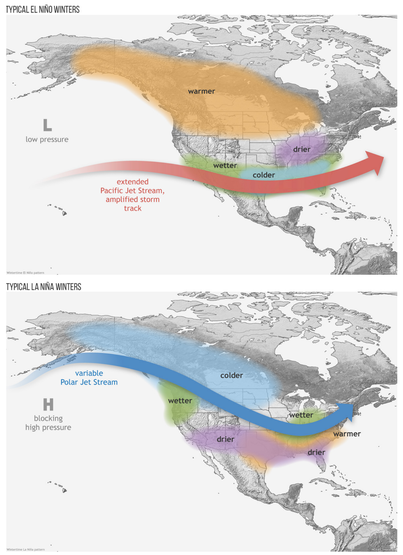
23rd Conference on Applied Climatology
26–28 June 2017, Asheville NC

Different Flavors of Normals: Accounting for ENSO and Climate Change

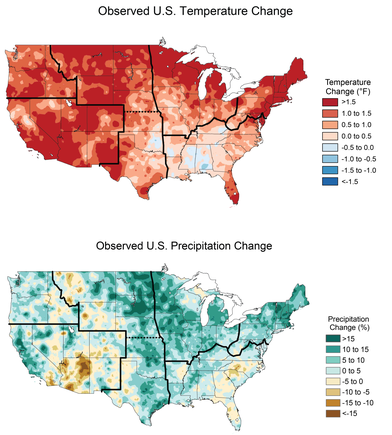
Carl J. Schreck III[1,2], Anthony Arguez[2], Anand Inamdar[1,2], Alisa Young[2]
[1]Cooperative Institute for Climate and Satellites-North Carolina (CICS-NC), North Carolina State University, [2]NOAA's National Centers for Environmental Information (NCEI)

Poster #7

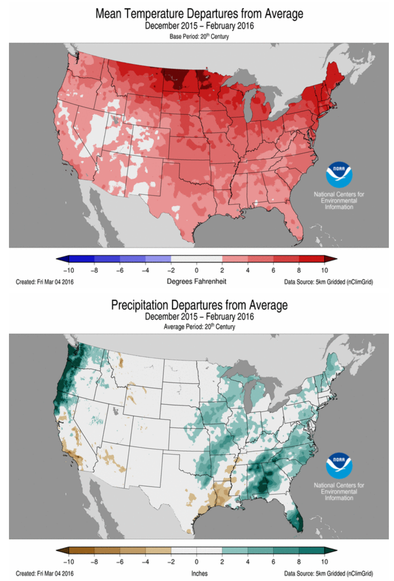
Motivation



Typical wintertime US impacts from ENSO
Courtesy of Climate.gov



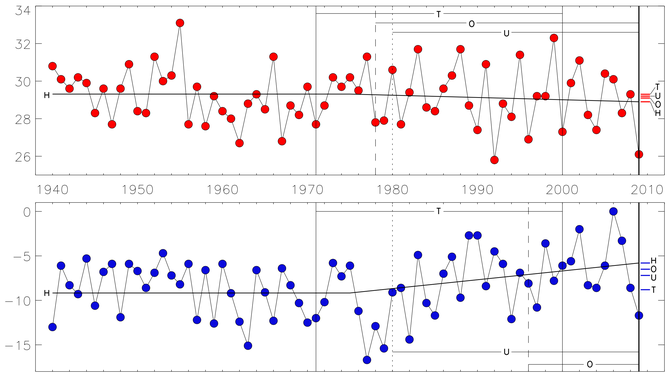
Observed changes over the past 22 years (1991-2012) compared to the 1901-1960 average.
From the 4th National Climate Assessment



Observed anomalies during 2016/17 El Niño

- Traditional normals just represent the mean over some defined period
- Climate variability is complex, but some parts are well known
  - Emissions produce relatively stable trend
  - Models have some skill forecasting ENSO and the impacts can persist for month
- Much of climate prediction skill comes from these two modes
- To what degree were the anomalies in 2016/17 a combination of the two?

Proposed Algorithm



Alternative normals of July Tmax and January Tmin for Chicago, IL (Midway)
T = Traditional (1971-2000) O = OCN U = Annual Update H = Hinge Fit

1. Two ways to identify the component associated with climate change:
   a. Hinge fit or other alternative normal
   b. Regress against global surface temperature time series
2. Subtract the climate change component from the data to obtain non-secular variability
3. Two ways to identify the component of variability associated with ENSO:
   a. Bin by ENSO index for El Niño/La Niña/Neutral years
   b. Nonlinear regression against ENSO index
4. Add the results from #1 and #3 to produce new normals

Future climates will either be projected by extrapolating hinge or using CMIP projections of global surface temperature

Questions for **YOU**

- How would you use this?
- What temporal-spatial resolution do you need?

Scan for survey

- Do you need strong vs moderate vs weak events?
- Which impacts are you more interested in? ENSO or Climate Change?
- What kinds of uncertainty do you need?

Proposed Deliverable

- User selects year and ENSO phase, such as:
  - e.g., El Niño in 2018, La Niña in 2030, Neutral in 2020
- Provide gridded maps of adjusted normals for 1, 3, 6, or 12 month windows
- User selects a grid point to get monthly normals at that point
- Initial variables will be monthly max/min temperature, mean precipitation, and Heating/Cooling/Growing degree days
- Future work may include days above/below thresholds, such as:
  - Min < 32°F, Max > 90°F, Precipitation > 1"

cicsnc.org
ncsu.edu
ncei.noaa.gov

NC STATE UNIVERSITY

cjschrec@ncsu.edu

pdf of this poster