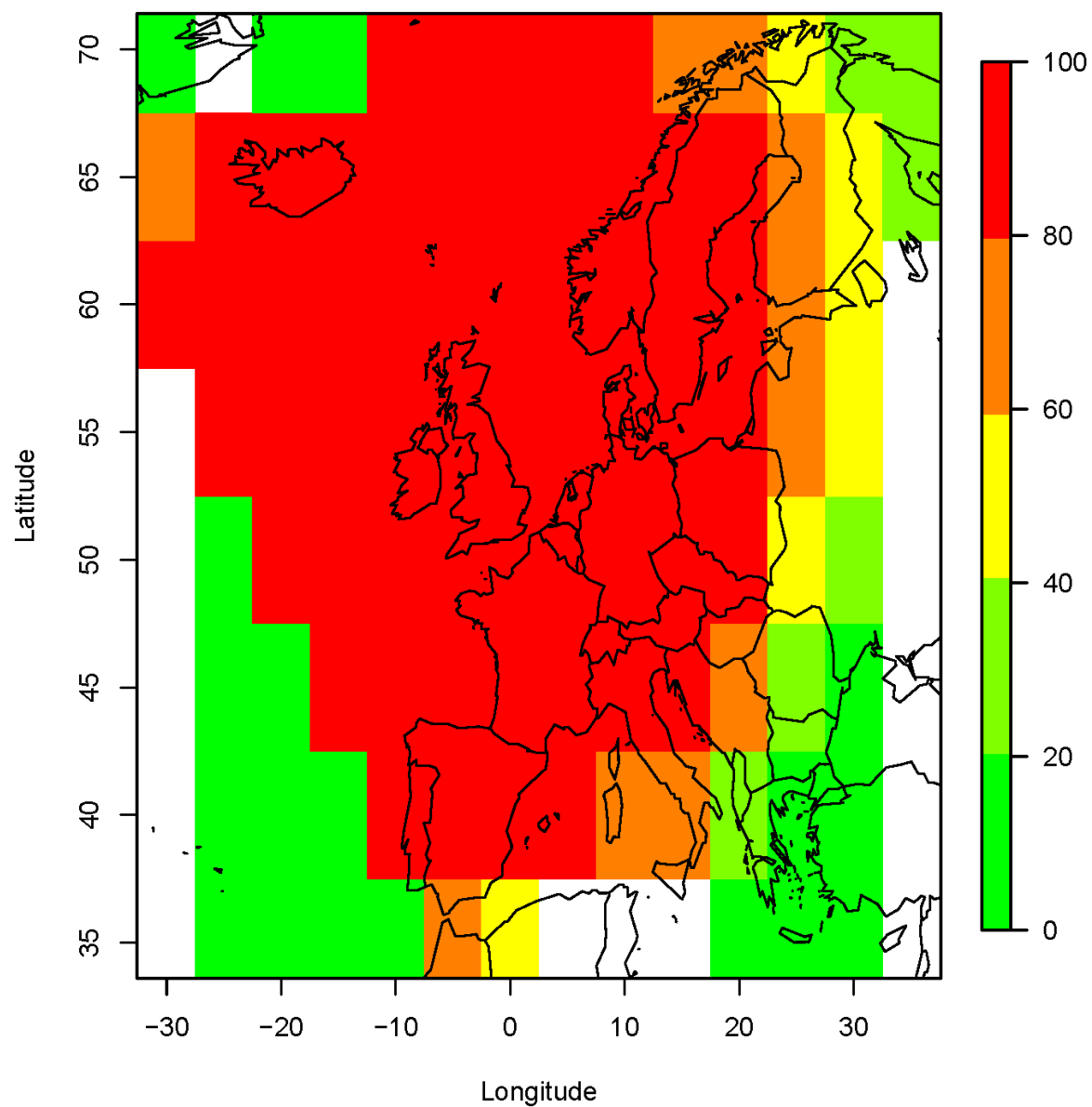
Supplementary figure 01

Distribution of autocorrelation functions for each grid point in the NCEP SLP dataset, for lags between 0 and 20 days. Each box and whisker plot is drawn for a lag and all grid points with data. The boxes represent the median (q_{50}), 25th (q_{25}), and 75th (q_{75}) quantiles of the distribution. The upper whisker is $\min(1.5(q_{75} - q_{25}) + q_{50}, \max(C))$, i.e. circles are outliers exceeding the interquartile range. The lower whisker is $\max(-1.5(q_{75} - q_{25}) + q_{50}, \min(C))$. The horizontal dashed line represents the 50th quantile of autocorrelation values when days are picked at random. The horizontal dotted line is the 75th quantile of autocorrelation values for days picked at random.



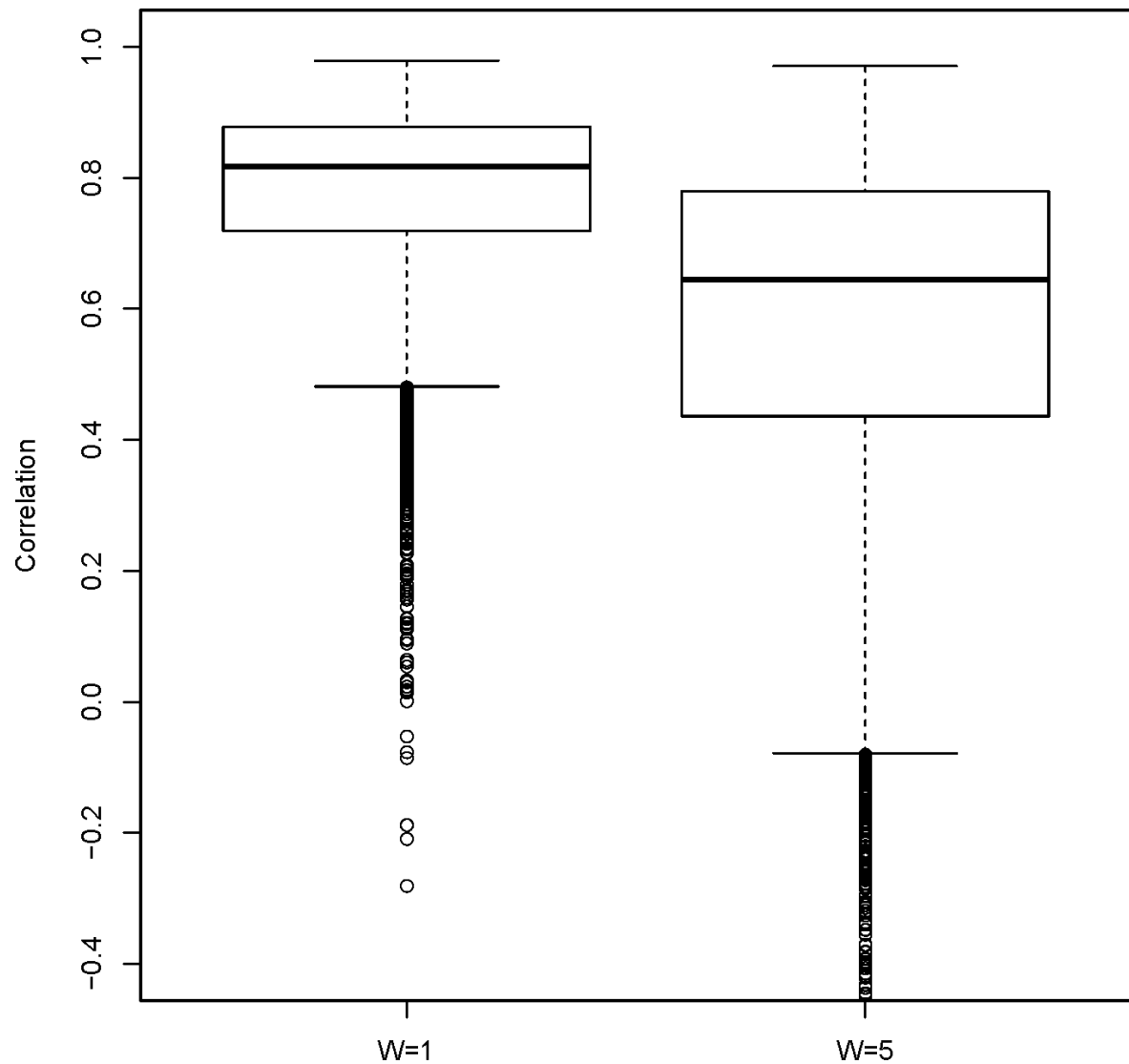
Supplementary figure 02

Spatial coverage of the gridded Kingston dataset. The percentage of “existing” data in the gridded set is computed for all grid cells. The white cells indicate “no data”.



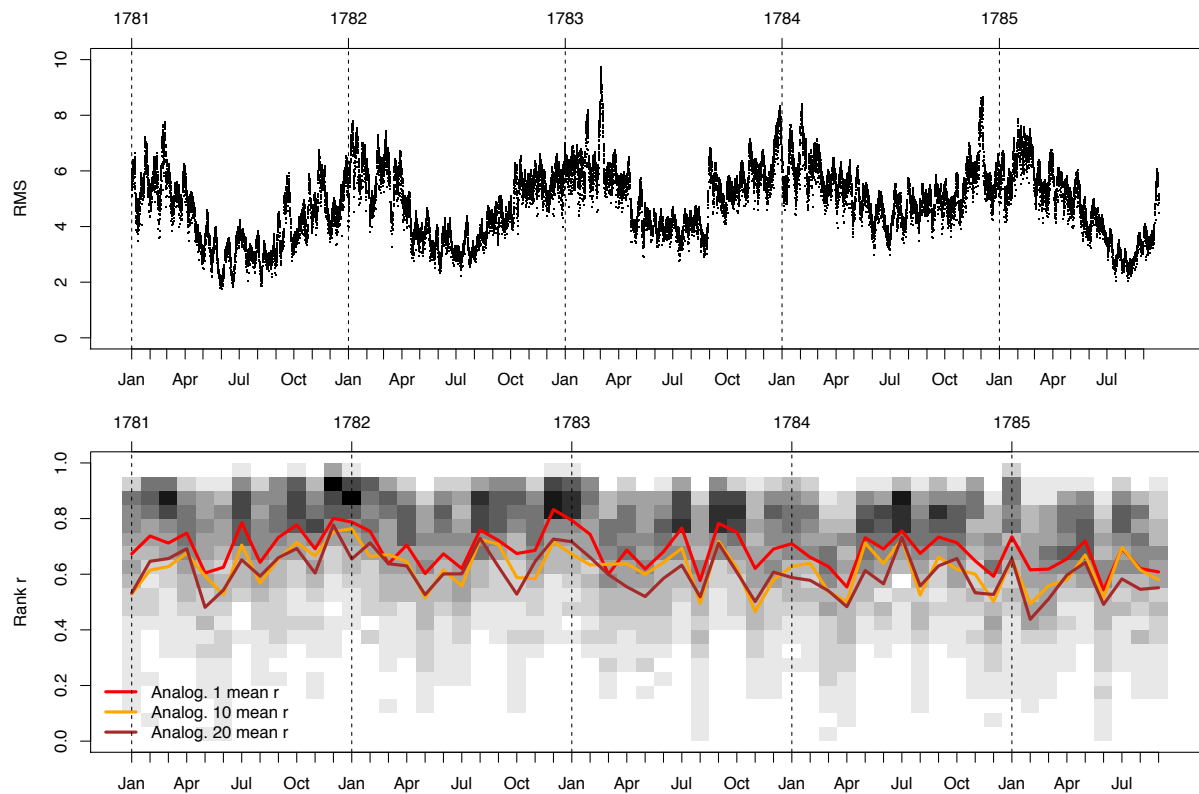
Supplementary figure 03

Box and whisker plots of the daily spatial correlation between the Kington (1988) SLP and the NCEP analogues with windows of 1 day ($W=1$) and 5 days ($W=5$). The median of the correlation for $W=1$ is $r=0.82$; the median of the correlation for $W=5$ is $r=0.64$.



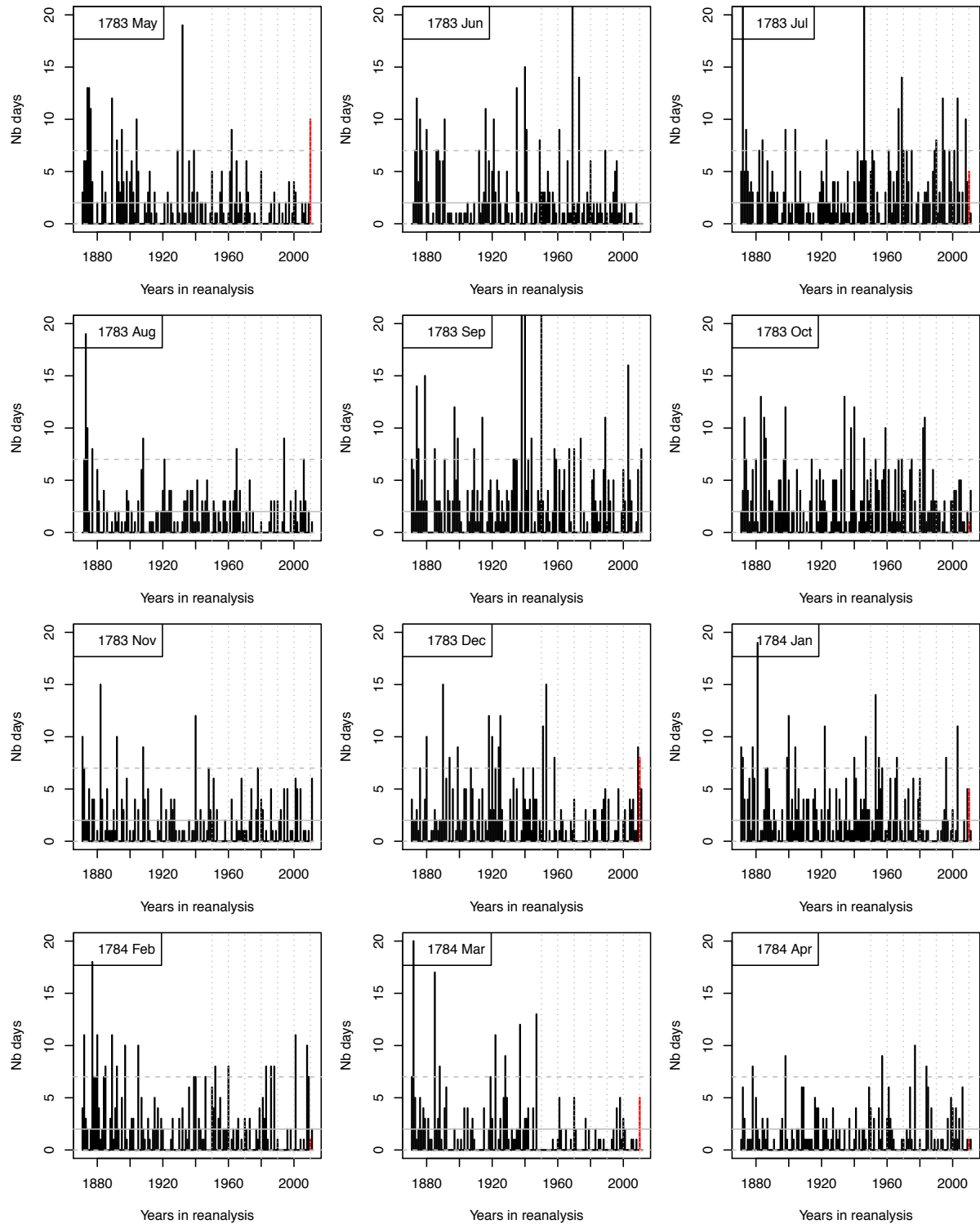
Supplementary figure 04

Scores (correlation and RMS) of analogues in the 20CR reanalysis (Compo et al. 2011) between 1871 and 2012. Upper panel: RMS values between Kingston (1988) SLP anomalies and analogues in 20CR, between 1781 and 1785 for each day and all 20 analogues. Each day yields 20 dots (one for each analogue). Lower panel: Monthly averages of spatial rank correlation between the Kingston (1988) SLP anomalies and 20 best analogues from RMS (lines). The shaded squares represent the probability distribution of the correlation values (dark greys indicate higher probability) for each month, for 20 analogues and daily reconstructions. The red line represents the monthly mean of Spearman correlations between the first (i.e. with lowest RMS) analogue and the Kingston SLP anomalies. The orange and brown lines represent mean score values for the 10th and 20th analogues (median and worst RMS among the 20 analogues).



Supplementary figure 05

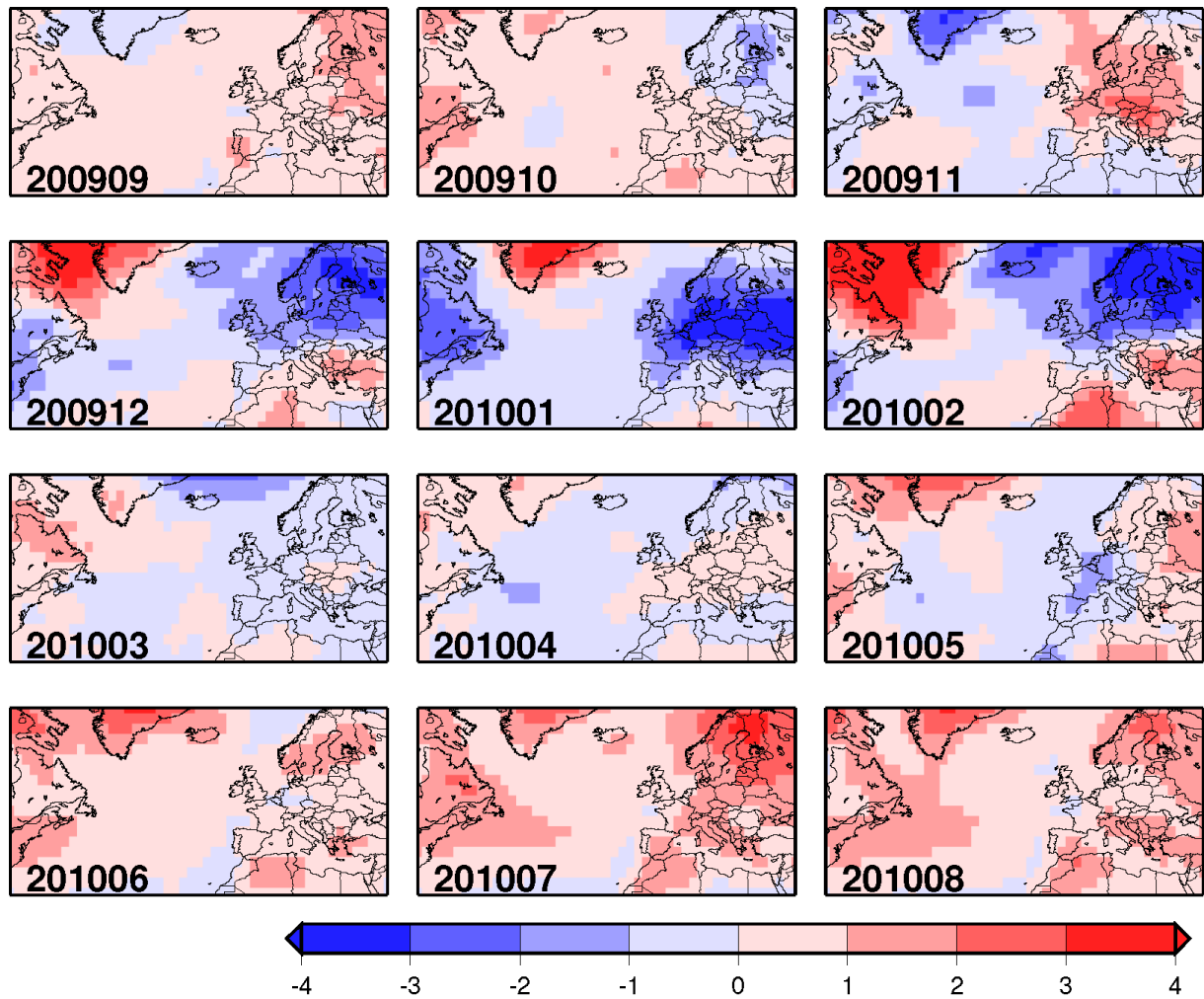
Histograms of years of the 20 first analogues (between 1948 and 2012) in the 20CR reanalysis (Compo et al. 2011) between 1850 and 2012, for the months between May 1783 and April 1784. The 2010 year is outlined in red. The horizontal grey lines represent the median frequency of the years of analogues. The horizontal dashed lines are the 10th and 90th quantiles of the frequency of the years of analogues.



Supplementary figure 06

Median of 20 surface air temperature anomaly reconstructions (in K) with respect to 1971–2000, between September 2009 and August 2010. The months are indicated in the lower left corners of the panels as $10^2y + m$, where y and m are respectively the year and the month.

Temperature anomalies (post 200909)



Supplementary movie 01

The movie is available in the supplementary material on the Clim. Past web site and at:

<http://www-lscedods.cea.fr/estimr/CHEDAR/MOVIE/>

The movie (animated gif file) shows the evolution of SLP in the Kington (1988) dataset (left figures) and analogue reconstructions from NCEP reanalysis (right figures), between May 1783 and April 1784. A time counter (year-month-day) is indicated in the lower left corner of the left figures. The white grid cells in the left figure indicate that there is no data.

Supplementary table 01

Correlations of daily temperature anomalies (with respect to an average seasonal cycle) between European stations.

	Bologne	Copenhagen	Dijon	La Rochelle	Mannheim	Montmorency	Munich	Prague	Rome	SaintMalo
Bologne	1	0.21	0.5	0.38	0.41	0.34	0.54	0.49	0.57	0.23
Copenhagen		1	0.39	0.41	0.53	0.49	0.5	0.57	0.067	0.49
Dijon			1	0.83	0.8	0.83	0.82	0.54	0.38	0.71
La Rochelle				1	0.62	0.83	0.65	0.44	0.23	0.71
Mannheim					1	0.7	0.79	0.67	0.26	0.59
Montmorency						1	0.7	0.52	0.19	0.77
Munich							1	0.77	0.41	0.6
Prague								1	0.34	0.48
Rome									1	0.15
SaintMalo										1