

Watts et al 2012 Figures and Tables

Figure 1 – USHCNv2 stations that with complete metadata valid for application of the Leroy (2010) site classifications system

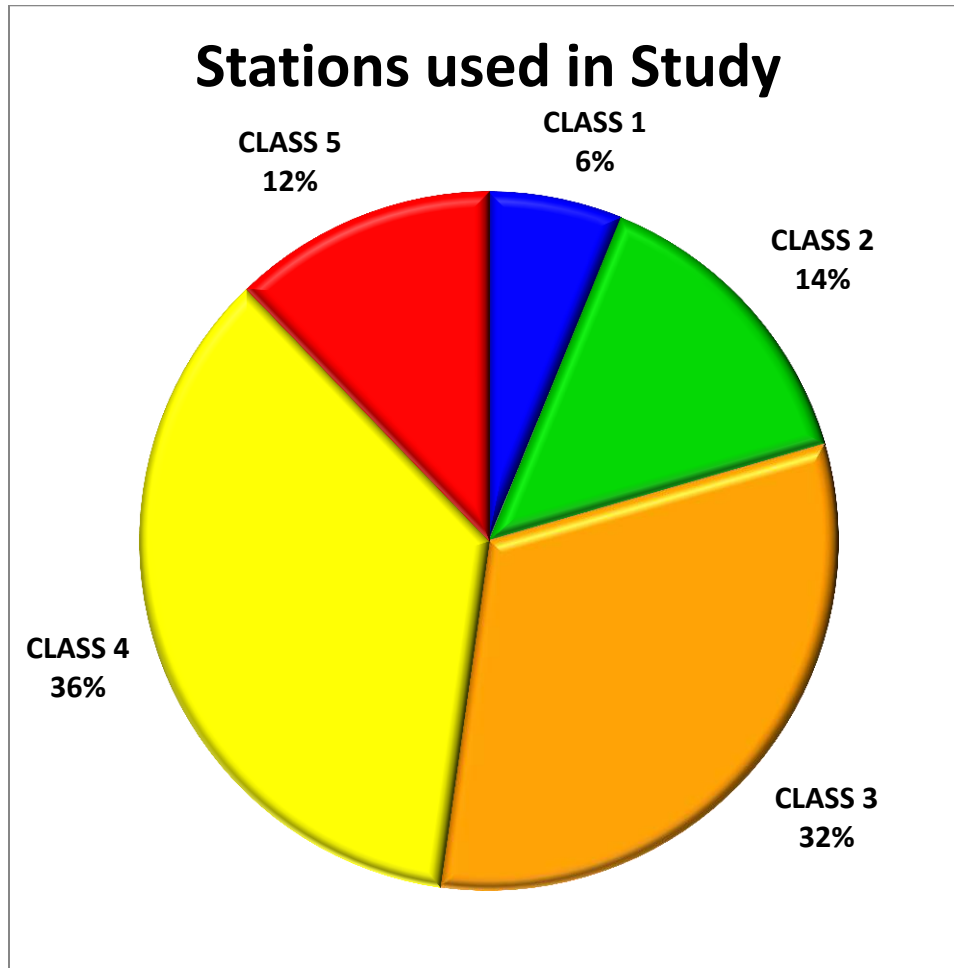


Figure 2 – Regional and CONUS trend averages of all rated stations, using Raw data.

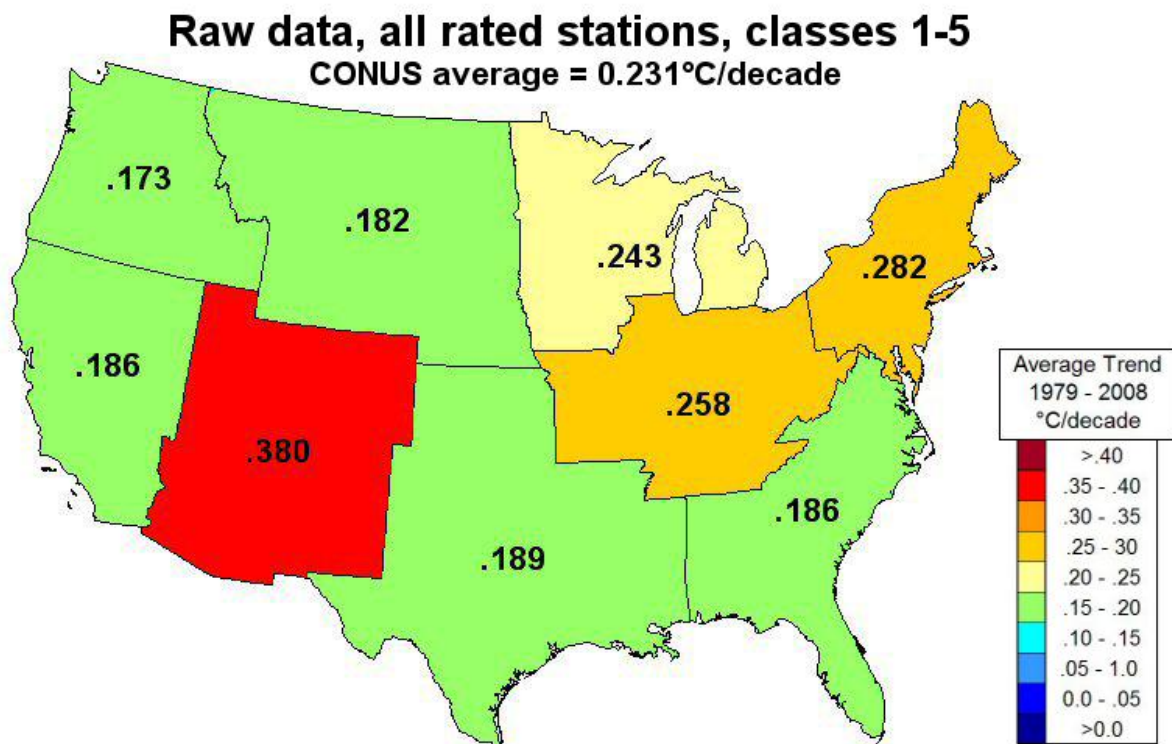
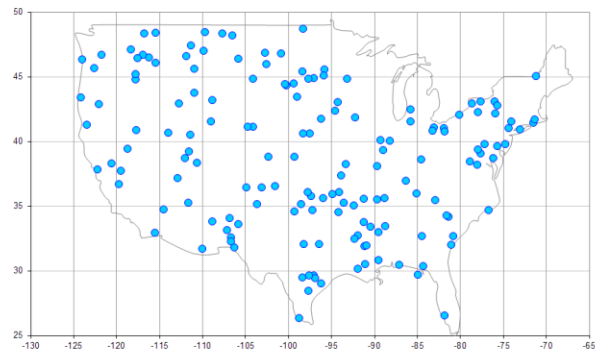
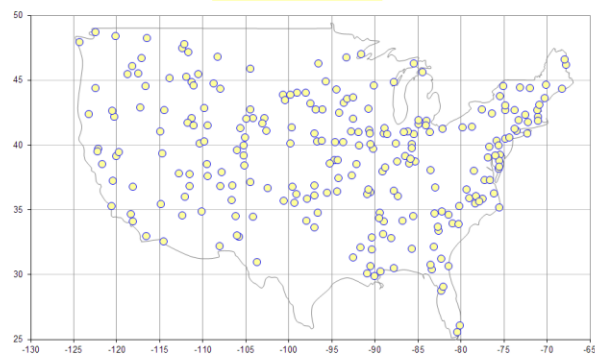


Figure 3 – station distributions in the CONUS by class

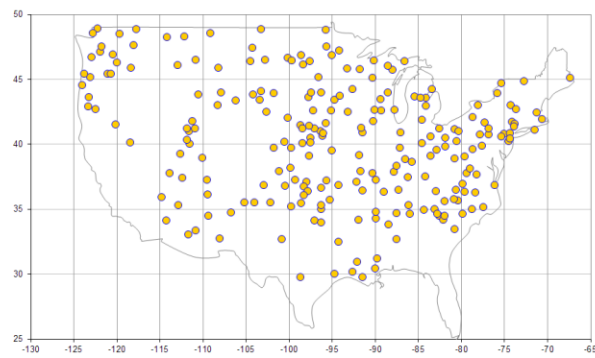
Class 1/2 Stations



Class 3 Stations



Class 4 Stations



Class 5 Stations

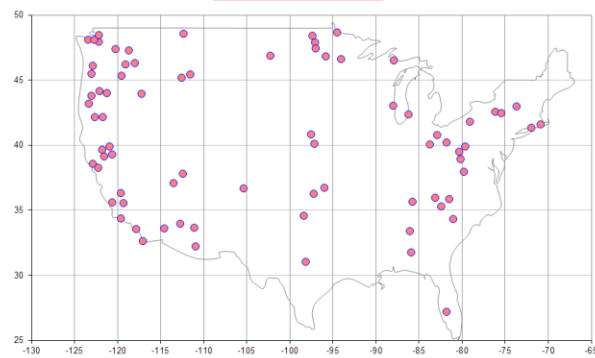


Figure 4 – Station Class comparisons of decadal trends by region

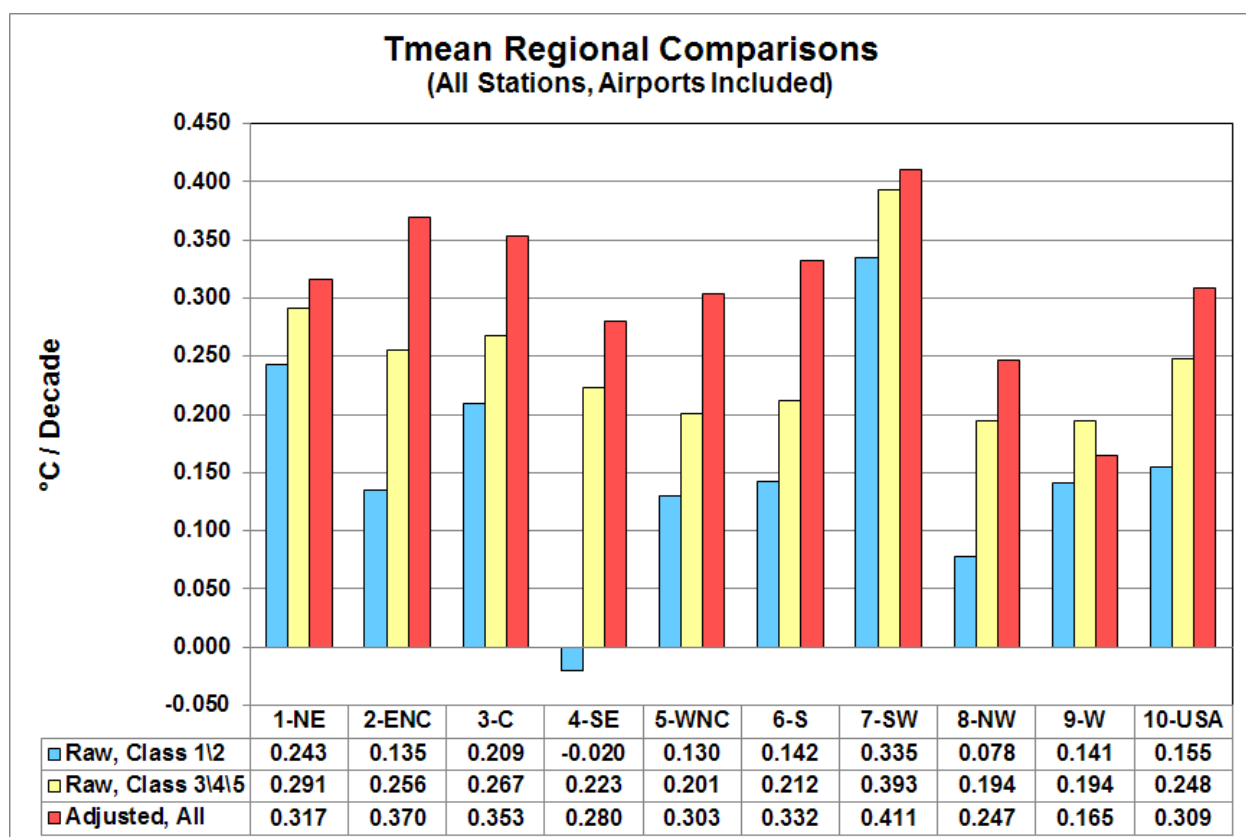


Figure 5 – Station Class comparisons of decadal trends by region with airport stations excluded

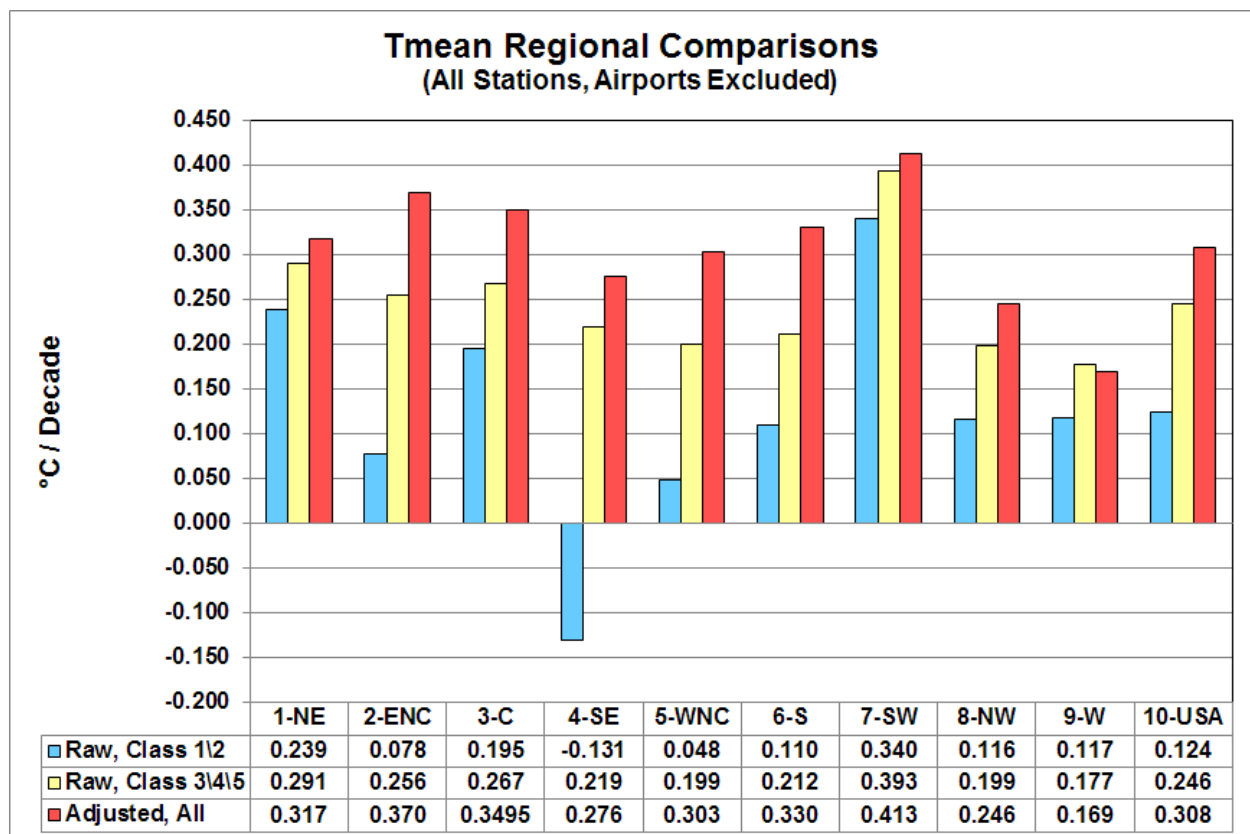


Figure 6 - Station Class comparisons of decadal trends by region, airports only

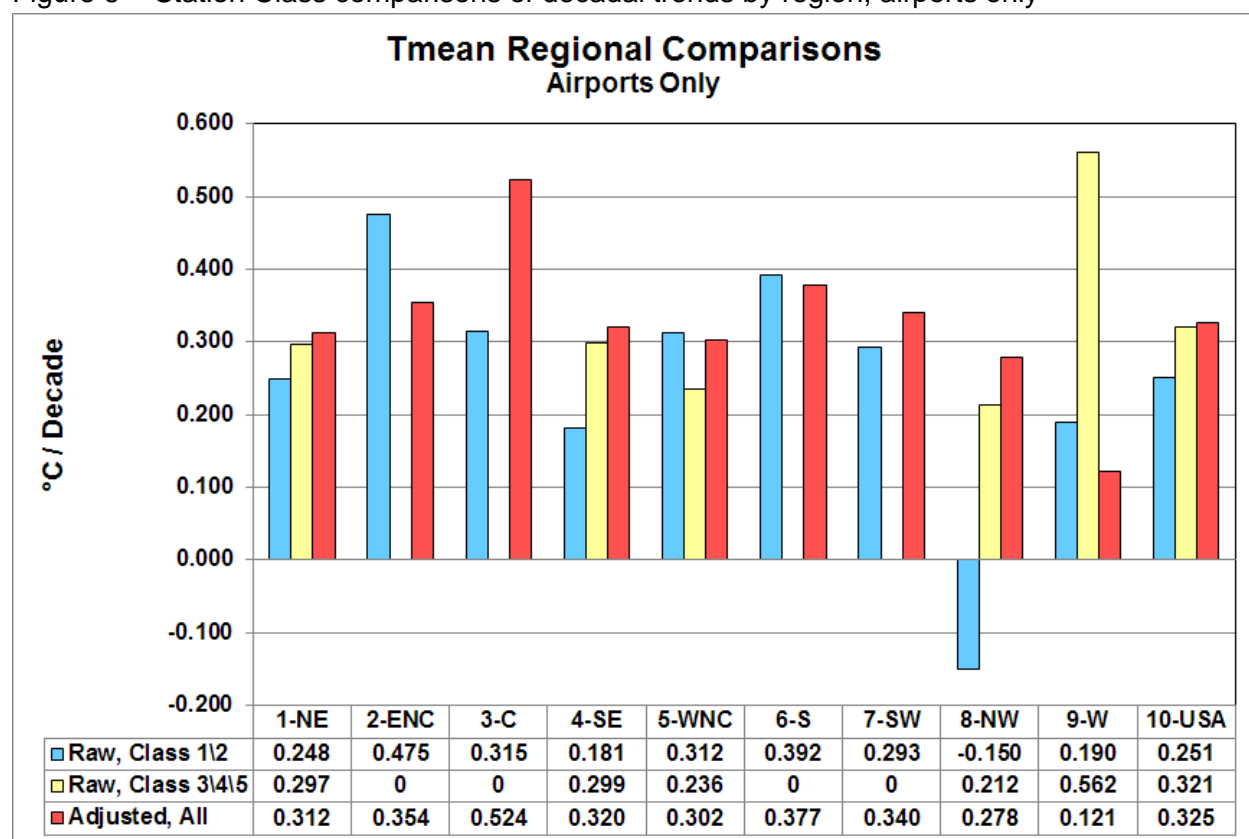


Figure 7 – Station Class comparisons of decadal trends by region, rural stations, airports excluded

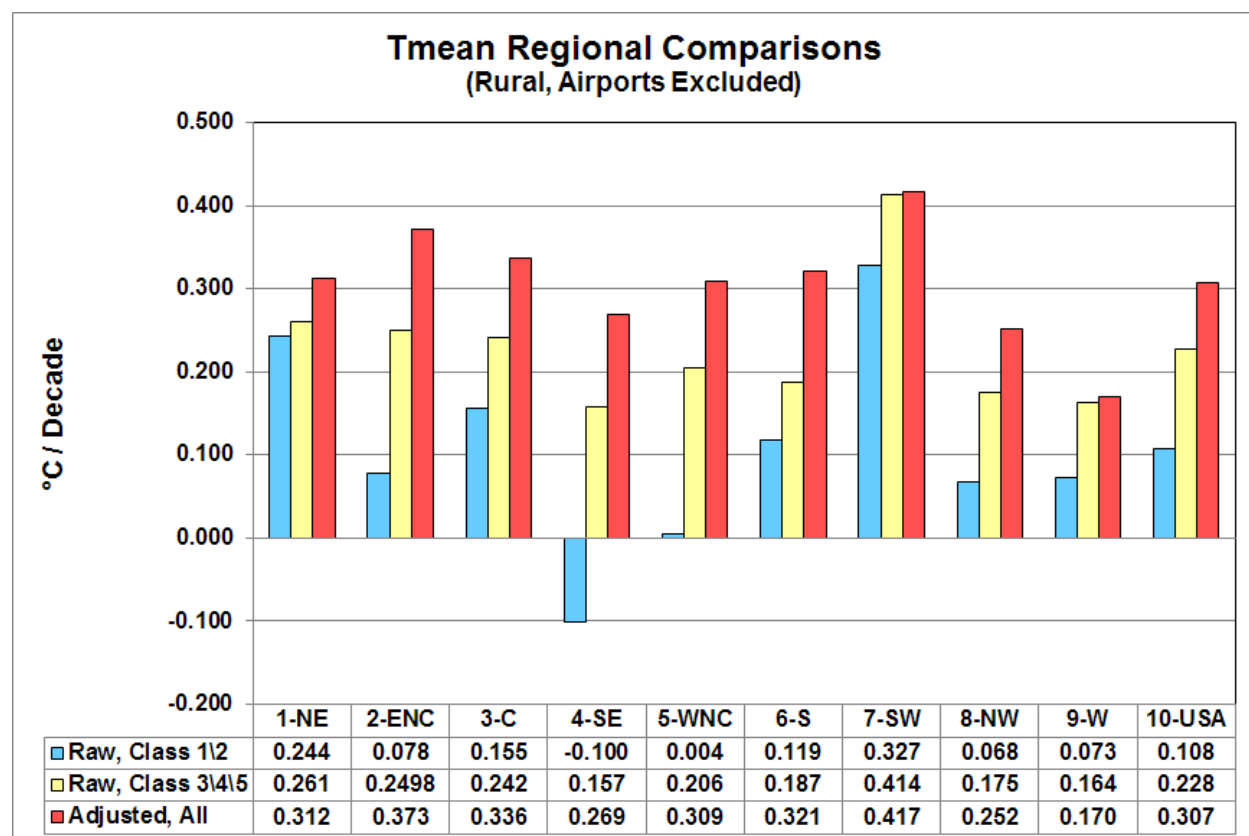


Figure 8 – Station Class comparisons of decadal trends by region, rural MMTS stations, excluding airports

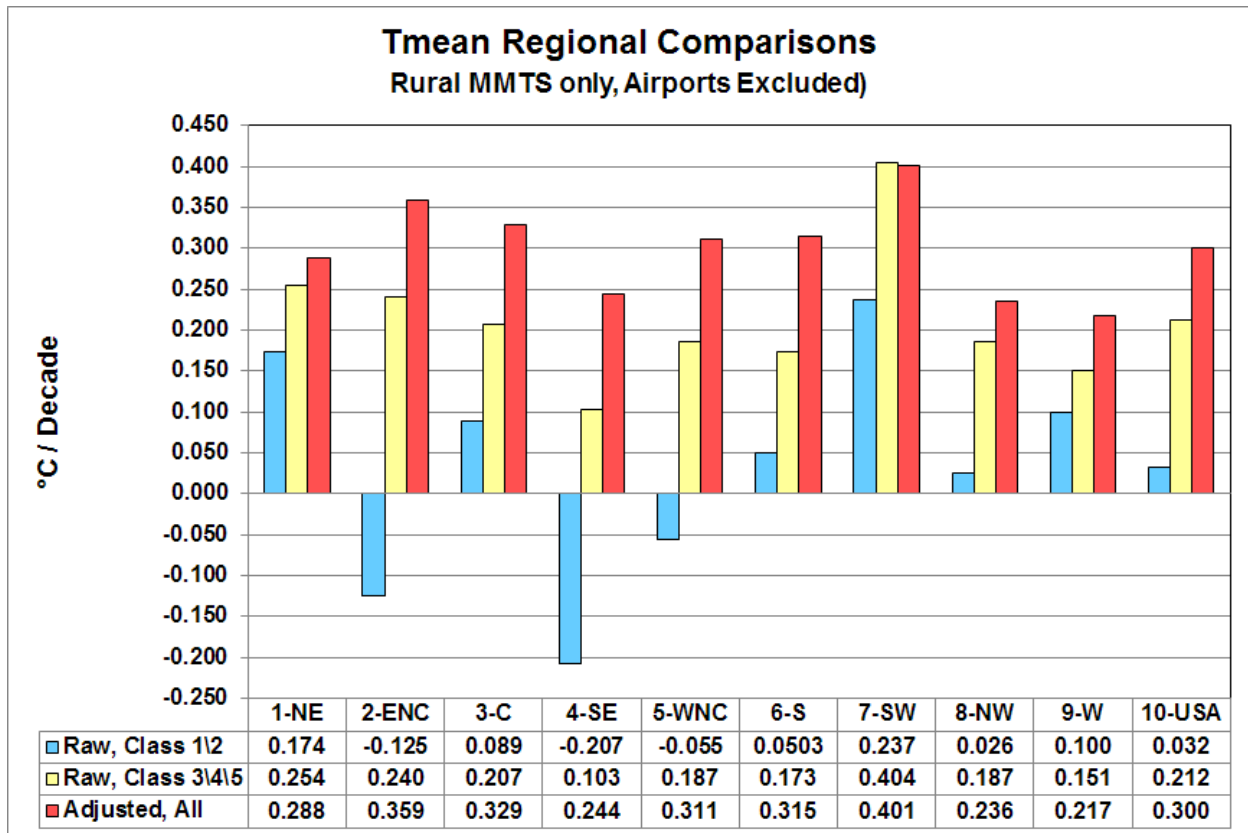


Figure 9 – An example of a Cotton Region Shelter (CRS) with paint deterioration allowing for exposed wood, creating a lower albedo. Wilson Landing Fire Station, Chico, CA Photo by A.Watts.



Figure 10 – CONUS station class comparison using gridding, with a Class 4 baseline

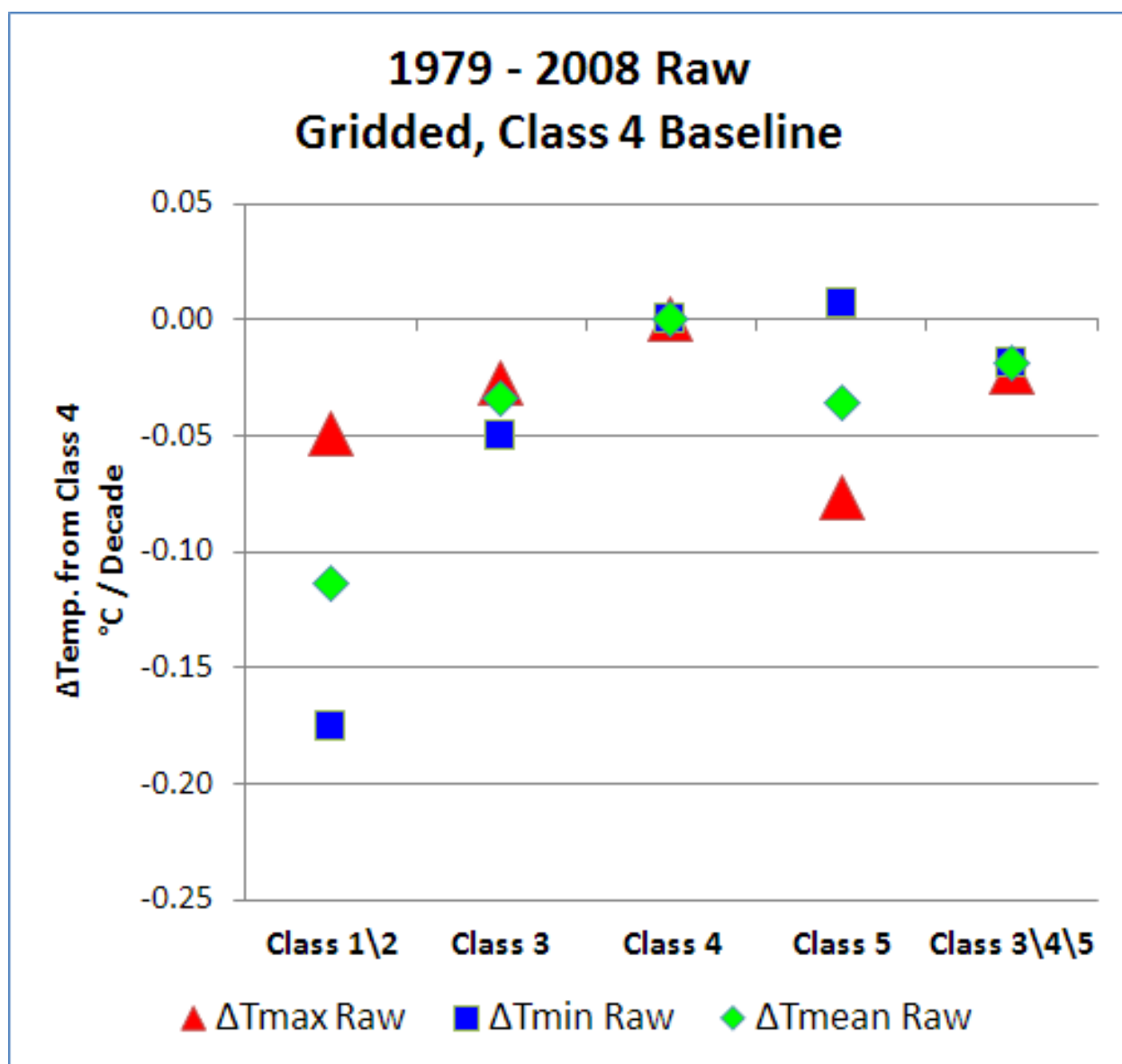


Figure 11 - CONUS station class comparison using gridding, with a Class 3 baseline

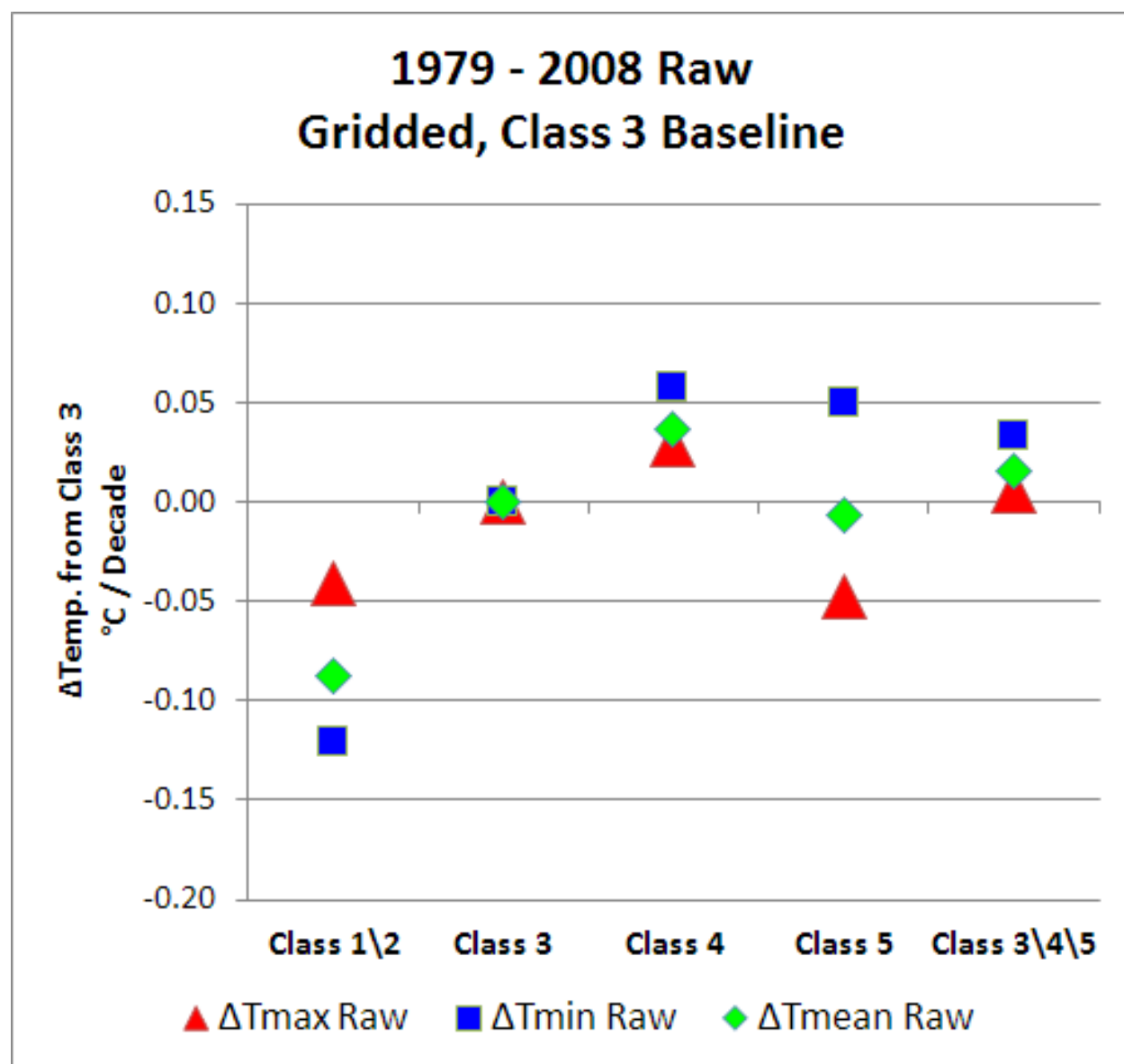


Figure 12 - CONUS station class comparison using gridding, with a Class 1&2 baseline

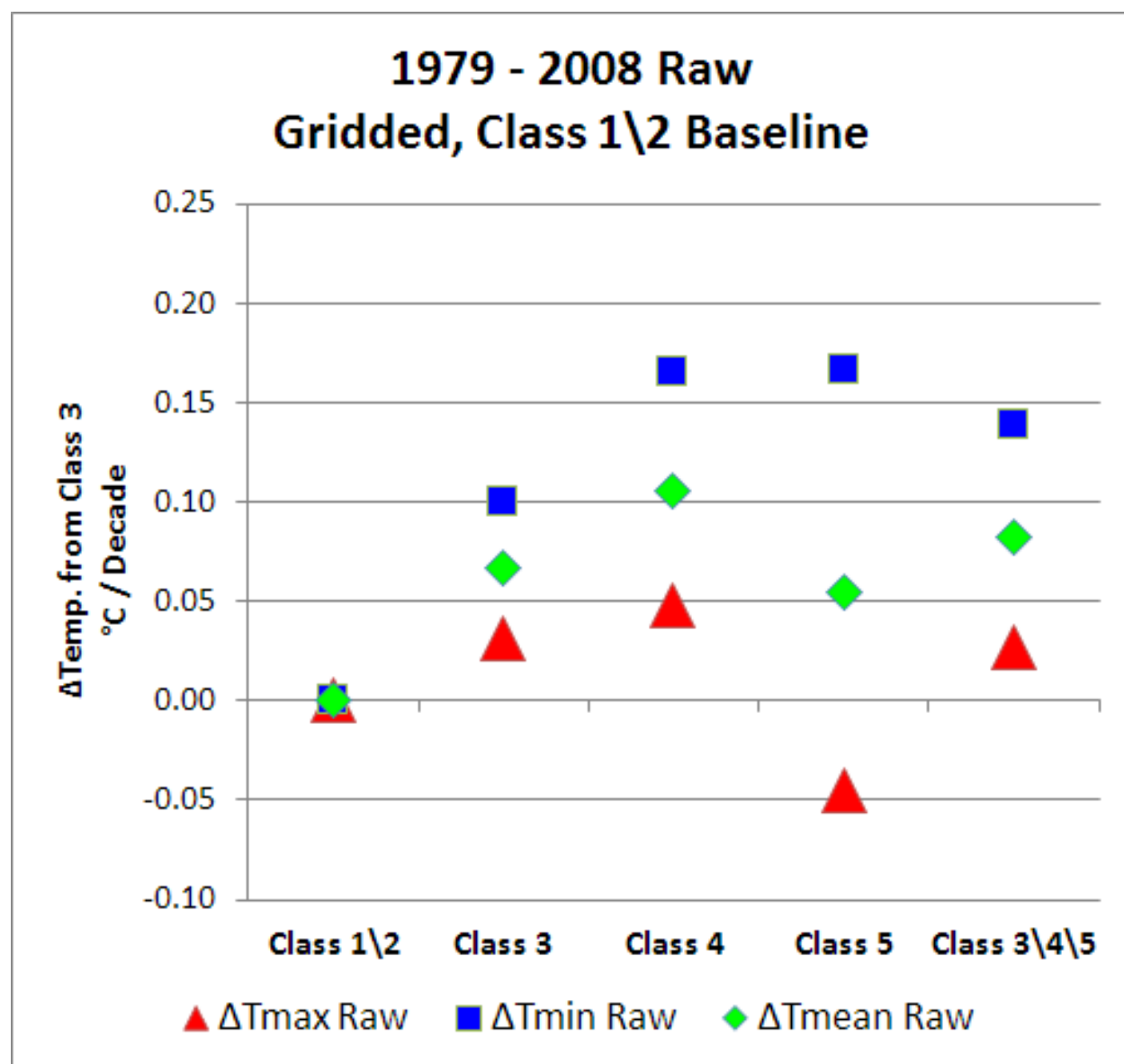


Figure 13 – ungridded comparison of station equipment types

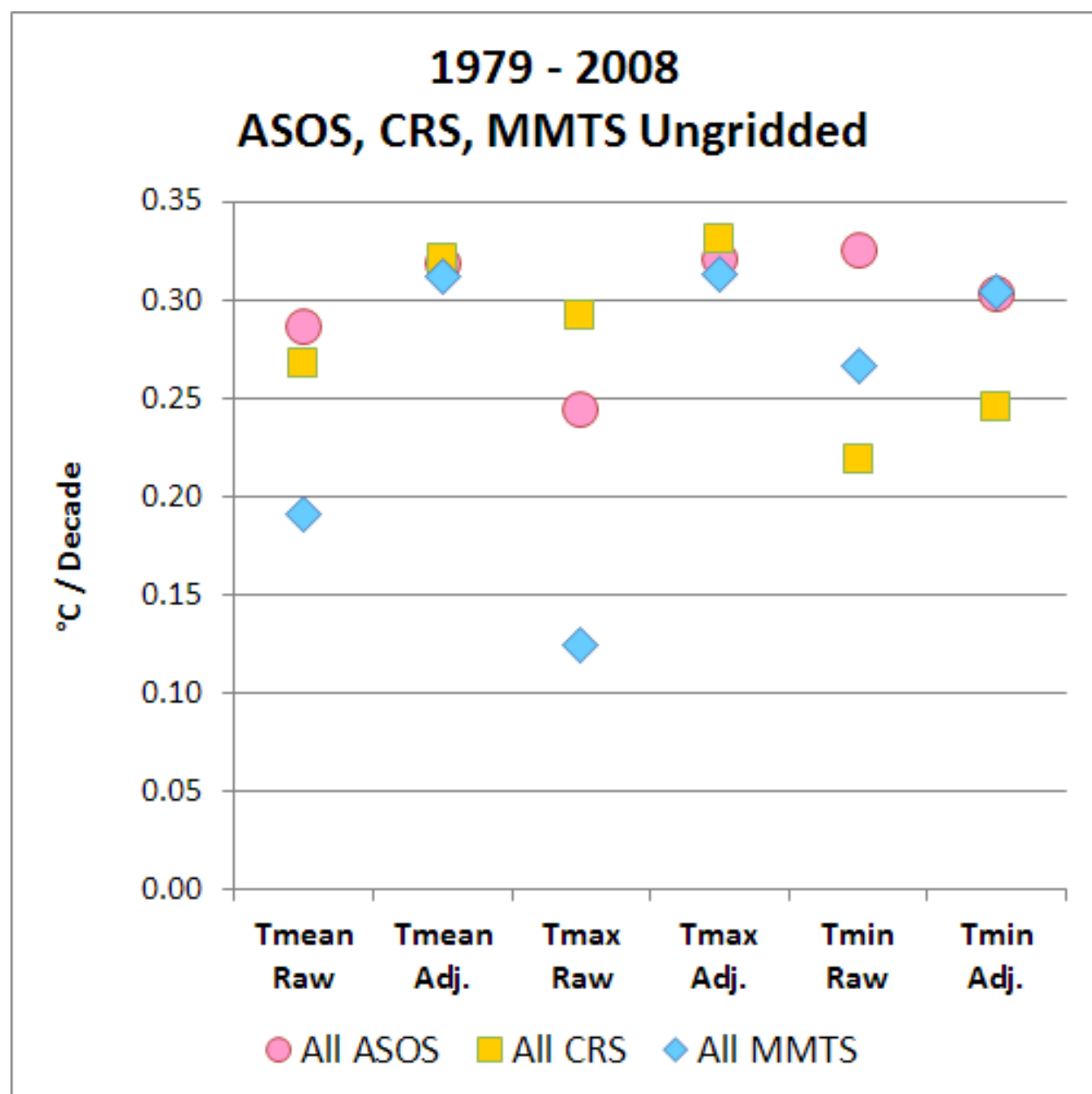


Figure 14 – gridded CRS equipped stations, Class 4 baseline

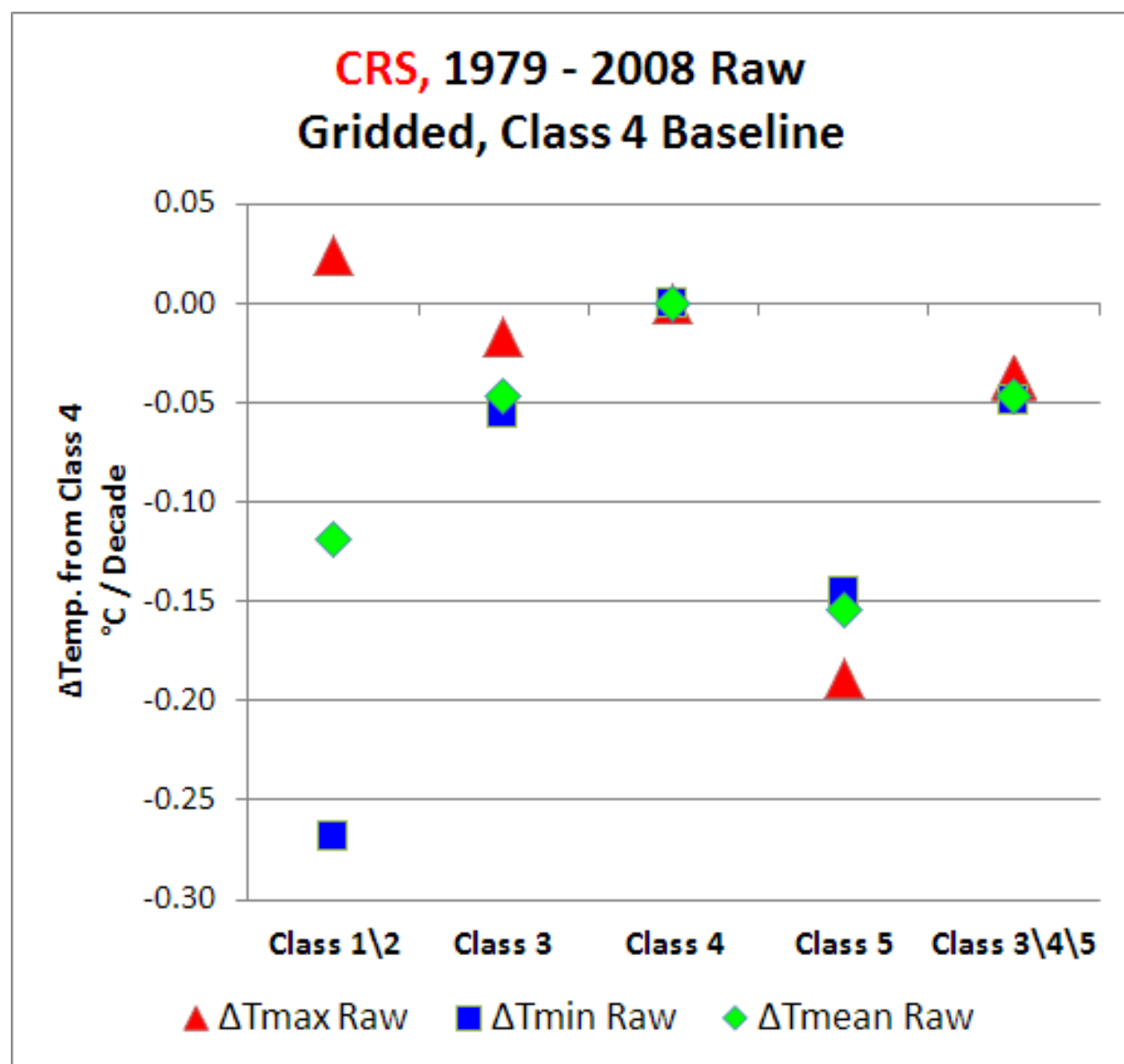


Figure 15 - gridded MMTS equipped stations, Class 4 baseline

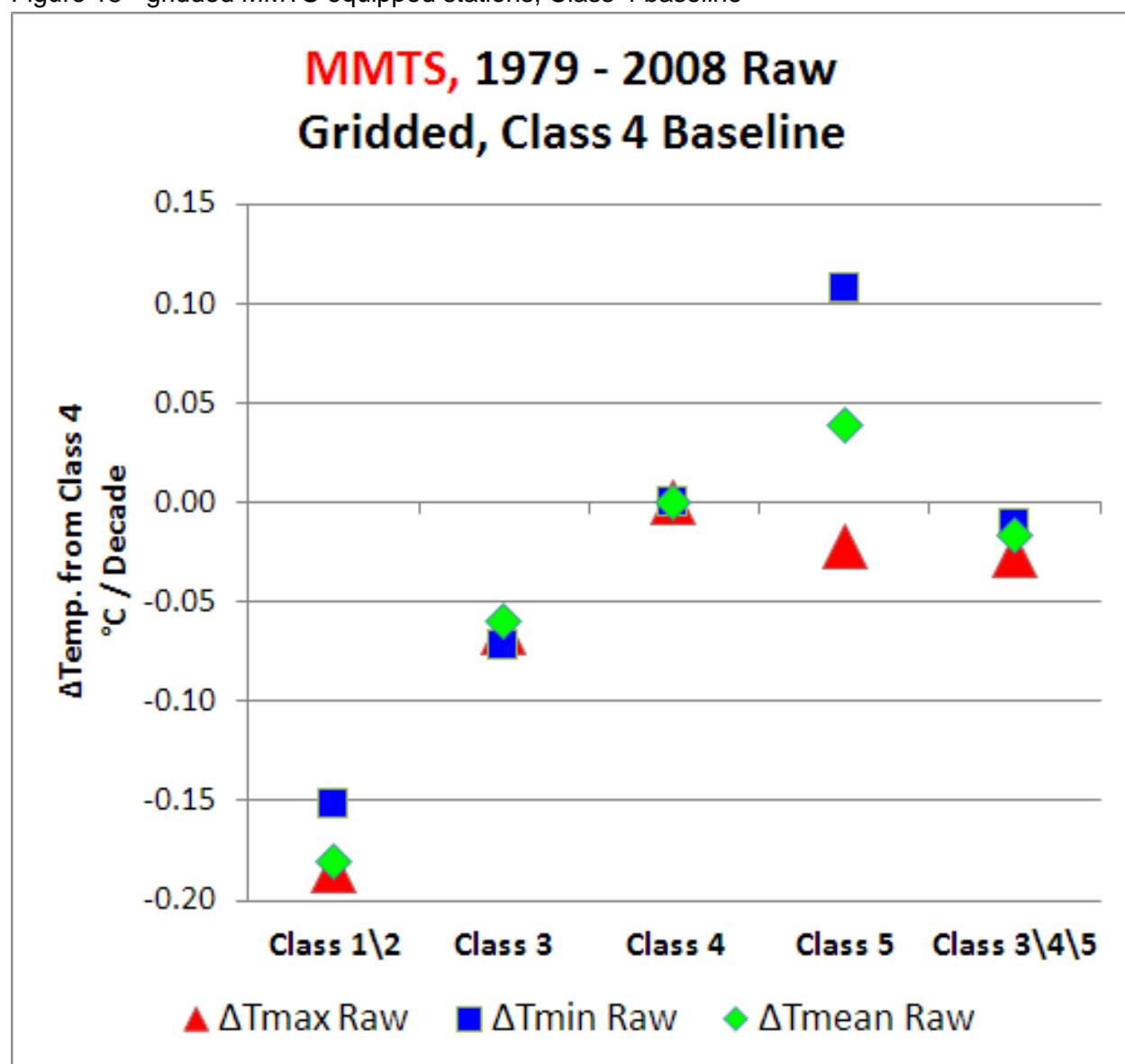


Figure 16 – All stations, urban, semi-urban, and rural and by class



Figure 17 – ungridded urban, semi-urban, and rural stations by class

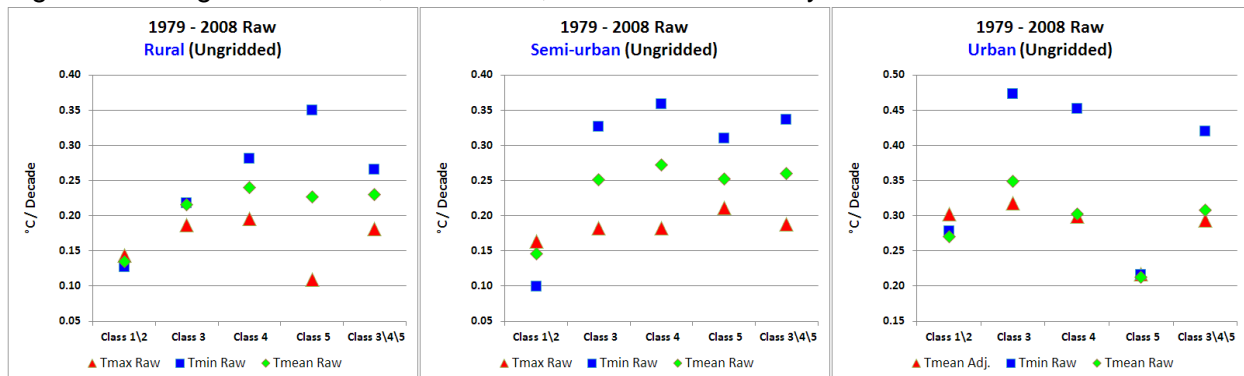


Figure 18 – All stations, gridded, raw and adjusted data comparison

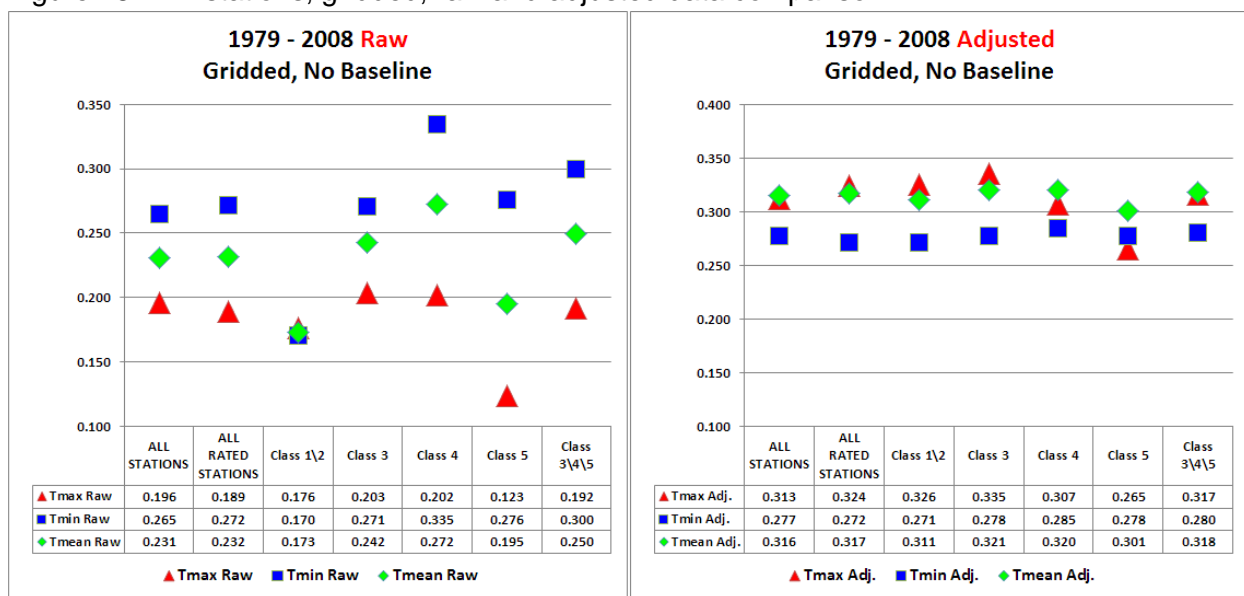


Figure 19 - Grid boxes used in the CONUS

Figure 20 – Comparisons of regions and gridded values for all CONUS compliant stations, all CONUS non-compliant stations, and final USHCNv2 adjusted CONUS data

Comparison All Rated Stations in the CONUS

What the compliant thermometers (Class 1&2) say: **+155°C/decade**
 What the non-compliant thermometers (Class 3,4,5) say: **+248°C/decade**
 What the NOAA final adjusted data says: **+309°C/decade**

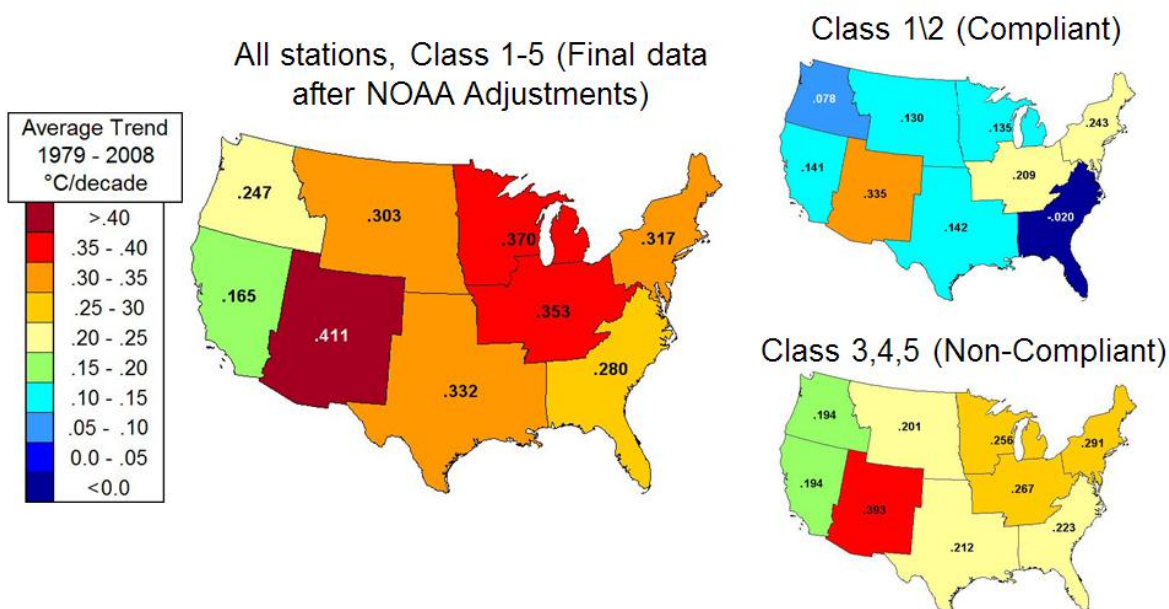


Figure 21 - Barplot showing random effects on trends calculated from USHCN “raw” data for rating; urbanization; equipment; and max-min.

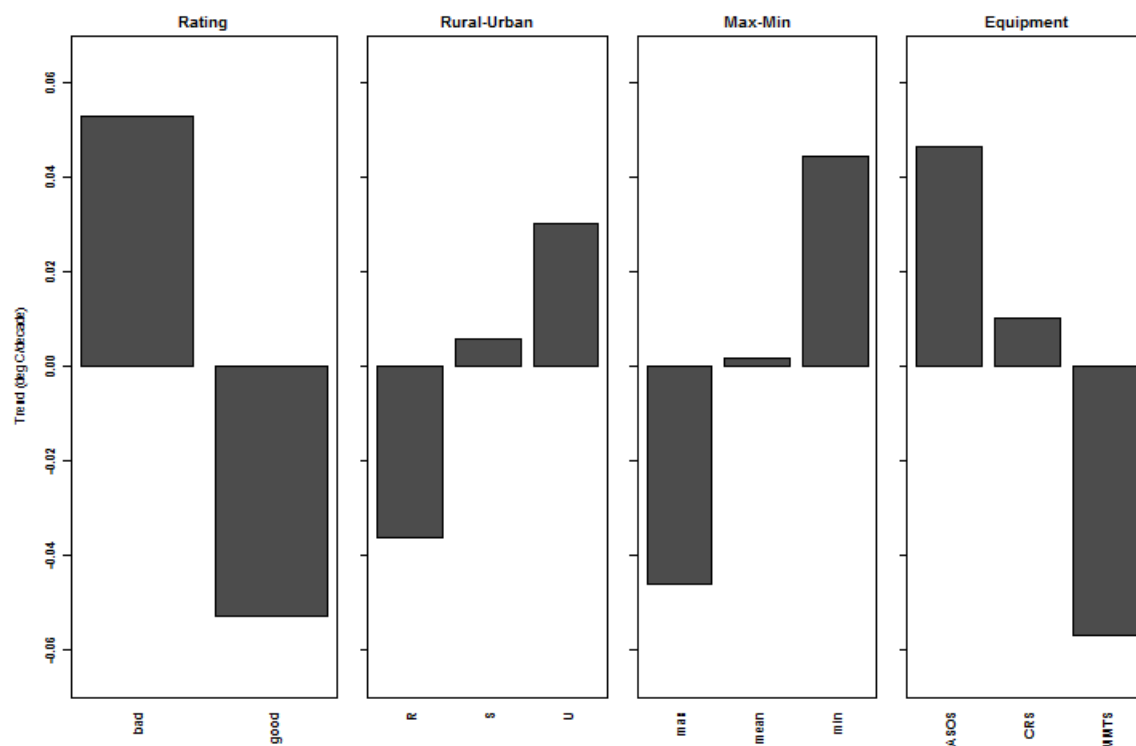


Figure 22 - Barplot showing random effects on trends calculated from USHCN “adjusted” data for equipment; rating; urbanization and max-min.

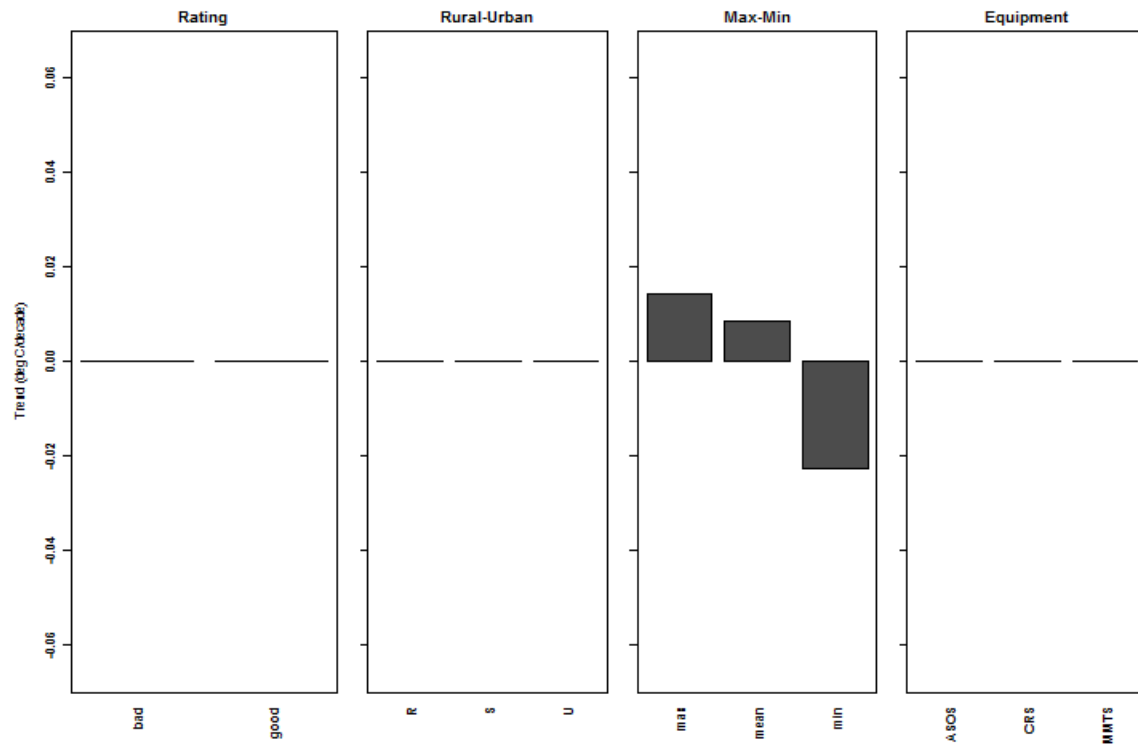


Figure 23 – Trends by rating and max-min for (left) “compliant” stations and (right) “non-compliant” stations. Table of data shown below. NOAA continental US trend for 1979-2008 shown in green at left

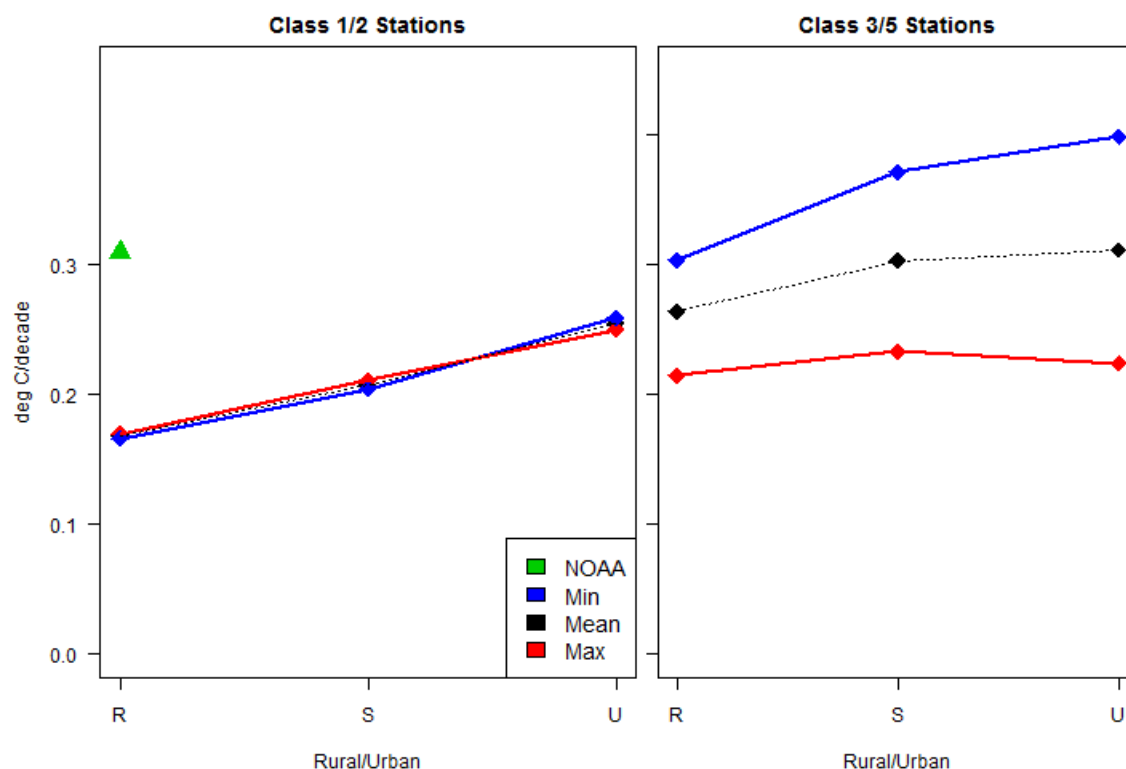


Table 1. WMO-CIMO-XV compliant and non-compliant classifications for local site temperature measurement representivity, per Leroy (2010)

Class 1 (compliant)

- Flat, horizontal land, surrounded by an open space, slope less than 1/3 (19°);
- Ground covered with natural and low vegetation (< 10 cm) representative of the region;
- Measurement point situated:
 - at more than 100 m from heat sources or reflective surfaces (buildings, concrete surfaces, car parks, etc.)
 - at more than 100 m from an expanse of water (unless significant of the region)
 - away from all projected shade when the Sun is higher than 5°.

A source of heat (or expanse of water) is considered to have an impact if it occupies more than 10% of the surface within a circular area of 100 m surrounding the screen, makes up 5% of an annulus of 10m–30m, or covers 1% of a 10 m circle.

Class 2 (compliant)

- Flat, horizontal land, surrounded by an open space, slope inclination less than 1/3 (19°);
- Ground covered with natural and low vegetation (<10 cm) representative of the region;
- Measurement point situated:
 - At more than 30 m from artificial heat sources or reflective surfaces (buildings, concrete surfaces, car parks, etc.)
 - At more than 30 m from an expanse of water (unless significant of the region)
 - Away from all projected shade when the Sun is higher than 7°.

A source of heat (or expanse of water) is considered to have an impact if it occupies more than 10% of the surface within a circular area of 30 m surrounding the screen, makes up 5% of an annulus of 5m–10m, or covers 1% of a 5 m circle.

Class 3 (non-compliant, additional estimated uncertainty added by siting up to 1°C)

- Ground covered with natural and low vegetation (<25 cm) representative of the region;
- Measurement point situated:
 - at more than 10 m from artificial heat sources and reflective surfaces (buildings, concrete surfaces, car parks, etc.)
 - at more than 10 m from an expanse of water (unless significant of the region)
 - away from all projected shade when the Sun is higher than 7°.

A source of heat (or expanse of water) is considered to have an impact if it occupies more than 10% of the surface within a circular area of 10 m surrounding the screen or makes up 5% of an annulus of 5 m.

Class 4 (non-compliant, additional estimated uncertainty added by siting up to 2°C)

- Close, artificial heat sources and reflective surfaces (buildings, concrete surfaces, car parks, etc.) or expanse of water (unless significant of the region, occupying:
 - Less than 50% of the surface within a circular area of 10 m around the screen
 - Less than 30% of the surface within a circular area of 3 m around the screen
- Away from all projected shade when the Sun is higher than 20°.

Class 5 (non-compliant, additional estimated uncertainty added by siting up to 5°C)

Site not meeting the requirements of class 4. i.e.

- More than 50% of the surface within a circular area of 10 m around the screen

- More than 30% of the surface within a circular area of 3 m around the screen

Table 2. Lists of surveyed stations with enough survey material for application of the Leroy 2010 siting classification system.

Station rating	Count	Sums
Class 1	48	160 compliant stations – 20.5%
Class 2	112	
Class 3	247	619 non-compliant stations - 79.5%
Class 4	277	
Class 5	95	
All	779	

Table 3: Anova test results

Effect Left Out (1 df)	Anova Chisq	Pr(>Chisq)
Rating	46.564	8.868e-12
Urbanization	19.763	8.765e-06
Equipment	32.472	1.209e-08
Max-Min	36.858	1.270e-09

Table 4: Changes from Classification in Fall et al

	Compliant	Non-Compliant	Total
New Rating	7	26	33
Rating Discontinued	0	-15	-15
Non-Compliant to Compliant	117	-117	0
Compliant to Non-Compliant	-13	13	0
Net Change	111	-93	18