

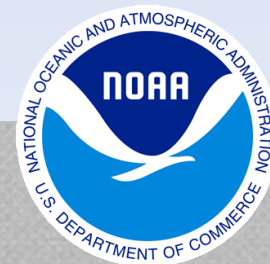
Frost and Freeze Data and Impacts to the Agriculture, Construction and Transportation Industry



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First and Last Day of Frost:
A USCRN Perspective

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Cooperative observer (COOP) and US Climate Reference Network (USCRN) networks were designed using differing technologies for separate purposes.

COOP

- Serve agricultural communities
- Volunteered weather observers
- Naturally aspirated thermistors



USCRN

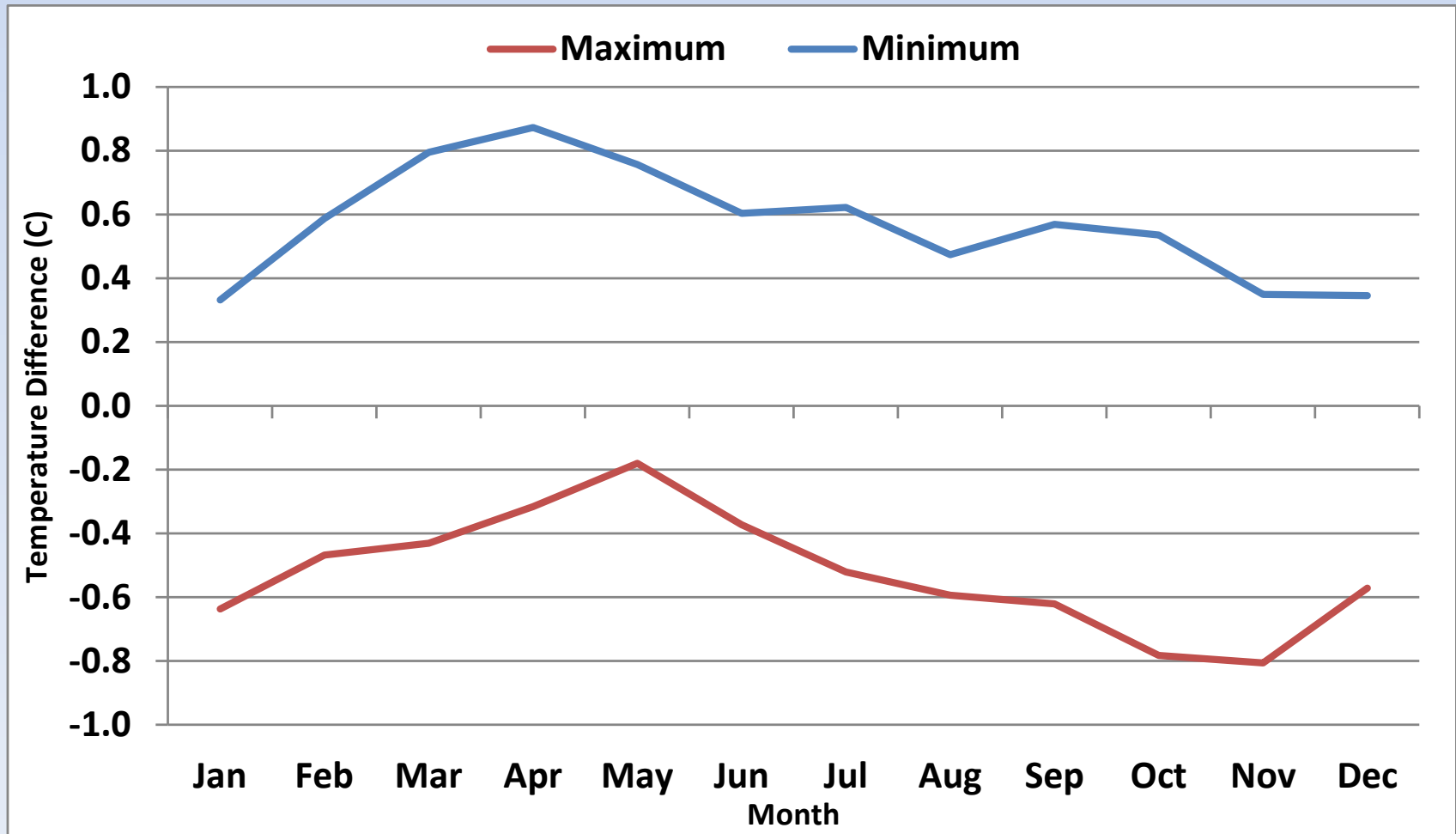
- Detect climate signals
- Automated observations
- Aspirated thermistors



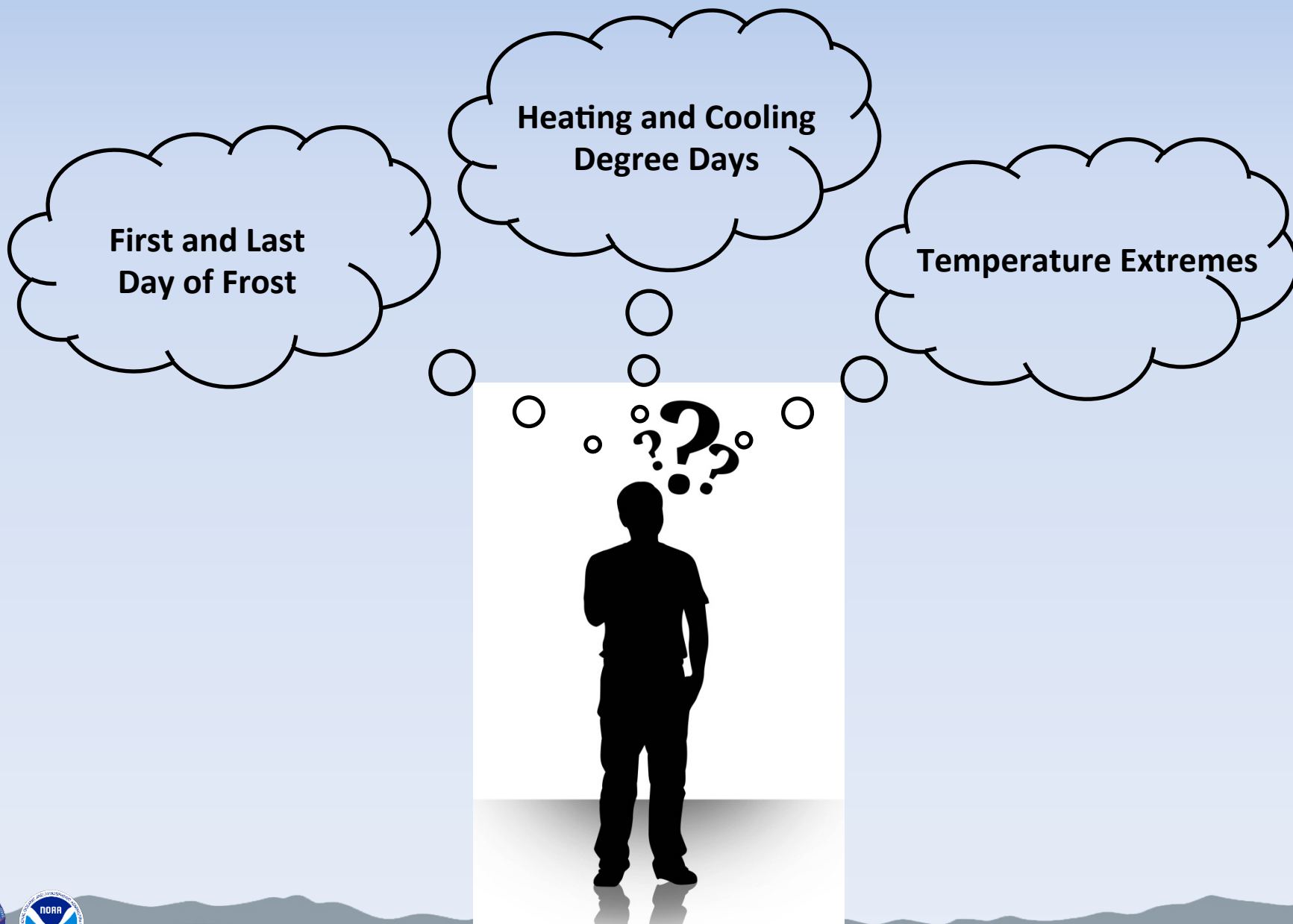
Temperature Comparisons US Climate Reference Network

Observed temperature differences between the networks resulted in USCRN cooler maximums and warmer minimums

- USCRN *maximum* temperatures were 0.58 °C *cooler*
- USCRN *minimum* temperatures were 0.54 °C *warmer*

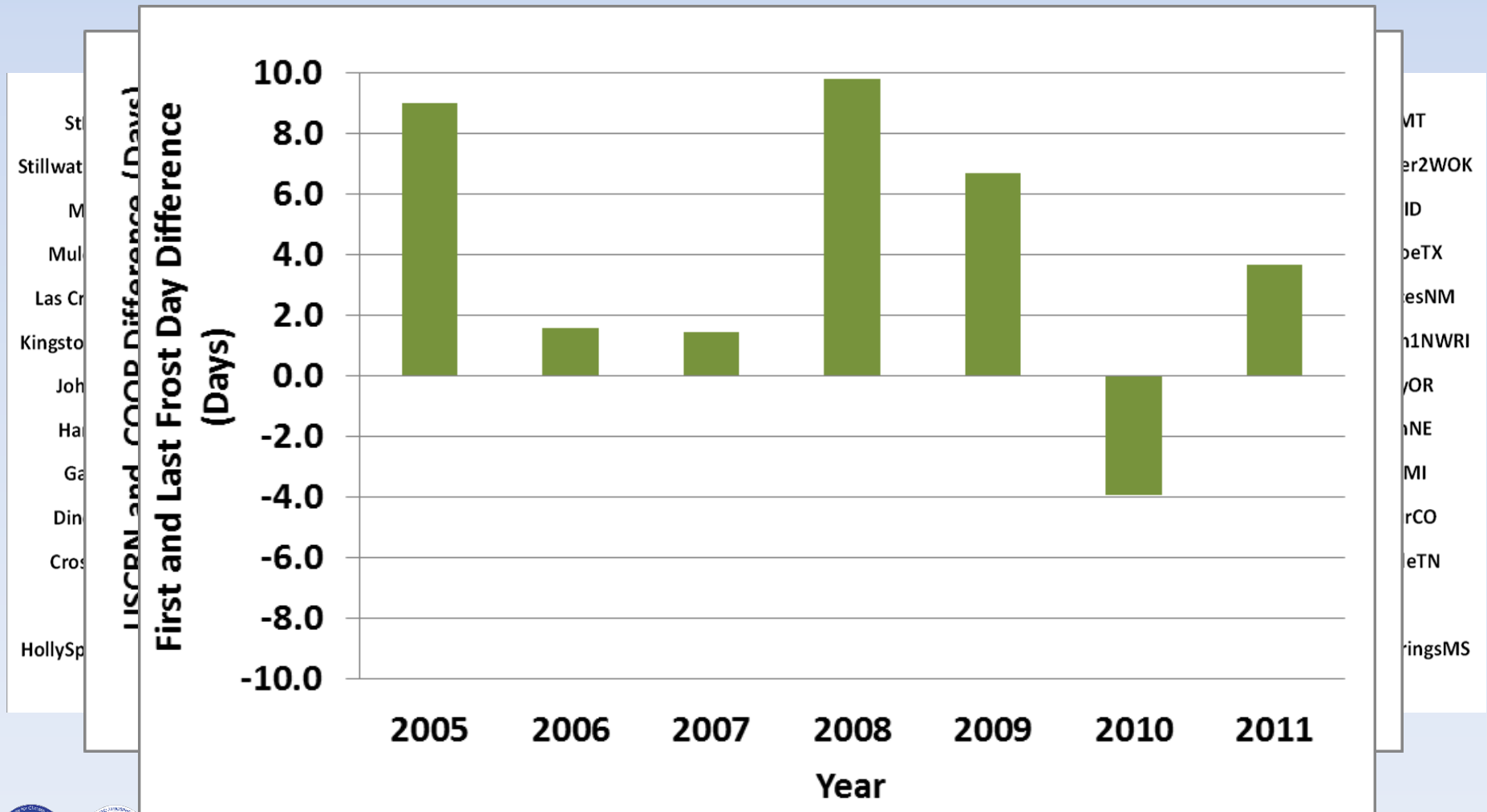


How Might These Temperature Biases Impact:



First and Last Day Of Frost US Climate Reference Network

USCRN and COOP last-day-of-frost differences were more *pronounced* than first-day-of-frost. These results may be influenced seasonal weather patterns, such as cold-snaps, that are more frequent during from the summer to fall than spring to winter months.



Summary

Network architecture (i.e. selection of sensing, shielding technologies) were found to affect daily observations of temperature.

- From USCRN and COOP perspectives, maximum and minimum temperatures were biased by more than 0.5 degree Celsius on average.

These temperature biases affected the occurrence of the first and last day of frost

- Shifts in the timing of the first and last day of frost varied greatly from year to year
- An average three day increase in the growing season
- Some years had changes in growing season length by than 5%

Data users must consider how observational uncertainties may impact their analysis!

