

Towards Week-2 to Week-4 excessive heat outlook systems

Augustin Vintzileos

University of Maryland ESSIC/CICS-MD

Jon Gottschalck and Mike Halpert

NOAA/CPC

NOAA's administrator mentioned at the 2015 AMS general assembly: "...our emergency management partners tell us that 8-14 day advanced warning of extreme heat predictions would improve public preparedness significantly..."

Ingredients of a Heat Wave:

- (a) Impacts of heat increase non-linearly with increasing temperature and humidity.
- (b) Geographical location, duration and timing of a heat events is very important

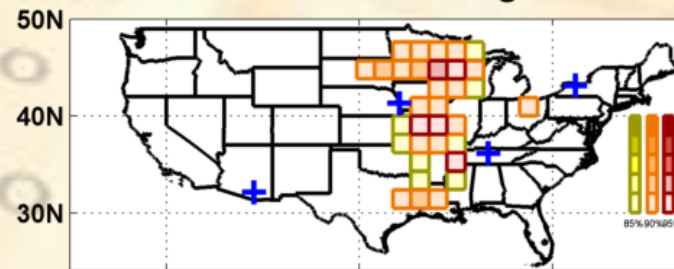
Probabilistic definition of heat waves based on NOAA's heat index and the duration of the event

Rarity of a heat event:

$$K_n^i(\alpha, M_{min}) = -\log\left(\prod_{d=1}^M p_d^i\right)$$

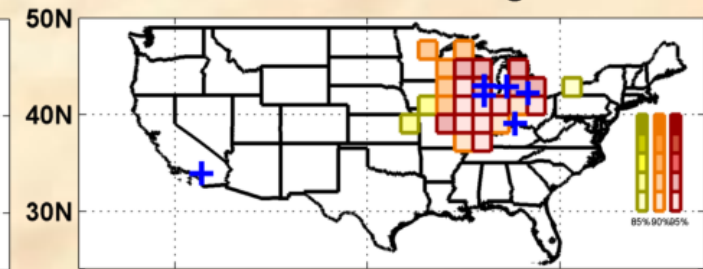
Chicago July 1995: > 700 deaths associated to a heat event

Excessive Heat Monitoring: 19950713



120W 100W 80W

Excessive Heat Monitoring: 19950714



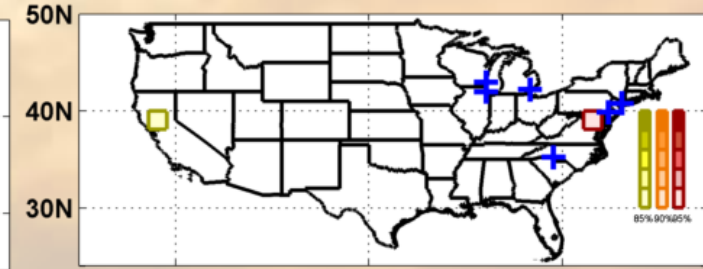
120W 100W 80W

Excessive Heat Monitoring: 19950715



120W 100W 80W

Excessive Heat Monitoring: 19950716



120W 100W 80W

Forecasting Heat Waves at subseasonal lead times: Sources of predictability

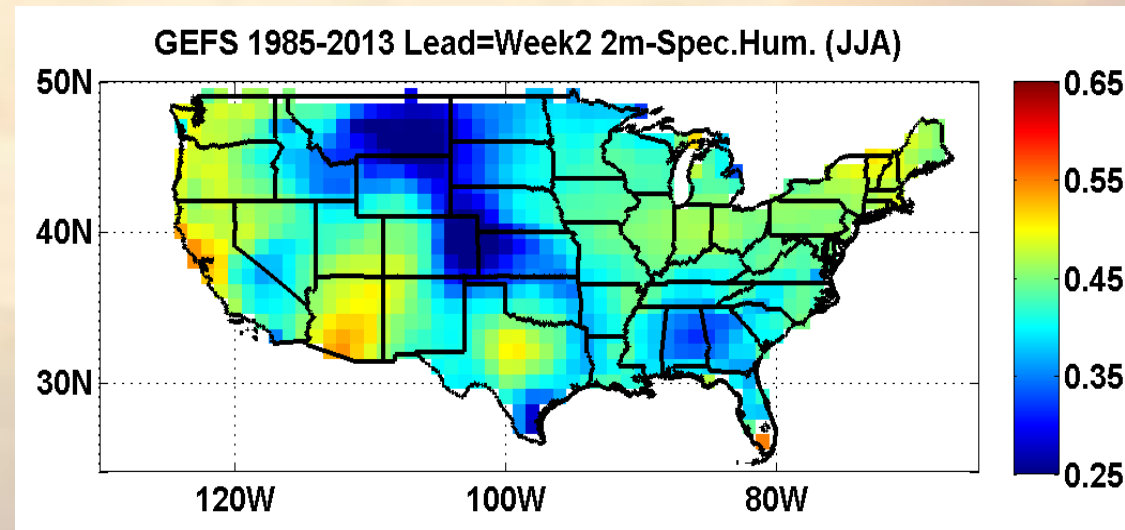
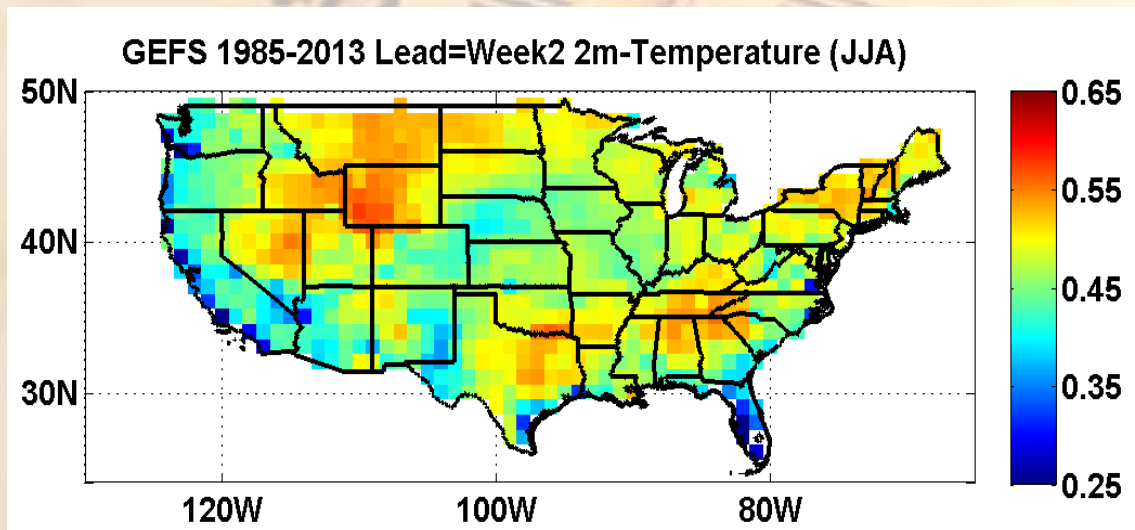


Atmospheric Initialization, deterministic forecast of weather

Modulation of the statistics of weather by slow atmospheric modes (e.g. MJO, ENSO) and coupling to the ocean and land

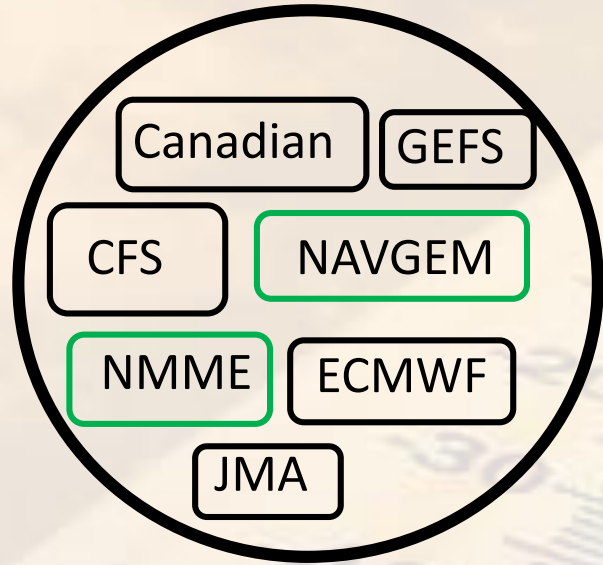
Predictability of T2m and Q2m at Week-2 (GEFS - Reforecast)

Anomaly correlation: GEFS weekly ensemble mean 1985-2013 vs. gridded station T2m and R1 Q2m



Forecasting Heat Waves at subseasonal lead times: Prediction methodology

A pool of operational weather forecast models and the NMME

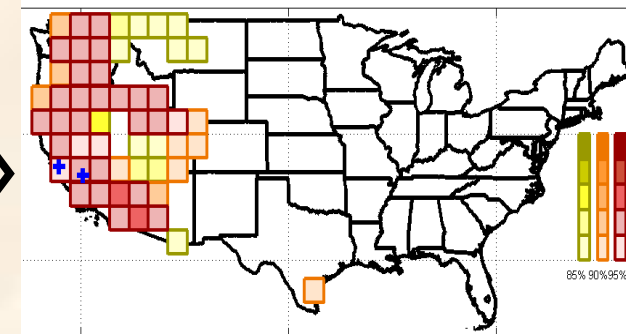


Post-processing

Bias correction
and optimal
consolidation

Statistics of
forecast heat
events

Forecast & Verification



Work to follow...

- Fine tune the heat event formula based on clustering of abnormal mortality data and heat warnings/ advisories issued from the NWS WFOs.
- Investigate systematic drifts of heat events as a function of lead time for each of the models in the pool.
- Develop post-processing algorithms to account for these biases.
- Develop optimal consolidation of multi-model super-ensembles.
- Transition to operations the experimental Subseasonal Excessive Heat Forecasting System (SEHOS).