

**CLIMATE CHANGE AND REGIONAL
HEATWAVES:**

POLICY IMPLICATIONS

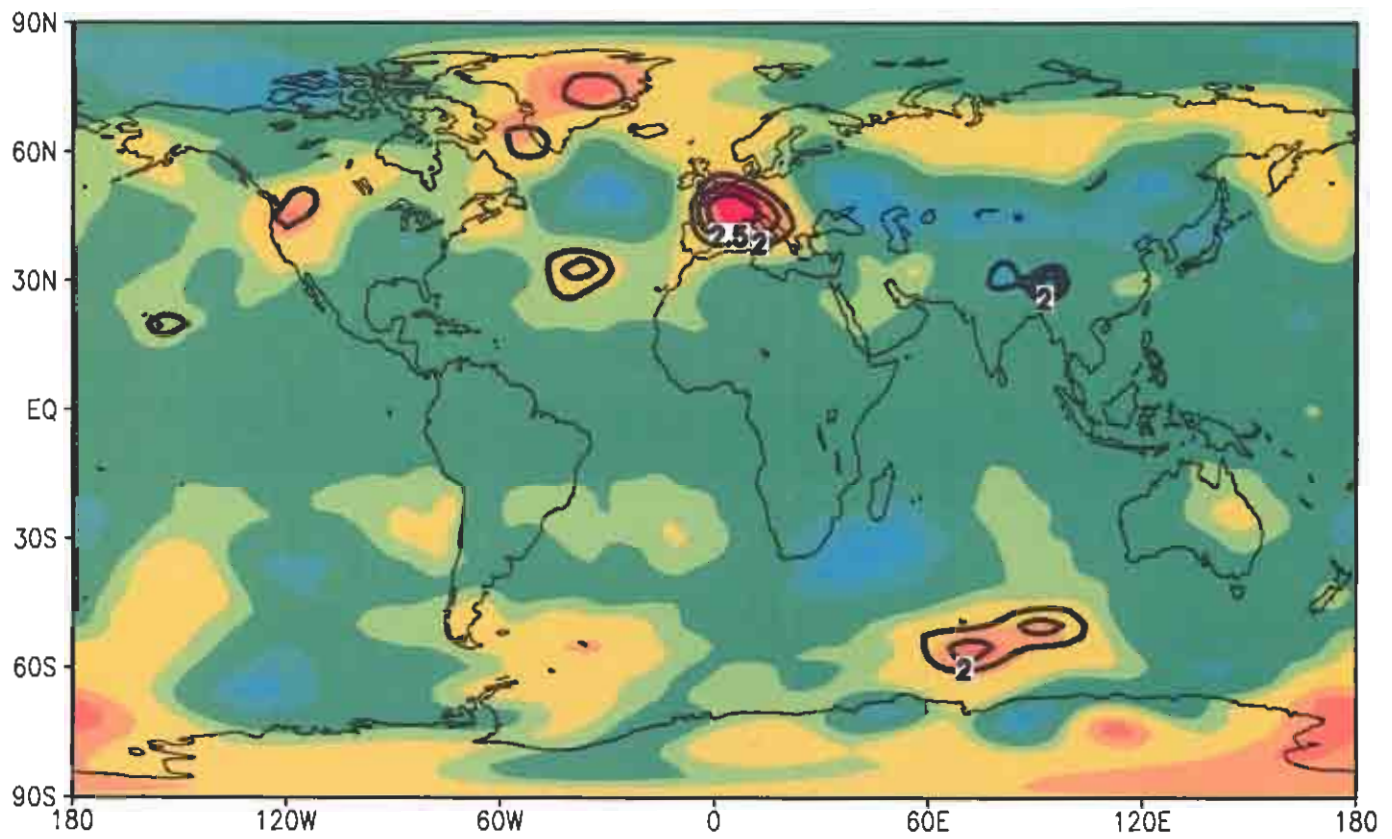
Thomas Chase
CIRES, Dept. of Geography

2003 EUROPEAN HEATWAVE

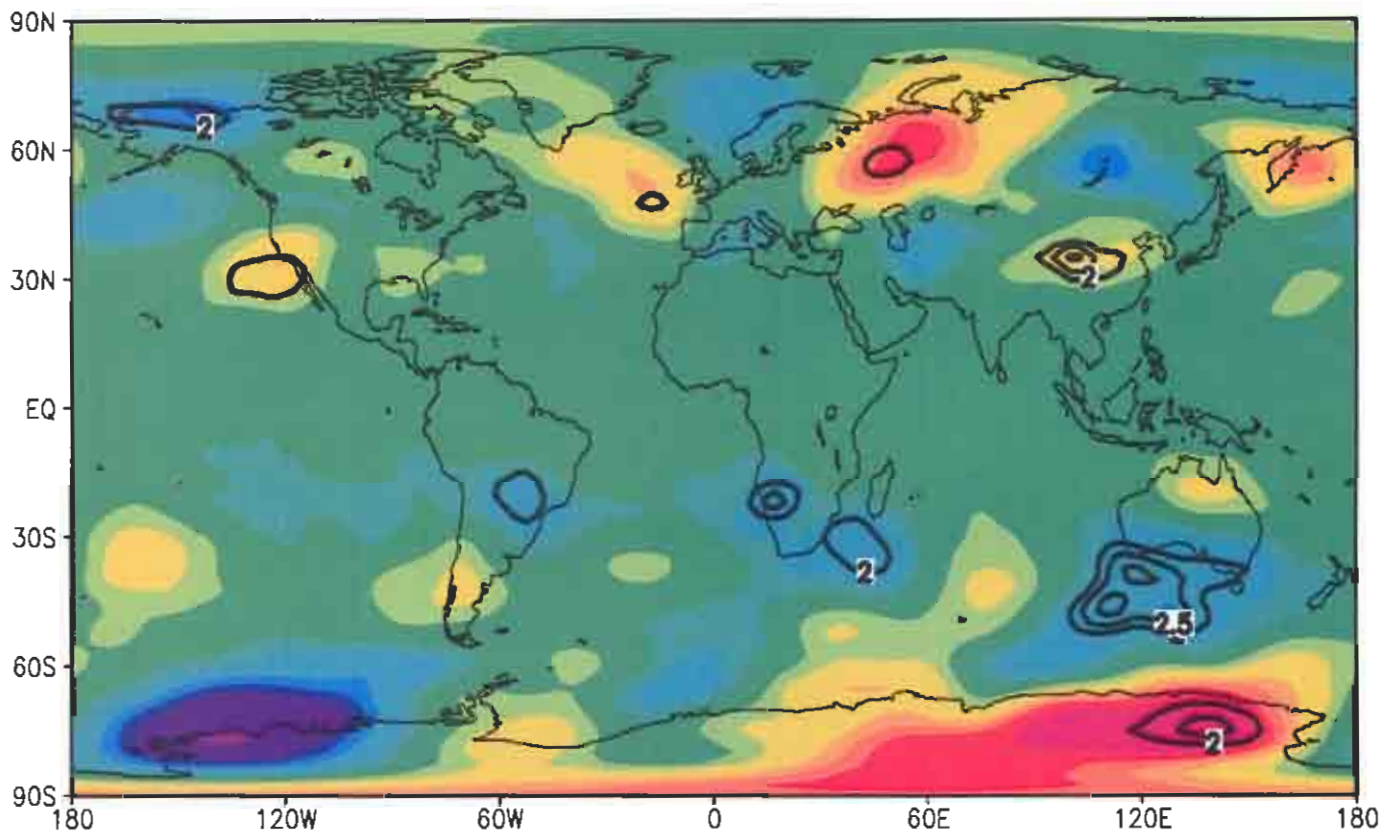
~ 30,000 DIED

~ \$13 billion ECONOMIC
DAMAGE

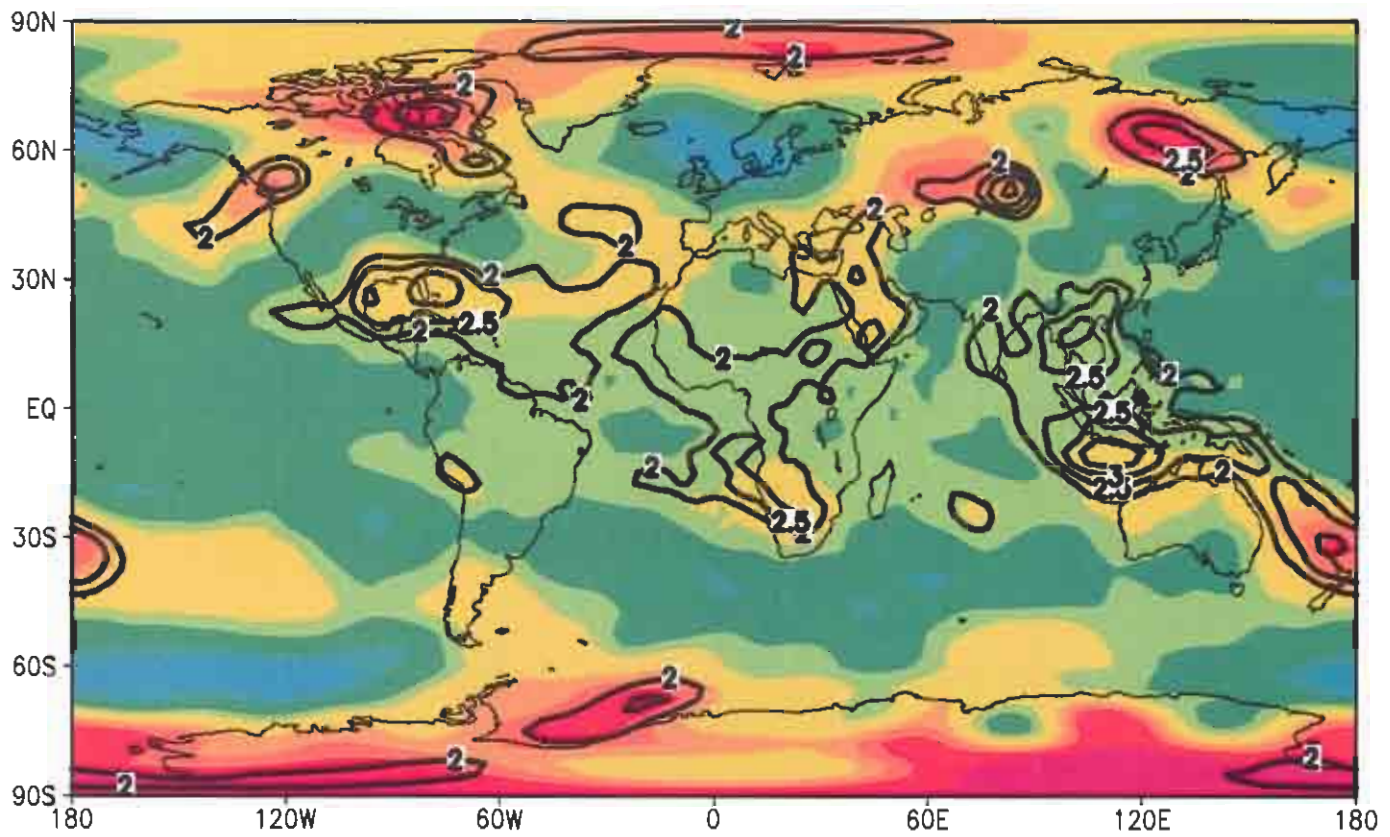
2003 NCEP JJA THICKNESS TEMP ANOMALY (1000–500 mb)



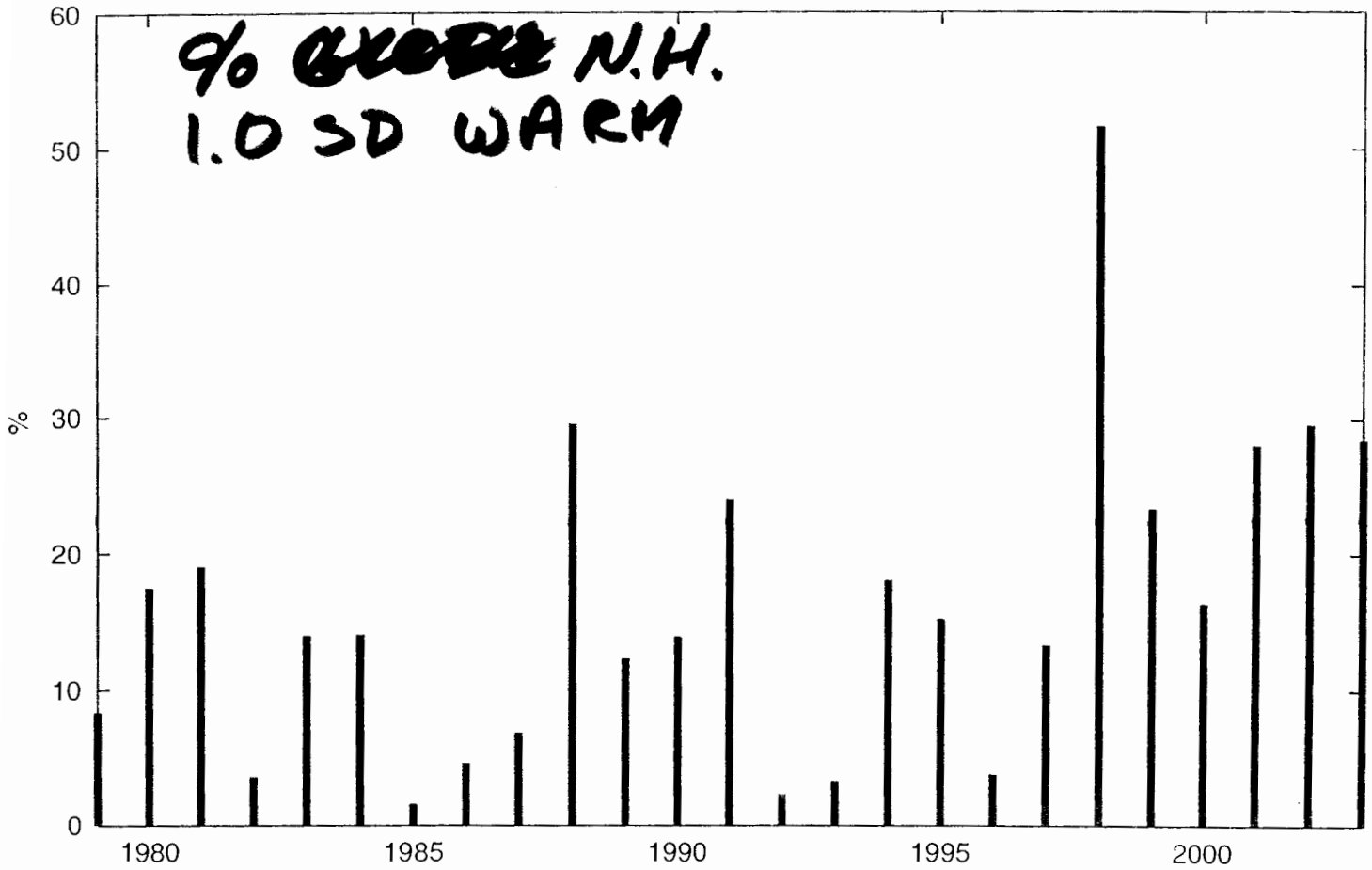
1981 NCEP JJA THICKNESS TEMP ANOMALY
(1000–500 mb)



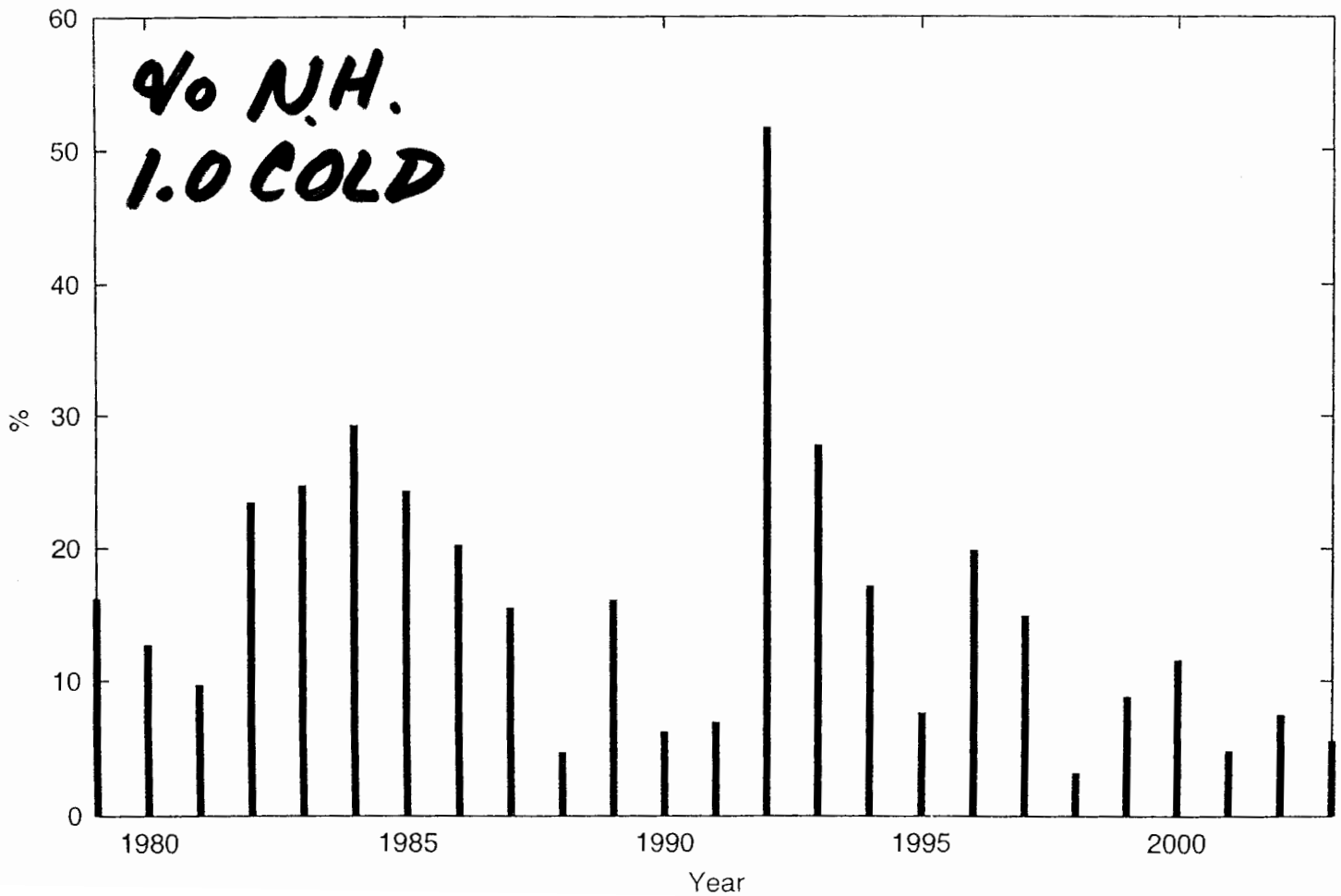
1998 NCEP JJA THICKNESS TEMP ANOMALY (1000–500 mb)



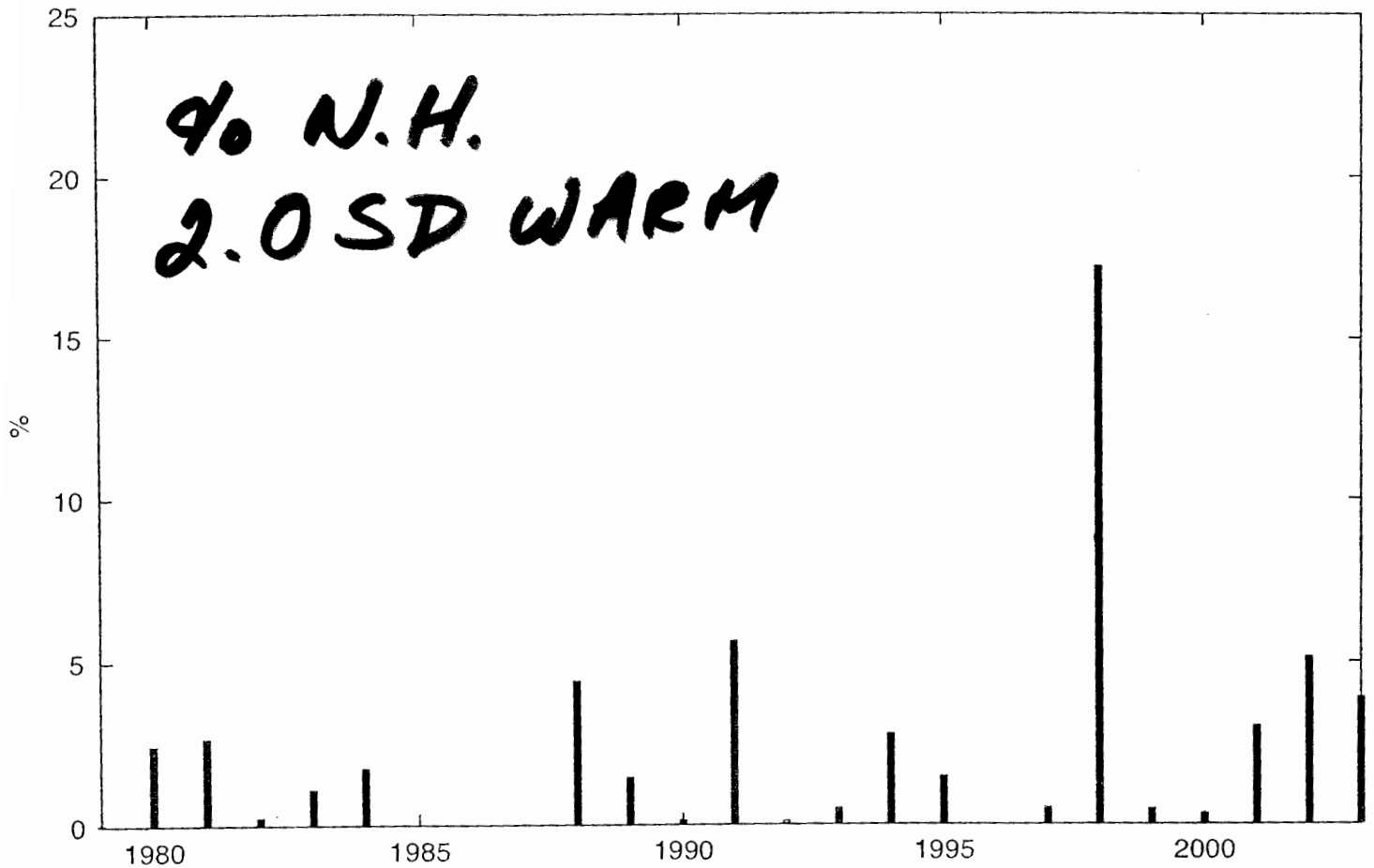
% of 22-80N affected by 1.0 SD WARM anomalies JJA



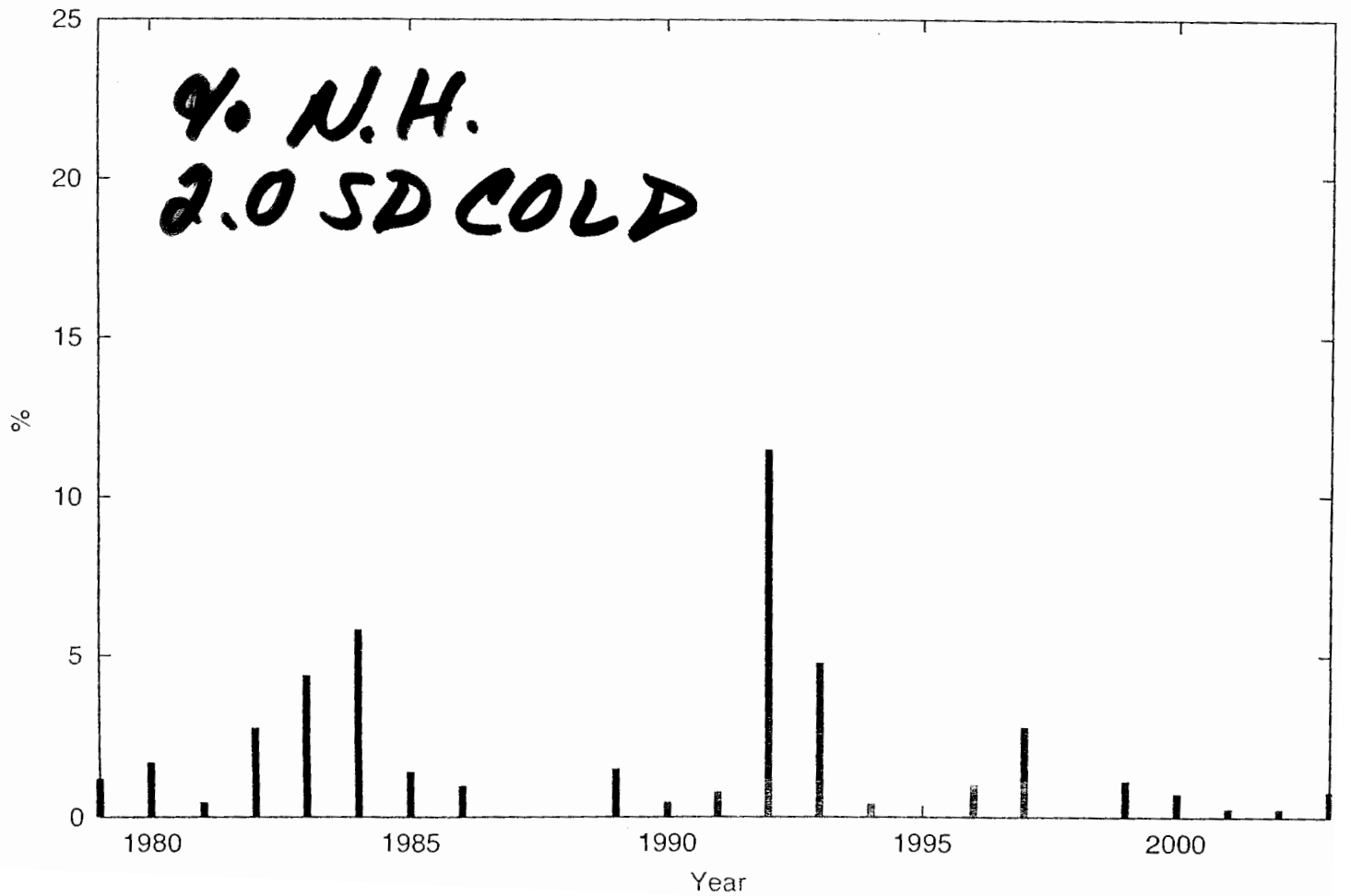
% of 22-80N affected by 1.0 SD COLD anomalies JJA



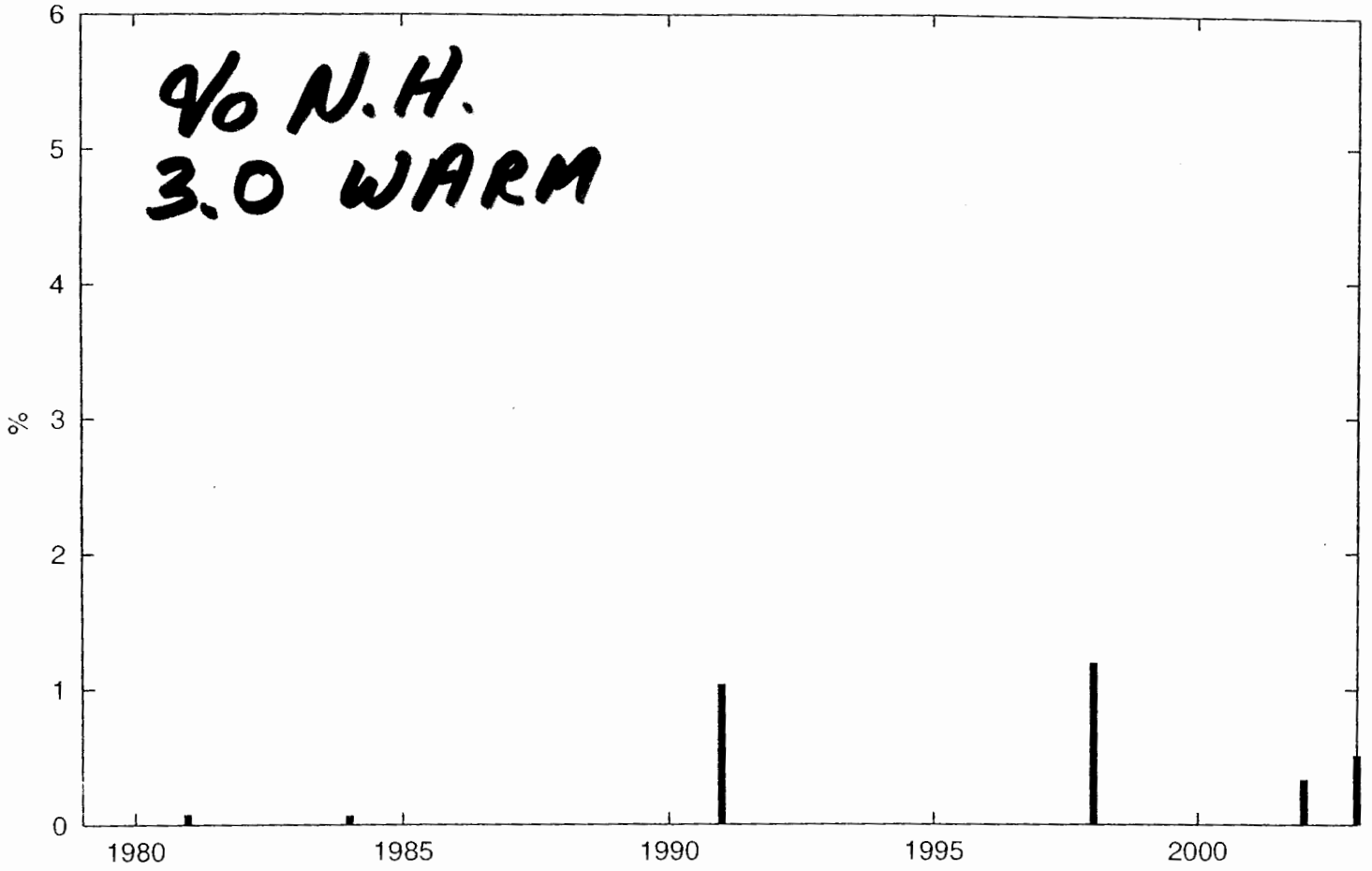
% of 22-80N affected by 2.0 SD WARM anomalies JJA



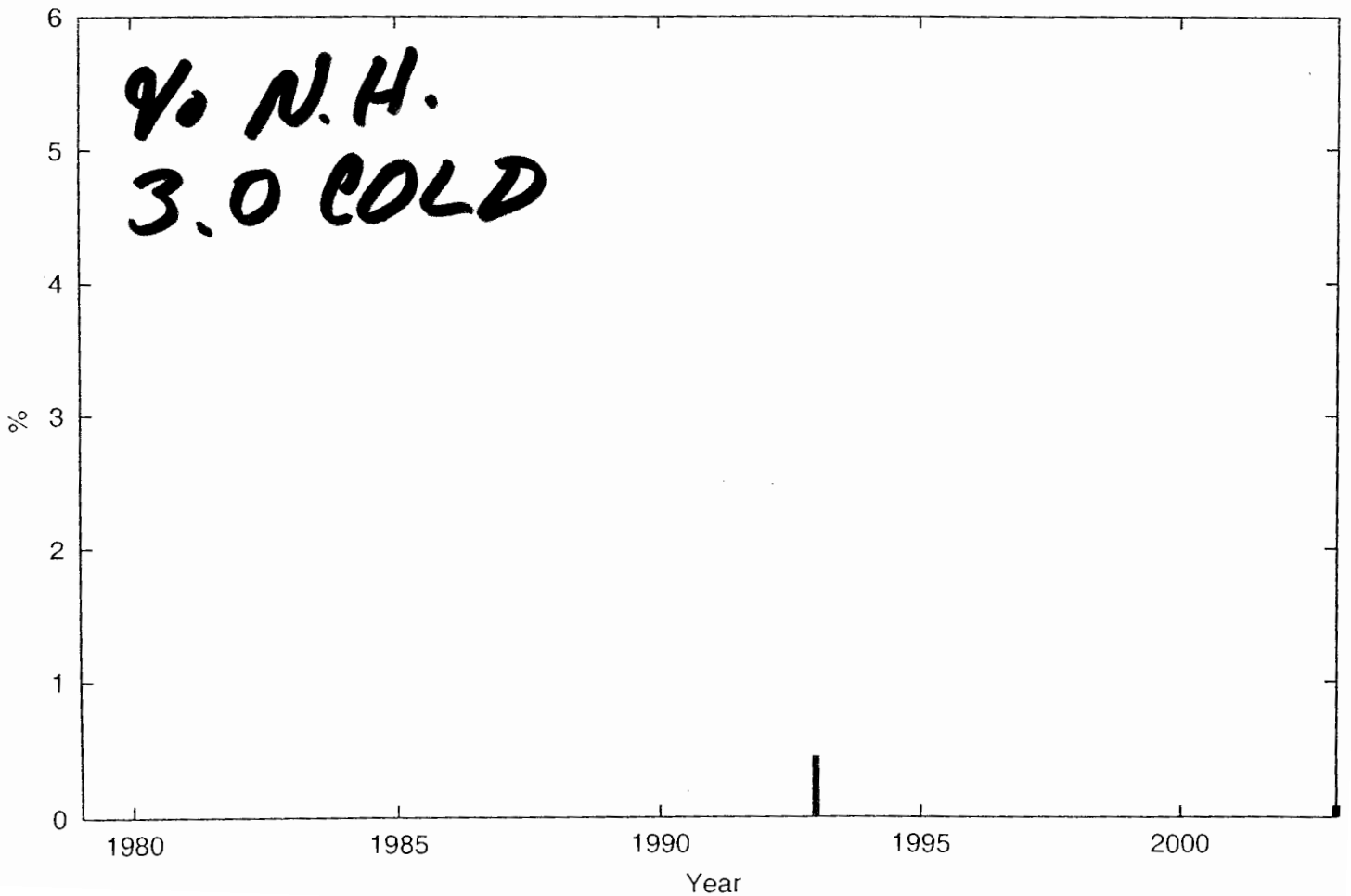
% of 22-80N affected by 2.0 SD COLD anomalies JJA



% of 22-80N affected by 3.0 SD WARM anomalies JJA



% of 22-80N affected by 3.0 SD COLD anomalies JJA



CORRELATIONS

AREA OF COLD VS. WARM REGIONAL ANOMALIES

1.0 SD	<u>-0.82</u>
2.0 SD	<u>-0.38</u>
3.0 SD	<u>0.18</u>

AREA OF REGIONAL ANOMALIES WITH HEMISPHERIC TEMPERATURE

	WARM	COLD
1.0 SD	<u>0.96</u>	<u>0.92</u>
2.0 SD	<u>0.79</u>	<u>0.66</u>
3.0 SD	<u>0.54</u>	<u>0.02</u>

- 1) Warm anomalies and cold anomalies tend not to occur together in a single year
- 2) Both warm and cold anomalies are correlated with warm and cold average years
- 3) For higher standard deviations these correlations are greatly reduced in most cases.

CONCLUSIONS

- 1) European Heat wave was unusual (3SD)
- 2) Regional heat waves happen in warmer than average years more often
- 3) Unusual weather is not that unusual.
Lots of regional heatwaves, cold spells over this period
- 4) Unusual weather due to natural variability (ENSO) seems much larger than in 2003

OTHER FACTORS

Anomalous circulation, lingering high pressure:

- 1) SST due to ENSO**
- 2) Summer annular mode (natural circulation)**
- 3) Reduced soil moisture**
- 4) More active west African monsoon**

Human and economic cost:

- 1) Air pollution (20-40% of deaths)**
- 2) ?**