

EGU2020-9904

<https://doi.org/10.5194/egusphere-egu2020-9904>

EGU General Assembly 2020

© Author(s) 2020. This work is distributed under the Creative Commons Attribution 4.0 License.



## Narrowing uncertainty on past and future human-induced warming using Kriging

Aurélien Ribes<sup>1</sup>, Saïd Qasmi<sup>1</sup>, and Nathan Gillett<sup>2</sup>

<sup>1</sup>CNRM, Université de Toulouse, Météo France, CNRS, Toulouse, France (aurelien.ribes@meteo.fr)

<sup>2</sup>CCCMA, Environment and Climate Change Canada, Victoria, BC, Canada

Using historical observations to constrain climate projections is an old idea. A variety of approaches, time periods and scales have been used to this purpose. Simultaneously, detection and attribution (D&A) methods have been developed to assess the contribution of subsets of forcings to historical changes, and have also been used to constrain projections. Here, we describe a unified statistical method to constrain the entire forced response pathway of global mean temperature using an adaptation of Kriging. We start by introducing this new statistical approach. Then, we derive consistent observationally-constrained estimates of attributable warming to date for various forcings, attributable warming rate, the response to various scenarios, Transient Climate Response (TCR), and Equilibrium Climate Sensitivity (ECS). Using revised observations of near-surface atmospheric temperature, we estimate a total forced warming of  $1.19 \pm 0.15^\circ\text{C}$  in 2019, with respect to the 1850-1900 baseline. Based on the newly available CMIP6 ensemble, we find that historical observations narrow uncertainty on past and future warming by about 50%, while evidence suggests that the proposed technique is not over-confident. Remarkably, both sides of uncertainty ranges are affected, leading to a 5–95% range for TCR of  $1.44\text{--}2.35^\circ\text{C}$ . We also compare and discuss the differences between the CMIP5 and CMIP6 ensembles. The proposed method is easily transposable, thus opening the possibility to monitor climate change and narrow uncertainty at the regional scale and/or for different climate variables.