NERC
NORTH AMERICAN ELECTRIC
RELIABILITY CORPORATION

NERC Project 2023-07 Project Update

TPL-008-1 Extreme Heat and Extreme Cold Temperature

Requirement R1 through R4 Benchmark Events and Planning Cases

Jordan Mallory, NERC

September 2024

RELIABILITY | RESILIENCE | SECURITY




- North American Electric Reliability Corporation (NERC) Antitrust Guidelines
  - It is NERC's policy and practice to obey the antitrust laws and to avoid all conduct that unreasonably restrains competition. This policy requires the avoidance of any conduct that violates, or that might appear to violate, the antitrust laws. Among other things, the antitrust laws forbid any agreement between or among competitors regarding prices, availability of service, product design, terms of sale, division of markets, allocation of customers or any other activity that unreasonably restrains competition

Agenda

- Project 2023-07 Drafting Team
- FERC Order 896
- TPL-008-1 Extreme Heat and Extreme Cold Temperature
  - Requirement R1 through R4
- Benchmark Event Overview

NERC Project 2023-07 Drafting Team

Name	Entity
Evan Wilcox (Chair)	American Electric Power
Jared Shaw (Vice Chair)	Entergy Services
Josie Daggett	Western Area Power Administration
Michael Herman	PJM Interconnection
Tracy Judson	Florida Power & Light
Sun Wook Kang	ERCOT
Andrew Kniska	ISO New England
Dmitry Kosterev	Bonneville Power Administration
David Le	California ISO
Karl Perman	CIP CORPS
Meenakshi Saravanan	ISO New England
Hayk Zargaryan	Southern California Edison

FERC Order 896

- Directives:
  - December 15, 2024 (Regulatory Deadline)
    - Develop Benchmark Events and Planning Cases Based on Major Prior Extreme Heat and Cold Weather Events and/or Meteorological Projects.
    - Entities Responsible for Developing Planning Cases and Conducting Transmission Planning Studies of Wide-Area Events
    - Coordination Among Registered Entities and Sharing of Data and Study
    - Conduct Transmission System Planning Studies for Extreme Heat and Cold Weather Events
      - Steady State and Transient Stability Analyses
      - Sensitivity Analysis
      - Modifications to the Traditional Planning Approach
    - Implement a Corrective Action Plan if Performance Standards Are Not Met

TPL-008-1

Draft 1

- Results 18.69%
- Main concern:
  - Benchmark events

Draft 2

- Results 18.17%
- Main concern:
  - Benchmark events
  - Flexibility

New proposed path:

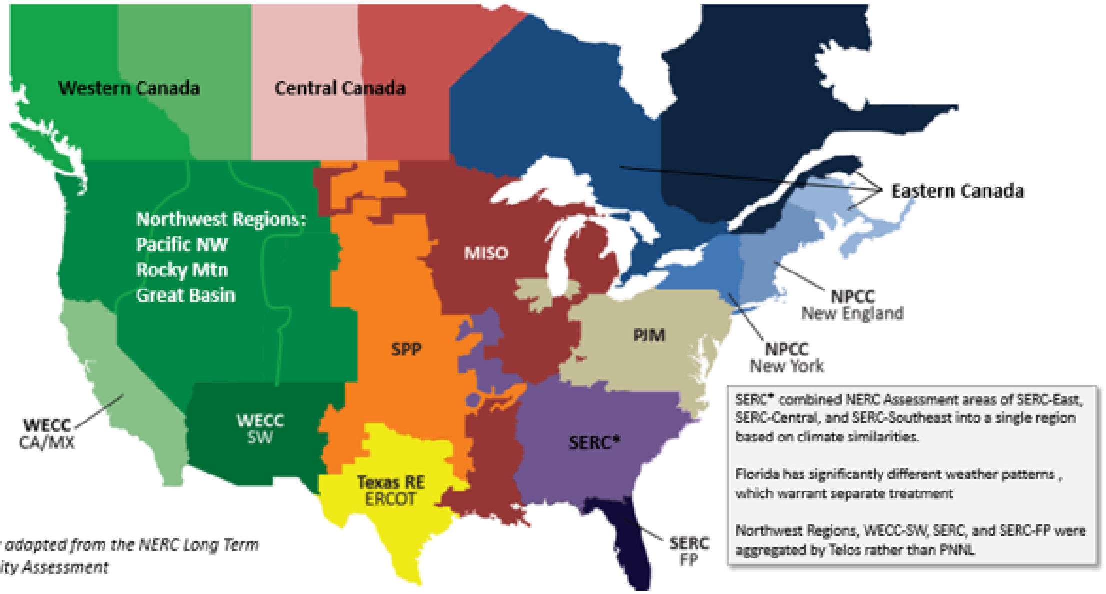
- Addresses FERC Order 896
- Provides entities with flexibility

TPL-008-1 New Proposed Path Requirement R1

R1. Each Planning Coordinator shall identify the zone(s) the Planning Coordinator belongs to per Attachment 1, and shall identify, in conjunction with its Transmission Planner(s), each entity's individual and joint responsibilities for completing the Extreme Temperature Assessment. *[Violation Risk Factor: Lower] [Time Horizon: Long-term Planning]*

Section 1. Zone

The below map has been sectioned into zones requiring Planning Coordinators to identify its zone per Requirement R1.



Source: adapted from the NERC Long Term Reliability Assessment

Slido Poll

Passcode: 202307

Do you agree that 40 years of temperature data is sufficient for Requirement R2?

Do you agree that representing one of the 20 worst extreme cases is the appropriate number for Requirement R2?

TPL-008-1 New Proposed Path Requirement R2

R2. Each Planning Coordinator shall coordinate with all Planning Coordinators within a zone, as identified in Requirement R1, to select one common extreme heat benchmark temperature event and one common extreme cold benchmark temperature event for the zone. Selected benchmark temperature events with a 3-day rolling average of daily maximum (heat) or minimum (cold) shall[1]: *[Violation Risk Factor: High] [Time Horizon: Long-term Planning]*

2.1. Consider no less than 40 years of temperature data ending no more than 5 years prior to the time the benchmark temperature events are selected; and

2.2. Represent one of the worst 20 extreme temperature conditions temperature across the zone.

[1] The Electric Reliability Organization (ERO) will maintain a library of benchmark temperature events that meet the criteria of Requirement R2.

TPL-008-1 New Proposed Path Requirement R3

R3. Each Planning Coordinator shall coordinate with all Planning Coordinators within a zone, as identified in Requirement R1, to implement a process for developing benchmark planning cases that represent the benchmark temperature events selected in Requirement R2 and sensitivity cases to demonstrate the impact of changes to the basic assumptions used in the benchmark planning cases. This process shall include: *[Violation Risk Factor: Medium] [Time Horizon: Long-term Planning]*

3.1. Selection of System models within the Long-Term Transmission Planning Horizon to serve as the starting point for the planning cases.

3.2. Assumed seasonal and temperature dependent adjustments for Load, generation, Transmission, and transfers within the study zone, as identified in Requirement R1.

3.3. Assumed seasonal and temperature dependent adjustments for Load, generation, Transmission, and transfers in areas outside the study zone, as needed.

3.4. For sensitivity cases, identification of changes to at least one of the following conditions:

- Generation;
- Real and reactive forecasted Load; or
- Transfers.

TPL-008-1 New Proposed Path Requirement R4

R4. Each responsible entity, as identified in Requirement R1, shall use the coordination process developed in accordance with Requirement R3 and data consistent with that provided in accordance with the MOD-032 standard, supplemented by other sources as needed, to develop the following: *[Violation Risk Factor: High] [Time Horizon: Long-term Planning]*

4.1. One common extreme heat and one common extreme cold benchmark planning case.

4.2. At least one common extreme heat and one common extreme cold sensitivity case.

Timeline

Completed:

- Initial Posting:
  - March 20 – May 3, 2024 (45-day comment and ballot period)
- Additional Postings:
  - July 16 – August 22, 2024 (38-day comment and ballot period)

In Progress:

- October 7 – 22, 2024 (15-day comment and ballot period)
- November 7 – 22, 2024 (15-day comment and ballot period)
- Final Ballot period:
  - December 5 – 10, 2024
- NERC Board Adoption:
  - December 11, 2024
- File with Regulatory Authorities:
  - December 2024 (Regulatory Deadline – FERC Order 896)

Questions and Answers

Extreme Hot and Cold Weather Benchmark Events

TPL-008 Update | September 10, 2024

TELOS ENERGY

Objectives

- Provide historical **extreme hot and extreme cold weather** benchmark events
- For Planning Coordinators (PC) **continent-wide** to apply to their power flow cases
- Sufficient **historical** hot and cold temperature weather data over an appropriate **range of years** to **identify** the most extreme hot and cold temperatures
- Should NOT consider a single peak hour when extreme weather occurred as the sole temperature determination […] determine the extreme temperature profile over a **span of hours or days**

Note: Telos Energy is not developing the underlying weather data, but rather using publicly available data to identify extreme heat and cold events.

Project Scoping

In-Scope	Out-of-Scope
Extreme heat and cold temperature data	Other weather events (renewable lulls, hydro droughts, wildfires, hurricanes, etc.)
Historical weather data	Climate projections of future weather (although this can be added)
Continent-wide (US & Canada)	Unique datasets by region
Correlated, Consistent, Time Synchronized Data	Stitched together dataset comprised of different events and/or datasets
Long historical record	Using only a few years of recent observations
Identification of extreme events	Meteorological validation and explanation
…	…

Note: Extreme heat and extreme cold events do not necessarily reflect the most extreme conditions for current and/or future power systems. Resource availability and load is a function of additional properties, including wind production, solar irradiance, fuel supply, hydro drought conditions, etc.

The scope of the analysis is strictly evaluating extreme heat and cold temperatures per FERC Order 896.

Modeled weather data vs. historical observations

See: Energy Systems Integration Group. 2023. *Weather Dataset Needs for Planning and Analyzing Modern Power Systems*. A Report of the Weather Datasets Project Team. https://www.esig.energy/weather-data-for-power-system-planning.

	Pros	Cons
Modeled Data, **Numerical Weather Prediction (NWP) and/or Historical Reanalysis**	• Captures more geographic locations / diversity compared to limited number of historical observations • Long historical record • Consistent data, no gaps in historical record, or differences in instrumentation – allows comparison of data across the entire period • Temperature data is relatively easy to model compared to other properties (wind speed, icing, etc.) • Can apply climate trends for future year forecasts	• Modeling bias and uncertainty (requires validation) • Requires ongoing effort for continued development • Difficult to future-proof… updating the model/code requires rerun of previous years • Resolution necessary for power system properties (wind speed, irradiance, etc.) needs to be high for • Computationally intensive • Large data management needs
Historical Observations	• Accuracy • Simplicity • Limited data management needs • Requires less (no) validation	• Data quality concerns, gaps in historical record, outliers and instrumentation changes over time • Limited number of sites (200-300) providing long historical record of consistent, quality data • Weighting or averaging observations to represent wide geographies is challenging • Hourly resolution is lacking

Recommendation: Use publicly available *modeled data* to inform TPL-008 data library and potentially augment with historical observations if/when needed

United States Data Source - PNNL Weather Dataset

Burleyson, C., Thurber, T., & Vernon, C. (2023). Projections of Hourly Meteorology by Balancing Authority Based on the IM3/HyperFACETS Thermodynamic Global Warming (TGW) Simulations (v1.0.0) [Data set]. MSD-LIVE Data Repository. https://doi.org/10.57931/1960530

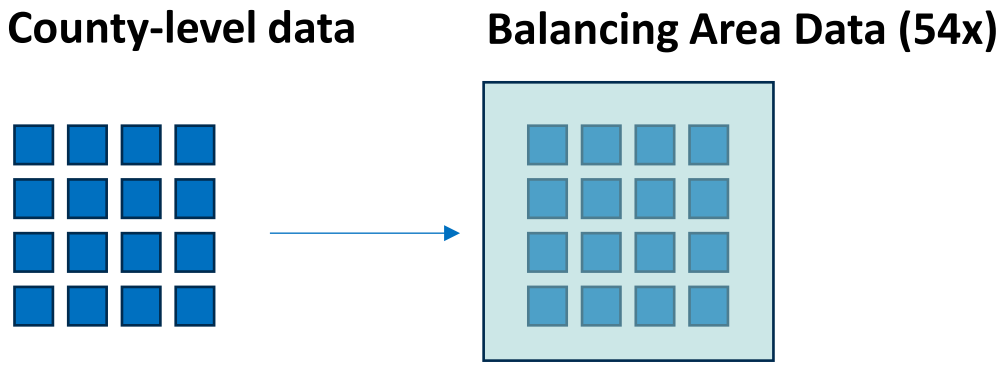
- **43 years (1980-2022) of historical hourly** meteorology +80 years (2020-2099) of projected hourly meteorology
- Dynamical downscaling of historical reanalysis, ERA5 downscaled to higher temporal and spatial resolution using Weather Research and Forecasting Model (WRF)
- 12km model resolution
- Output is first spatially-averaged by county then population-weighted to 54 Balancing Authorities (BAs) in the conterminous United States
- Includes temperature, humidity radiation, wind speed (10-m)
- Includes eight future climate scenarios
- Relying on atmospheric and meteorological science team at PNNL. Telos Energy has performed limited validation on the data

Variables

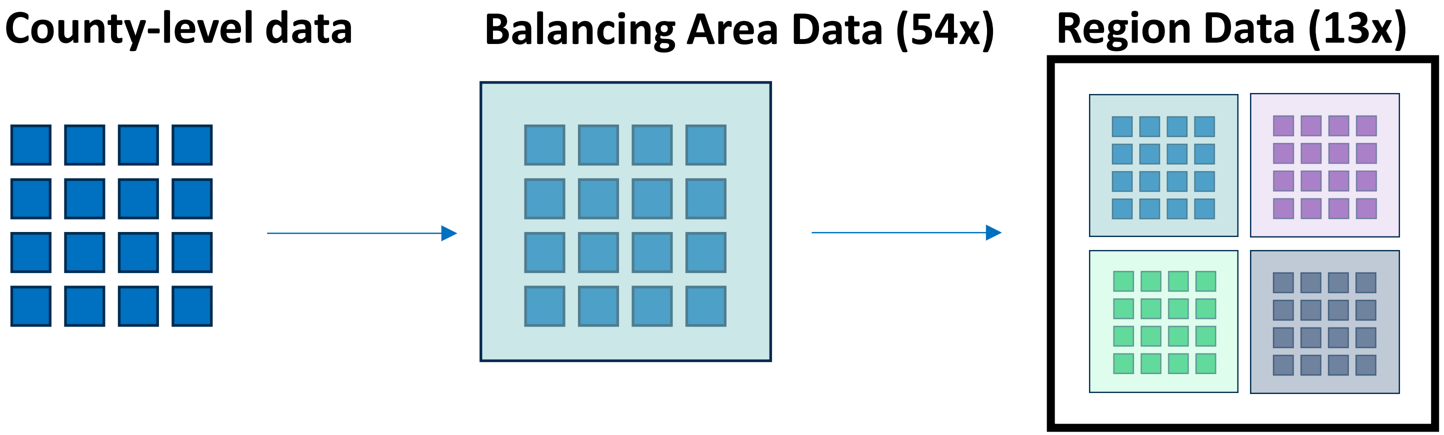
Variable	Name	Description	Units
Time	Time_UTC	Hour in Coordinated Universal Time	-
Temperature	T2	2-m temperature	K
Specific Humidity	Q2	2-m water vapor mixing ratio	kg kg^{-1}
Shortwave Radiation	SWDOWN	Downwelling shortwave radiative flux at the surface	W m^{-2}
Longwave Radiation	GLW	Downwelling longwave radiative flux at the surface	W m^{-2}
Wind Speed	WSPD	10-m wind speed (derived from U10 and V10)	m s^{-1}

https://www.pnnl.gov/events/godeeep-webinar-series-deep-dive-one

Data Granularity

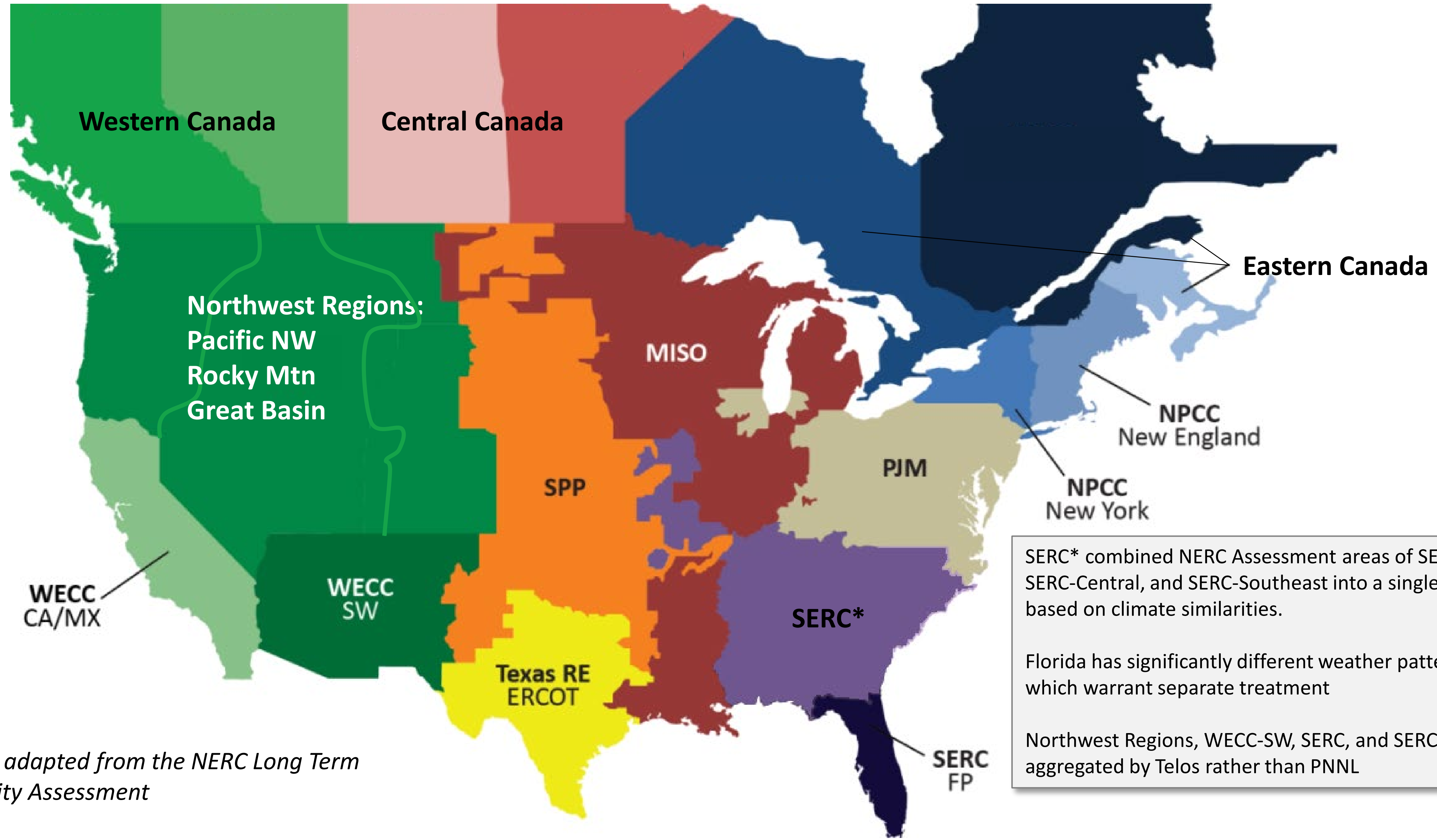


- Starts with 12x12km grid cells
- Data aggregation performed by **PNNL**
- County-level data aggregated to BA by **population weighting**
- BAs were geolocated and which counties they span
- Refer to: hVps://immmsfa.github.io/tell/user_guide.html.
- Used directly for large ISO BAs
  [CAISO, MISO, SPP, PJM, NYISO, ISONE]



- Data aggregation performed by **Telos**
- BA-level data aggregated to regions by **load weighting**
- Only used to aggregate smaller BAs in WECC-NW, WECC-SW, SERC, FRCC

All hourly temperature data will be available to planning coordinators at the county, balancing authority, or regional levels



SERC* combined NERC Assessment areas of SERC-East, SERC-Central, and SERC-Southeast into a single region based on climate similarities.

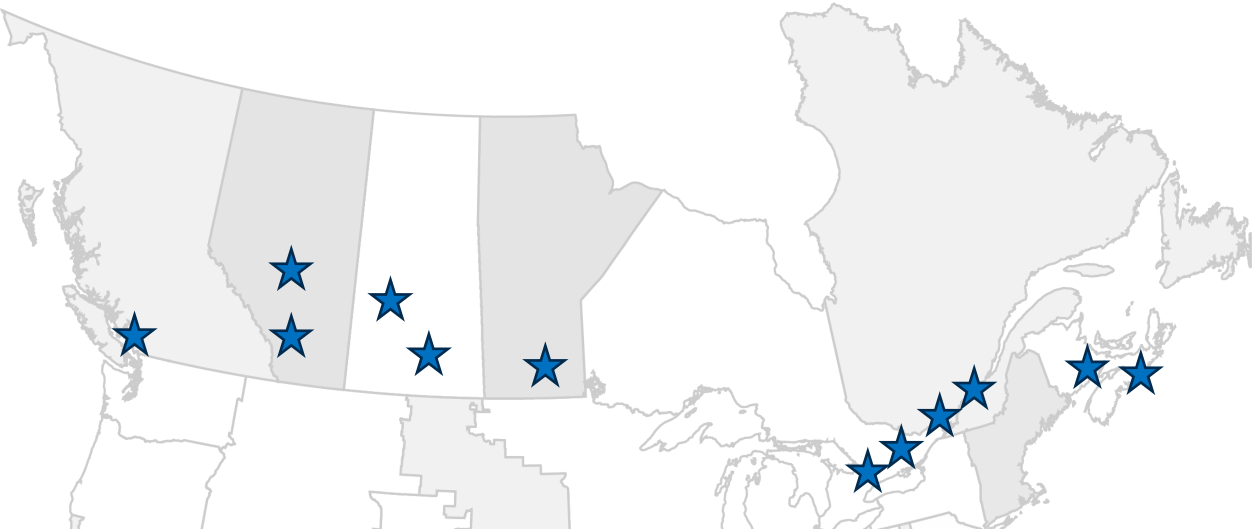
Florida has significantly different weather patterns , which warrant separate treatment

Northwest Regions, WECC-SW, SERC, and SERC-FP were aggregated by Telos rather than PNNL

***Source:** adapted from the NERC Long Term Reliability Assessment*

Canada Data Source –Observed Weather Stations

- The PNNL Dataset does not model weather data in Canada
- In lieu of modeled Canadian data, Telos compiled observed weather data from weather stations in the lower Canadian provinces
- Each weather station was weighted by 2021 Census population data assigned to the nearest population center and rolled up into 3 regions: Canada East, Canada Central, and Canada West



Region	Province	# of stations
Western Canada	British Columbia	2 stations
	Alberta	2 stations
Central Canada	Saskatchewan	2 stations
	Manitoba	1 station
Eastern Canada	Ontario	2 station
	Quebec	2 stations
	New Brunswick	1 station
	Nova Scotia	1 station

Screening for Extreme Heat and Cold Events

Multi-Day Weather Events

- Calculated three-day rolling average temperatures for both extreme heat and extreme cold to identify multi-day periods of extreme heat/cold

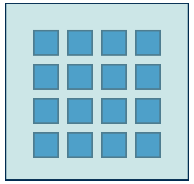
Wide-area assessment

- Aggregated U.S. into 13 regions and evaluated average temperatures across wide areas rather than smaller planning coordinators
- Evaluated the Top 40 extreme heat and cold 3-day periods for reach region and prioritized events that occurred across multiple regions during the same “event”
- Ensured each region had at least its Top 2 worst events covered

Note: other weather properties will have impacts on power system reliability, including humidity, wind speed, irradiance, month/weekday, etc., but the scope of this analysis and request only considered temperature

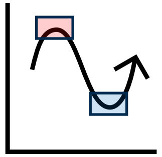
Event Selection Process Overview

Aggregate Date to Weather Zones → Calculate min and max temperatures → Calculate 3-day rolling average → Rank extreme events in each zone → Create shortlist of wide-area events



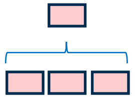
Step 1. Aggregate balancing authorities to geographical regions, “weather zones”

- PNNL Dataset aggregated county → balancing authority
- Telos aggregated balancing authority → geographical region



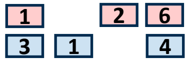
Step 2. Calculate maximum and minimum daily temperatures for each region

- Weighting balancing authority data by peak load if necessary

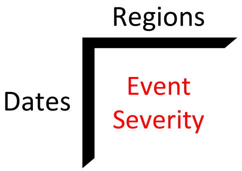


Step 3. Calculate 3-day rolling average of max/min daily temperatures as “ extreme events”

- Assessing 3-day rolling average of maximum daily temperature for heat events
- Assessing 3-day rolling average of minimum daily temperature for cold events



Step 4. Rank extreme events in each region and compare ranks across regions



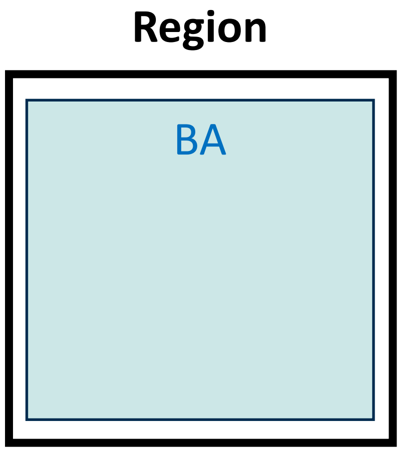
Step 5. Create shortlist of extreme weather events based on severity and regions affected

Aggregate Date to Weather Zones → Calculate min and max temperatures → Calculate 3-day rolling average → Rank extreme events in each zone → Create shortlist of wide-area events

Step 1: Aggregating Balancing Authorities to Geographical Regions and "Weather Zones"

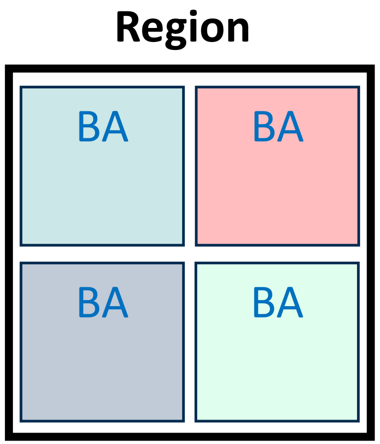
Some weather zones were represented by a single BA

- CAISO → California
- MISO → Midwest
- ISONE → New England
- SPP → Central
- ERCOT → Texas
- NYISO → New York
- PJM → Mid-Atlantic



Some weather zones were represented by multiple BAs

- Northwest
- Southwest
- Southeast
- Florida
- Canada East
- Canada Central
- Canada West



Aggregate Date to Weather Zones → **Calculate min and max temperatures** → Calculate 3-day rolling average → Rank extreme events in each zone → Create shortlist of wide-area events

Step 2: Calculate Max and Min Daily Temperatures

For each day and each zone, the max and min daily temperature were calculated from hourly, balancing authority (BA) temperatures

Temperature (F)

…	HE 2	HE 3	HE 4	…	HE 17	HE 18	HE 19	…
	42	40	44		71	73	68	

Daily Min (HE 3: 40)

Daily Max (HE 18: 73)

For regions comprised of multiple BAs, temperatures were weighted by the percentage of regional peak load served by each BA

Temperature (F)

	Daily Min	Daily Max	Peak Load %	Weighted Min	Weighted Max
BA 1	36	66	.5	18	33
BA 2	32	64	.25	8	16
BA 3	44	72	.25	11	18
				37	67
				Region Daily Min	Region Daily Max

Aggregate Date to Weather Zones → Calculate min and max temperatures → **Calculate 3-day rolling average** → Rank extreme events in each zone → Create shortlist of wide-area events

Step 3: Calculate 3-day rolling average of max/min daily temperatures

To represent long-duration weather events, the 3-day average temperature was calculated for each day, centered on the day

Date	Daily Min
1/13/1990	31
1/14/1990	27
1/15/1990	25

Date	3-Day Avg Min
1/14/1990	27.7

The **coldest** 3-day average minimum temperatures were labeled as "cold events"

Date	3-Day Avg Min
2/2/2004	14
2/3/2004	10
2/4/2004	17

The **hottest** 3-day average maximum temperatures were labeled as "heat events"

Date	3-Day Avg Max
6/21/2011	98
6/22/2011	110
6/23/2011	102

Aggregate Date to Weather Zones → Calculate min and max temperatures → Calculate 3-day rolling average → **Rank extreme events in each zone** → Create shortlist of wide-area events

Step 4: Ranking Extreme Events

For each region, the heat and cold event temperatures were ranked over the entire 40+ year historical data set, with “1” representing the most extreme event.

February 1987 (Example)

Date	1/14	1/15	1/16	1/17	1/18	1/19
Rank		3				8

To avoid double-counting of the same weather event, any ranks within one week of each other were removed in favor of the most extreme event

February 1987 (Example)

Date	1/14	1/15	1/16	1/17	1/18	1/19
Rank		3 ✓				8 ✗

Step 6: Creating a Shortlist of Extreme Weather Events

Once all distinct event date ranges were created, the highest-ranking extreme event for each affected region was filtered into a spreadsheet

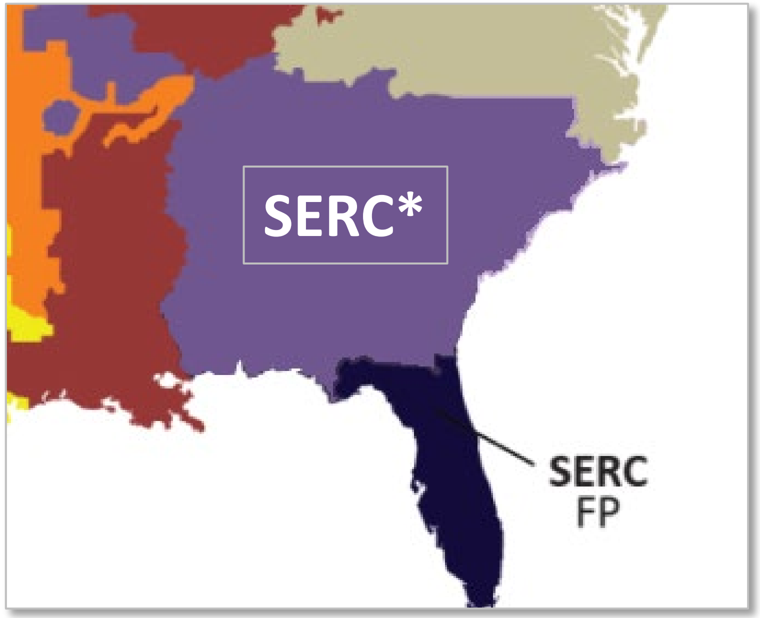
We created a shortlist of extreme weather events under two criteria:

- **A top 2 event occurred for any region**

  -OR-

- **At least 3 regions had a top 5 event simultaneously**

Extreme Weather Events: SERC



Winter Storm Elliott ranks #12 & 20

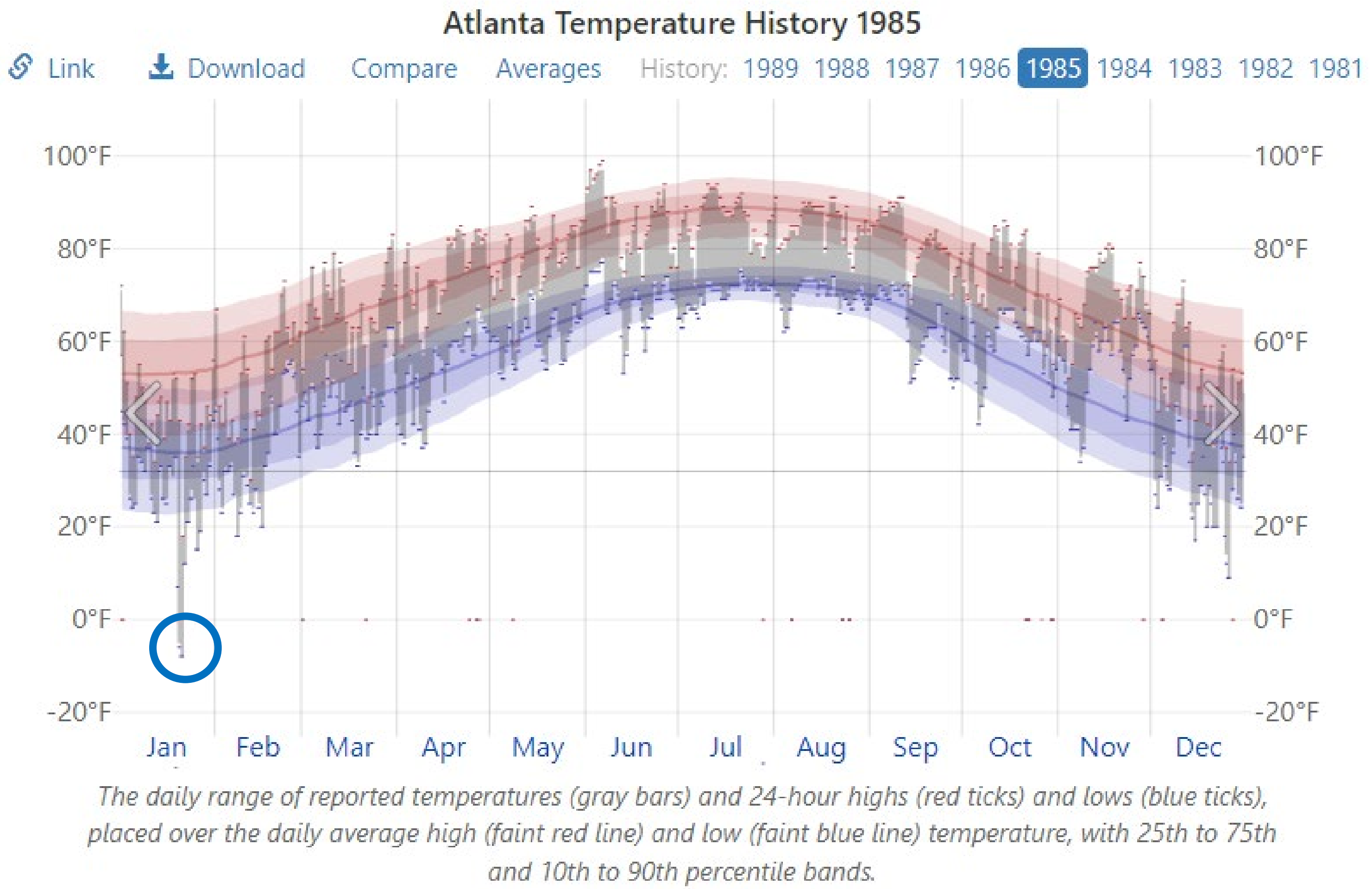
Top 20 Cold Events

Rank	Date	Rolling Avg Min Temp
1	1/21/1985	0.6
2	12/25/1983	2.8
3	1/22/1985	5.7
4	12/23/1989	6.0
5	1/11/1982	6.2
6	1/20/1985	7.2
7	12/26/1983	8.3
8	2/5/1996	9.3
9	2/4/1996	9.4
10	12/24/1989	9.4
11	12/24/1983	10.8
12	**12/24/2022**	**11.2**
13	1/10/1982	11.6
14	12/22/1989	12.4
15	1/19/1994	12.6
16	2/19/2015	13.3
17	1/12/1982	13.3
18	1/20/1994	13.4
19	1/7/2014	13.7
20	**12/25/2022**	**13.8**

Top 20 Heat Events

Rank	Date	Rolling Avg Max Temp
1	6/30/2012	106.9
2	8/16/2007	106.2
3	8/15/2007	105.8
4	6/29/2012	105.7
5	7/31/1999	105.3
6	8/3/2011	104.9
7	8/17/2007	104.8
8	8/14/2007	104.8
9	8/21/2007	104.4
10	7/1/2012	104.3
11	8/22/2007	104.0
12	7/30/1999	103.9
13	8/4/2011	103.7
14	8/10/2007	103.6
15	8/20/2007	103.3
16	8/1/1999	103.2
17	8/9/2007	103.0
18	7/24/2010	103.0
19	8/11/2007	103.0
20	8/18/2007	102.9

January 1985 Cold Wave

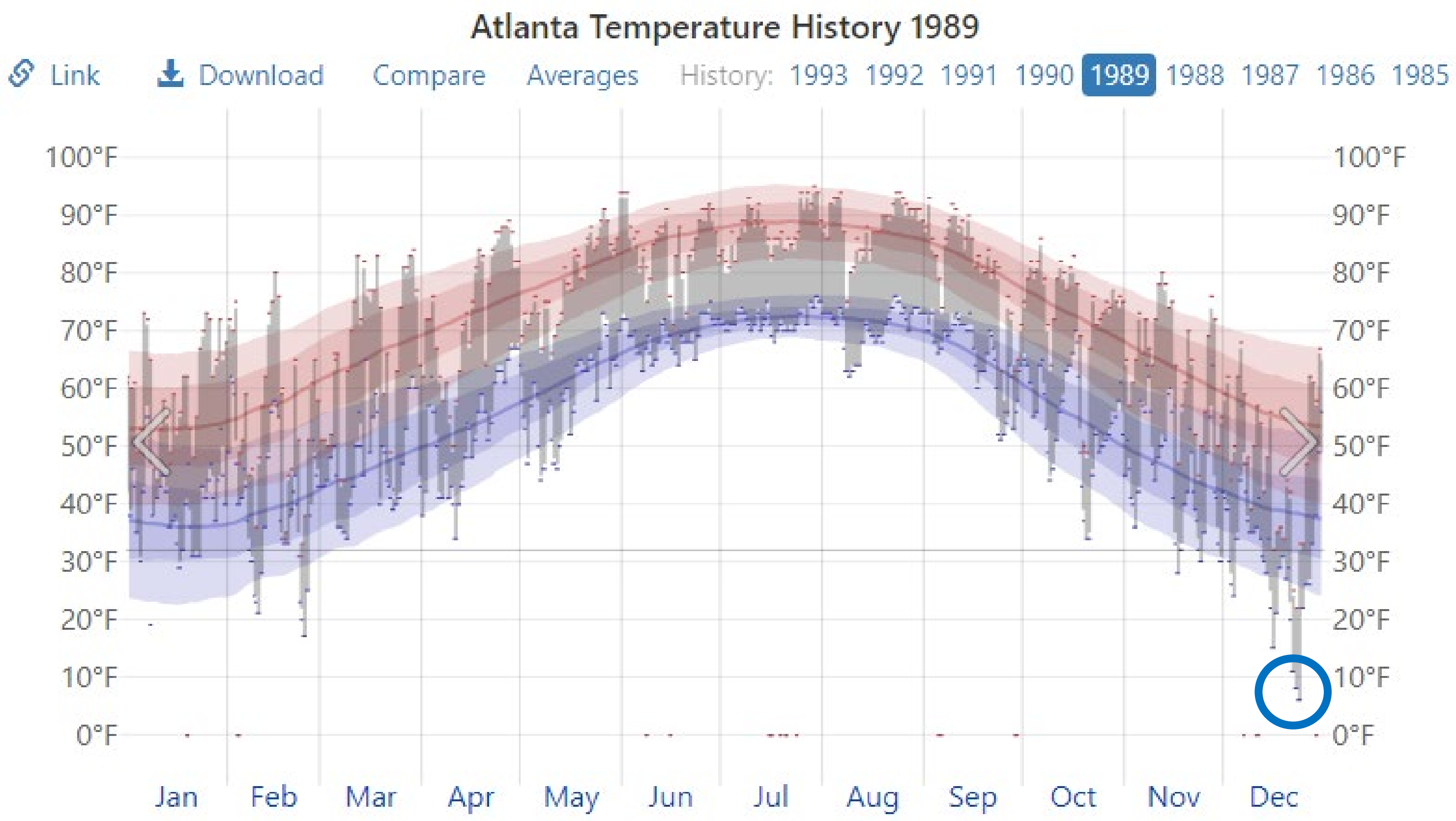


Source: WeatherSpark.com

"One of the most intense arctic outbreaks of the 20th century occurred January 18-22, 1985. Extremely cold temperatures affected every state east of the Rockies with three new state record lows established: -34° at Mt. Mitchell, North Carolina, -19° at Caesar's Head, South Carolina; and -30° at Mountain Lake, Virginia. According to newspaper reports at least 165 fatalities were attributed to the weather. The inauguration parade for President Reagan's second term was canceled with wind chills in Washington DC colder than -10° F. Florida's Secretary of Agriculture termed this the "freeze of the century" with the state's citrus industry suffering $2.5 billion in losses."

https://www.weather.gov/ilm/January1985cold

December 1989 Cold Wave



The daily range of reported temperatures (gray bars) and 24-hour highs (red ticks) and lows (blue ticks), placed over the daily average high (faint red line) and low (faint blue line) temperature, with 25th to 75th and 10th to 90th percentile bands.

Source: WeatherSpark.com

"December of 1989 featured several surges of Arctic air into the central and eastern United States beginning around mid month and lasting until Christmas. This Arctic outbreak was a historic event, with many locations establishing monthly or all-time record lows. Sub-freezing temperatures extended across much of the southeast U.S. with considerable damage to citrus crops in Florida and south Texas […]. Many other locations across the southeast U.S. had damage from frozen pipes as well. The cold weather resulted in snow and sleet falling as far south as central Florida just before Christmas, and parts of northern Florida had its first White Christmas on record. As an area of low pressure moved northeast across Florida, the cold weather resulted in the largest snowstorm in history on the southeast U.S. coast, with totals in excess of a foot along the Atlantic coast of North and South Carolina."
https://www.weather.gov/ilx/dec1989-cold

Wide-Area Extreme Cold Events

Rank of events by average three-day average min temperature, 1980-2022

Start Date	End Date	Western Canada	Pacific NW	California	Great Basin	Southwest	Rocky Mountain	Central Canada	ERCOT	SPP	MISO	SERC	Florida	PJM	New York	New England	Eastern Canada
1/1/1981	1/7/1981														10	1	1
1/9/1981	1/16/1981											12	4	10	2	12	11
1/15/1982	1/21/1982													9	7	6	2
12/20/1983	12/29/1983	9	3				4	6	3	2	4	2	3	3			
1/16/1984	1/24/1984						7			13	3	15		2	3		16
1/17/1985	1/25/1985								11	10	10	1	1	4			
1/29/1985	2/7/1985		15	12	3	6	2		9	7	9						
1/29/1989	2/9/1989	1	2	2	2		3	16		12							
12/19/1989	12/27/1989								1	1	5	3	2	5			15
12/17/1990	1/2/1991	8	1	1	1	1	1			16							
1/13/1994	1/29/1994										2	7		1	1	3	4
1/28/1996	2/8/1996	15	10				9	1	5	3	1	5		7	18		
1/23/1997	1/29/1997	2						7									
1/11/2004	1/18/2004														9	2	6
1/30/2011	2/12/2011					2	5		4	11	13						
1/10/2013	1/17/2013			5	4	3											
2/10/2021	2/19/2021						12	2	2	4	15						

Numbers represent rank of event relative to a region's 43-year history. Lower numbers represent more extreme for that region.

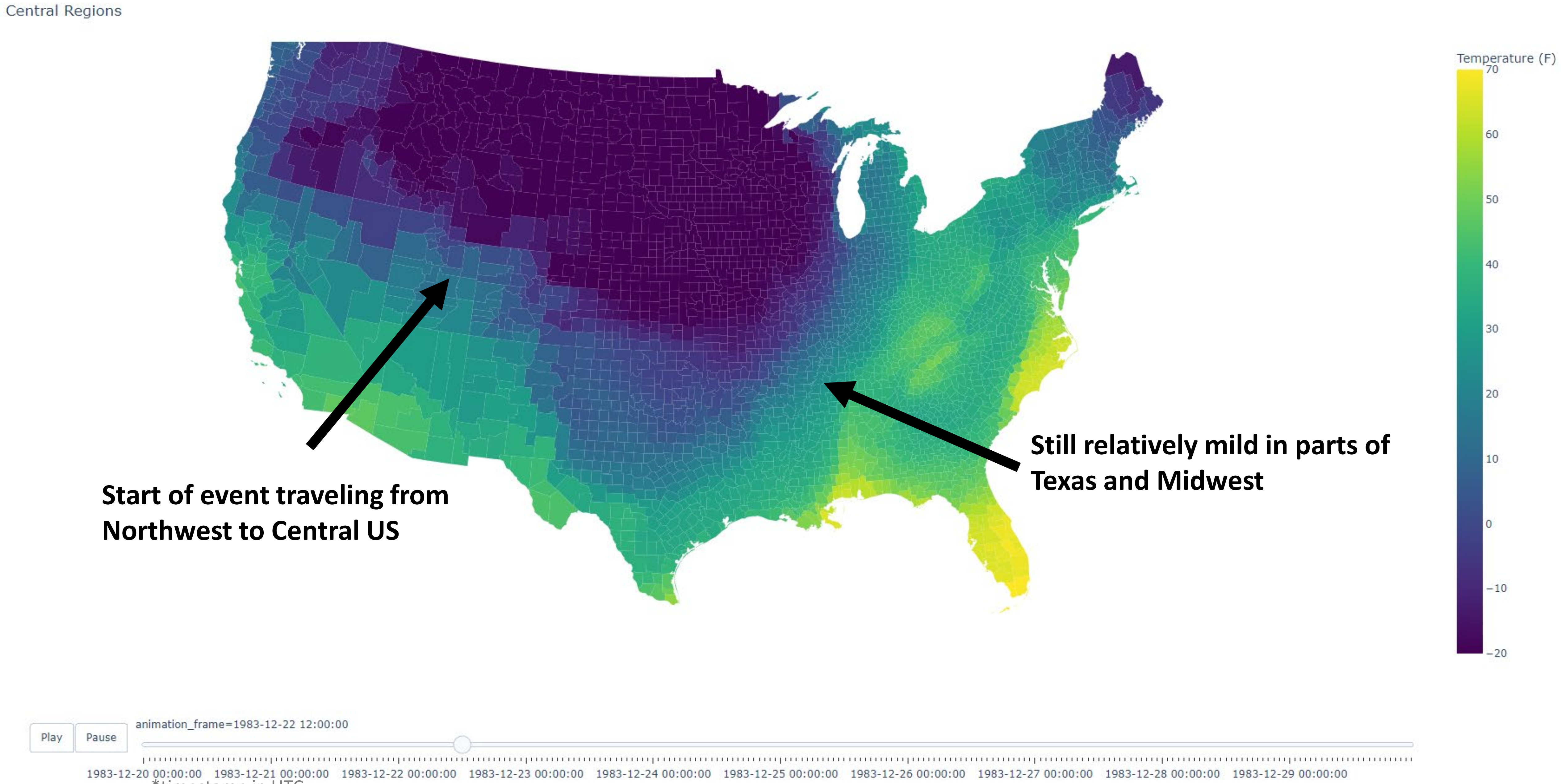
Wide-Area Extreme Heat Events

Rank of events by average three-day average max temperature, 1980-2022

Start Date	End Date	Western Canada	Pacific NW	California	Great Basin	Southwest	Rocky Mountain	Central Canada	ERCOT	SPP	MISO	SERC	Florida	PJM	New York	New England	Eastern Canada
6/24/1980	7/2/1980					13			2								
8/23/1984	8/29/1984							2									
7/3/1988	7/11/1988										13			13			1
8/11/1988	8/19/1988										1			4	7	17	
6/23/1990	6/29/1990					2											
7/16/1991	7/24/1991													16	9	1	8
7/25/1995	7/31/1995					1	10		10								
6/15/1998	6/21/1998												1				
6/28/1998	7/4/1998												2				
7/9/1998	7/22/1998				3		2		14								
7/2/1999	7/8/1999													2	1	6	
9/1/2000	9/7/2000								1								
8/5/2001	8/11/2001													8	3	5	2
6/23/2002	7/6/2002	4					7							18	13	2	3
7/8/2002	7/16/2002	5			1												
7/8/2005	7/26/2005				8	8	1			13							16
7/13/2006	7/26/2006	2	6	3			5			3	9						
8/13/2007	8/19/2007											2					
7/16/2011	7/25/2011									9	14			6	2	3	4
7/30/2011	8/6/2011								5	2		4					
6/21/2012	7/9/2012						3		9	5	2	1		1			
7/29/2012	8/5/2012									1	8						
8/6/2018	8/14/2018	3	18					1									
9/3/2020	9/9/2020			1													
6/25/2021	7/2/2021	1	1												16	21	
7/8/2021	7/14/2021				2												
8/10/2021	8/18/2021	8	2					5									

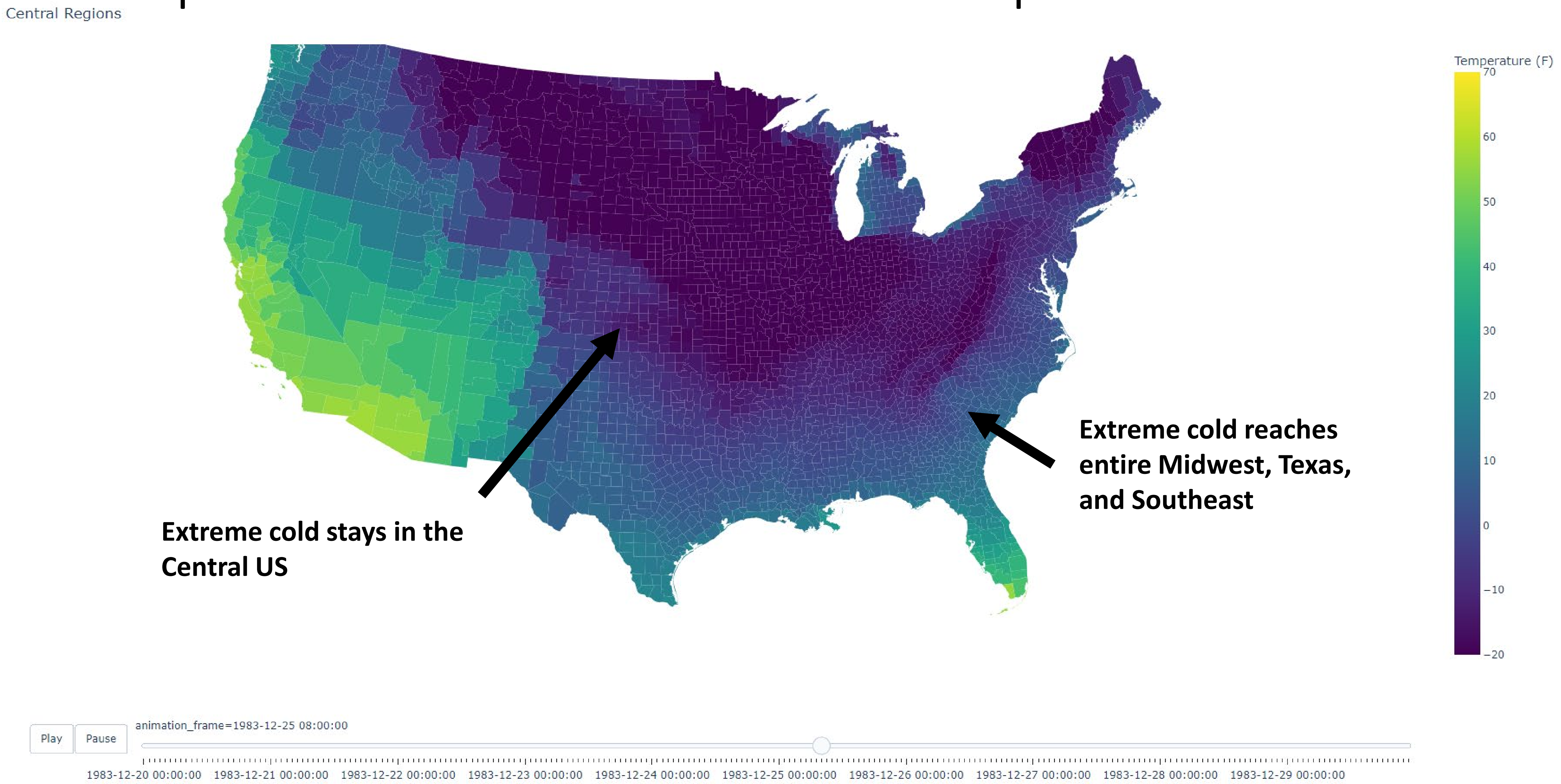
Numbers represent rank of event relative to a region's 43-year history. Lower numbers represent more extreme for that region.

Example of Animated Weather Map for Cold Event



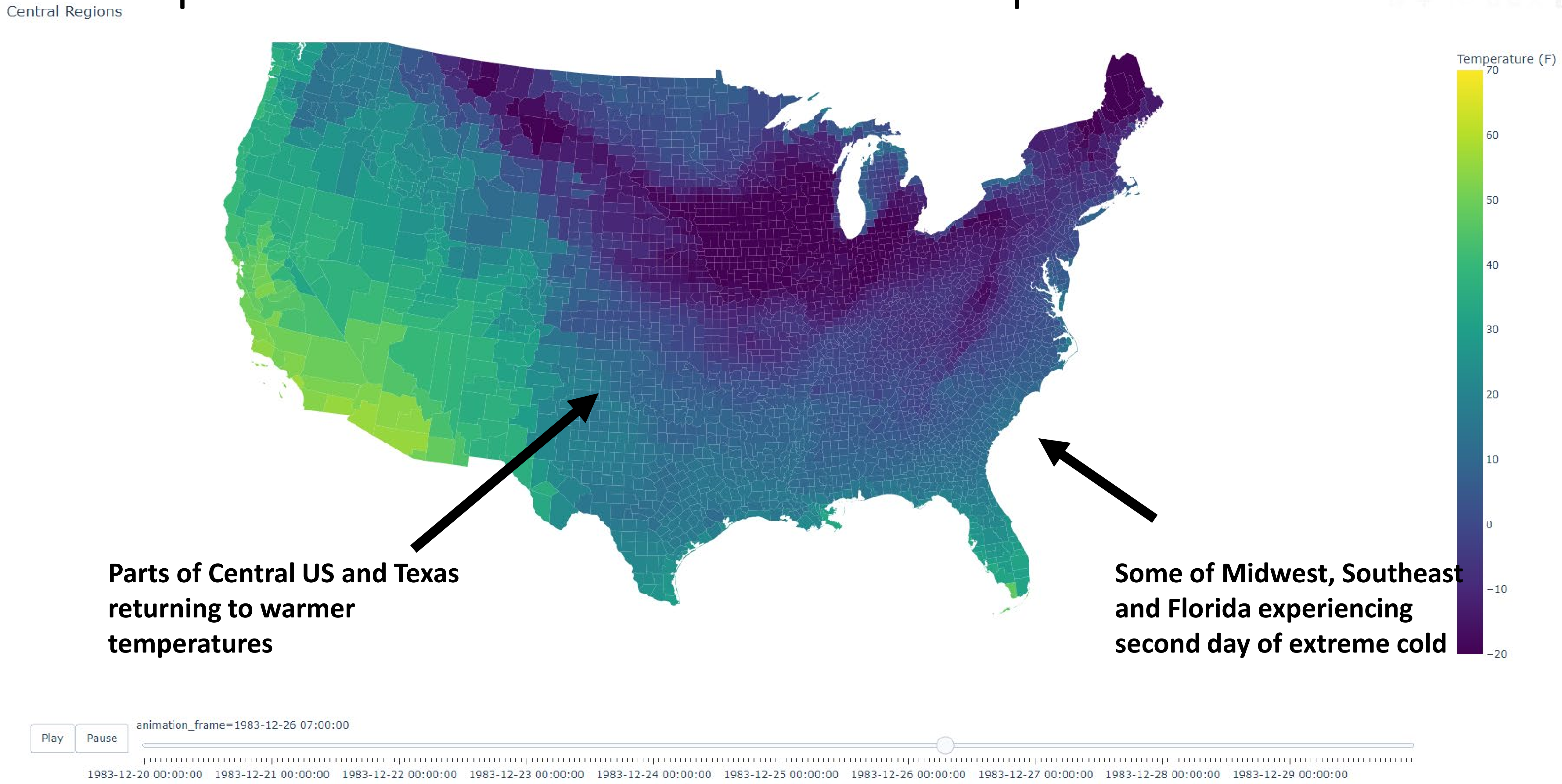
*timestamp in UTC

Example of Animated Weather Map for Cold Event



*timestamp in UTC

Example of Animated Weather Map for Cold Event



Parts of Central US and Texas returning to warmer temperatures

Some of Midwest, Southeast and Florida experiencing second day of extreme cold

*timestamp in UTC

Recommendations and Implementation

- **Planning coordinators should consider choosing a wide-area event from shortlist with regional crossover**
  The electric power grid is highly interconnected, and coordination across entities is important. Regional crossover best represents stressed conditions in neighboring areas
- **Modeled data allows for consistent comparison of temperature data across long time frames and across regions, it will not be 100% accurate**
  It is a valuable tool for identifying events and comparing relative temperatures between events, but it should not replace local data and forecasting
- **Extreme weather events is not just about temperature. The power grid is affected by factors like humidity, wind speed, solar irradiance.**
  Power flow cases should consider many factors when being developed, including impacts on load, wind and solar production, fuel availability, generation and transmission outages, etc.

Thank You!

Questions?

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