

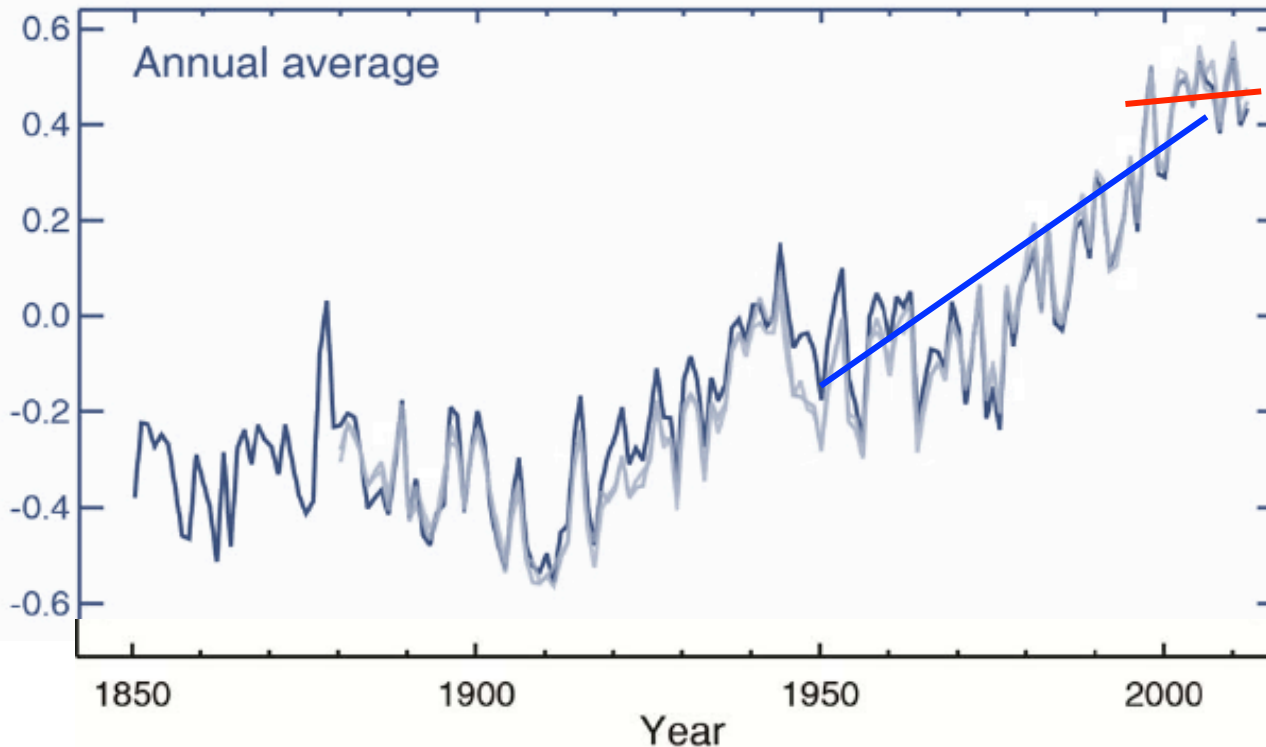
Recent global temperature record

- 'Warmest year': 2014 is in a statistical tie with 9 other years since 1998 (uncertainty is 0.1°C)
- No statistically significant trend for past 16+ years. Compare with major warming trend 1976-1998 (22 yrs)
- Since 1998, 25% of human CO_2 has been emitted
- Climate models predicted a trend of $0.2^{\circ}\text{C}/\text{decade}$ in early part of 21st century: growing discrepancy between climate models and observations
- Changes in ocean circulation seems to be dominant reason for 'pause', with solar & volcanoes
- Growing discrepancy raises serious questions about utility of climate models, the cause of warming in the 20th century, and predictions of 21st century warming.

Q4: Putting the warming “hiatus” in context



Observed globally averaged combined land and ocean surface temperature anomaly 1850–2012



- Warming rate since the **late 1990's** is less than the rate **since the 1950's** (or since 1900)
- There is a LOT of variation in temperature on year-to-year timescales...
- ...trends over short periods of time should not undermine our understanding of the big picture

Q4: Diagnosing the cause of the “hiatus”



- “Roughly equal measure”
 - aerosols/Sun
 - internal variability

- Heat still accumulating in the Earth System

