

# An assessment of Earth's climate sensitivity using multiple lines of evidence

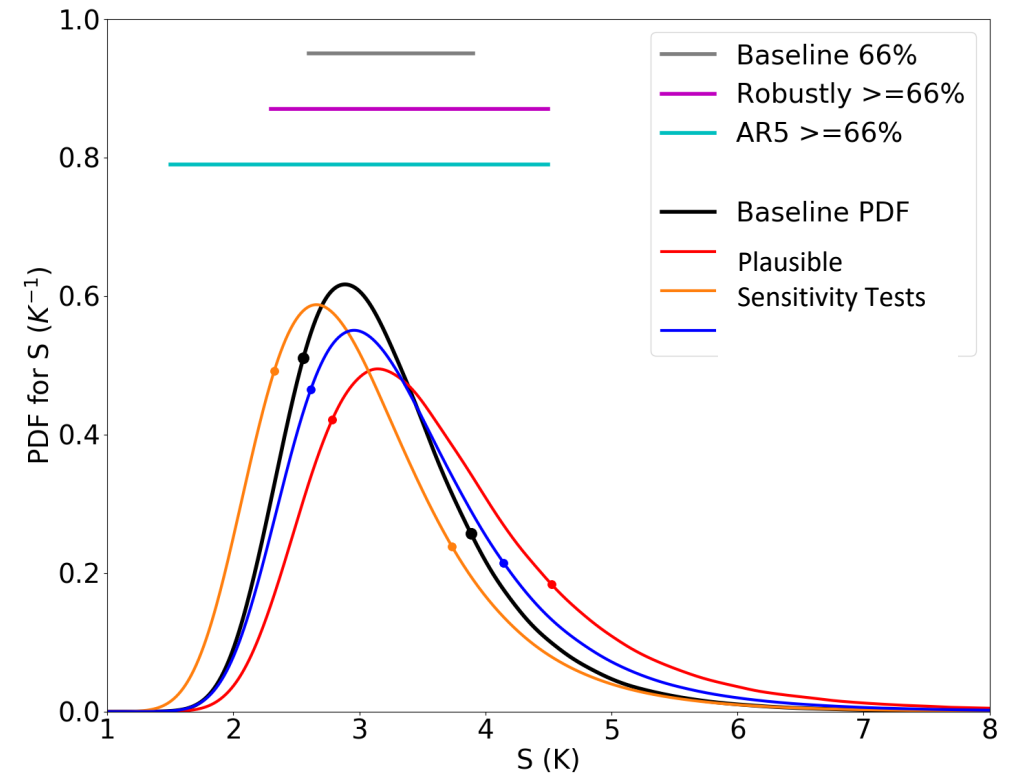


Kate Marvel (CU/GISS)

**Science Question:** The climate response to increasing greenhouse gases is characterized by the climate sensitivity. Constraining this value from observations has been a goal for more than 4 decades but has been very uncertain (ranging from 1.5 to 4.5 K) with results dependent on approach and methodology.

**Synthesis:** An international multi-author/multi-institution team has produced a new synthesis, based on process studies (taken largely from CERES and MODIS data), historical trends and paleo-climate reconstructions, and which is put together using a Bayesian approach that better quantifies the remaining uncertainties.

**Results:** The new constraints are substantially narrower (2.3–3.9 K) than in previous assessments, even taking into account plausible alternative assumptions. The results rule out a low enough sensitivity to prevent substantial climate change but also conclude that it is not likely that sensitivity is substantially above 4.5 K.



Probability Density Functions of resulting climate sensitivity ( $S$ ) (black/grey) in comparison with the IPCC 5<sup>th</sup> Assessment Report (AR5) (cyan). Colored curves show results from sensitivity tests which could plausibly arise given reasonable alternative assumptions.