Proposal

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May 2, 2017

1 Statement of the Problem

1. **What is the global temperature pattern in the long term?**
2. **According to the pattern in Q_1, has there been periods with abnormal temperature?**
3. **Does the temperature now rise abnormally compared with the past cyclical temperature rising?**
4. **Does difference exists in temperature pattern between south & north hemisphere?**
5. **How is carbon dioxide concentration correlated to global temperature?**
6. **Will there be a pause in global warming?**

2 Review of Previous Work

- *Interdecadal Oscillations and the Warming Trend in Global Temperature Time Series* by Vautard, Nature; London350.6316, 1991
- *On the definition and identifiability of the alleged "hiatus" in global warming* by Stephan Lewandowsky, James S. Risbey & Naomi Oreskes, 2015, https://www.nature.com/articles/srep16784
- *Global temperature change* by James Hansen, Makiko Sato, Reto Ruedy, Ken Lo, David W. Lea, and Martin Medina-Elizade, 2006, http://www.pnas.org/content/103/39/14288.abstract
- *Prospects for a prolonged slowdown in global warming in the early 21st century* by Thomas R. Knutson, Rong Zhang & Larry W. Horowitz, 2016

3 Description of Data

Data Resource:

1. Global Temperature Data from NASA's GISS data, whose land-ocean version combines land temperature observations with sea surface temperature data.
2. UAH Data from satellite observations.
3. GLOBAL Land-Ocean Temperature Index from GHCN-v3 1880-03/2017 + SST: ERSST v4 1880-03/2017.
4. North Hemisphere Station Temperature Index from GHCN-v3 1880-03/2017.
5. South Hemisphere Land-Ocean Temperature Index from GHCN-v3 1880-03/2017 + SST: ERSST v4 1880-03/2017.
6. CO2 data from NOAA Earth System Research Laboratory, Global. Starting from 1971, by month.