Sceptic priors and climate consensus

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Research Article

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Abstract

How much evidence would it take to convince sceptics that they are wrong about climate change? I explore this question within a Bayesian framework. I consider a group of stylised sceptics and examine how these individuals update their beliefs in the face of current and continuing climate change. I find that available evidence in the form of instrumental climate data tends to overwhelm all but the most extreme priors. Most sceptics form up dated beliefs about climate sensitivity that correspond closely to estimates from the scientific literature. However, belief convergence is a non-linear function of prior strength. It thus becomes increasingly difficult to convince the remaining pool of sceptics. I discuss necessary conditions for consensus formation under Bayesian learning and show how apparent deviations from the Bayesian ideal still be accommodated within the same conceptual framework. I argue that a generalized Bayesian model thus provides a bridge between competing theories of climate scepticism as a social phenomenon.

Full Text

Due to technical limitations, full-text HTML conversion of this manuscript could not be completed. However, the latest manuscript can be downloaded and accessed as a PDF.

Figures

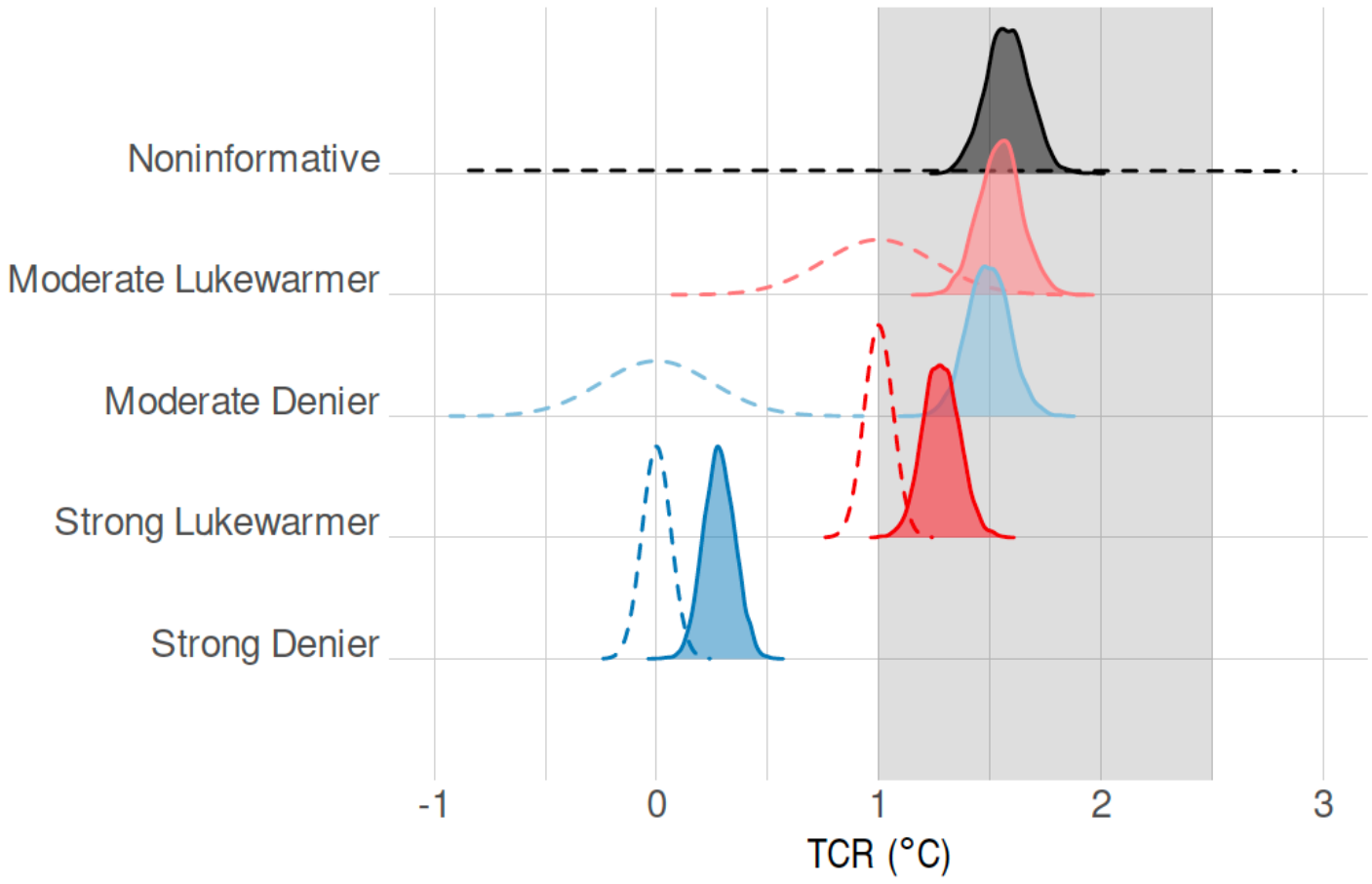

Figure 1

TCR densities. Dashed lines denote priors, solid lines denote posteriors. The grey shaded region denotes the IPCC ”likely” TCR range of 1.0–2.5 °C.

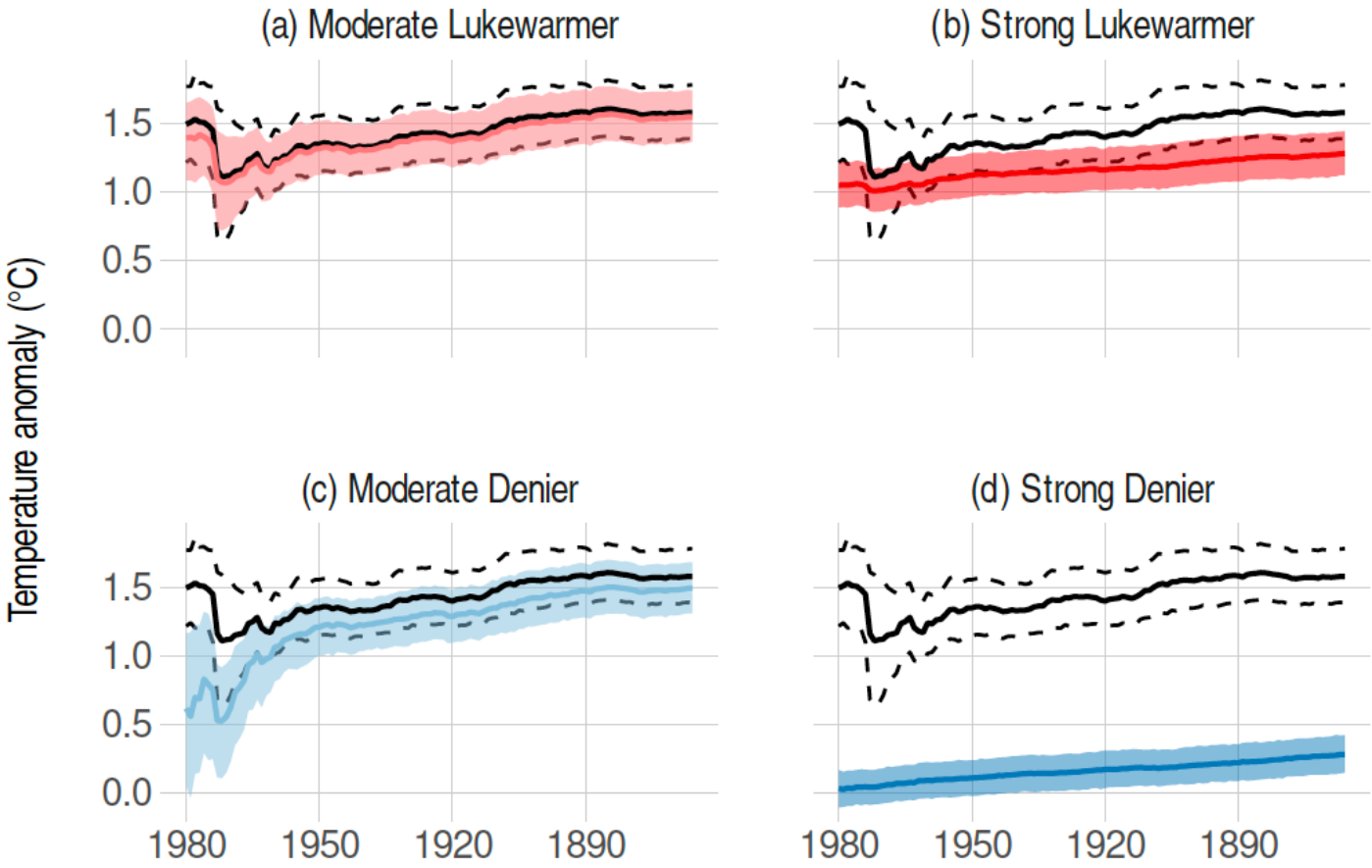

Figure 2

Recursive TCR estimates. Solid lines denote means, shaded regions (or dashed lines) denote 95% credible intervals. The recursive estimates are obtained by running the regression in eq. (5) on an increasing subsample of the data. I start nearest to the present and move backwards in time, adding another year’s worth of data at every iteration, until the full historical dataset is included. In each panel, the resulting posterior TCR estimate from a sceptic prior is contrasted with the noninformative case (in black).

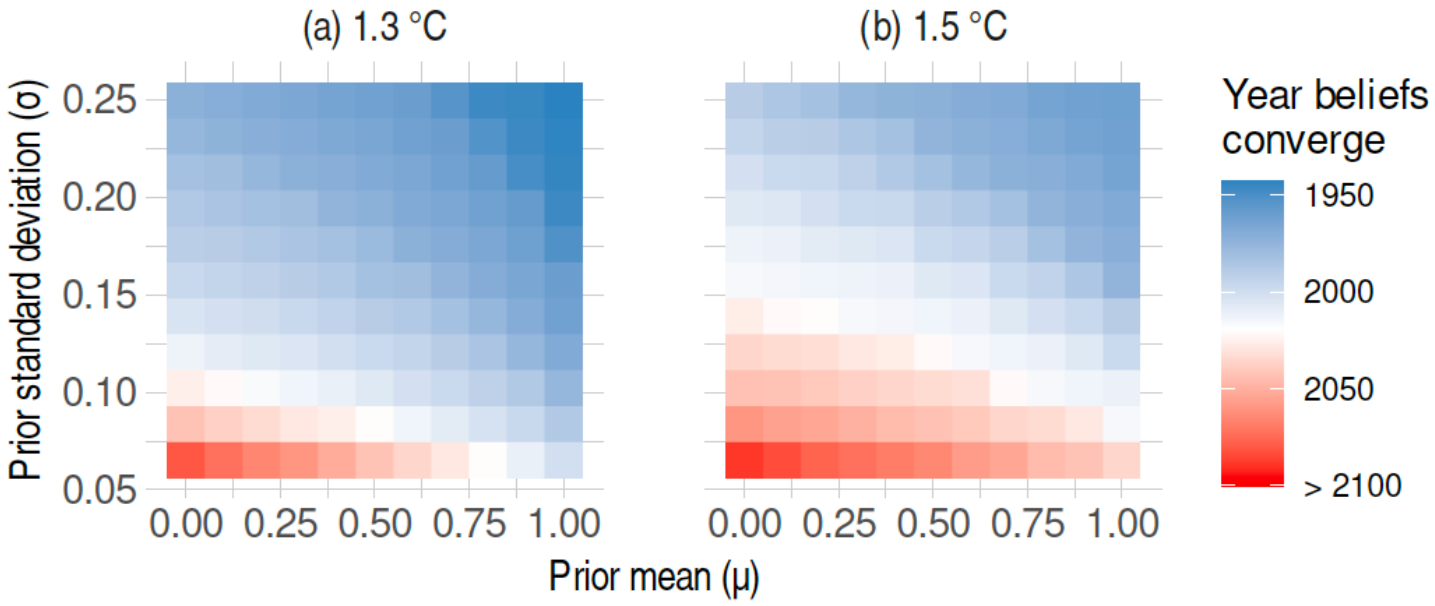

Figure 3

When do sceptic beliefs about TCR converge with mainstream estimates? Axes denote the means and standard deviations of a range of normally-distributed sceptic priors on TCR. Convergence is defined as occurring when the mean posterior TCR for a particular prior equals the relevant target value, i.e. (a) 1.3 °C or (b) 1.5 °C. The year of convergence assumes a starting date of 1866 to coincide with the common historical dataset. Blue shading indicates that convergence is feasible with historically available data. Red shading indicates that convergence can only occur once additional data has been accumulated in the future.

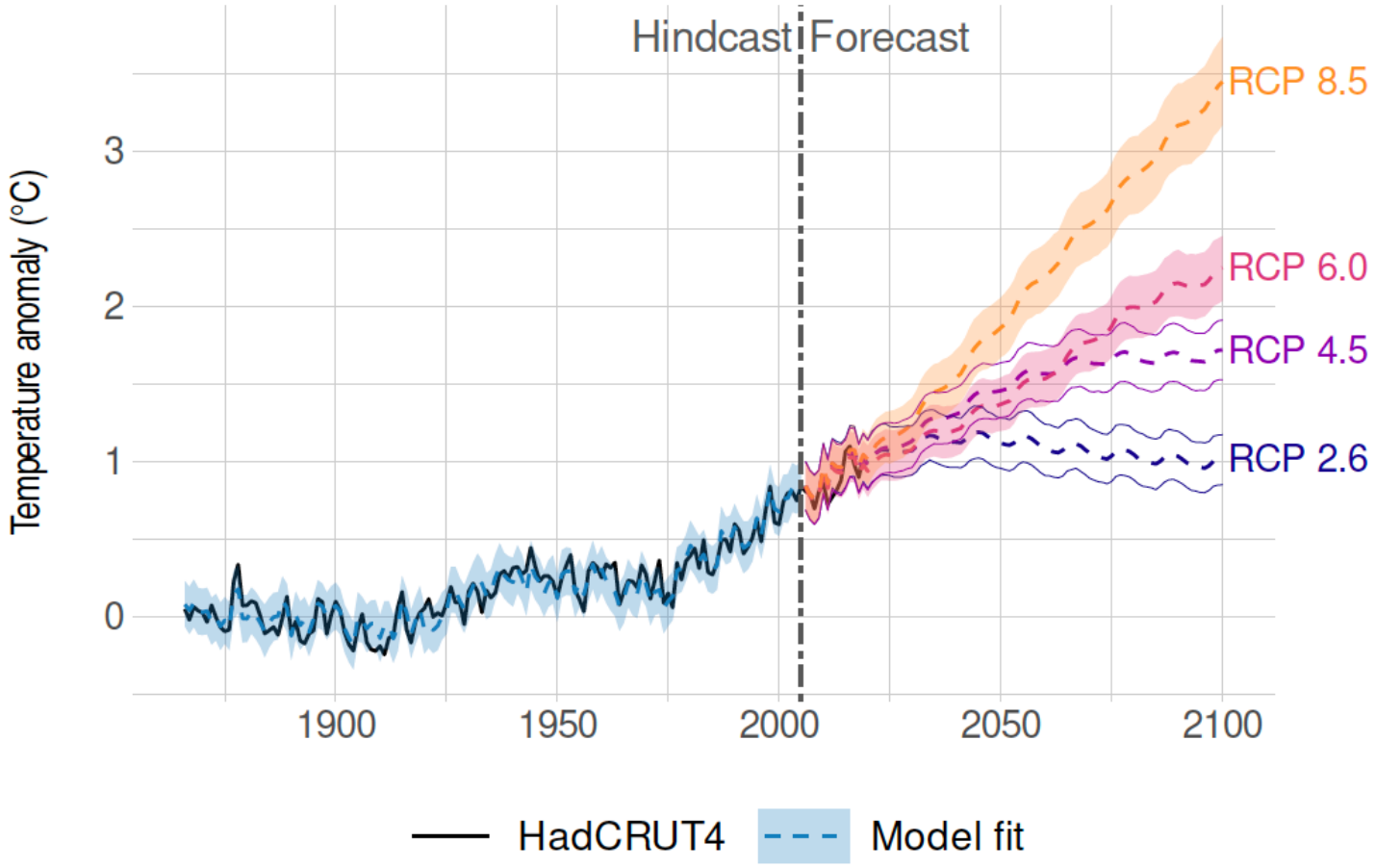

Figure 4

Model fit and prediction: noninformative priors. Temperature anomaly relative to the 1871–1900 average. Shaded regions denote 95% credible intervals. Note that predictions for RCPs 2.6 and 4.5 are potentially ill-conditioned and are included for reference purposes only. See text for details.

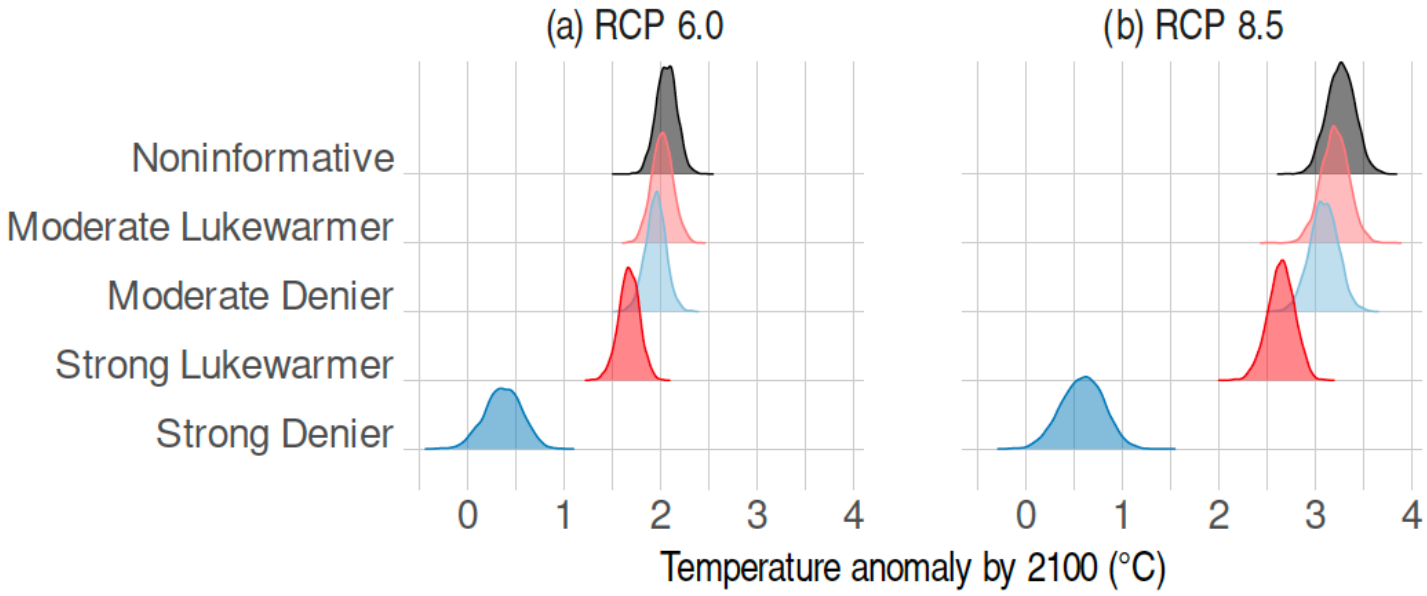

Figure 5

Predicted temperature anomaly by 2100: all priors types. Points denote means and error bars denote 95% credible intervals.

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- scepticSM.pdf