



Tracing the history of estimated climate sensitivity

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Climate sensitivity is usually defined as the change in the global mean temperature of the earth with doubling concentrations of atmospheric CO₂. It has been computed explicitly for well over a century; most commonly with respect to pre-industrial concentrations but also in different circumstances.

Arrhenius (1896) computed the climate sensitivity for 1.5x, 2.0x, 2.5x and 3.0x CO₂ concentration. His figure for CO₂ doubling was approx. 6.0 degrees Celcius, surprisingly close to modern estimates (e.g. Moss and Schneider, 2000, Stainforth et al. 2005).

Here we explore the confidence which may be associated with such evaluations and the implications for decision making in the context of a changing climate. The development of these estimates is traced through time and contrasted with estimates of physical constants such as the speed of light, over the same time period. Arguments regarding the current uncertainty in climate sensitivity are noted and their relevance to modern industrial decision making in the reinsurance sector are discussed.

Arrhenius, S. (1896). On the influence of carbonic acid in the air upon the temperature of the ground. The London, Edinburgh and Dublin Philosophical Magazine and Journal of Science, 5, 1896.

Moss, R.H. and S.H. Schneider (2000). Uncertainties in the IPCC TAR: Recommendations to lead authors for more consistent assessment and reporting. Guidance Papers on the Cross Cutting Issues of the Third Assessment Report of the IPCC, 33-51.

Stainforth et al. (2005). Uncertainties in predictions of the climate response to rising levels of greenhouse gases, Nature, 433, 403-406.