

Weather Clim. Dynam. Discuss., referee comment RC3  
<https://doi.org/10.5194/wcd-2022-19-RC3>, 2022  
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## Reply on AC2

Theodore Shepherd (Referee)

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Referee comment on "Trends in the tropospheric general circulation from 1979 to 2022"  
by Adrian J. Simmons, Weather Clim. Dynam. Discuss.,  
<https://doi.org/10.5194/wcd-2022-19-RC3>, 2022

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On point (iii), the author's response seems to suggest that the annual mean is the best indicator of "real" change, and that highlighting individual seasons might be seen as a form of cherry-picking. But for atmospheric circulation, everything we know about atmospheric dynamics -- including from much of the author's previous work -- tells us that the response to forcings will depend quite sensitively on the background state (even if the response is linear, it is only tangent linear), and the background state has a strong seasonal cycle. Thus, a seasonality in the forced response is to be expected and is not necessarily a sign of lack of robustness. Taking an annual mean beats down the noise but it also dilutes the signal. Zappa et al. (2015 J.Clim., DOI: 10.1175/JCLI-D-14-00823.1) examine this issue for the North Atlantic/European sector and suggest a form of optimal seasonal averaging (which actually is extended winter and extended summer), which better detects signals than the annual mean.