

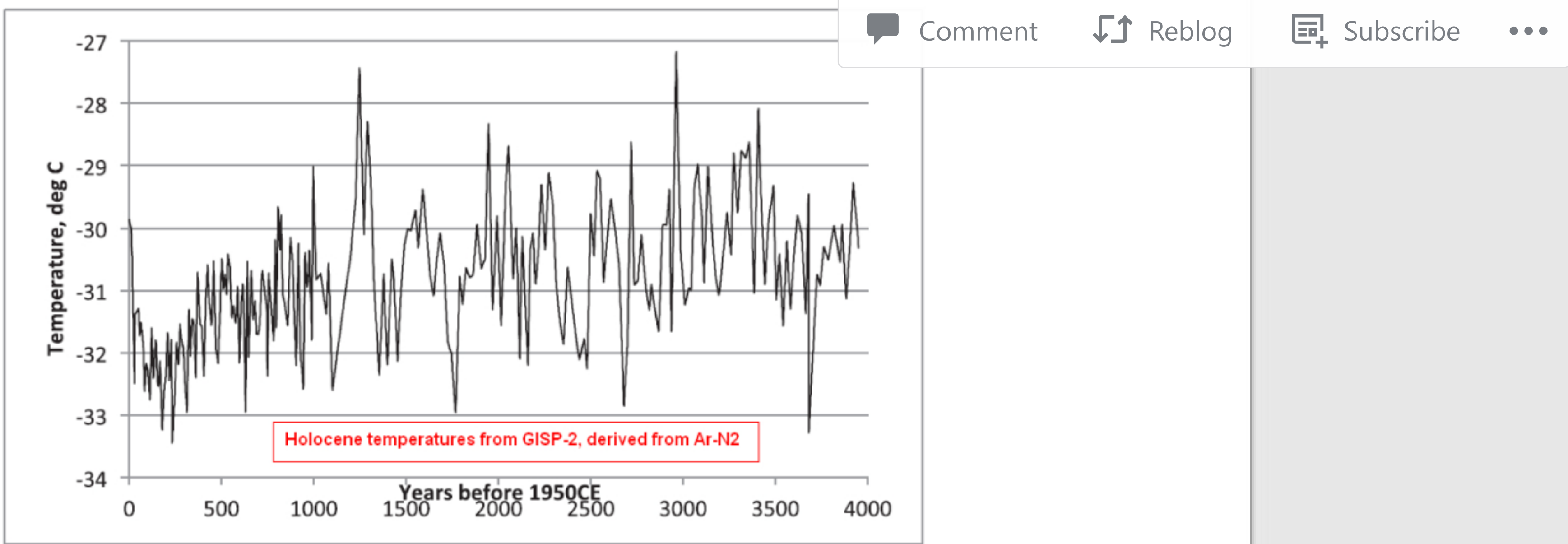
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A weblog on climate, global change and climate measurements

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Does last century warming exceed natural variations?

Dr. Philip Loyd from South-Africa has published in Energy & Environment a short but easily understandable paper trying to ask this question ([link](#) to abstract). He took several reconstructed temperature series reaching back up to over 8000 years, i.e. covering the Holocene period. An example shown in the figure below is the Gips-2 reconstruction from a Greenland ice core, where temperatures have been deduced from an analysis of the Ar (Argon) and N2 (Nitrogen) isotopes.



First he de-trended the data by subtracting the best polynomial fit (which was a linear one in this case); than he calculated the differences from temperatures 100 years apart, and finally calculated the statistical standard deviation of this ensemble. The following figure gives the result for the 4 series that he used:

Core	Estimated Standard Deviation, deg C
GISP	0.67
GISP-2	1.27
Vostok	0.83
Dome-C	1.13

Taking these 4 results and computing the average gives **0.98** (rounded to 2 decimals) with an uncertainty of 0.27.

So the historical data show that temperatures fluctuate naturally by ~0.98 °C during one century; as the Hadcrut3 series for global temperatures from 1900 to 1999 gives a warming of 0.7°C, this number is **smaller** than the natural centennial variability. The author concludes prudently “the signal of anthropogenic global warming may not yet have emerged from the natural background”; which means in very simple words **that human caused centennial warming** (by greenhouse gas emissions for instance), **if it exists, does not exceed for the moment natural temperature variability.**

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