How to (nearly) win the $100,000 climate contest

In November 2015, British statistician and climate change sceptic Douglas Keenan concocted a "climate contest" that effectively wagered $100,000 against someone statistically proving that global warming isn't natural. He gave the world a year to meet his challenge. With four months left before the deadline, my research team at McGill University dissected the contest revealing the misconceptions of the sceptics; while at the same time, nearly winning the contest.

Keenan is a proponent of the theory that global warming is simply a giant natural fluctuation (GNF) caused by solar, volcanic or other natural cause. In a paper published in the journal *Geophysical Research Letters* (see below, published online, July 29th)*,* my team provide a detailed analysis of Keenan's mathematical GNF model that he designed so as to be on average "trendless" but that could nevertheless be fit to the globally, annually averaged temperature series since 1880. In spite of this, we found that the GNF theory completely falls apart when tested against the extensive database and knowledge of pre-Industrial Revolution temperatures, in particular "multiproxies" – here from the 1500-1900 AD. Multiproxy temperatures are derived from thousands of tree rings, bore holes, ice cores, lake sediments, pollen and other indicators of past temperatures. Typical pre-industrial, century-to-century global temperature change is about 0.20 degrees Celsius, in Keenan's model, however, it is three to five times larger, depending on which variant of the model is considered. We showed that his model's variability over periods of centuries is so strong that even mild extrapolations would have meant that the Earth went in and out of an ice age roughly every 1,000 years -- instead of every 100,000 years. Keenan's failure to produce a physically plausible GNF model leaves anthropogenic warming as the only workable theory.

In 2014, I published an analysis showing that the probability of industrial age warming being a GNF was less than 0.1%. Taking this latest analysis into consideration, we may be confident in concluding that the GNF model can easily be scientifically rejected.

Until recently, in Montreal there was a billboard that read: "The sun is the main driver of climate change. Not you. Not CO_2". No, it *is* you. And me. It's us.

For those interested in the money, the paper also contains a supplement showing how to correctly classify 893 of Keenan's 1000 series as either trended or nontrended. Since the contest would be won with 900 correct identifications, and 95% of the time the technique is correct to within 18 series, this technique is within striking distance of the prize. A small tweak and $100,000 could be yours!

-Shaun Lovejoy

References and links:

The paper (proofs with corrections):

S. Lovejoy, L. del Rio Amador, R. Hébert, I. de Lima, 2016: Giant natural fluctuation models and anthropogenic warming, Geophys. Res. Lett., dx.doi.org/10.1002/2016GL070428

http://www.physics.mcgill.ca/~gang/eprints/eprintLovejoy/neweprint/GRL54794.proof.only.SL.8.8.16.pdf

The pre-publication version of the supplement (how to (nearly) win the contest):

http://www.physics.mcgill.ca/~gang/eprints/eprintLovejoy/neweprint/GRL.prepublication.Supplement.18.6.16.pdf

Le Huffington Post Quebec blog:

S. Lovejoy, 2016: La grande fluctuation naturelle a un prix: 100 000 $, Le Huffington Post Quebec, 9 Août, 2016, Huffington Post blog (in French).

http://quebec.huffingtonpost.ca/shaun-lovejoy/changements-climatiques-climato-sceptique-modele-keenan_b_11390336.html