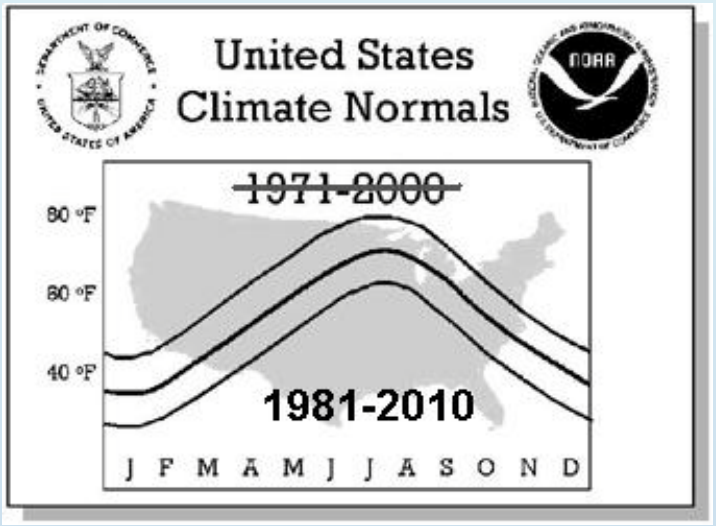


NOAA's 1981-2010 Climate Normals

Pre-release Webcast presented by

NOAA's National Climatic Data Center

June 13, 2011

Takeaway Messages

- Most Normals will be available July 1 via FTP
- NWS Normals to be loaded into AWIPS Aug 1
- We use daily data much more than last time
- Temperature Normals are internally consistent
- Comprehensive suite of precipitation Normals
- HDD/CDD computed more directly this time
- Hourly Normals for about 260 stations
- Pseudonormals for short-record stations
- On average 1981-2010 warmer than 1971-2000

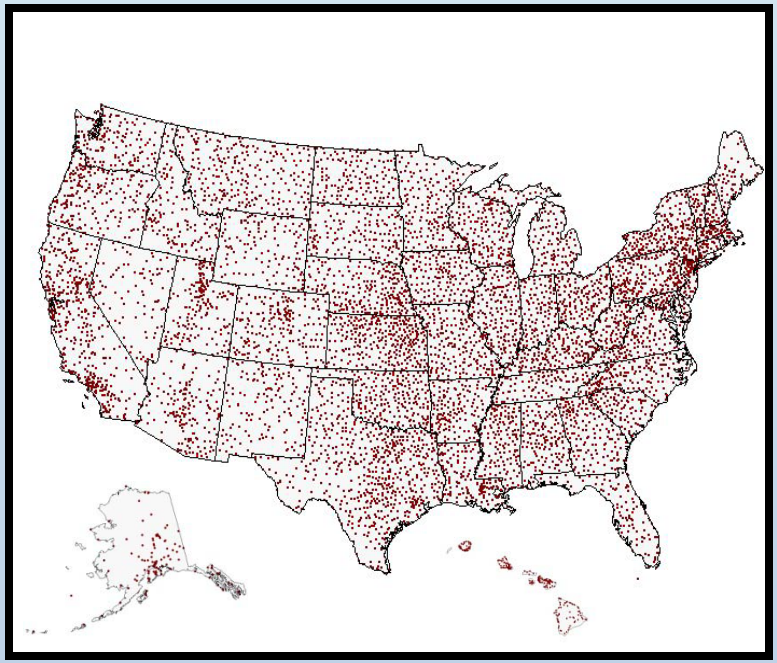
Outline

- **Climate Normals Background and Overview**
- **What to Expect on July 1, 2011**
  - Variables, access, etc.
- **NWS Release versus the Public Release**
- **Temperature Normals including HDD/CDD**
- **Precipitation/Snow Normals**
- **Pseudonormals and CRN Normals**
- **Preliminary Results**

Background: NOAA's Climate Normals

Daily, monthly & annual 30 year climate averages

- **Main Parameters**
  - Temperature (max, min, mean)
  - Heating & Cooling Degree Days
  - Precipitation and Snowfall
  - Daily, Monthly, Seasonal, and Annual
- **World Meteorological Organization Mandate**
  - Countries Calculate new normals every 30 years
  - Past periods: 1931-60, 1961-90
  - Next period: 1991-2020
- **WMO Recommendation**
  - Countries update normals every 10 years
  - Current period 1971-2000
  - Next scheduled period: 1981-2010



1971-2000 U.S. Normals
~8,000 stations

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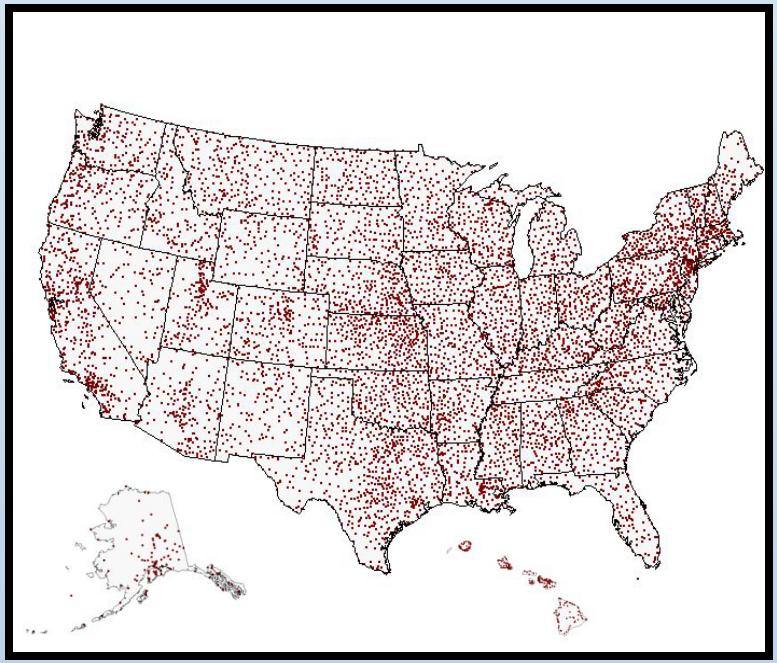

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1981-2010 Normals: Drop 1970s and add 2001-2010

Overview: 1981-2010 Climate Normals

- **Number of Stations (rounded)**
  - **Temperature: 7500**
  - **Precipitation: 8700**
    - **Snowfall: 6400**
    - **Snow Depth: 5300**
  - **Hourly: 260**
- **Source Data Sets**
  - **Primary: GHCN-Daily**
  - **Secondary: ISD-Lite for Hourly Normals**
  - **Normals Station IDs based on GHCN-Daily IDs**

What to Expect on July 1st

- Daily/monthly/seasonal/annual normals of station-based temperature, precipitation, snowfall, and snow depth
- Hourly normals for 260 First Order Stations
- README files, documentation, station lists and metadata
- Instructions for FTP access will be provided on the new normals webpage:

http://www.ncdc.noaa.gov/oa/climate/normals/newnormals.html

What NOT to Expect on July 1st

- Some products will not be available July 1…
- but should be available by January 1 2012:
  - Most agricultural normals such as frost/freeze date normals
    - Requires complete daily data or simulations
  - Spatial aggregations of normals such as climate division normals or gridded normals
  - Population-weighted normals such as monthly HDD/CDD
    - Requires new Census data

Temperature Normals Released July 1	
Daily	**Tmax, Tmin, Tavg,** DTR
	Heating and Cooling Degree Days
	Standard Deviations
Monthly	**Tmax, Tmin, Tavg,** DTR
	Midnight observing time offsets
	Heating and Cooling Degree Days
	Count Normals
	Standard Deviations
Seasonal	**Tmax, Tmin, Tavg,** DTR
	Heating and Cooling Degree Days
	Count Normals
Annual	**Tmax, Tmin, Tavg,** DTR
	Heating and Cooling Degree Days
	Count Normals

Precipitation Statistics Produced for the 1981-2010 Normals		
Precipitation	**Average monthly totals**	Avg
	Average month-to-date totals	
	Average year-to-date totals	
	Average number of days per month exceeding various thresholds	Freq
	Daily relative frequencies exceeding various thresholds	
	25th, 50th, and 75th percentiles of monthly totals	Pctl
	Daily 25th, 50th, and 75th percentiles	
Snowfall	**Average monthly totals**	Avg
	Average month-to-date totals	
	Average year-to-date totals	
	Average number of days per month exceeding various thresholds	Freq
	Daily relative frequencies exceeding various thresholds	
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	Daily 25th, 50th, and 75th percentiles	
Snow Depth	Average number of days per month exceeding various thresholds	Freq
	Daily relative frequency exceeding various thresholds	
	Daily 25th, **50th**, and 75th percentiles	Pctl

Hourly Normals

- Air Temperature
- Pressure
- Dew point Temperature
- Heat Index
- Heating Degree Hours
- Cooling Degree Hours
- Clouds
- Winds
- Wind Chill

NWS Deliverable

- **NCDC provides the National Weather Service a special deliverable for loading into AWIPS**
- **This will be delivered to NWS July 1st, but won't be loaded into AWIPS until August 1st**
- **Several hundred stations, mostly ASOS**
- **Only a portion of the product portfolio**
  - **No hourly normals, limited thresholds, etc.**
- **For more information on the NWS deliverable, please contact Jim Zdrojewski**

Computation of 1971-2000 Normals

Much more than a 30 year average

Weather Stations

STANDARDIZATION

-Time of Observation Correction

-Statistical QC

-Station History QC

-Missing Data Estimation

Standardized Month-Year Sequential Data

Normals Calculations

-Means

-Totals

-Standard Deviations

Monthly Normals

Spline Fit Calculations

Daily Normals

Many stations change location during the course of 30 years. Data are standardized based on the current location.

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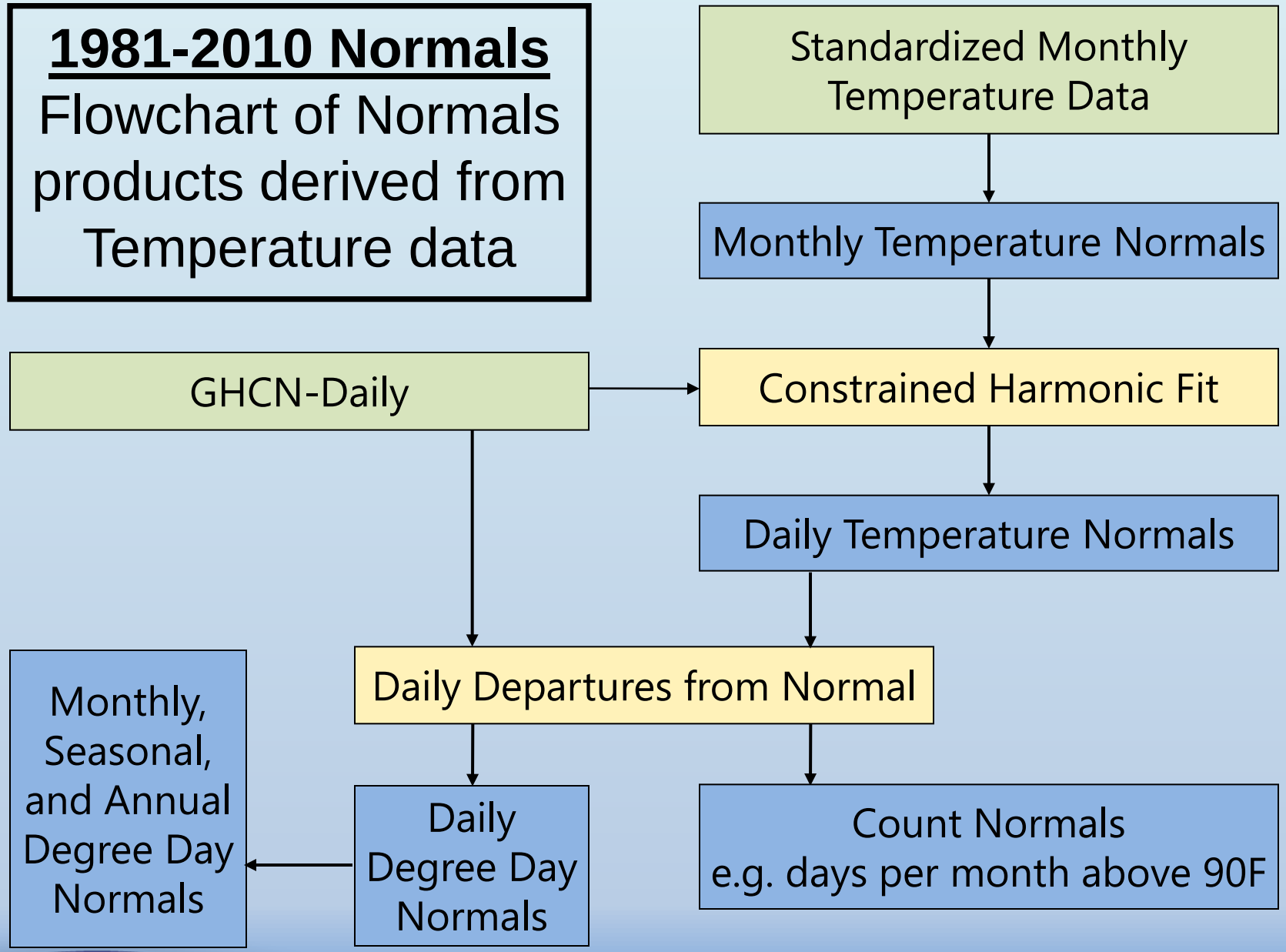
No Daily Data Used

1981-2010 Normals

Flowchart of Normals products derived from Temperature data



Normals of Tmax, Tmin, Tavg, DTR

- We give monthly temperature precedence because of the robust quality control and standardization done at the monthly scale
- Stations with at least 10 non-missing and non-suspect years per month are retained
- Missing monthly values are filled based on an index of agreement analysis
- The 30 values per month are averages and data completeness is tracked as a flag

Going from Monthly to Daily

- Daily temperature normals of tmax, tmin, tavg, and dtr are computed using daily temperature data
- The annual cycle is captured by Harmonic Analysis (sines and cosines)
- We use constrained minimization to ensure daily and monthly normals are consistent
- This passes through the quality control and standardization done at the monthly scale

Computation of HDD/CDD

- No longer using Thom Method or splining
- Start with daily tavg normals
- The key is to measure the spread about the daily tavg normals
- We use a moving window approach to estimate the spread about the daily normal
- The daily HDD/CDD normals are then the scaled averages of the relevant distributions
- Monthly, seasonal, and annual HDD/CDD are accumulated from the daily HDD/CDD values

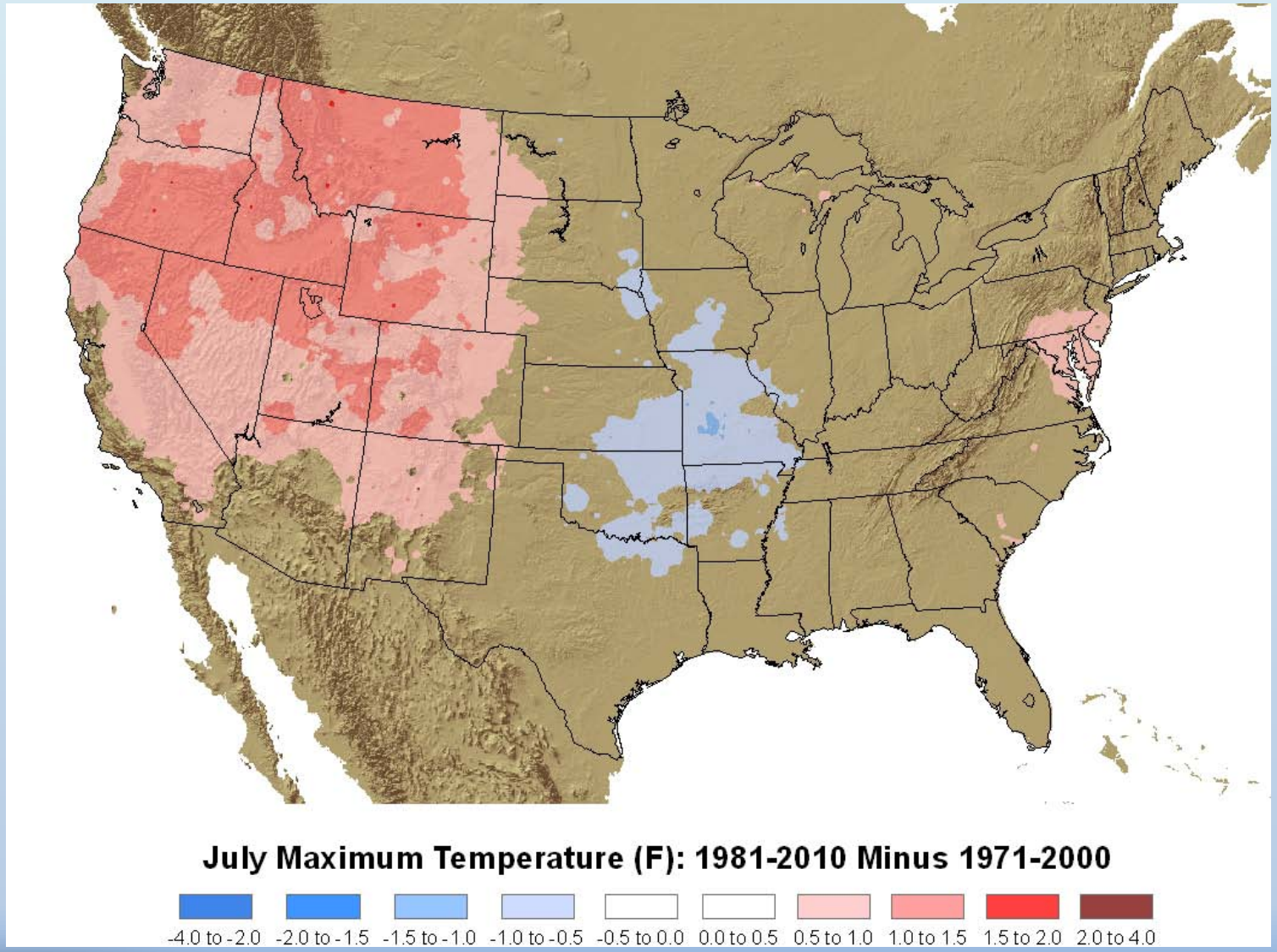
Precipitation-related Normals

- More daily statistics: probabilities and percentiles for precipitation, snowfall, and snow depth
  - Probabilities of measurable amounts and of amounts exceeding various higher thresholds
  - Conditional percentiles: 25th, 50th, and 75th percentiles of nonzero amounts
- For precipitation and snowfall, month-to-date and year-to-date totals replace daily means.
- Snowfall and snow depth statistics at several thousand stations compared to several hundred stations in the 1971-2000 normals.

Pseudonormals and CRN

- Pseudonormals are estimates of expected normals for short-record stations
- Based on Sun and Peterson papers from 2005
- Linear combination of normals from neighboring stations, using overlapping data records to establish the weighting
- Station must meet several criteria:
  - Must have at least 2 years of non-missing and non-suspect data values per month
  - Must have reported at least one value in 2010
- In addition, there must be sufficient neighbors
- Includes Climate Reference Network (CRN) stations

Preliminary Results



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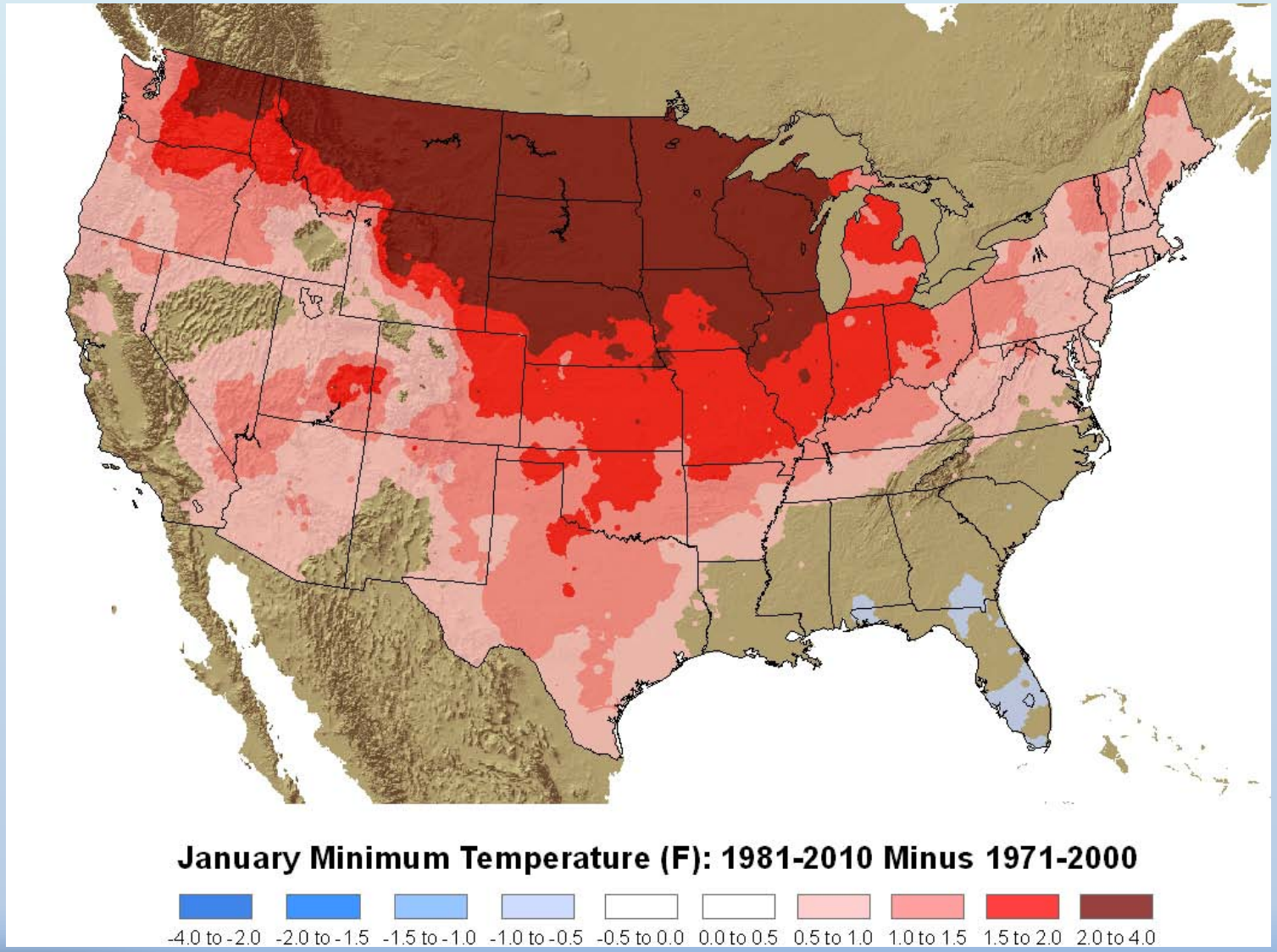

Preliminary Results

- Previous figures are apples-to-apples comparisons
- Statewide averages of annual normals of tmax and tmin show that the 1981-2010 normals are warmer than the 1971-2000 for all lower 48 states
- Apples-to-Oranges comparisons for temperature
  - Different methodology, QC/standardization
  - 5053 stations used last time and this time
  - Tmax: Avg change for all station months is <+0.1F
    - Largest monthly absolute change is +0.9F in January
  - Tmin: Avg change for all station months is +0.6F
    - Every month shows a positive change
    - Largest monthly change is +1.7F in January

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For More Information

- See our website on the 1981-2010 Normals:

http://www.ncdc.noaa.gov/oa/climate/normals/newnormals.html

- Website contains FAQs and other information
- Contact Anthony.Arguez@noaa.gov with any other questions about the 1981-2010 Normals