

# Examples of Skewed Temperatures

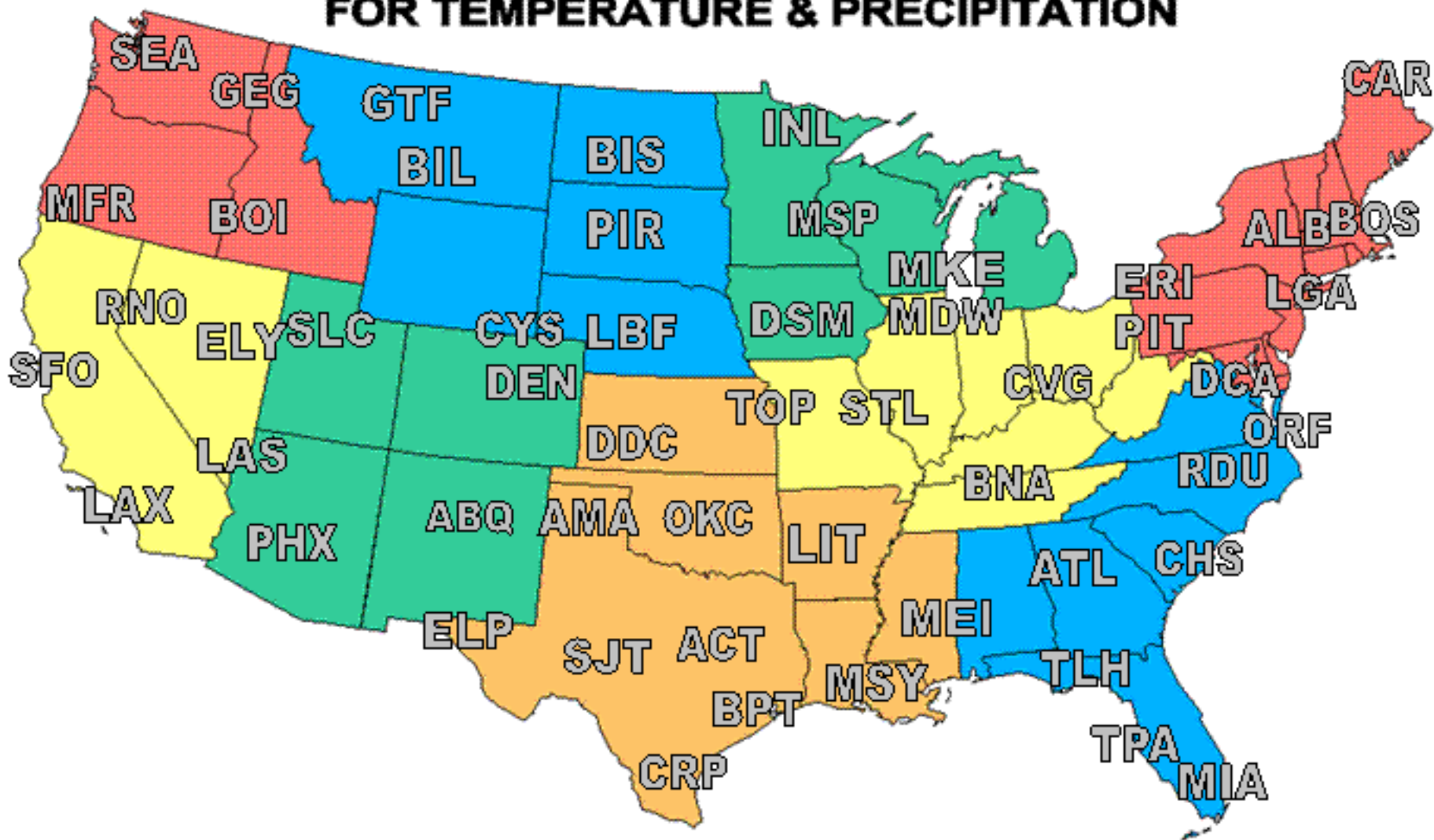
Source:

Scott Runyon M.S. Thesis

# Methodology

- Temperature data were gathered from the National Climatic Data Center's (NCDC) high resolution surface dataset
- Daily high temperatures were extracted for 54 surface stations over a 54-year period (1948–2001)
- Stations selected on basis of both dataset continuity and coverage within the NCDC's Standard Regions for temperature and precipitation

# U.S. STANDARD REGIONS FOR TEMPERATURE & PRECIPITATION



National Climatic Data Center, NOAA

## Methodology (cont.)

- An *anomalously hot day* was initially defined as a day having a high temperature  $\geq 2$  standard deviations ( $\sigma$ ) above the normal\* high temperature
- Result:
  - Large variability in number of anomalous warm events between stations
  - Extreme ratios of anomalously hot days to anomalously cold days at many stations

# Methodology (cont.)

- This initial method led to a discovery:  
*High temperatures at most stations are not normally distributed (“skewed”)*

## Negatively Skewed

2 Standard Deviation Temperature Anomalies		
Station	% Negative	% Positive
DEN	94.2	5.8
CYS	91.3	8.7
TPA	90.7	9.3
MSY	88.8	11.2
BPT	87.8	12.2
AMA	87.6	12.4
ELY	87.6	12.4
GTF	86.9	13.1
ABQ	86.5	13.5
SJT	86.3	13.7

## Positively Skewed

2 Standard Deviation Temperature Anomalies		
Station	% Negative	% Positive
LAX	5.7	94.3
SFO	13.8	86.2
ERI	28.8	71.2
BOS	30.7	69.3
SEA	32.2	67.8
LGA	37.7	62.3
MKE	40.5	59.5
CAR	40.8	59.2
ALB	44.5	55.5
ORF	44.5	55.5

## Methodology (cont.)

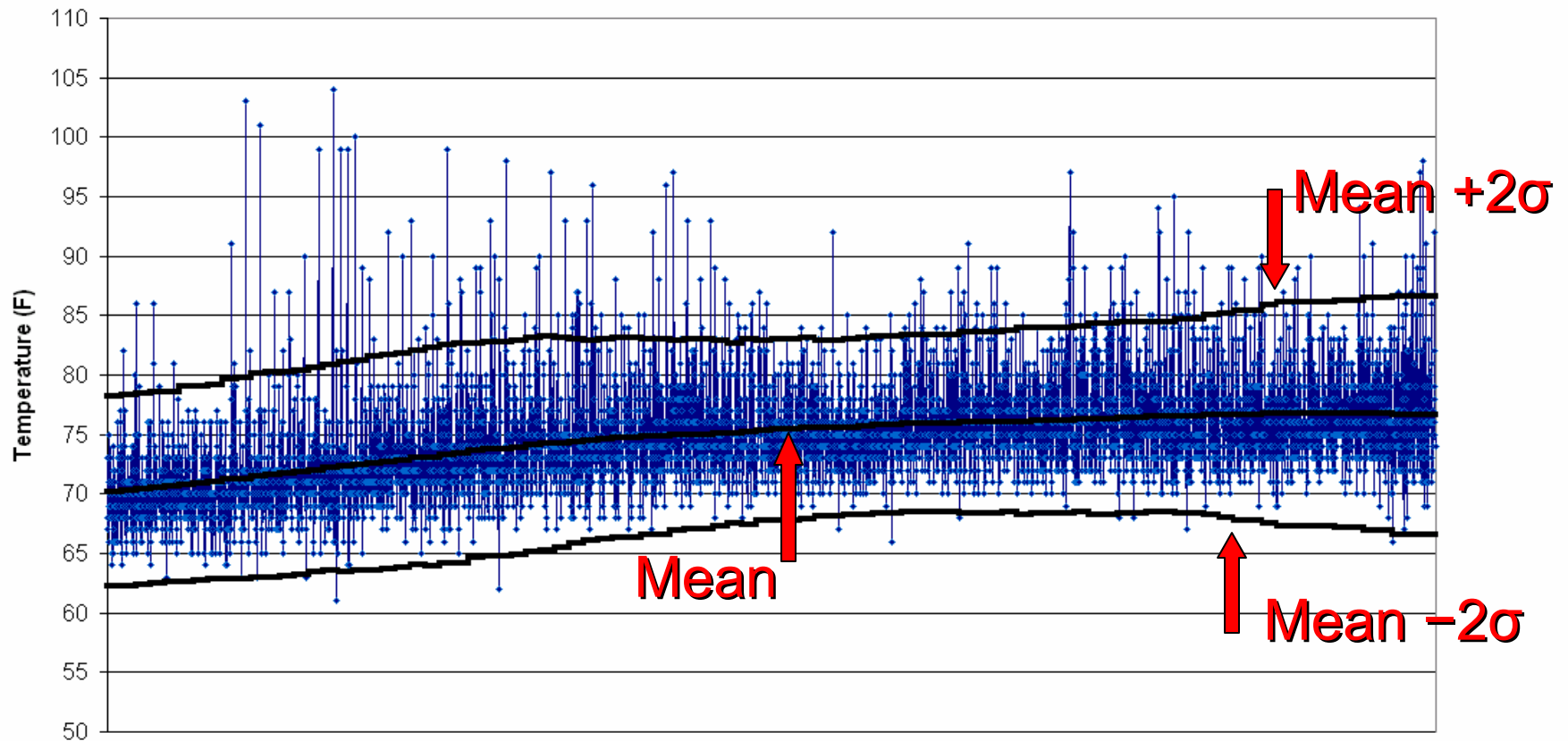
- *Temperature data is widely assumed to be normally distributed*
- Los Angeles, CA and Denver, CO:
  - Most positively and negatively skewed datasets, respectively
  - Using  $2\sigma$  method 989 (49) anomalously hot days were found in Los Angeles (Denver) for all seasons

## Methodology (cont.)

**Most Positively Skewed Station:  
Los Angeles, CA**

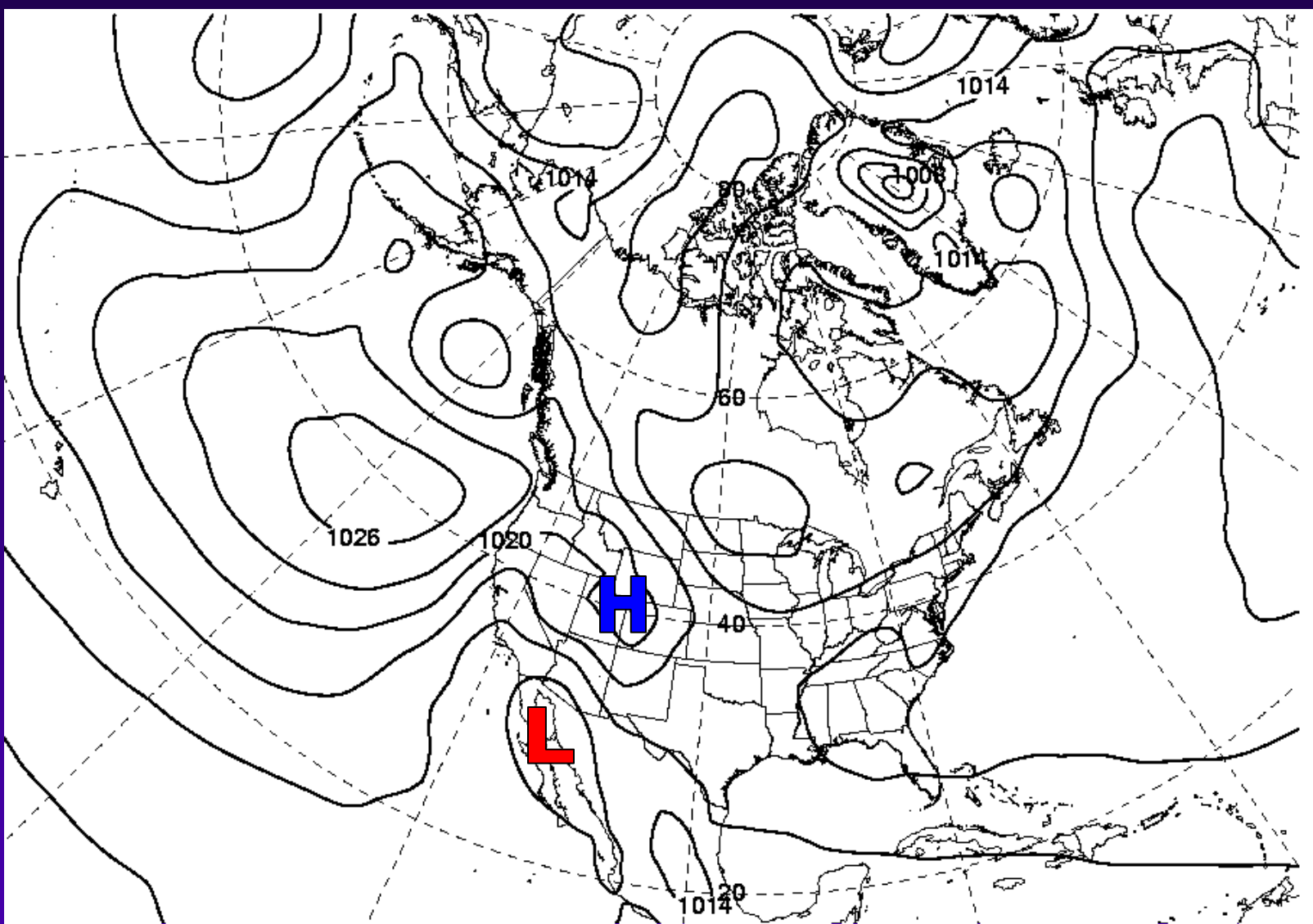
# Methodology (cont.)

## Los Angeles, CA: Daily High Temperatures



June 1 – August 31, 1948 – 2001

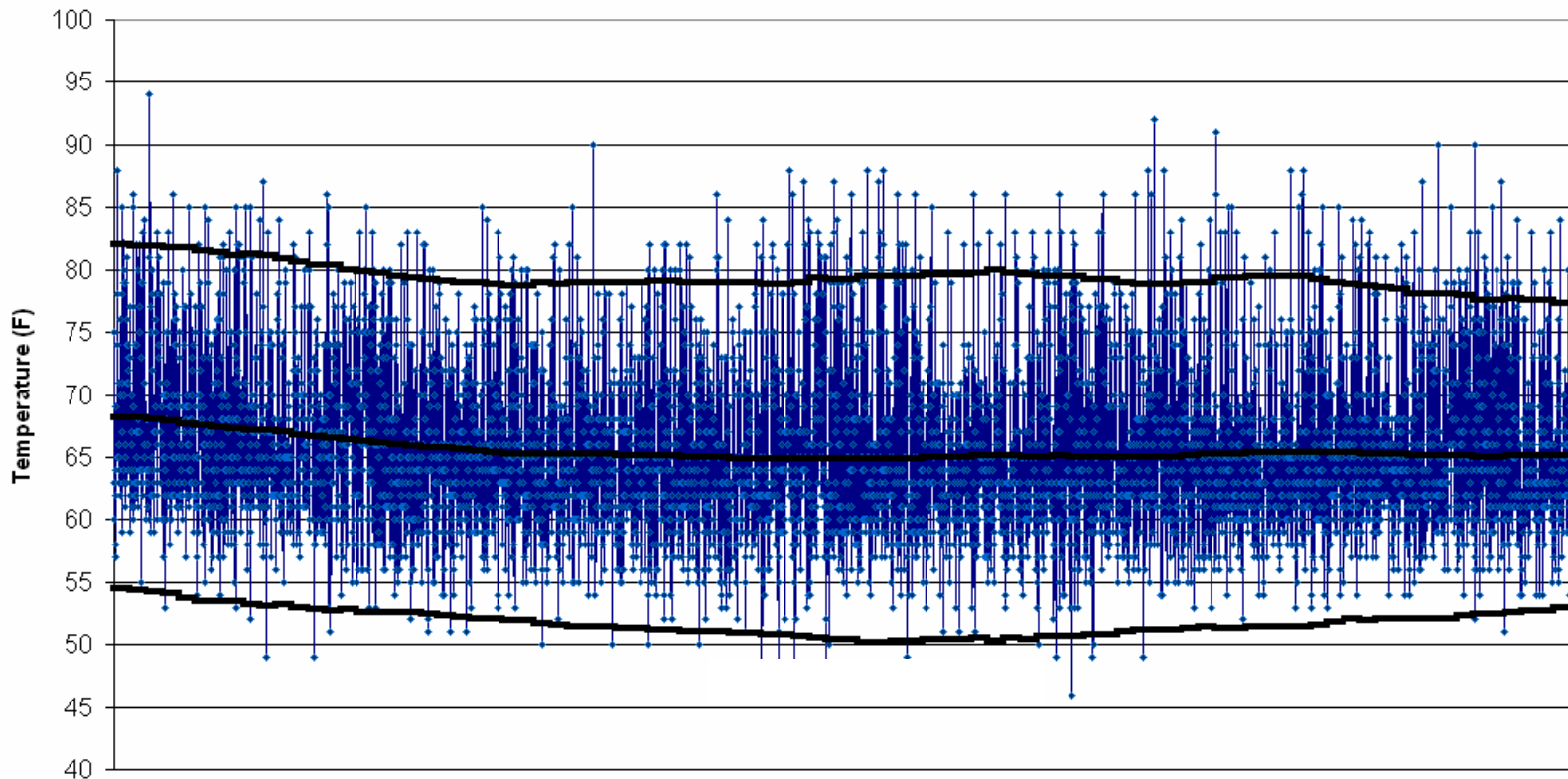




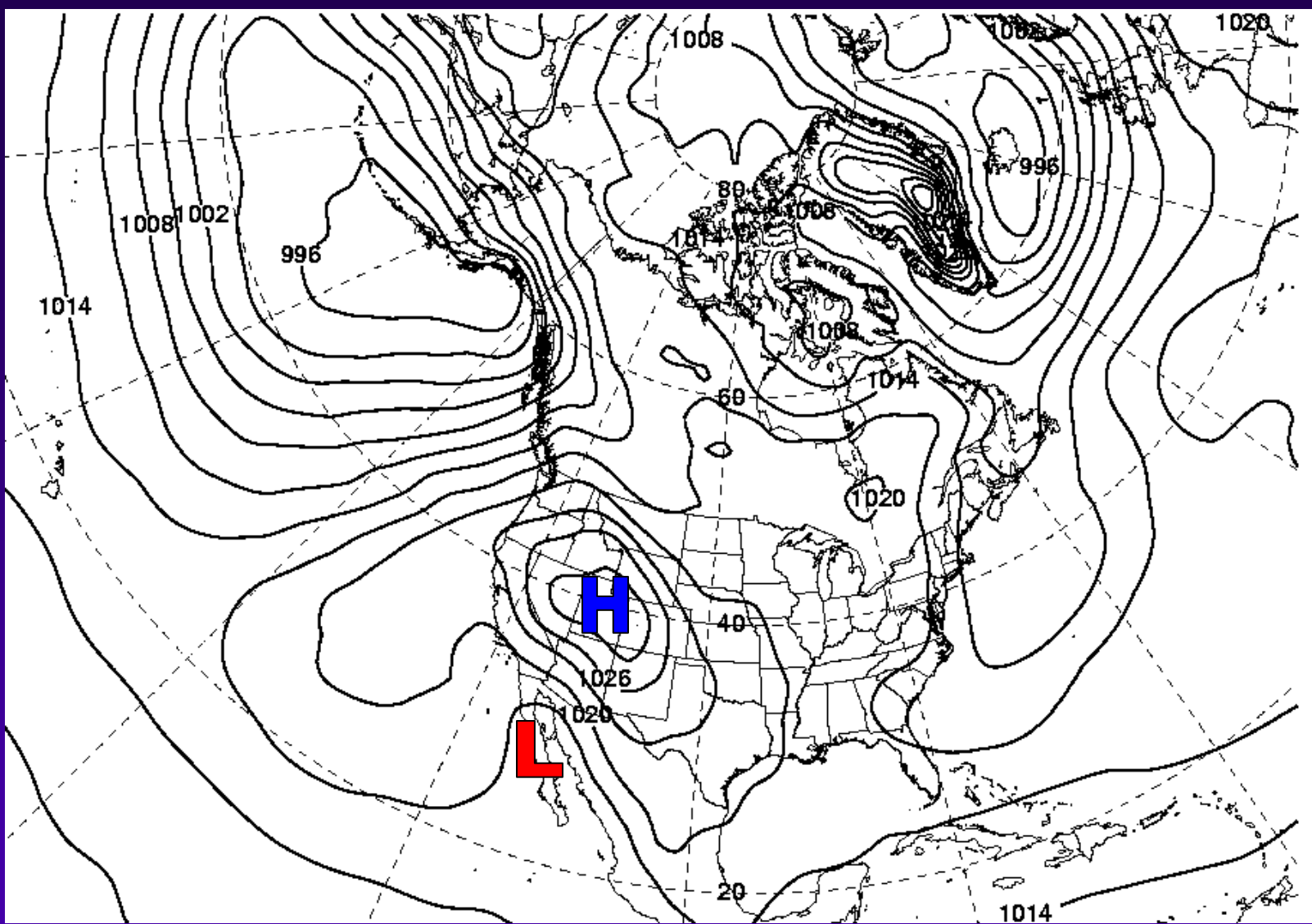
Los Angeles, CA: Composite Mean Sea Level Pressure (hPa) – Ten Most Anomalous Warm Summer Days

# Methodology (cont.)

## Los Angeles, CA: Daily High Temperatures



December 1 – February 29, 1948 – 2001



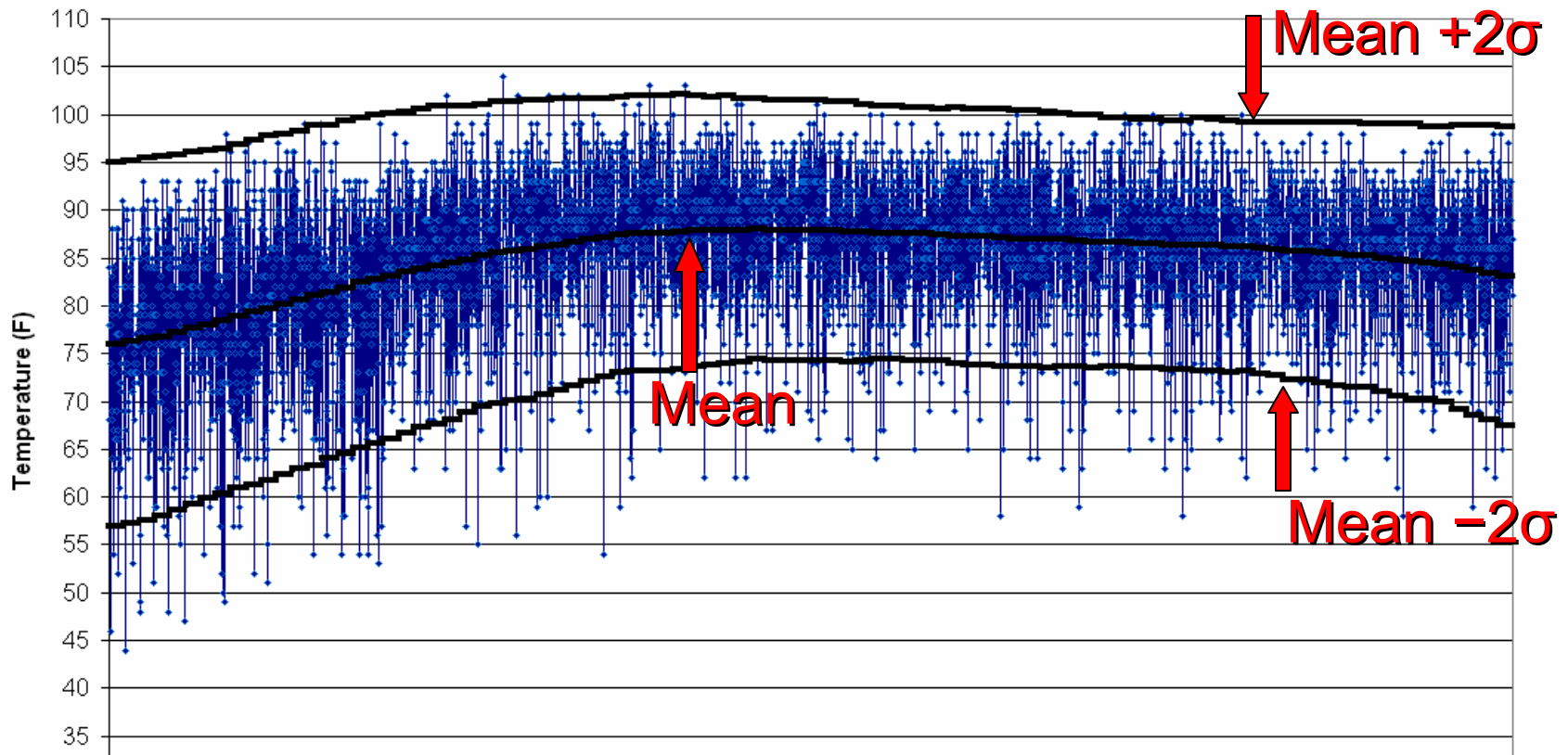
Los Angeles, CA: Composite Mean Sea Level Pressure (hPa) – Ten Most Anomalous Warm Winter Days

## Methodology (cont.)

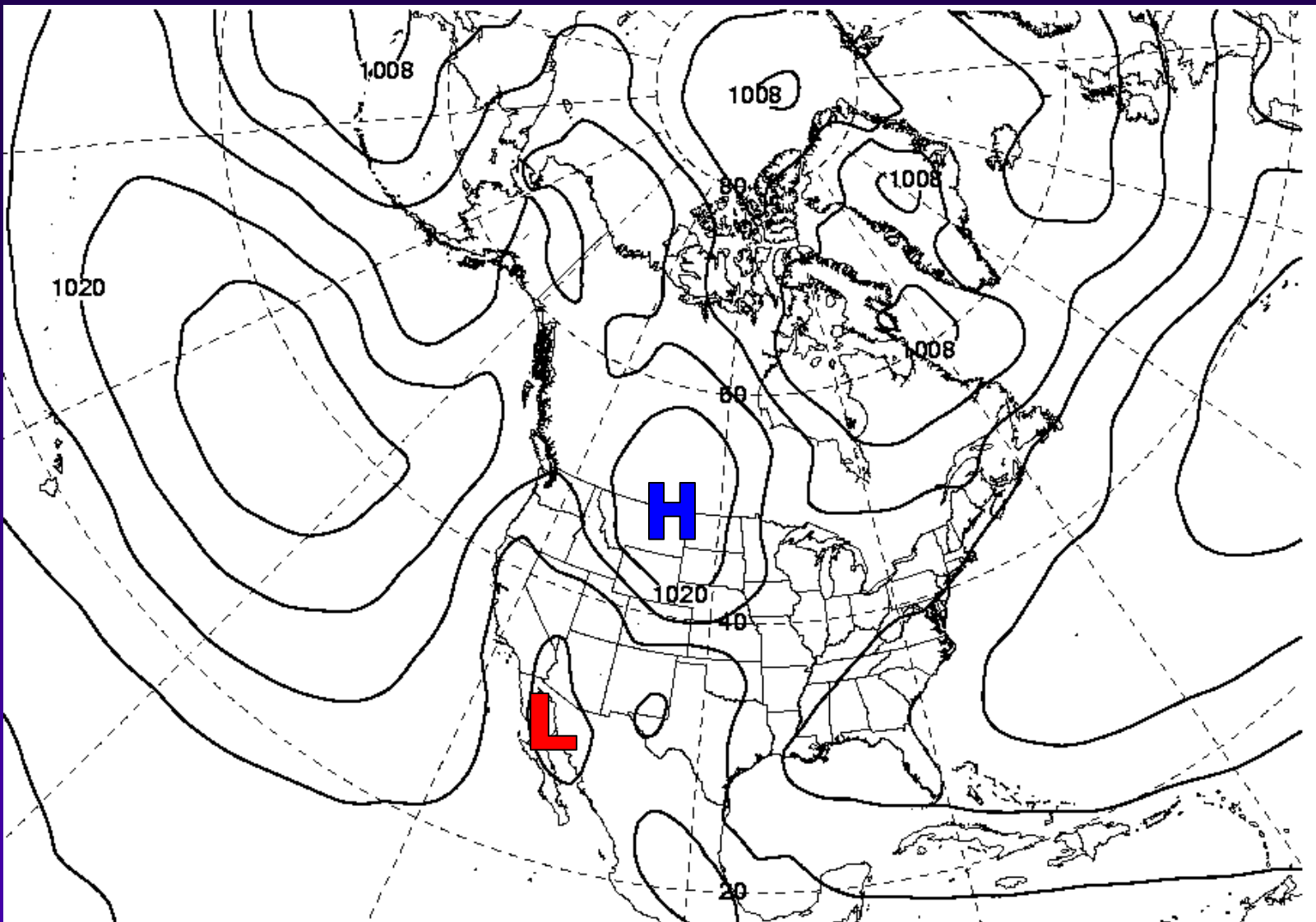
**Most Negatively Skewed Station:  
Denver, CO**

# Methodology (cont.)

## Denver, CO: Daily High Temperatures



June 1 – August 31, 1948 – 2001

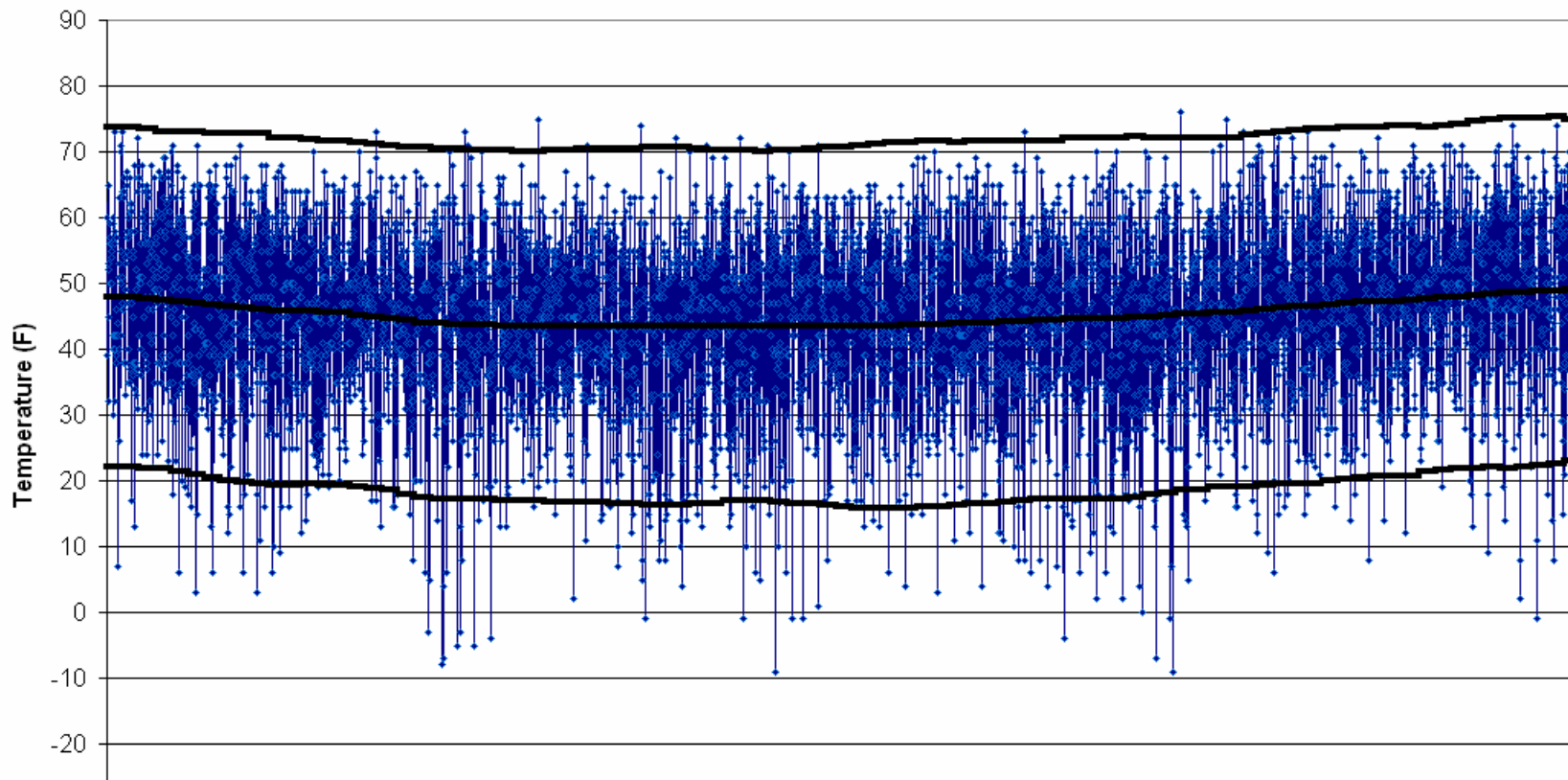


Denver, CO: Composite Mean Sea Level Pressure (hPa) – Ten Most Anomalous Cold Summer Days

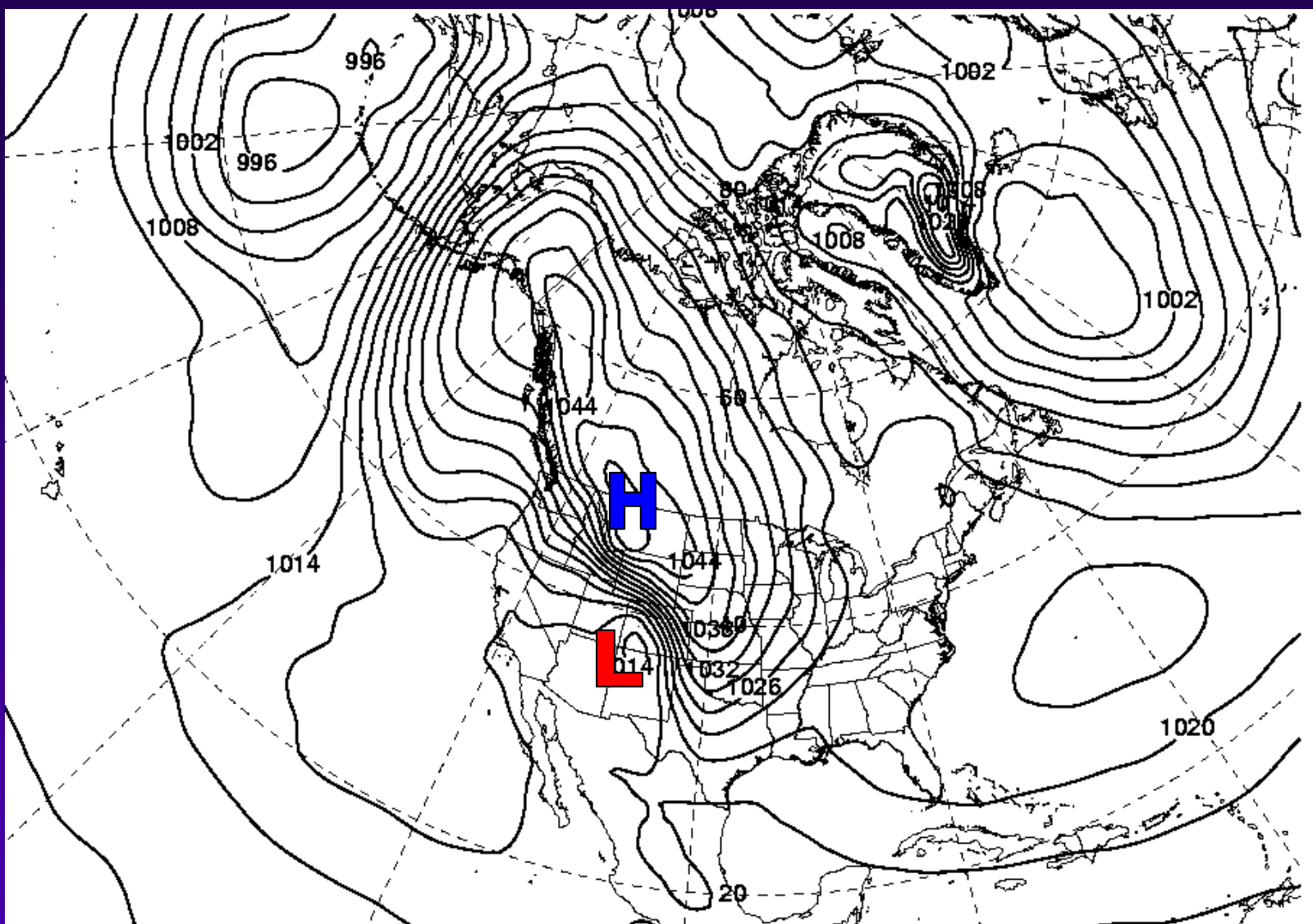


# Methodology (cont.)

## Denver, CO: Daily High Temperatures



December 1 – February 29, 1948 – 2001



Denver, CO: Composite Mean Sea Level Pressure (hPa) – Ten Most Anomalous Cold Winter Days