A review of known causes and effects of inhomogeneity in the surface temperature record

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Abstract

Introduction
including an overview of the amount of inhomogeneity – very few stations are free from inhomogeneity – however, don't paint too dire a picture. The record is still worth working with.

Non-climatic Origins of Inhomogeneity
Instrument changes, recalibrations, change of equations/conversion tables used
List any known largescale changes – i.e. mid-1990s move to Automation in the USA (perhaps a table compiling the knowns)
Liquid-in-glass to other thermometer types

The Physical Effects Determining Changes in Temperature Readings
Essentially radiation and windspeed manifested through exposure, ground surface type
Station moves, instrument moves, recording time change, screen change
Tabulate any known changes, locations, dates.
Mention respective differences in changes to Tmax, Tmin and Tmean

Inhomogeneity Structure (as found from homogenisation efforts to date)
change to the mean and variance?
Seasonally varying (and diurnally for that matter – affecting Tmin and Tmax differently)
likely magnitiudes
gradual inhomogeneities – urbanisation, land use
Likely frequency – i.e. GHCN – found approximately 1 break every 10 years
compound inhomogeneities – slopes and breaks together – graphics of known discontinuity patterns

Detecting the Inhomogeneity Signal Within the Real-world sNoise
annual cycle
natural variability (ENSO, NAO, Volcanoes, Solar Variability)
background long term trends
random error
covariance between stations
autocorrelation within a station series

Conclusions
Something about trying to get to the truth but not knowing when we've got there.

Acknowledgements

References