

Geophysical Fluid Dynamics Laboratory Review

June 30 - July 2, 2009



Do Rates of Warming at the Surface and the Lower Atmosphere Differ?

Presented by
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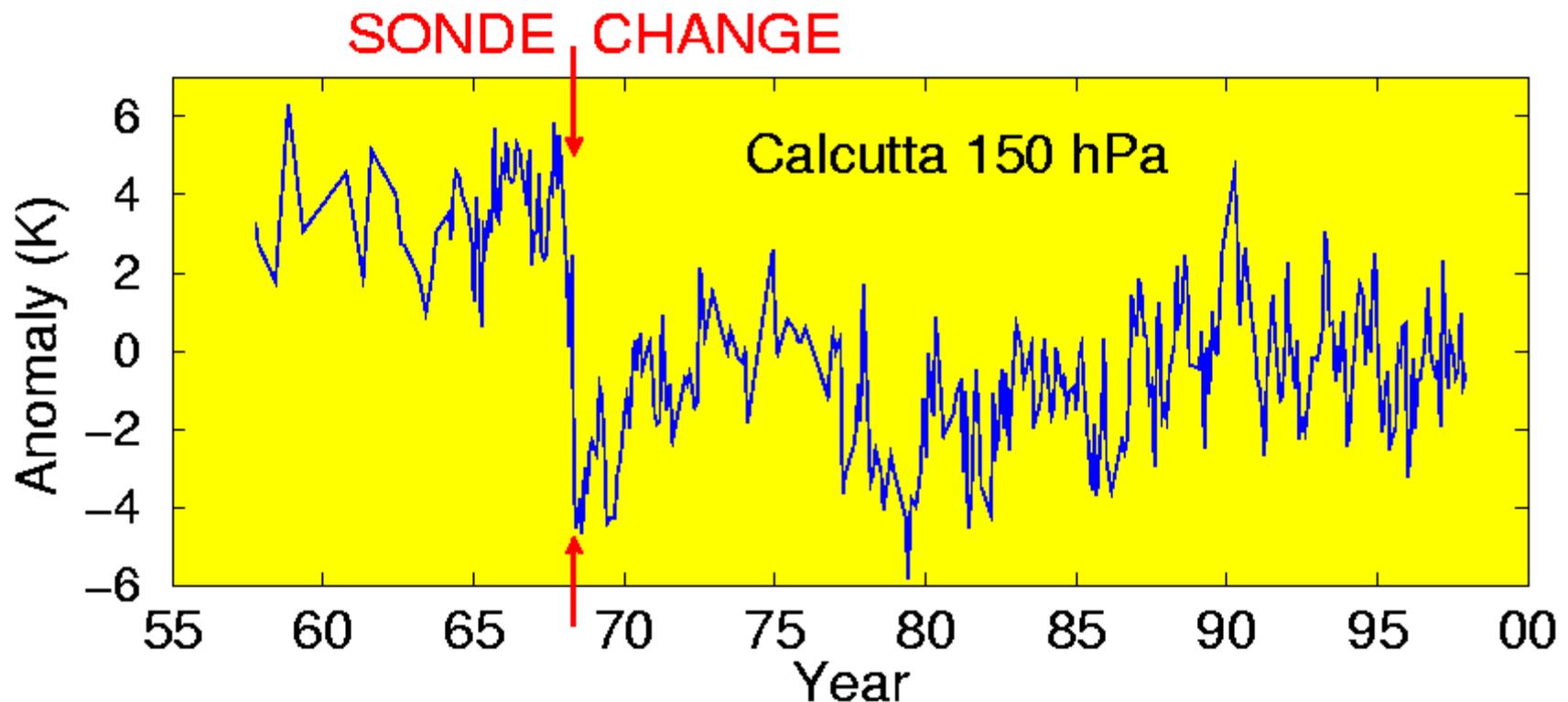


A Longstanding Controversy

- All GCMs current & past (realistic historical forcings):
 - Lower atmosphere (troposphere) warms more than surface
 - Maximum warming upper troposphere (tropics)
- Some observed datasets (satellite & radiosonde)
 - More warming at the surface than aloft (opposite of GCMs)
- Cause of the discrepancy (largely)
 - Unresolved errors in observed data
- This talk
 - Problems with radiosonde data

Artificial Discontinuities

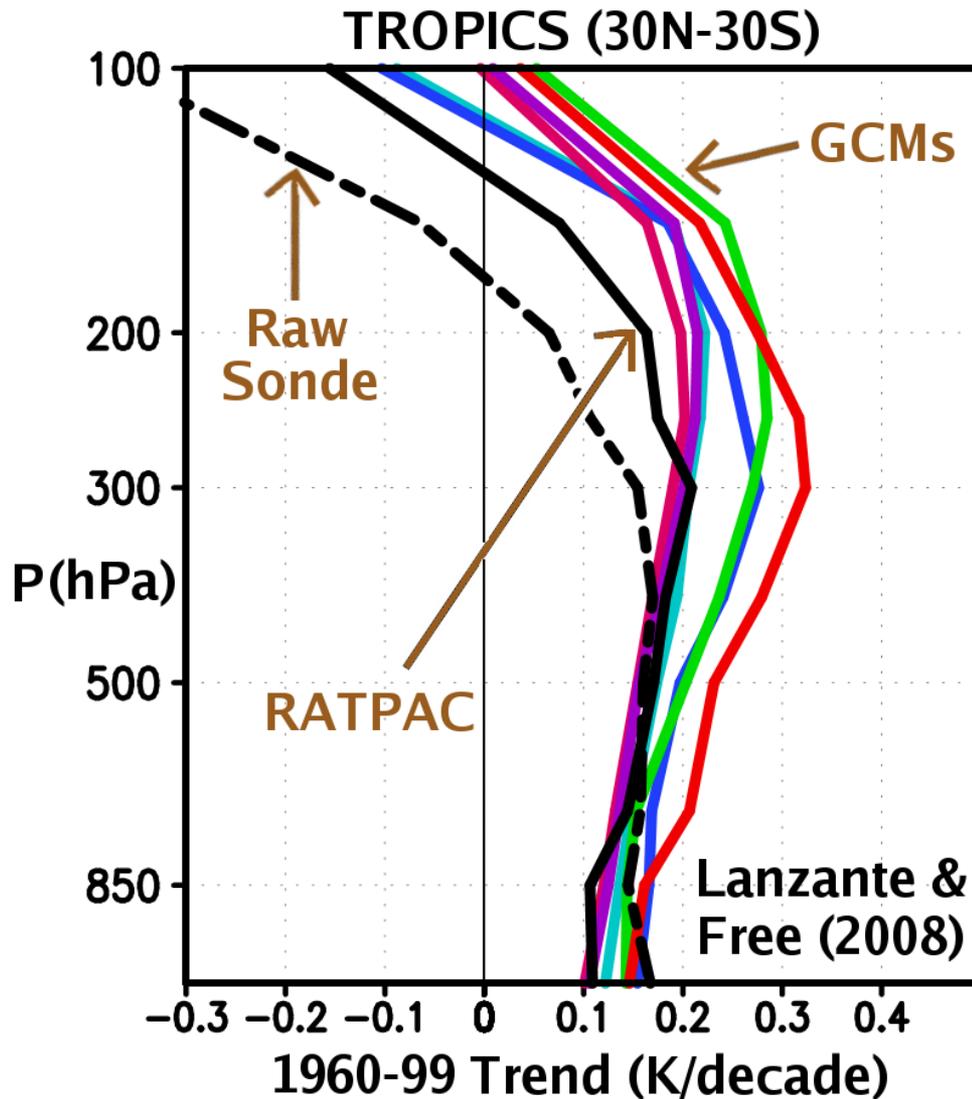
- Historical changes in instruments & practices --> Artificial discontinuities
- Can critically affect trend estimates
- Example (Calcutta) --> Worse case found



Improved Radiosonde Data

- RATPAC:
 - Radiosonde Atmospheric Temperature Products for Assessing Climate
- NOAA product (2005) developed collaboratively
 - GFDL / ARL / NCDC
- Raw data are biased
 - Trends contaminated with spurious cooling
- RATPAC attempts to remove major discontinuities
- Used in major US & international assessment reports
 - IPCC, CCSP, SPARC

Trend Comparison: Models & Observations



- Other improved radiosonde & satellite datasets & comparison studies
 - Collectively reduced gap between models & observations
- **Bottom line:** No fundamental discrepancy (models vs. observations)
[with regard to vertical structure of temperature change]

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