Outlook for the 2005 Ozone Season

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MWAQC TAC Meeting
March 11, 2005
MWCOG 3rd Floor Board Room
777 North Capitol St., NE, #300
Washington, DC 20002

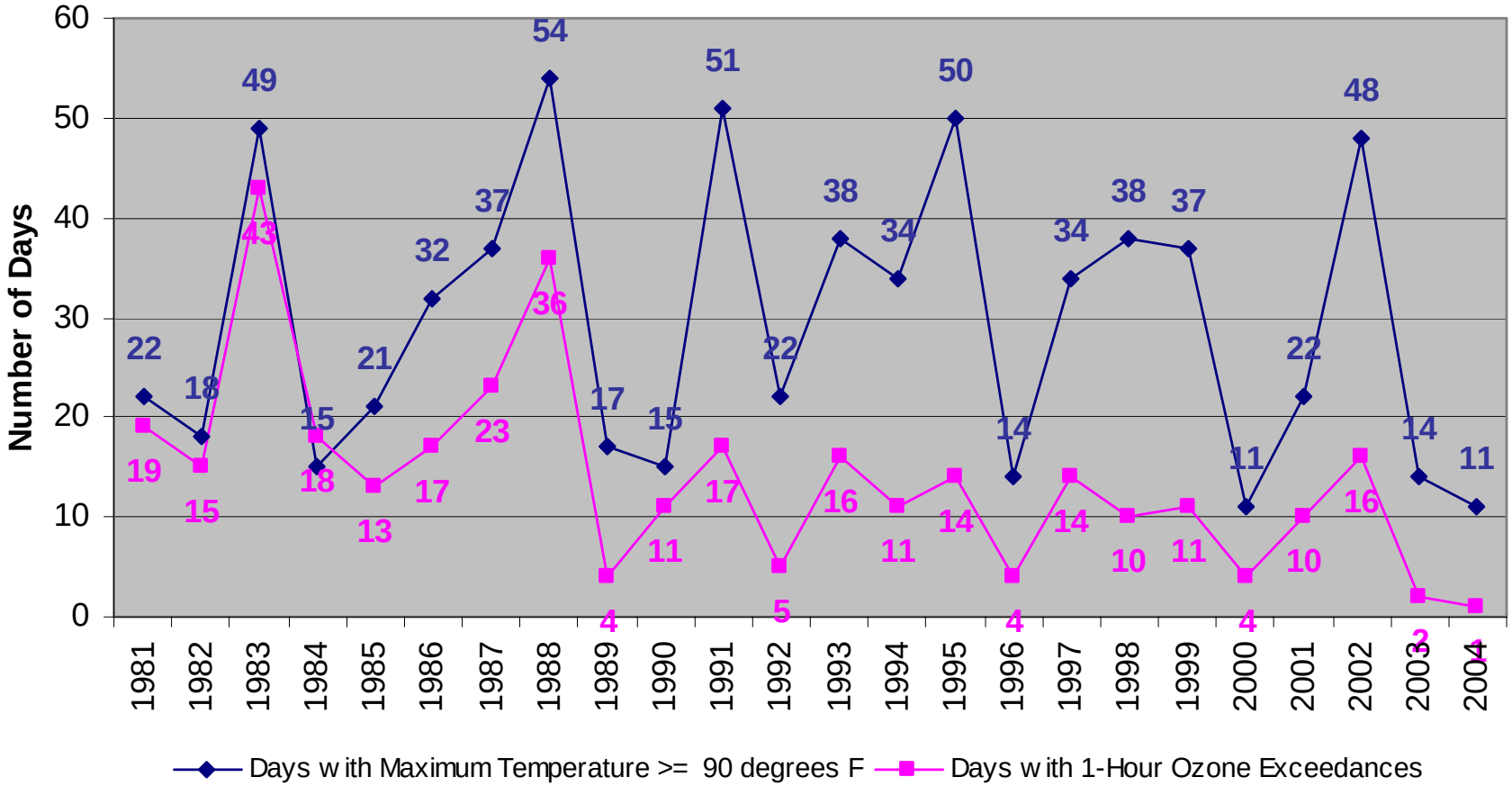
Outline

- Historical Ozone Seasons
- Review of 2004 Ozone Season
- Outlook for 2005 Ozone Season

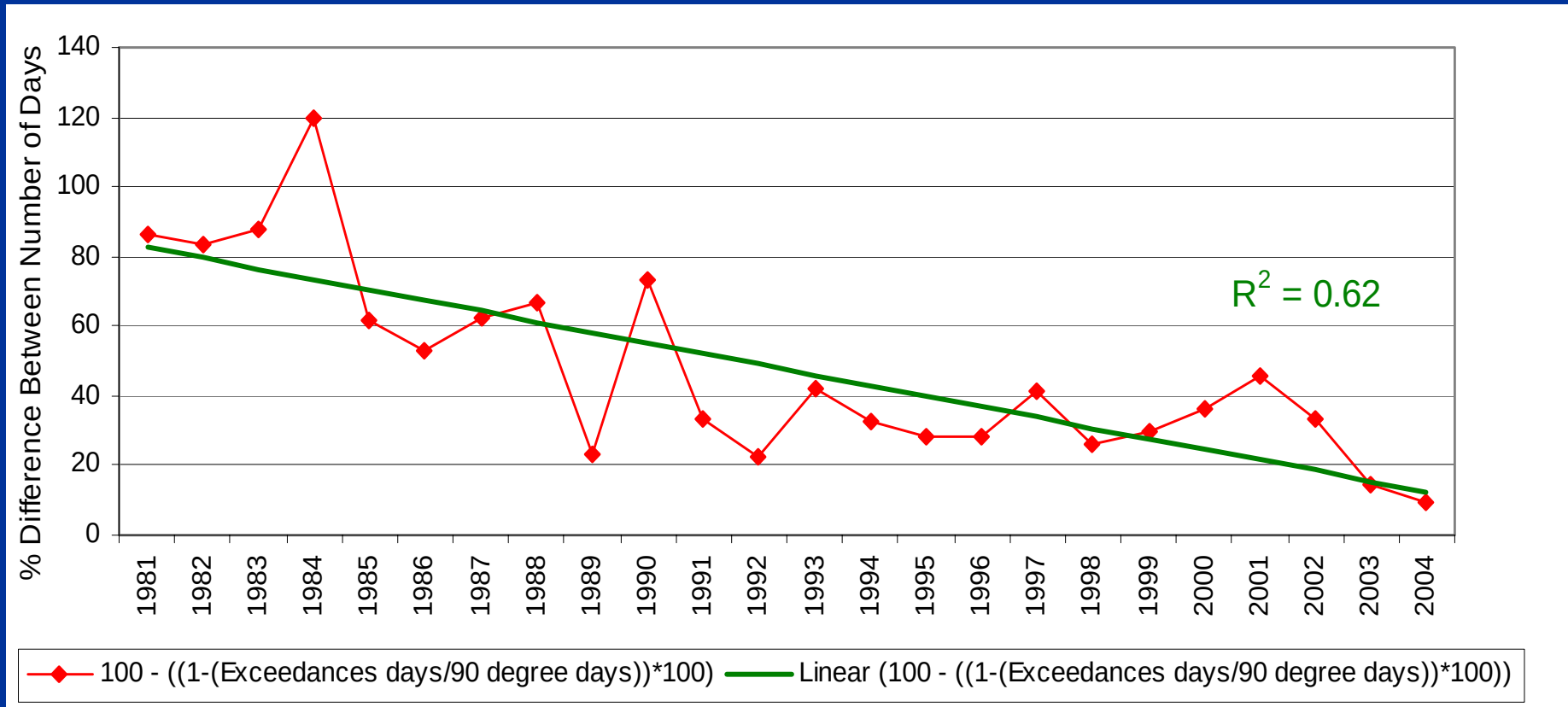
- Review of Monitoring Sites

Historical Ozone Seasons

Maryland 1-Hour O_3 Exceedances and 90°F Days



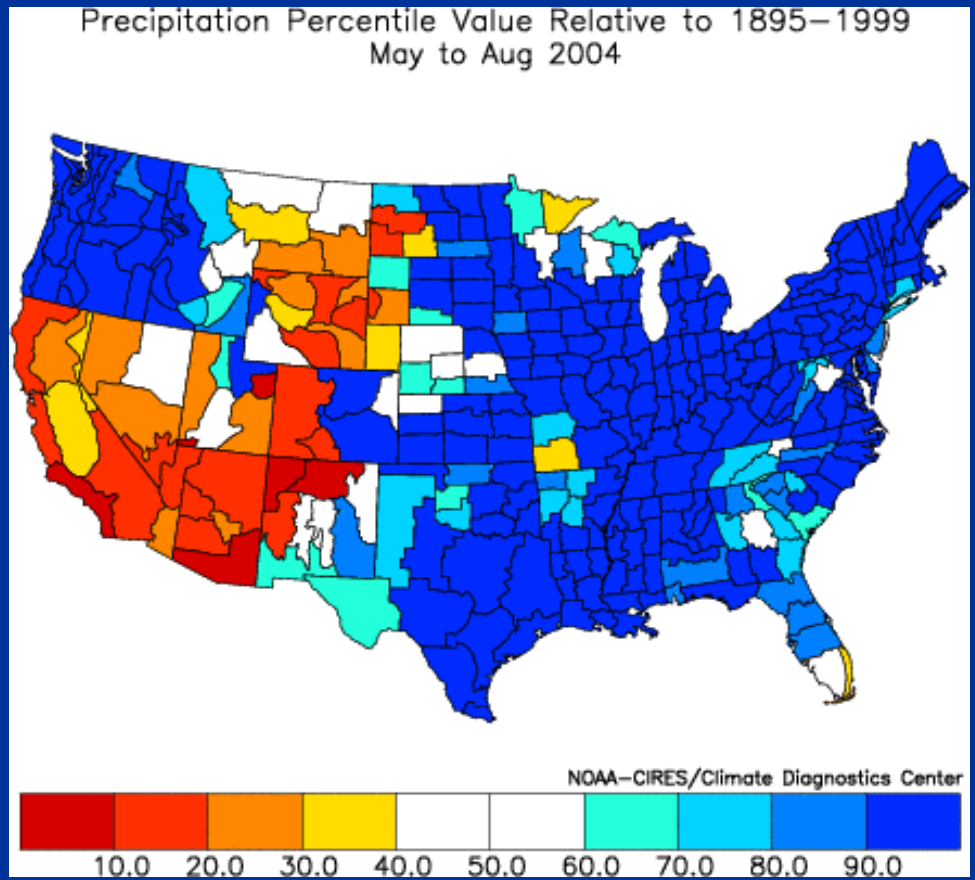
The Declining Trend of 1-hour O_3 Exceedance Days in Maryland with respect to The Number of 90˚F Days at BWI Airport



Review of 2004 Ozone Season

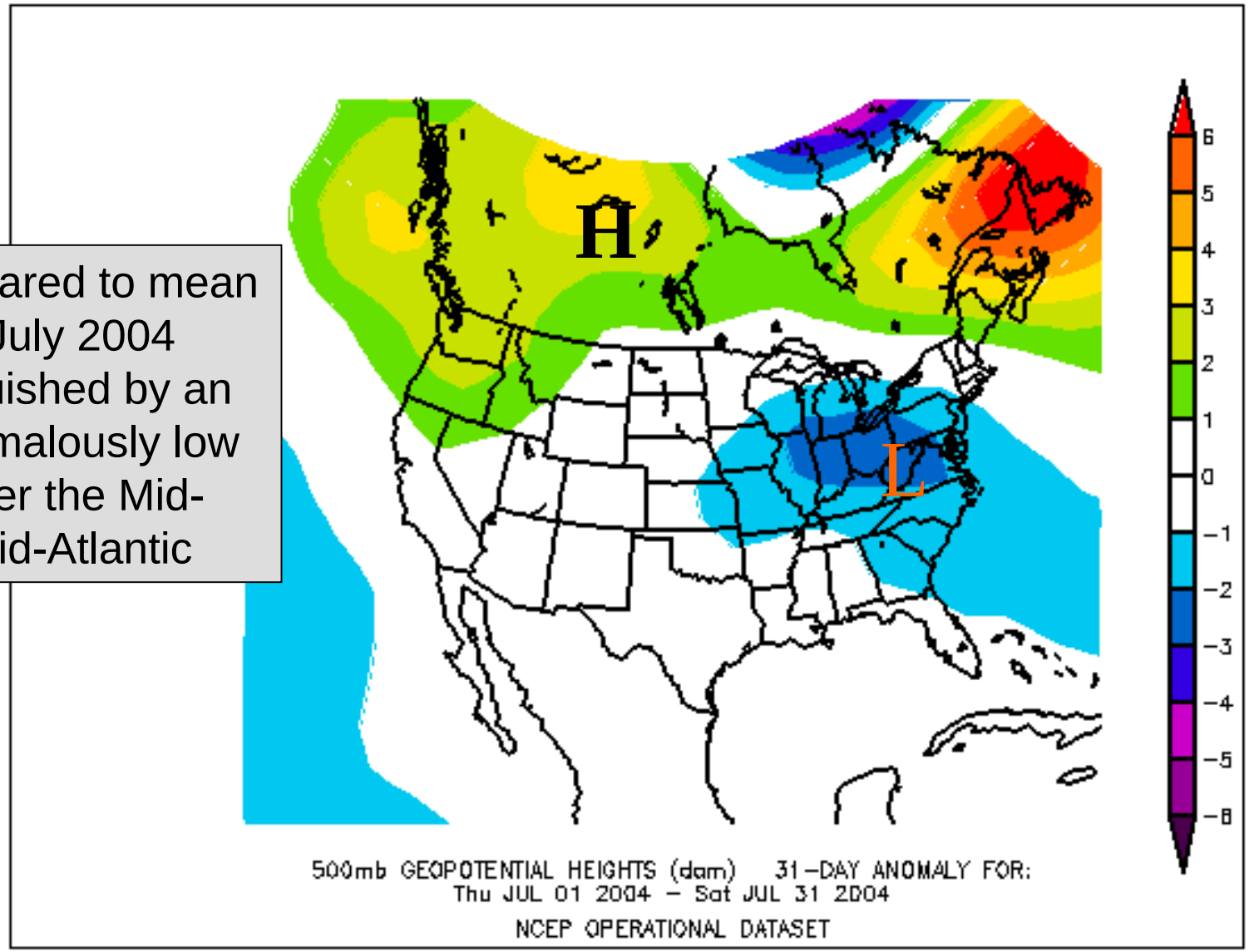
Precipitation Climatology

Precipitation Accumulation for May to August of 2004 was in the 90th percentile for most of the East coast, relative to the same months during the period of 1895-1999



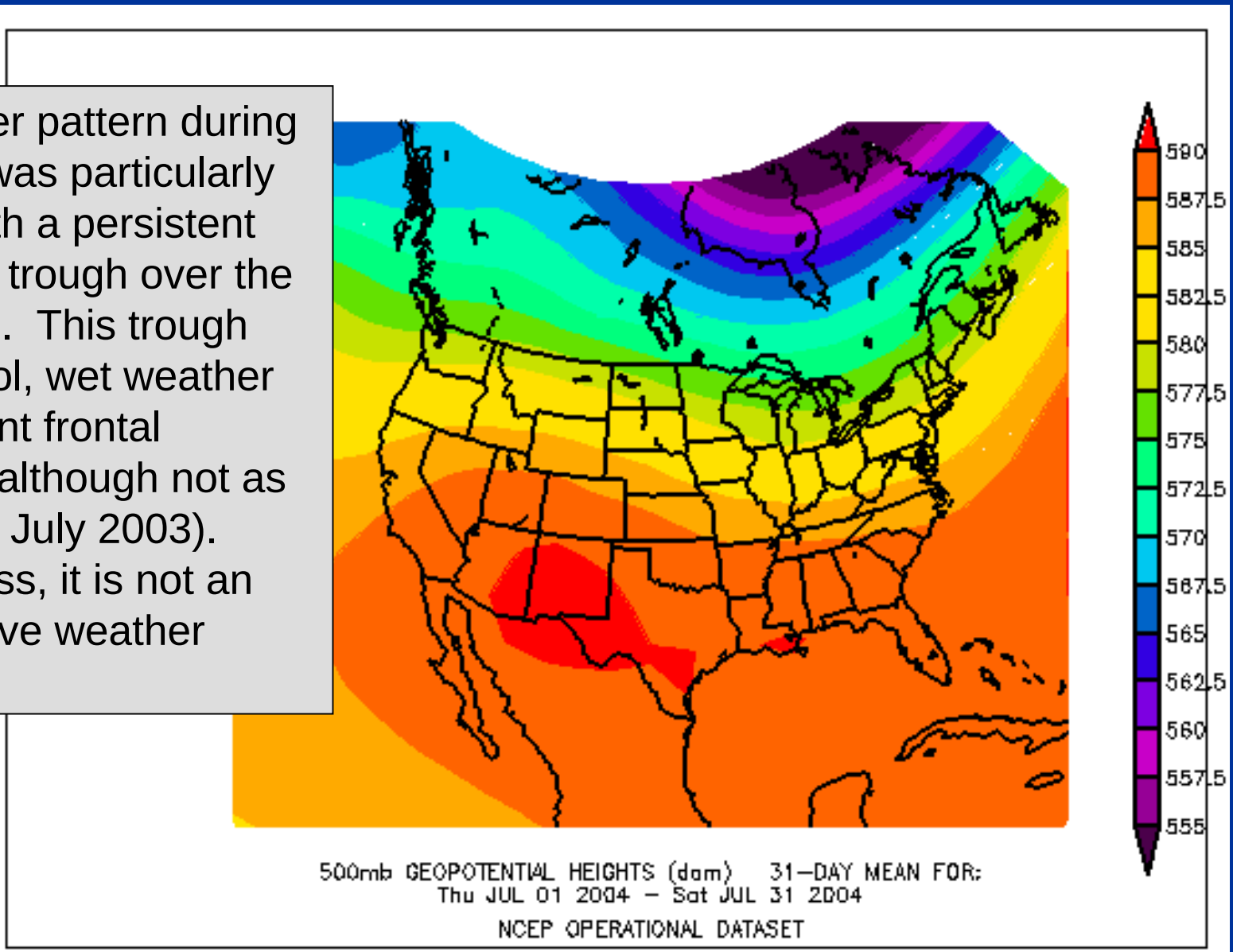
Anomalous Pressure in July

When compared to mean conditions, July 2004 was distinguished by an area of anomalously low pressure over the Mid-West and Mid-Atlantic



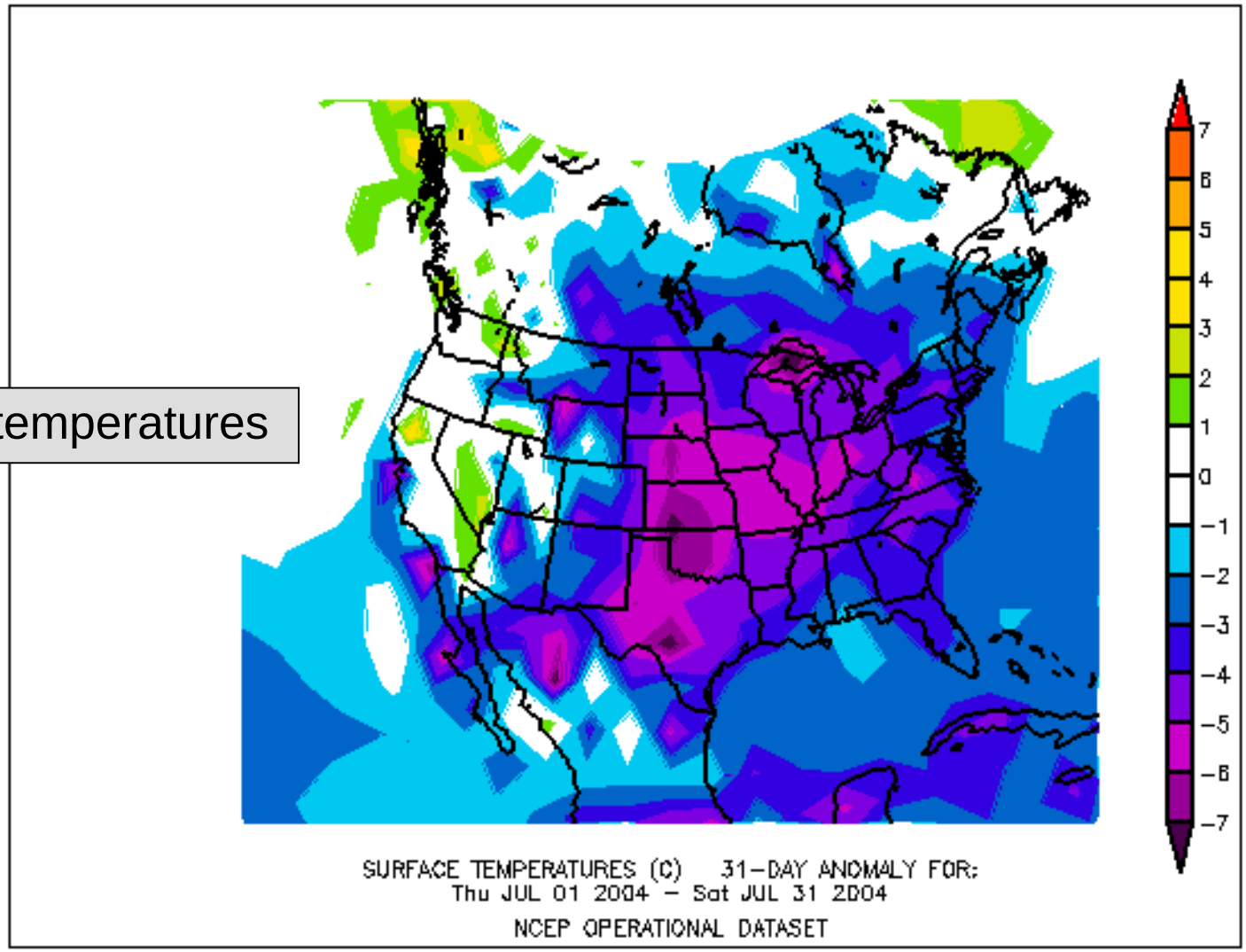
Mean Pressure in July

The weather pattern during July 2004 was particularly unusual with a persistent upper level trough over the eastern US. This trough brought cool, wet weather with frequent frontal passages (although not as extreme as July 2003). Nevertheless, it is not an O_3-conducive weather pattern.



Anomalous Temperature in July

Cool July temperatures



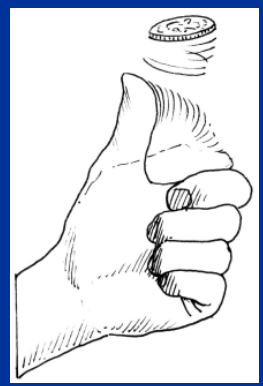
Outlook for 2005 Ozone Season

Outlook for the 2005 Ozone Season:

What are the chances it will be a warmer than normal or cooler than normal summer?

The models go WAY out on a limb and say…

50 / 50



There is an equal chance for a warmer than normal or cooler than normal summer. The same is true for precipitation.

JJA Temperature Outlook

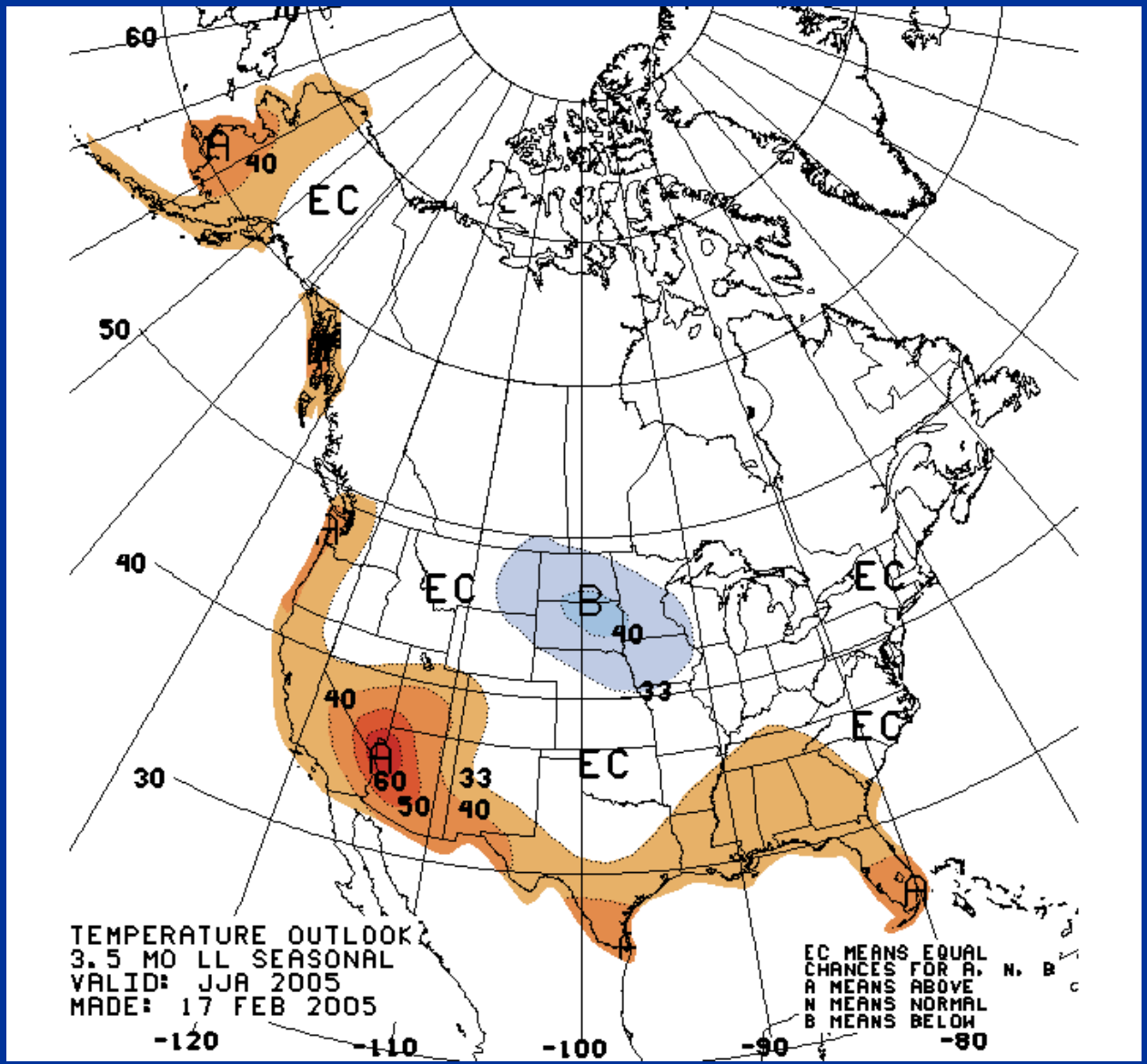


Figure by

NCEP

JJA Precipitation Outlook

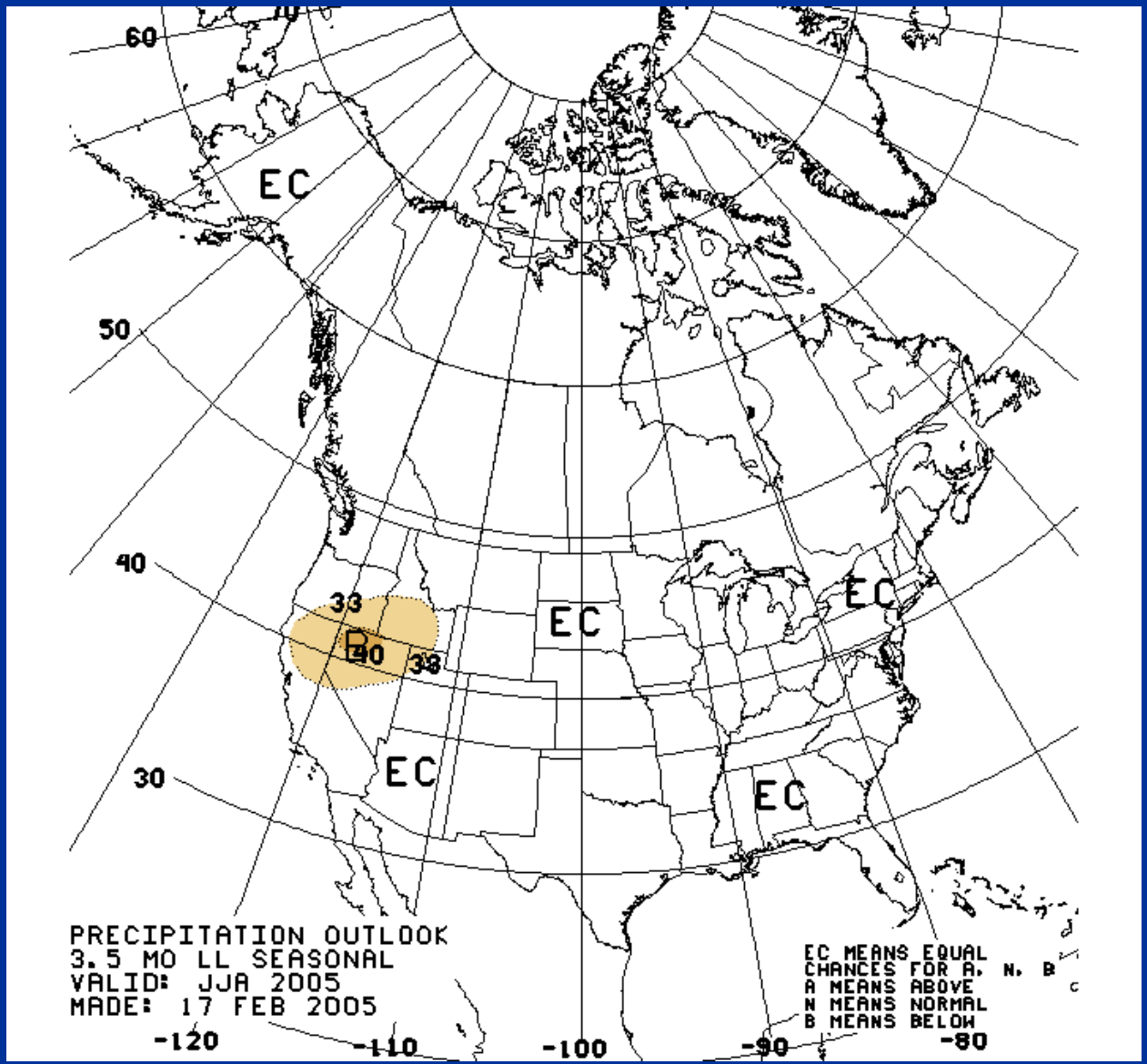
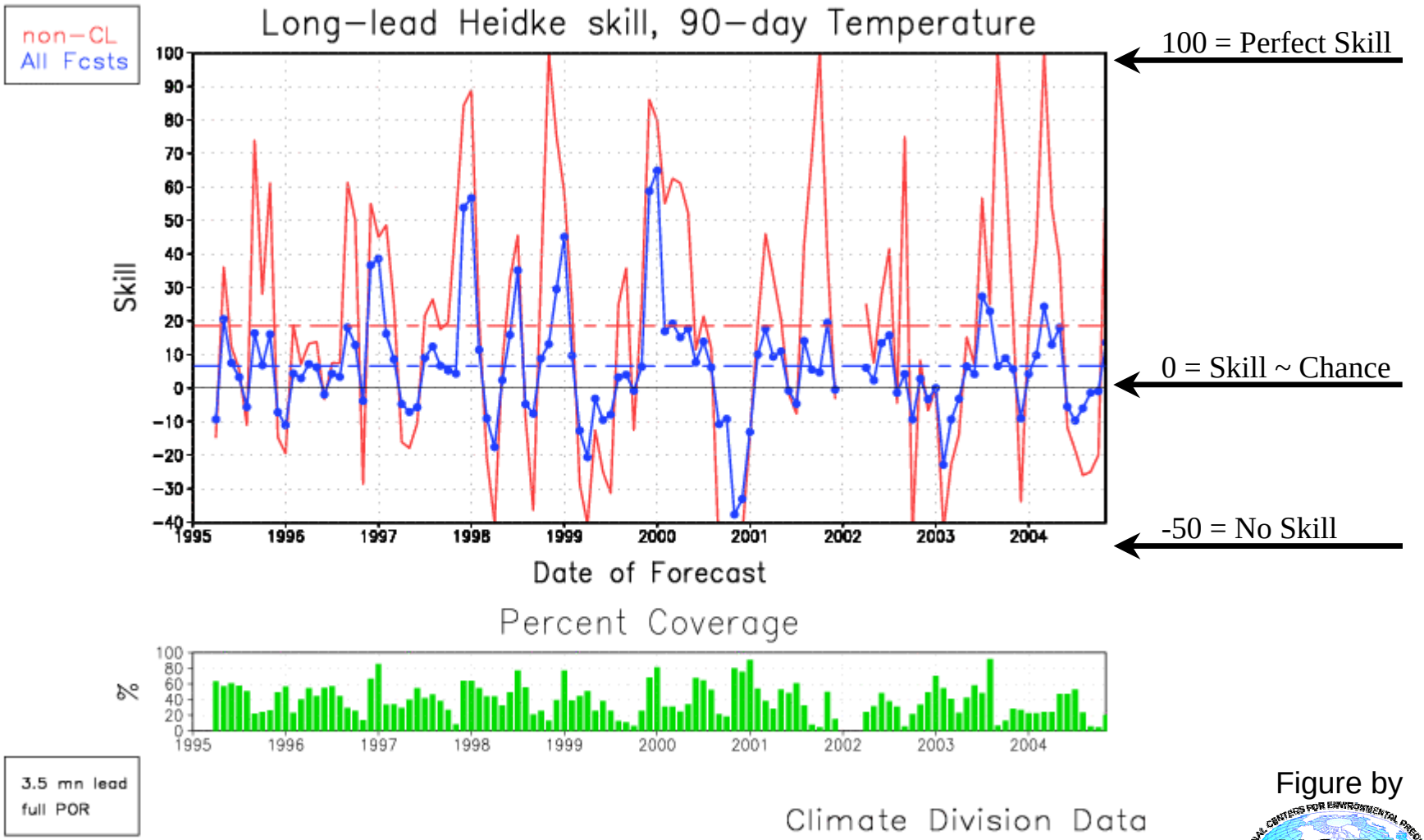


Figure by NCEP

Skill of 3.5 Month Forecasts



100 = Perfect Skill

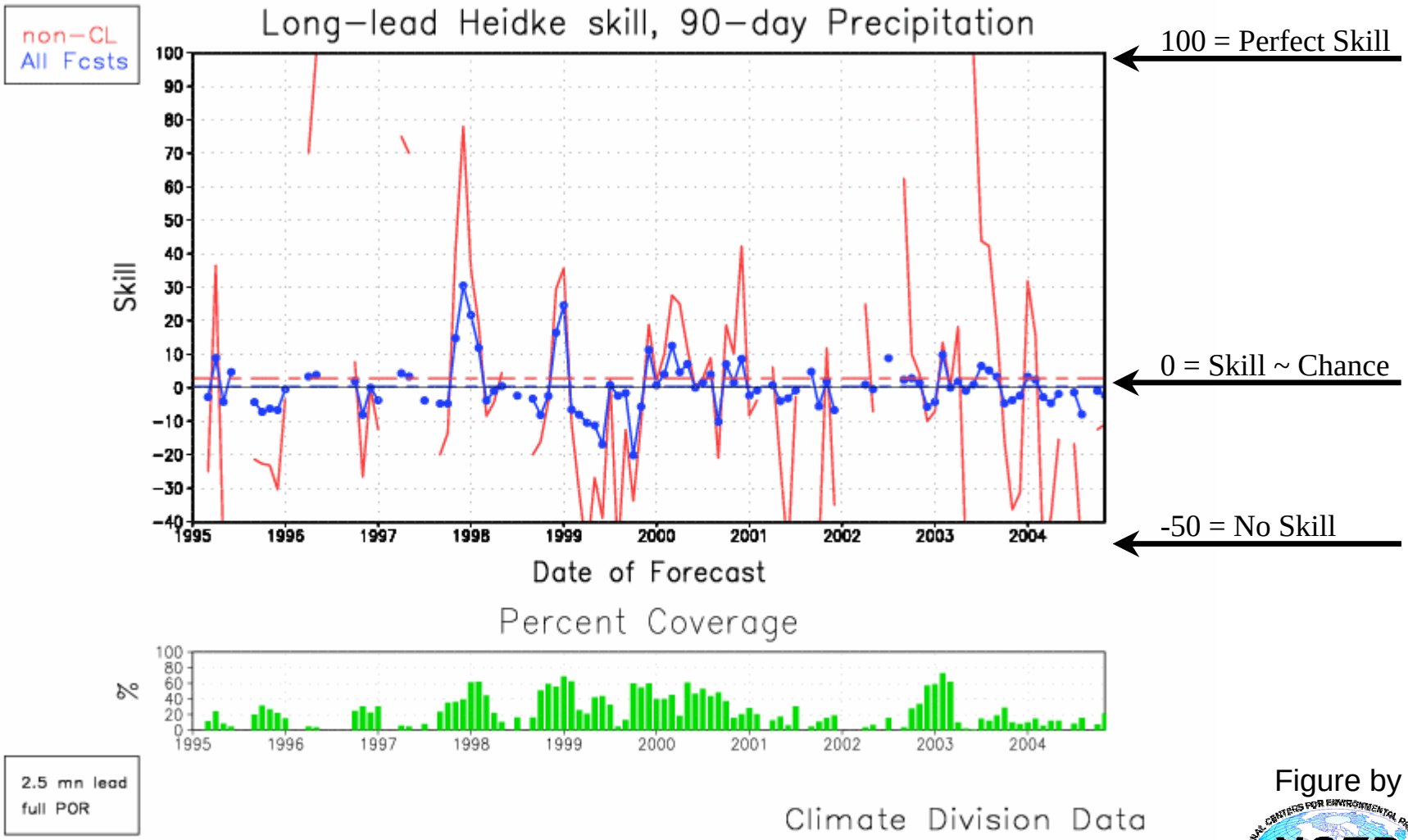
0 = Skill ~ Chance

-50 = No Skill

Figure by

NCEP

Skill of 3.5 Month Forecasts



100 = Perfect Skill

0 = Skill ~ Chance

-50 = No Skill

Figure by

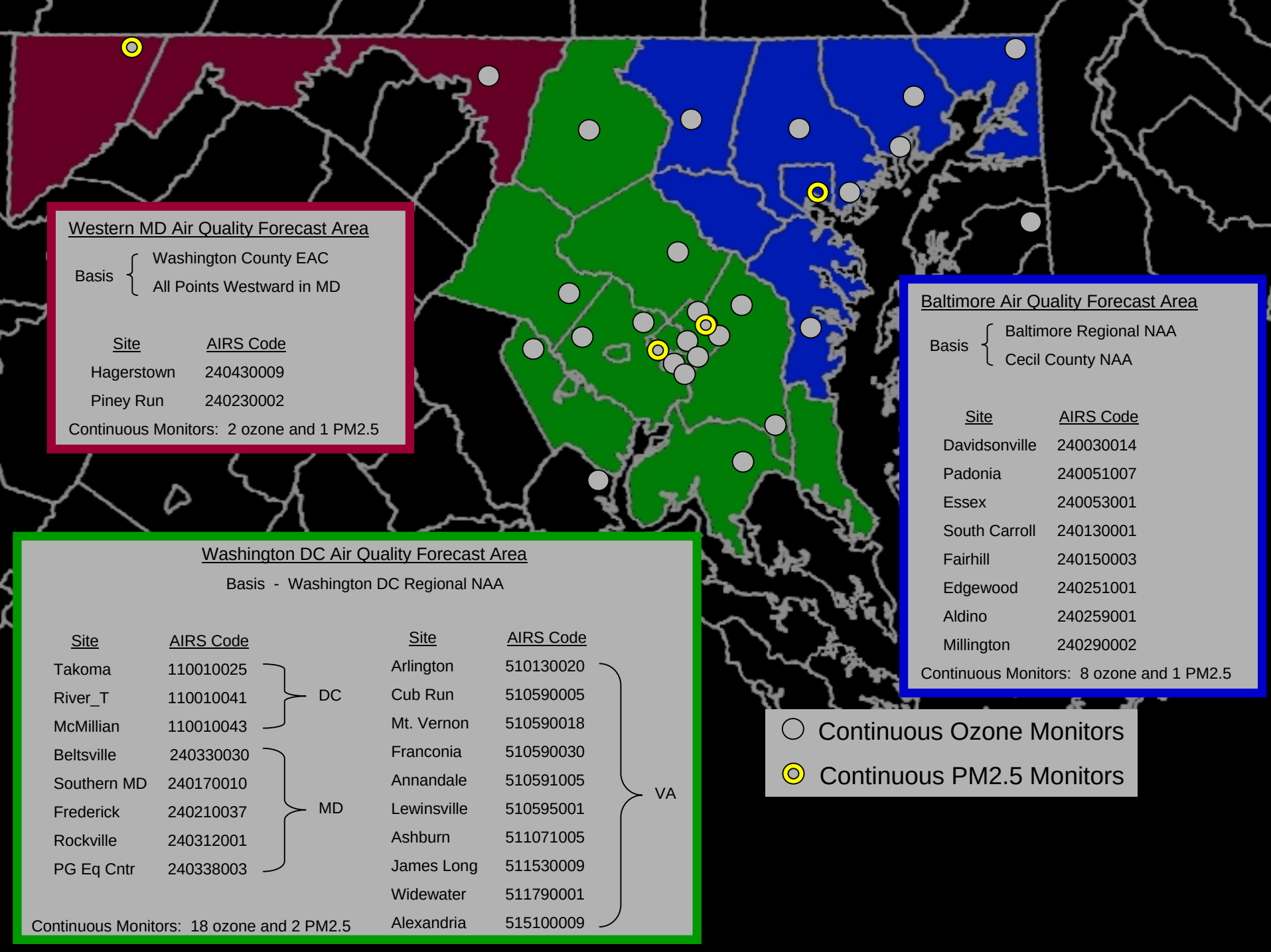
NCEP

Other Ozone Predictors

- Temperature and Precipitation provide a good start, but are not the only factors.
- A combination of additional factors are needed to maximize both regional-scale transport of O_3 and precursors and local O_3 production:
  - Limited cloud cover
  - Average wind speeds at surface and less than average speeds aloft
  - Boundary layer wind direction from the west
  - Relative humidity slightly below average
  - Mixing depth often restricted

Air Quality Forecast Areas & Monitor Locations

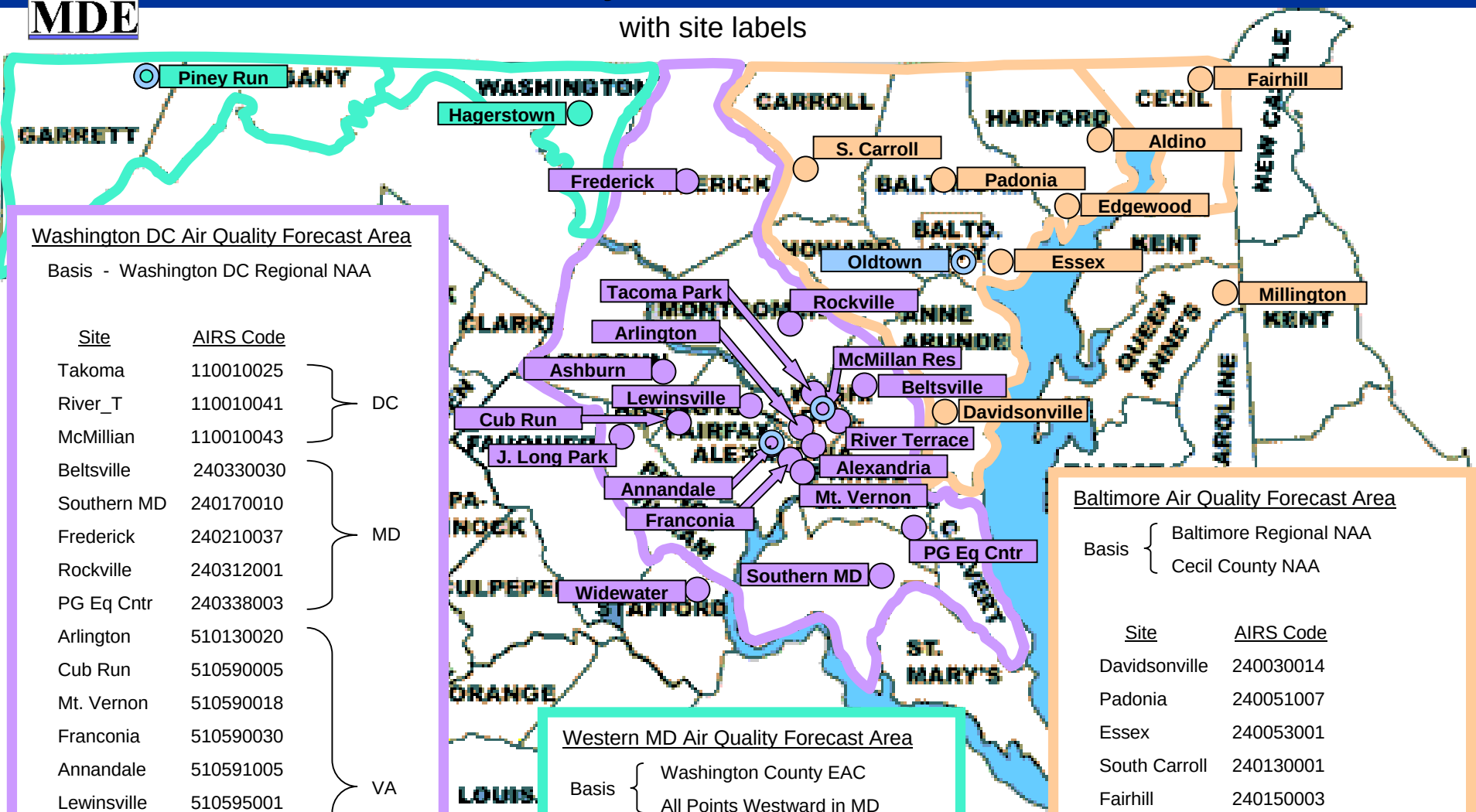
2005 in MD & DC


Western MD Air Quality Forecast Area
Basis
Washington County EAC
All Points Westward in MD
Site
AIRS Code
Hagerstown
240430009
Piney Run
240230002
Continuous Monitors: 2 ozone and 1 PM2.5
Baltimore Air Quality Forecast Area
Basis
Baltimore Regional NAA
Cecil County NAA
Site
AIRS Code
Davidsonville
240030014
Padonia
240051007
Essex
240053001
South Carroll
240130001
Fairhill
240150003
Edgewood
240251001
Aldino
240259001
Millington
240290002
Continuous Monitors: 8 ozone and 1 PM2.5
Washington DC Air Quality Forecast Area
Basis - Washington DC Regional NAA
Site
AIRS Code
Takoma
110010025
River_T
110010041
McMillian
110010043
DC
Beltsville
240330030
Southern MD
240170010
Frederick
240210037
Rockville
240312001
PG Eq Cntr
240338003
MD
Site
AIRS Code
Arlington
510130020
Cub Run
510590005
Mt. Vernon
510590018
Franconia
510590030
Annandale
510591005
Lewinsville
510595001
Ashburn
511071005
James Long
511530009
Widewater
511790001
Alexandria
515100009
VA
Continuous Monitors: 18 ozone and 2 PM2.5
Continuous Ozone Monitors
Continuous PM2.5 Monitors

MDE research effort to measure the change in transported ozone because of the significant SCR installations in the OHR Valley in 2003, 2004 and 2005: Aircraft, LIDAR, and Balloons.

MDE 2005 Air Quality Forecast Areas & Monitor Locations

with site labels



Washington DC Air Quality Forecast Area

Basis - Washington DC Regional NAA

Site	AIRS Code	
Takoma	110010025	DC
River_T	110010041	DC
McMillian	110010043	DC
Beltsville	240330030	MD
Southern MD	240170010	MD
Frederick	240210037	MD
Rockville	240312001	MD
PG Eq Cntr	240338003	MD
Arlington	510130020	VA
Cub Run	510590005	VA
Mt. Vernon	510590018	VA
Franconia	510590030	VA
Annandale	510591005	VA
Lewinsville	510595001	VA
Ashburn	511071005	VA
James Long	511530009	VA
Widewater	511790001	VA
Alexandria	515100009	VA

Continuous Monitors: 18 ozone and 2 PM2.5

Western MD Air Quality Forecast Area

Basis { Washington County EAC; All Points Westward in MD

Site	AIRS Code
Hagerstown	240430009
Piney Run	240230002

Continuous Monitors: 2 ozone and 1 PM2.5

Baltimore Air Quality Forecast Area

Basis { Baltimore Regional NAA; Cecil County NAA

Site	AIRS Code
Davidsonville	240030014
Padonia	240051007
Essex	240053001
South Carroll	240130001
Fairhill	240150003
Edgewood	240251001
Aldino	240259001
Millington	240290002

Continuous Monitors: 8 ozone and 1 PM2.5

Continuous PM2.5 monitors

Skill Score Explanation

The term "skill" in reference to forecasts means a measure of the performance of a forecast relative to some standard. Often, the standard used is the long-term (30-year) average (called the the climatology) of the parameter being predicted. Thus, skill scores measure the improvement of the forecast over the standard.

CPC uses the Heidke skill score, which is a measure of how well a forecast did relative to a randomly selected forecast. A score of 0 means that the forecast did no better than what would be expected by chance. A score of 100 depicts a "perfect" forecast and a score of -50 depicts the "worst possible" forecast. The dashed lines in the skill graph indicates the average skill score for all forecasts and for "Non-CL" forecasts. "CL" refers to climatology or a forecast of equal chances of Above, Near Normal, and Below Normal temperature or precipitation. "Non-CL" refers to all forecasts where enhanced above normal or enhanced below normal temperatures or precipitation are predicted. "Percent Coverage" is refers to the percent of the forecast region where enhanced above or below temperature or precipitation is predicted.

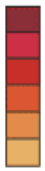
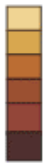
Figure by

NCEP

Climate Outlook

The key below is used to interpret each of the color versions of the ***Climate Outlook*** products. In areas where confidence in predictive skill has been established, the probabilities of the above normal, near normal or below normal categories are increased accordingly above the Climatology level of 1/3 (33.3%) for each category. These probabilities are contoured using colors as depicted in the key below.

In those areas where the skill of our present prediction tools is not sufficient, the default is equal chances (white color). The probabilities of experiencing each of the three categories (above normal, near normal or below normal) remain equally likely (1/3) in the white areas on attached maps.

Precip	Temp	Probability of Occurence			Most likely category
		Above	Near	Below	
		80.0%-90.0%	16.7%-06.7%	03.3%	"Above"
		70.0%-80.0%	26.7%-16.7%	03.3%	"Above"
		60.0%-70.0%	33.3%-26.7%	06.7%-03.3%	"Above"
		50.0%-60.0%	33.3%	16.7%-06.7%	"Above"
		40.0%-50.0%	33.3%	26.7%-16.7%	"Above"
		33.3%-40.0%	33.3%	33.3%-26.7%	"Above"
		33.3%-30.0%	33.3%-40.0%	33.3%-30.0%	"Near Normal"
		30.0%-25.0%	40.0%-50.0%	30.0%-25.0%	"Near Normal"
		33.3%-26.7%	33.3%	33.3%-40.0%	"Below"
		26.7%-16.7%	33.3%	40.0%-50.0%	"Below"
		16.7%-06.7%	33.3%	50.0%-60.0%	"Below"
		06.7%-03.3%	33.3%-26.7%	60.0%-70.0%	"Below"
		03.3%	26.7%-16.7%	70.0%-80.0%	"Below"
		03.3%	16.7%-06.7%	80.0%-90.0%	"Below"
		33.3%	33.3%	33.3%	"Equal Chances"