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Robust observational estimates of temperature sensitivity to surface radiative forcing derived from spatial differences

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A novel method to estimate key climatic sensitivities from spatial variations in observational datasets is presented. We apply it to the question of how much surface temperature changes under a given change in surface radiative forcing. Our results reveal that the type of radiative forcing, i.e. shortwave or longwave radiative forcing affects the sensitivity over its full range. Comparison of the observational based estimates with climate model simulations of quadrupled CO_2 levels show very good agreement even though they are derived completely independently. Finally, we discuss that existing observational estimates of temperature sensitivity yielded significantly lower sensitivities for climate change when the type of radiative forcing was unintentionally ignored.