

**Fig. 1. Left: monthly global temperature anomalies. Right: Nino3.4 temperature anomaly for past 6<sup>3</sup>/<sub>4</sub> years and NCEP forecast (green line).**

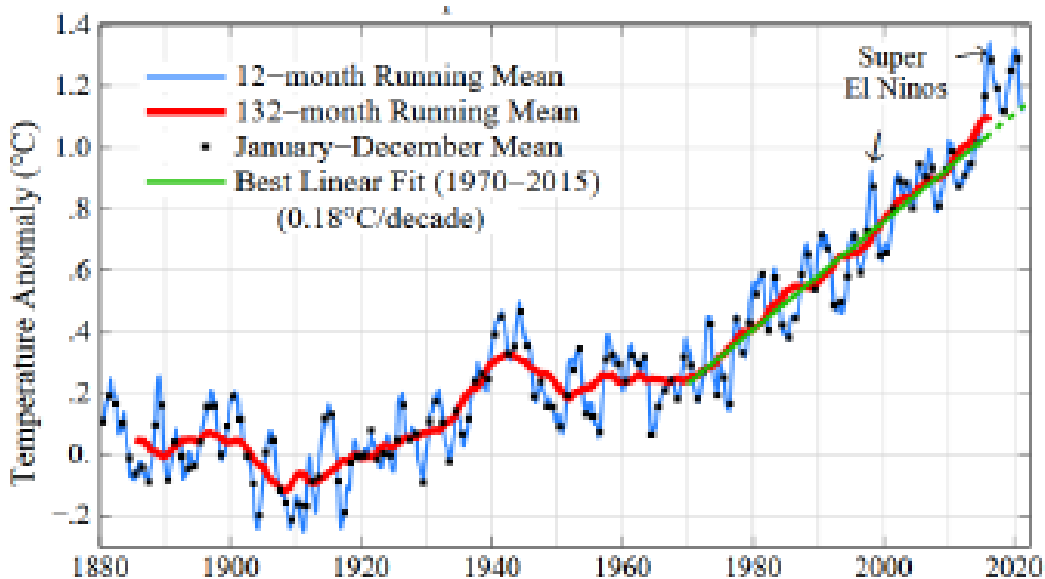
## October Temperature Update & Berlin Rally

18 November 2021

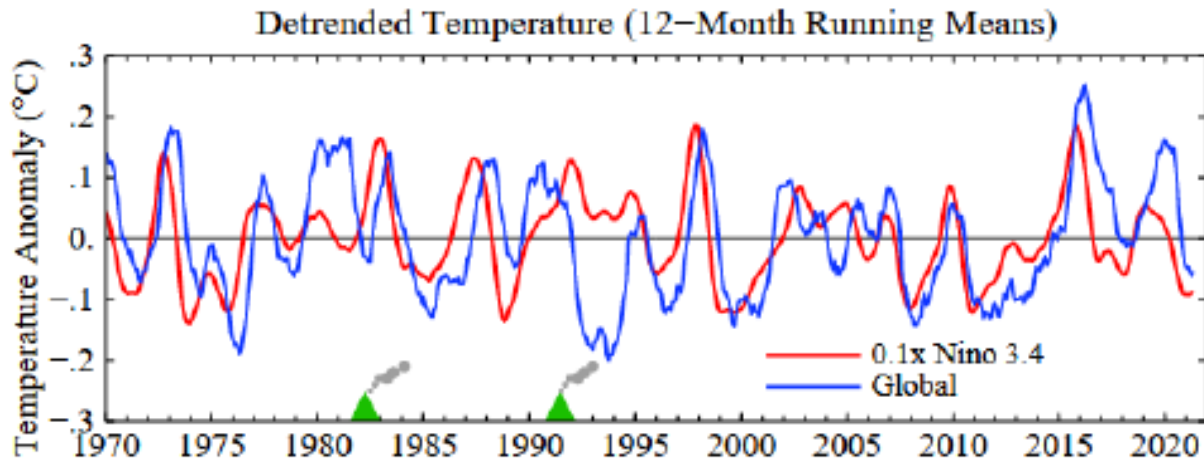
James Hansen and Makiko Sato

October global temperature was close to an October record for the 1880-2021 period of near-global instrumental data (Fig. 1, left), despite the cooling effect of a fairly strong, double-dip La Nina (Fig. 1, right). The October global temperature – the 4<sup>th</sup> warmest October in the period 1880-present – was +1.23°C relative to 1880-1920.

Almost all ENSO (El Nino Southern Oscillation) models including NOAA’s NCEP model project minimum Nino3.4 temperature by December.<sup>1</sup> Given the present extreme planetary energy imbalance<sup>2</sup> – more solar energy absorbed than heat radiated to space – the 12-month running-mean global temperature (Fig. 2) is now at or near its minimum, which means that the annual 2021 temperature will be the sixth warmest year (the five warmest being 2020, 2016, 2019, 2017, 2015).



**Fig. 2. Global surface temperature relative to 1880-1920 average.**



**Fig. 3. Correlation of global and Nino temperatures is 61 percent with global temperature lagging the Nino3.4 anomaly by 4-5 months.**

ENSO projections have a return to ENSO neutral conditions by next spring.<sup>1</sup> Thus 2022 should be notably warmer than this year, but the 4-5 month lag of global temperature after Nino3.4 temperature anomalies implies that 2022 will not challenge the 2020 annual record. However, the present extraordinary planetary energy imbalance is likely to drive a new record global temperature within the following 1-2 years with the help of even middling ENSO warmth analogous to that of 2019 (Fig. 1).

JH gave [brief comments](#) (text is [here](#)) last weekend in Berlin in opposition to the efforts of the German government to have the European Union and the United Nations treat gas as a clean fuel and exclude nuclear energy as a clean development mechanism. A more substantial presentation will be provided in a communication next week, including criticism of COP26.

<sup>1</sup> National Weather Service Climate Prediction Center [El Nino – Southern Oscillation](#).

<sup>2</sup> Hansen, J., [Sentinel for the Home Planet](#), 7 September 2020.