

# National Future Extreme Heat Scenarios for Assessment of Climate Impacts on Public Health

**Dale A. Quattrochi, PI (NASA MSFC)**

**Sue Estes, Co-I (NASA MSFC)**

**Bill Crosson, Co-I (USRA/NSSTC)**

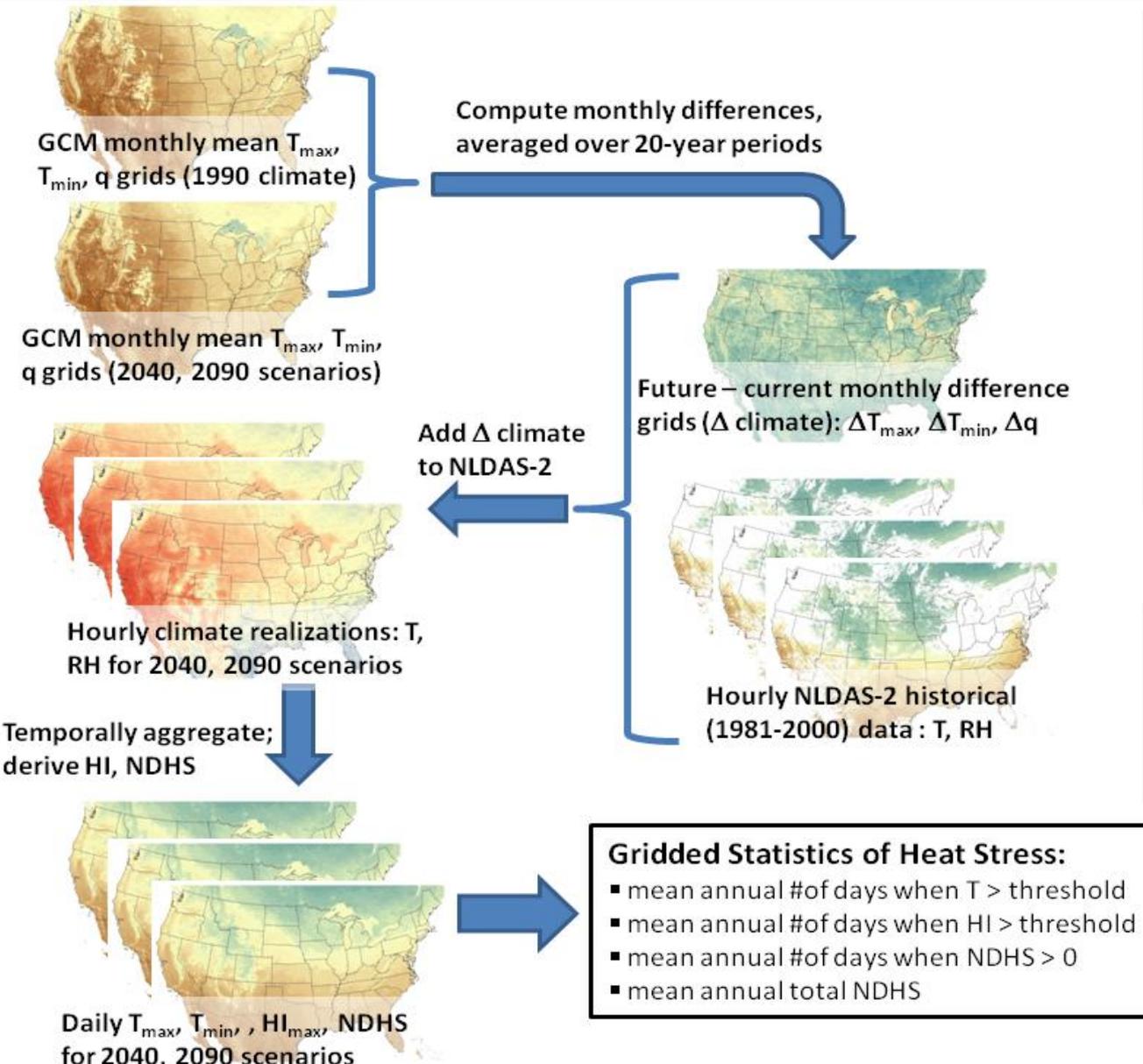
**Mohammad Al-Hamdan (USRA/NSSTC)**

**Maury Estes (USRA/NSSTC)**

# Project Objective

**To provide historical and future measures of climate-driven heat events to enable assessments of heat impacts on public health over the coterminous U.S.**

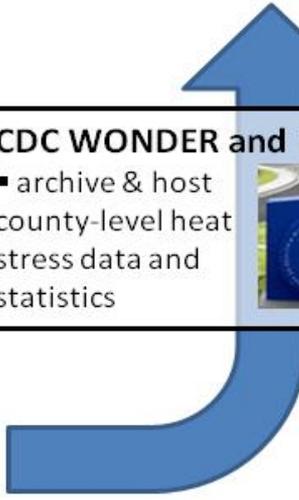
# Data Workflow



**Users:**  
Publichealth professionals  
General public

**CDC WONDER and EHTB:**

- archive & host county-level heat stress data and statistics



We obtained GCM output of monthly mean minimum and maximum daily temperatures and monthly mean specific humidity.

Source: Coupled Model Intercomparison Project (CMIP3) Multi-Model Dataset Archive at Program for Climate Model Diagnosis and Intercomparison (PCMDI). This activity was in support of the 4<sup>th</sup> Assessment Report (AR4).

## Scenarios:

20<sup>th</sup> Century Climate for 1980 -1999

SRES A2 for 2030-2049 (2040) and 2080-2099 (2090)

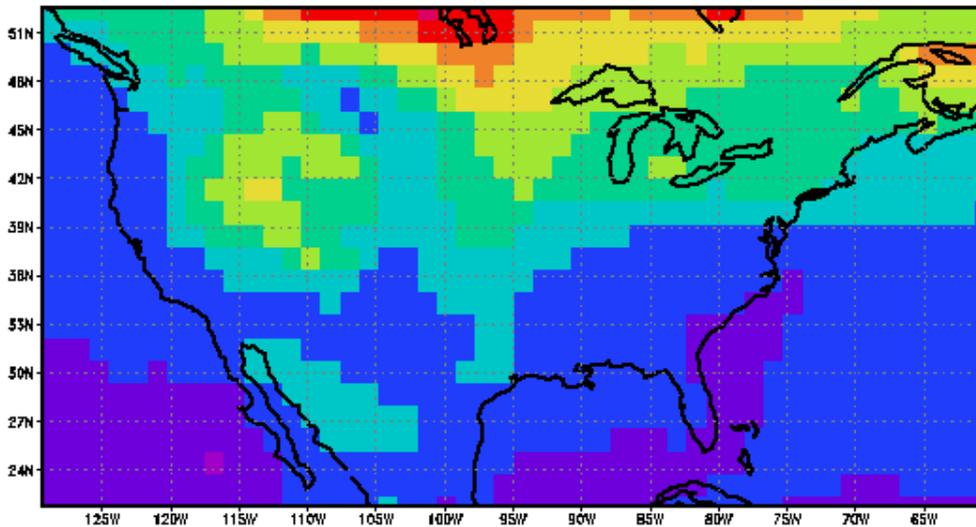
SRES A1B for 2030-2049 (2040) and 2080-2099 (2090)

	<u>Model</u>	<u># Ensemble members used</u>
1.	CCSM3 (NCAR)	2
2.	CSIRO-MK3.0 (Australia)	2
3.	CSIRO-MK3.5 (Australia)	3
4.	BCCR-BCM2.0 (Norway)	1
5.	INM CM3.0 (Russia)	1
6.	MIROC 3.2 (Med. Res.)	3

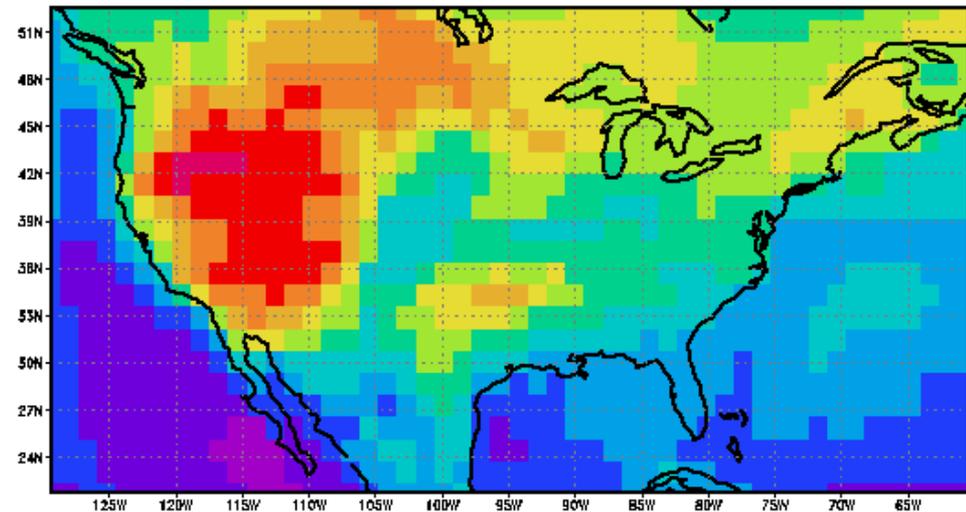
Means of each variable will be computed across ensembles, then across models.

# Monthly Mean Minimum Temperature Differences 2040 – 1990, CCSM3 Model – Averages of 2 ensemble members

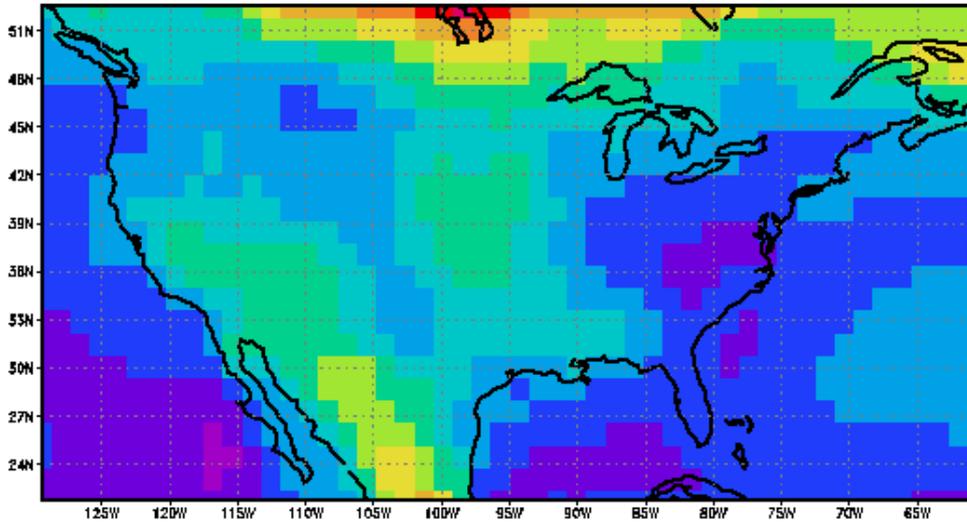
January



July



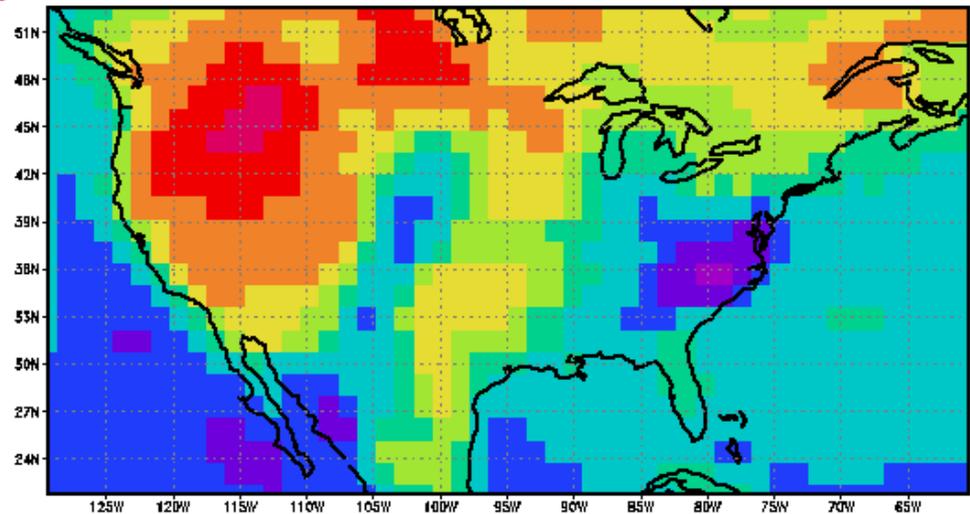
# Monthly Mean Maximum Temperature Differences 2040 – 1990, CCSM3 Model – Averages of 2 ensemble members



January



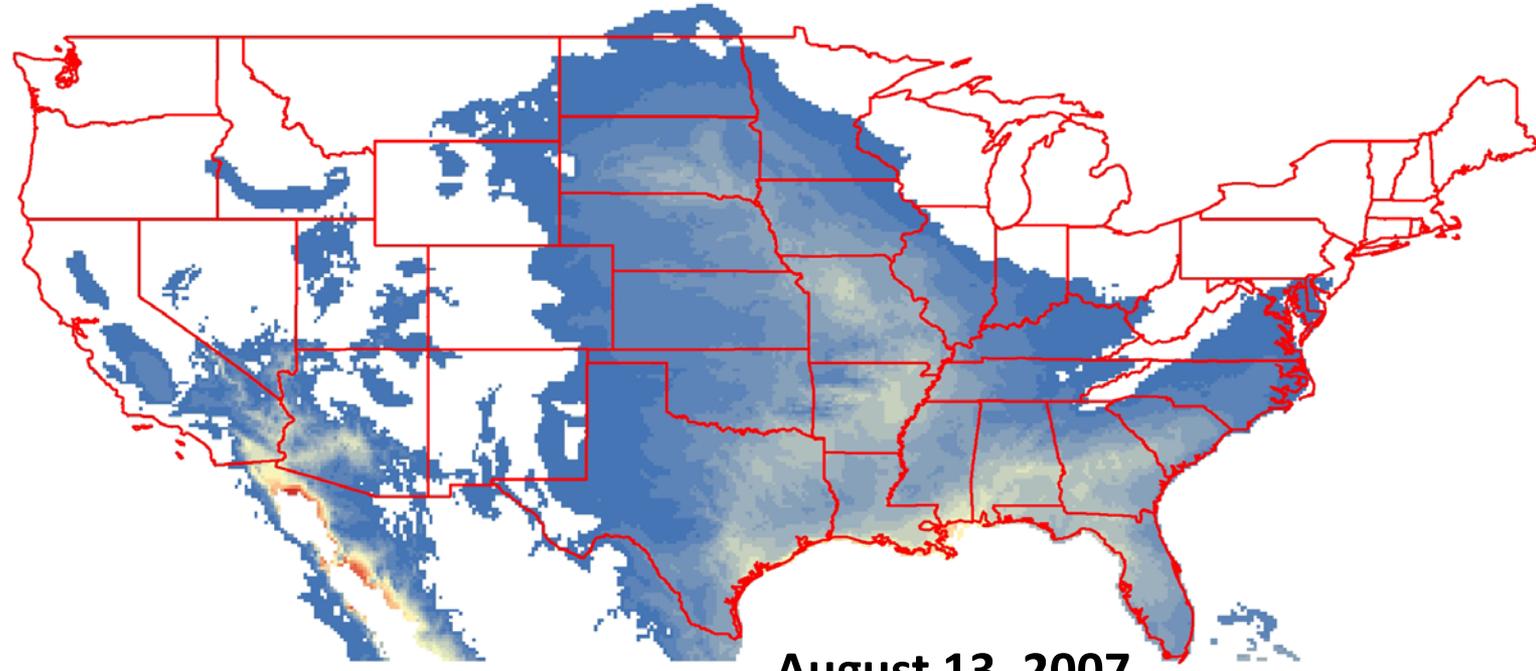
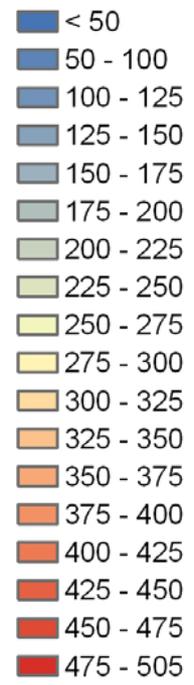
July



# Metrics of Excessive Heat

- 1. Daily Maximum Air Temperature
- 2. Daily Maximum Heat Index
- 3. Net Daily Heat Stress (NDHS)
  - New index that gives an integrated measure of heat stress (and relief) over the course of a day

NDHS  
(degree-hours)



August 13, 2007

# Key Results Expected

- GCM-scale monthly climatologies of max/min air temperature and specific humidity for the historical period 1981-2000, and future changes relative to this period.
- NLDAS-scale daily max/min temperatures, max heat index and NDHS for historical period.
- NLDAS-scale statistics over 20-year past and future periods of heat stress measures.
- County-level heat stress measures along with 2040 and 2090 population projections, to enable assessments of heat impacts on public health.

# Task Schedule

Year 1/Qtr. 1: Obtain NLDAS data for 1981-2000

- Completed

Year 1/Qtr 1-2: Obtain GCM monthly mean inputs for 1981-2000 ('current'), 2031-2050 ('2040'), and 2081-2100 ('2090').

- Completed for current and both future climate scenarios, SRES A2 and SRES A1B

Year 1/Qtr 3: Compute monthly differences, averaged over 20-year periods, between future and current climates (2040 and 2090).

- Will complete by 3/31

Year 2:

Create hourly climate realizations for 2040 and 2090 based on NLDAS +  $\Delta$  climate  
Derive statistics of Heat Index, NDHS, Tmax, Tmin on daily basis for future climates.  
Provide data to CDC WONDER at a county-level scale.

Year 3: Manuscripts/reports.