

**Fig. 1. Global surface temperature anomaly ( $^{\circ}\text{C}$ ) in past season relative to 1951-1980 mean.**

## February Temperature Update: La Niña Continues

14 March 2022

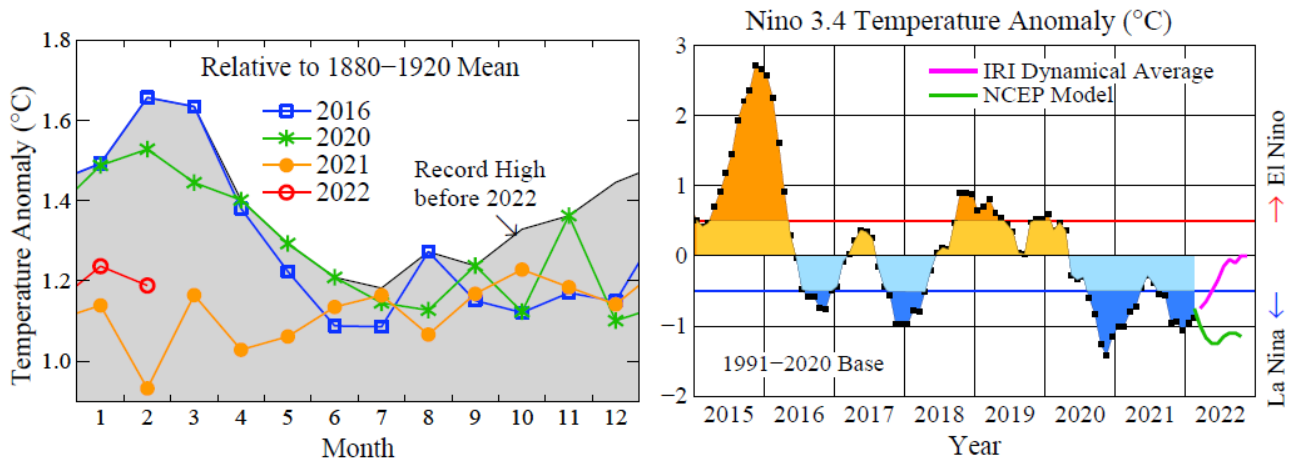
James Hansen, Makiko Sato and Reto Ruedy

The past season – meteorological NH winter, SH summer – was the 5<sup>th</sup> warmest Dec-Jan-Feb in the instrumental record, despite the continuing La Niña (the cold tongue in the equatorial Pacific). Most of Eurasia was remarkably warm, 2-5 $^{\circ}\text{C}$  above normal. The winter seemed cold to many people in North America, but a very warm December (Fig. 1) made the season well above normal in the U.S.

As for the La Niña: the Kelvin wave carrying a subsurface warm anomaly across the Pacific sort of [petered out](#) as it approached the South American coast, so it's dubious that it will have enough effect at the surface to spur a transition of ENSO (El Niño Southern Oscillation) toward the El Niño phase. Most of the warm anomaly is pulling back to the western Pacific where it will strengthen and reload for another shot in the future (sorry for the weapons analogy in these days). The average of the many ENSO dynamical models<sup>1</sup> (right side of Fig. 2) has a return to ENSO-neutral status by NH summer with the possibility of transitioning to El Niño late in the year. However, these forecasts are a few weeks old. The NCEP forecast, which is updated weekly based on several model runs, has continuation of La Niña (right side of Fig. 2). A practical impact of continued La Niña status is that conditions in the Atlantic will be ripe for strong tropical storms this year.

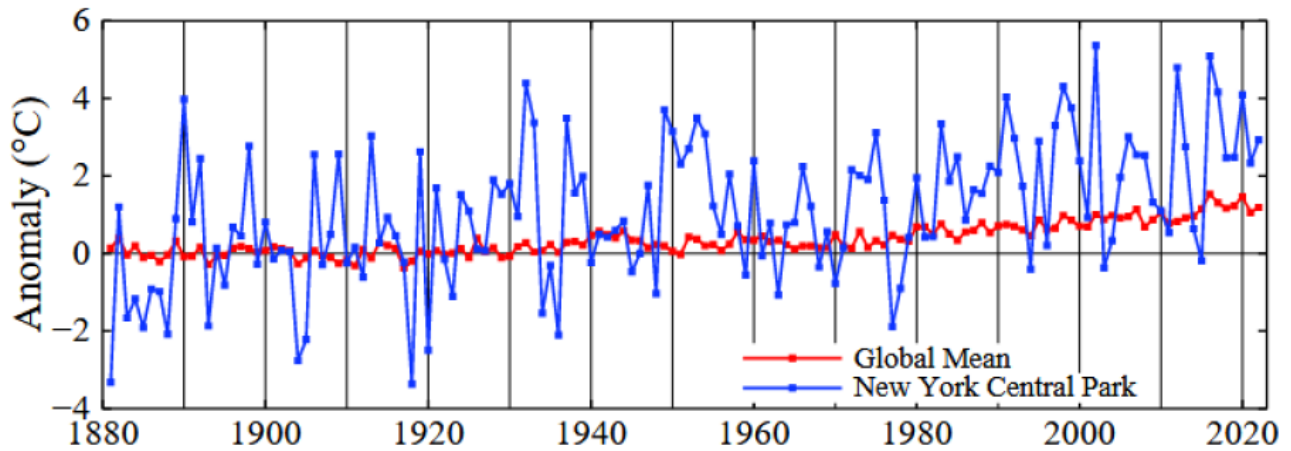
In any case, 2022 is not going to challenge the 2016/2020 record global temperature, given the fact that global temperature anomalies tend to lag Niño3.4 anomalies by 5 months (Fig. 5 in our [January Temperature Update](#)). 2022 should be warmer than 2021 even if the La Niña continues because Earth presently has record planetary energy imbalance (more energy coming in than going out) as will be discussed in a paper in preparation. The first two months of the year are consistent with that expectation (left side of Fig. 2).

<sup>1</sup> These are collected by Columbia University's International Research Institute for Climate and Society ([IRI](#)) and made available by the [Climate Prediction Center](#) of NOAA's National Center for Environmental Prediction (NCEP).



**Fig. 2. Left: monthly global temperature anomaly. Right: Niño3.4 temperature anomaly (°C).**

Watching ENSO development and global temperature change is like watching the grass grow, so let's look at something different. Does weather noise still dominate over global warming effects for seasonal-average local temperature? Figure 3 compares global and local (New York City) temperature anomalies for NH winter. Global warming is just over 1°C. Local warming averaged over several years is almost double that, such that the coldest years now are about what the average was a century ago. Most of the warming has occurred in the past 50 years, so if you are old enough you should notice that winters are not as cold as they used to be.



**Fig. 3. Global and New York City surface temperature anomalies for Dec-Jan-Feb relative to the 1880-1920 average.**