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Early global warming in the period 1850 to 1930

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The current global temperature datasets show no warming in the land surface temperature and the sea surface temperature for the period between 1850 and 1920. Several lines of evidence suggest that the Earth's surface was warming during this period. Every line of evidence by itself is currently not compelling, but the consilience of evidence at least makes a good case for further research.

This period is characterized by the introduction of Stevenson screens, which reduce radiation errors more than the monitoring methods used before. As a consequence, Stevenson screens typically observe cooler temperatures than earlier observations. Recent analyses of parallel measurements suggest that this cooling bias is larger than previously thought. Physical reasoning suggests that this bias to be largest sub-tropical and tropic regions; this pattern is also found in the limited number of parallel measurements available. We are missing information from continental climates. The Global Historical Climate Network (GHCNv3) does not change the trend between 1870 and 1920 and adjusts 0.1°C between 1850 and 1970. This small adjustment seems to be less than needed for this transition compared to the size of this jump estimated from the limited evidence we have from parallel measurements

Further evidence for warming during this period can be found in lake and river freeze and breakup times, which show a clear shortening of the freezing period between 1850 and 1920. Most of the glaciers for which we have data from this period show reductions in their lengths, which signals clear warming. Temperature reconstructions from proxies show non-significant warming. The CMIP model ensemble shows 0.2°C warming in the global mean temperature.

We will be looking at well-homogenized national datasets and compare them to the national averages from the global collections. For this period we have up now 3 such comparisons (Austria, Italy and Spain), which show too much scatter relative to the BEST dataset to identify a trend bias. We may have to start comparing single well-homogenized stations to get enough series starting in 1850. Suggestions for further lines of evidence are welcome.