

## ***Interactive comment on “On the meaning of independence in climate science” by J. Annan and J. Hargreaves***

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Thank you for the useful comments. Our point-by-point replies are as follows.

2.1 Failing to refer to the work of Bishop and Abramowitz was an oversight, as we didn't realise how substantially their approach differed from the cited Abramowitz and Gupta. However, this does not materially affect our argument.

p8 We used 30 year means, which certainly includes some internal variability but does allow for adequate discrimination of the models' equilibrium climates.

p10 We agree that in any overall assessment of model performance, the relationship of model output to observations of the real climate system is crucial. Our goal here was to emphasise that in the definition of independence presented here, observations

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are not used and thus it is purely an indication of inter-model relationships. It remains unclear to us whether the concept of independence should or can usefully be defined so as to also account for model performance in relationship to observations.

p11 agreed

Fig 2 Thank you for spotting this error. The captions are indeed swapped.

3.3 Note that the correlation here is measured between model inputs and climatological outputs, as parameters vary, and not over time series as in Bishop and Abramowitz. Therefore model biases (relative to observations) do not play a role. Whether the relationship between parameters and outputs embodied in the model is correct or not is an essentially unfalsifiable proposition, as outlined earlier in the text. The model is considered a representation of the researcher's beliefs.

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