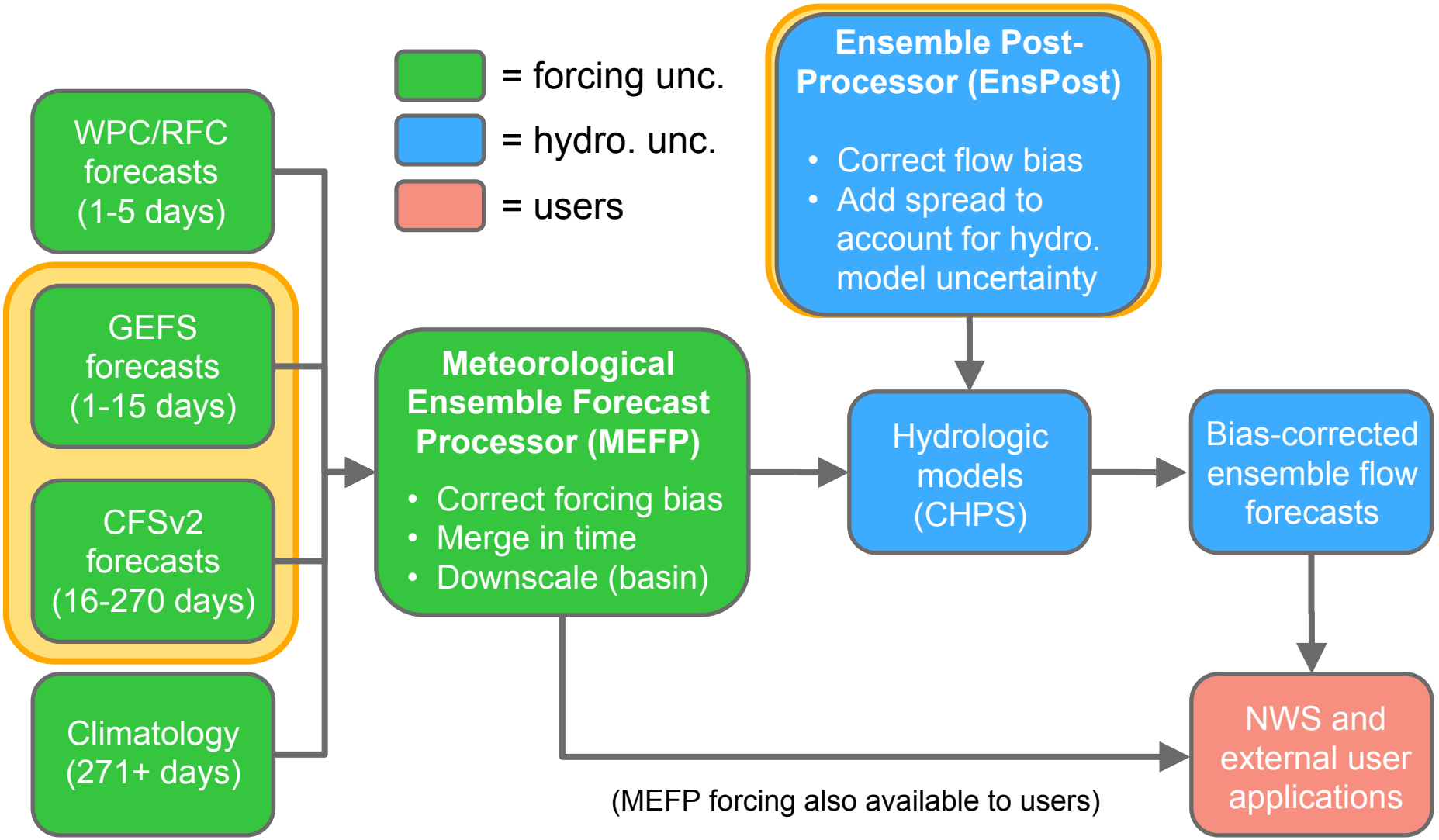
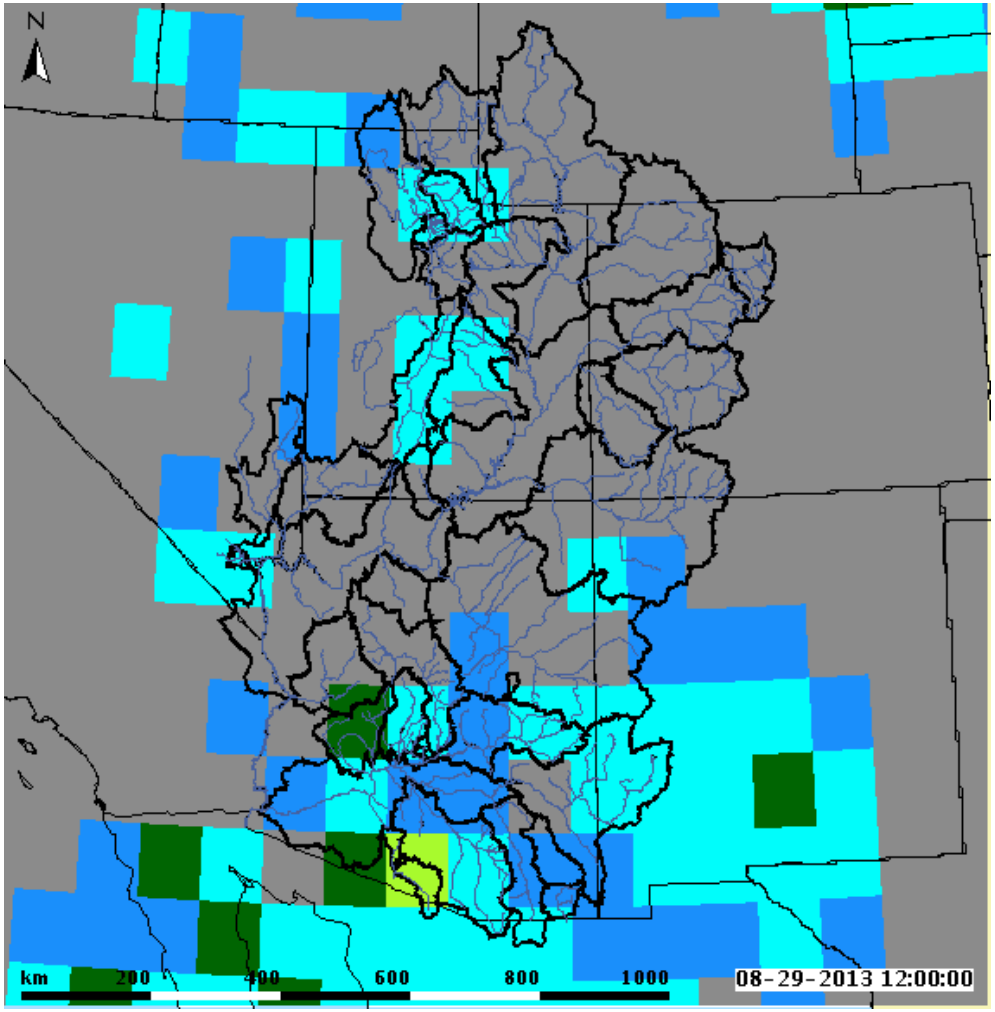
Including Meteorological Models in Ensemble Streamflow Prediction (ESP)

Meteorological Forecasts in ESP



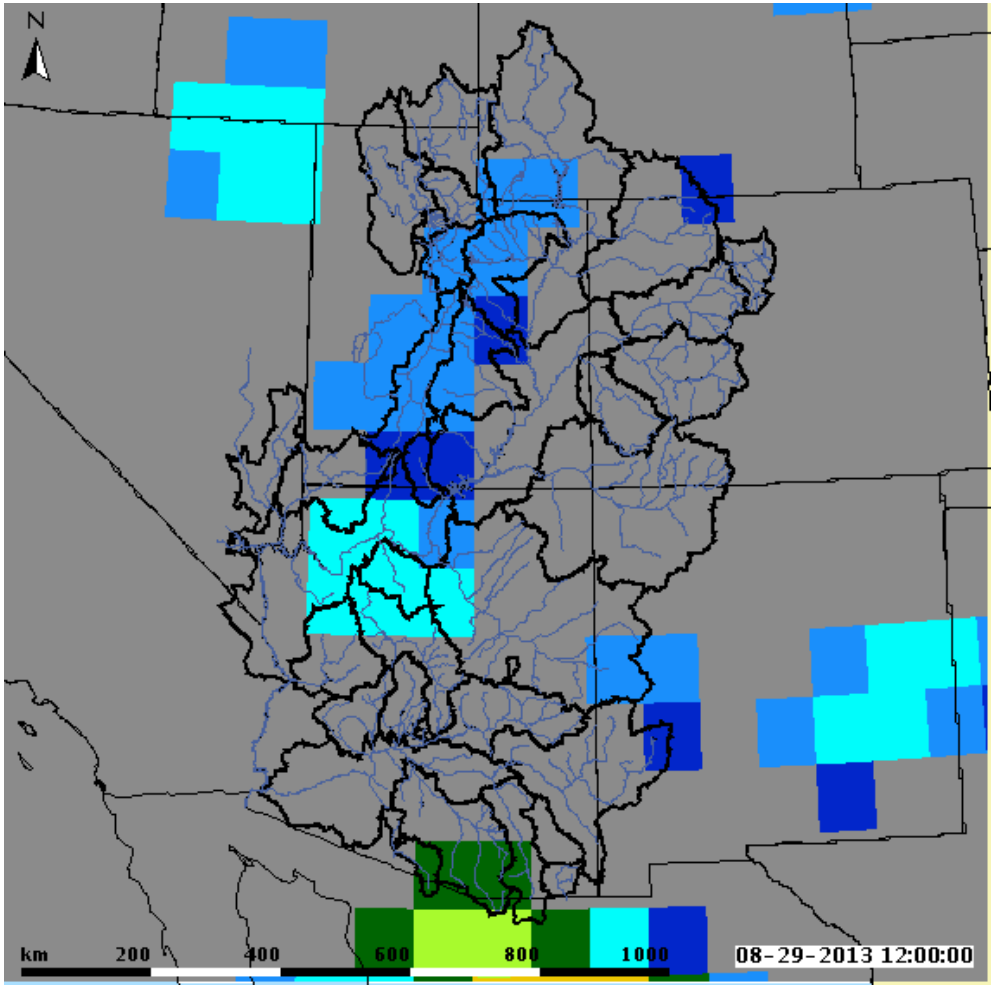
Global Ensemble Forecast System (GEFS)

- short term forecast 15 days out
- precipitation and temperature max/min
- comes as gridded product
- 1 degree resolution
- use the average of the GEFS 20 traces
- reforecasts available for 1985-2010
- http://www.emc.ncep.noaa.gov/GEFS/faq.php



Climate Forecast System (CFSv2)

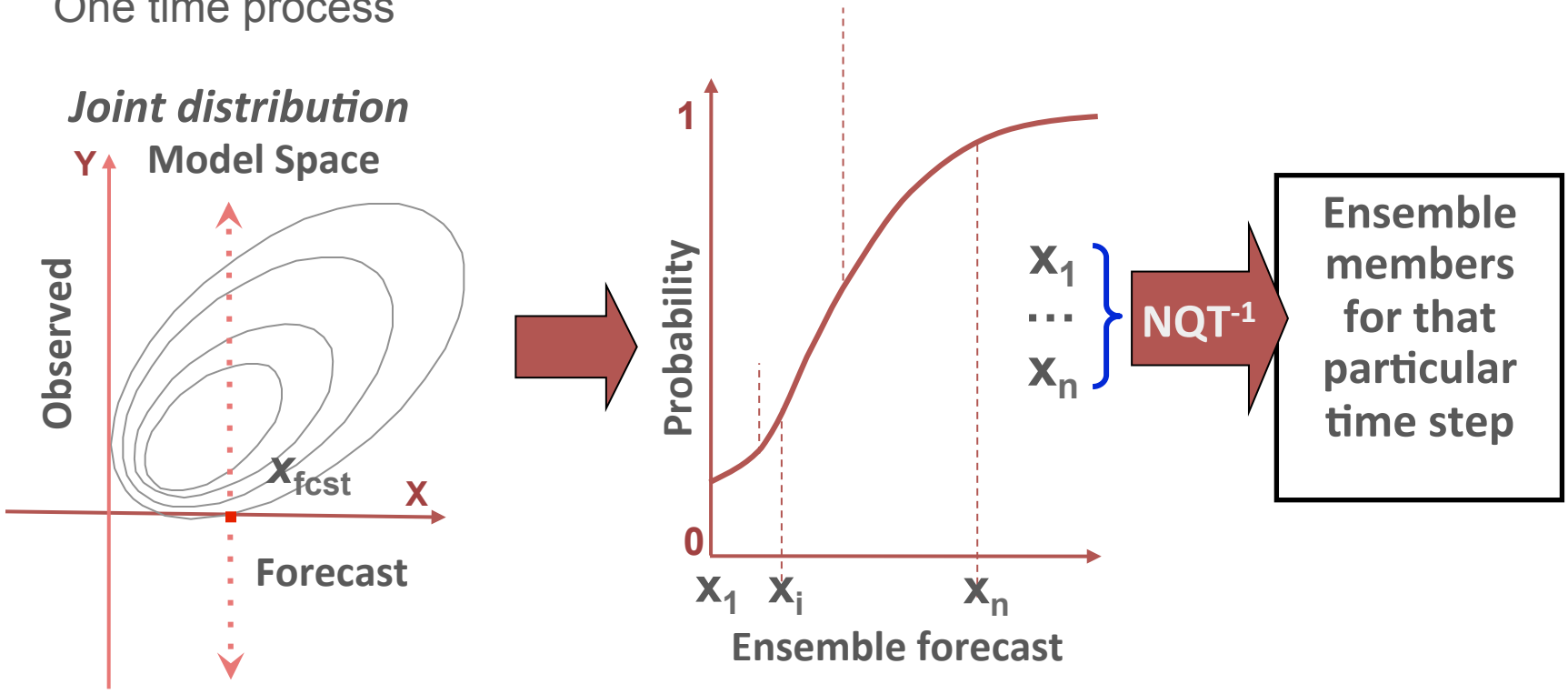
- long term forecast out 9 months (270 days)
- precipitation and temperature max/min
- comes as gridded product
- 1 degree resolution
- use the lagged ensemble mean
- reforecasts available for 1982-2011
- http://cfs.ncep.noaa.gov/cfsv2.info



GEFS and CFSv2 Processor (MEFP)

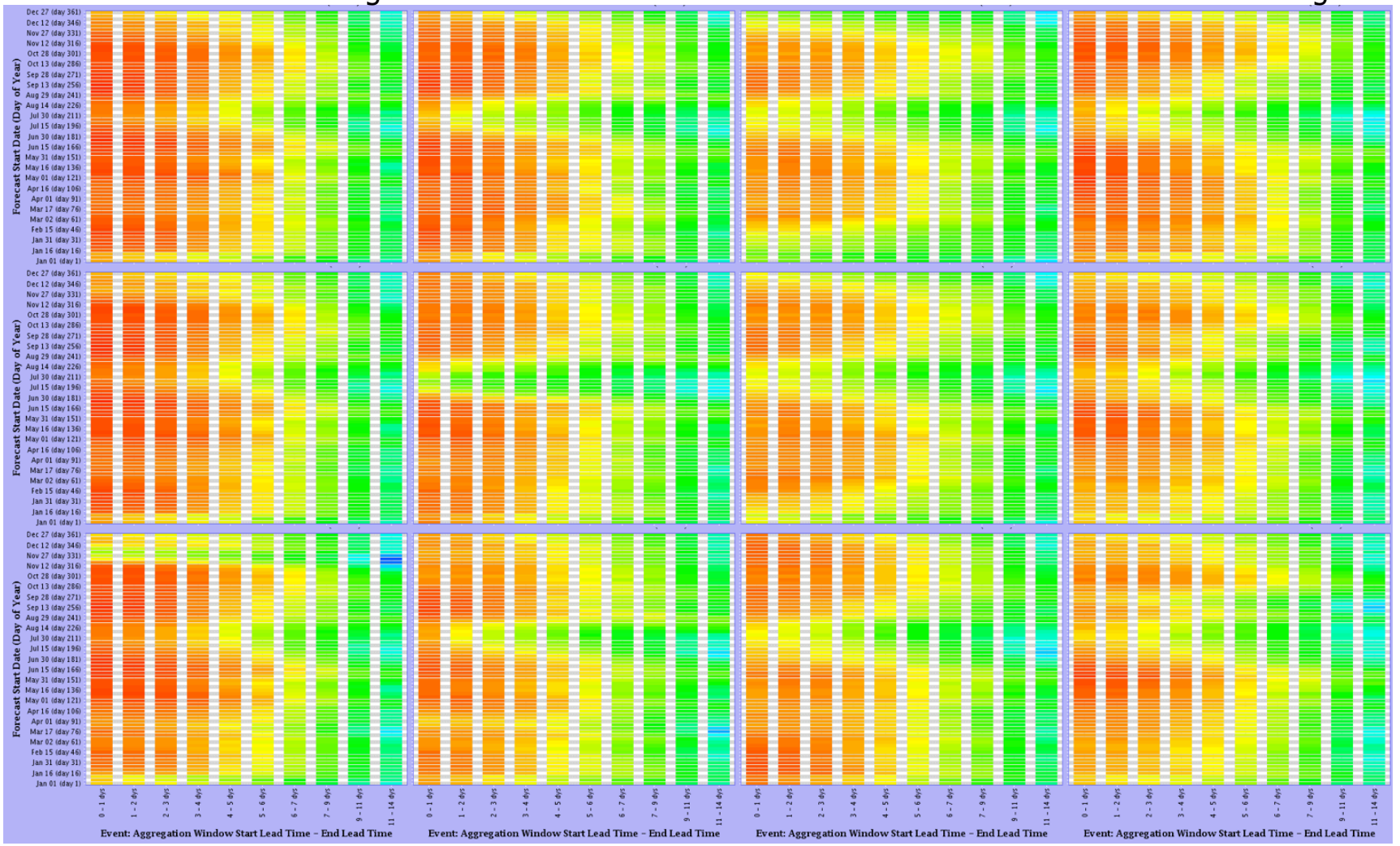
Meteorological Ensemble Forecast Processor

- Historical Observation, precipitation and max/min temperature, are statically related to GEFS and CFSv2 hindcasts to develop a bivariate relationship
- Parameters used in forecast process
- One time process

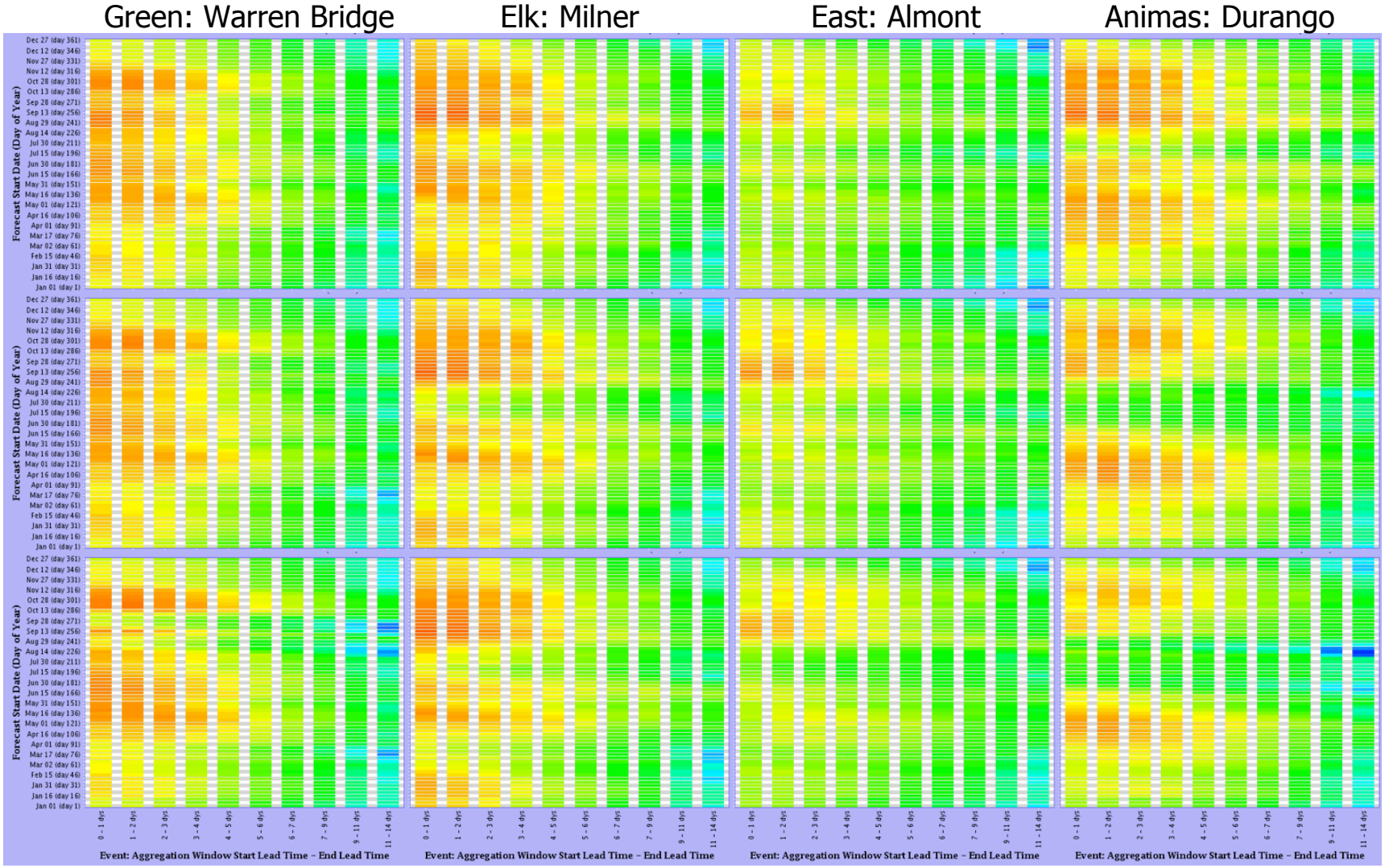


http://www.nws.noaa.gov/oh/hrl/general/HEFS_doc/Aug_2014_Seminar/Seminar_D_MEFP_Theory.pdf

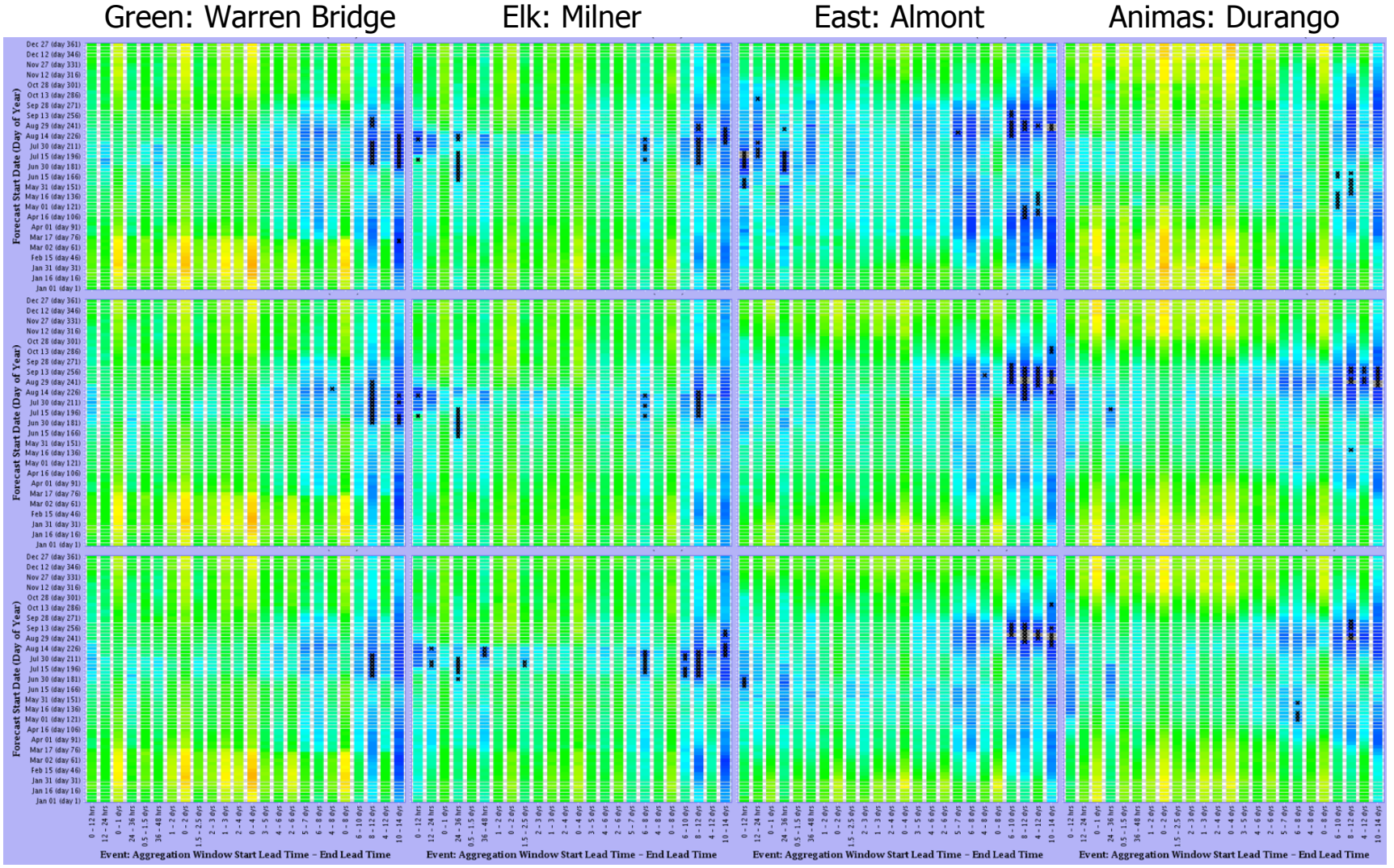
GEFS Temperature MAX Skill



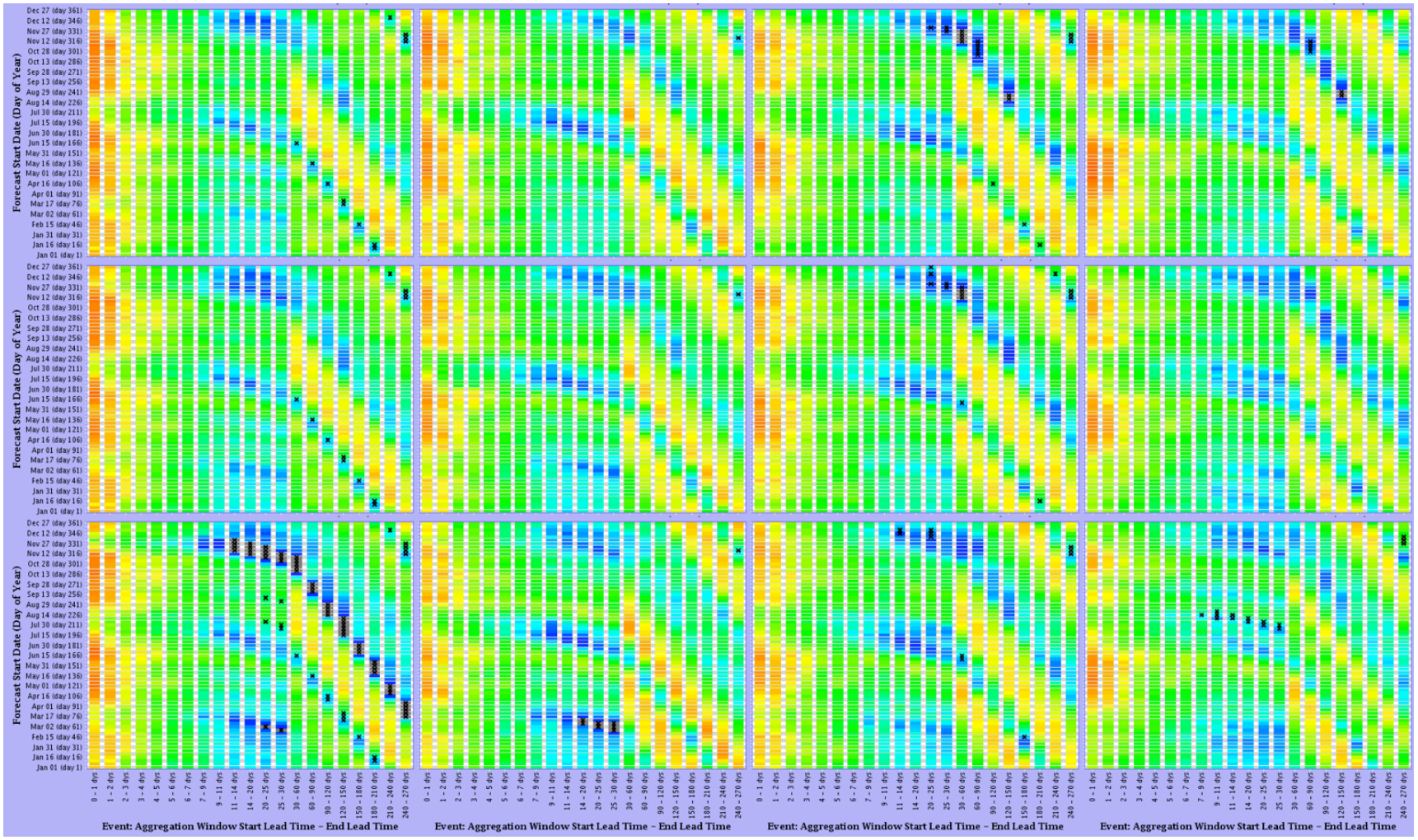
GEFS Temperature MIN Skill



GEFS Precipitation Skill



CFSv2 Temperature MAX Skill



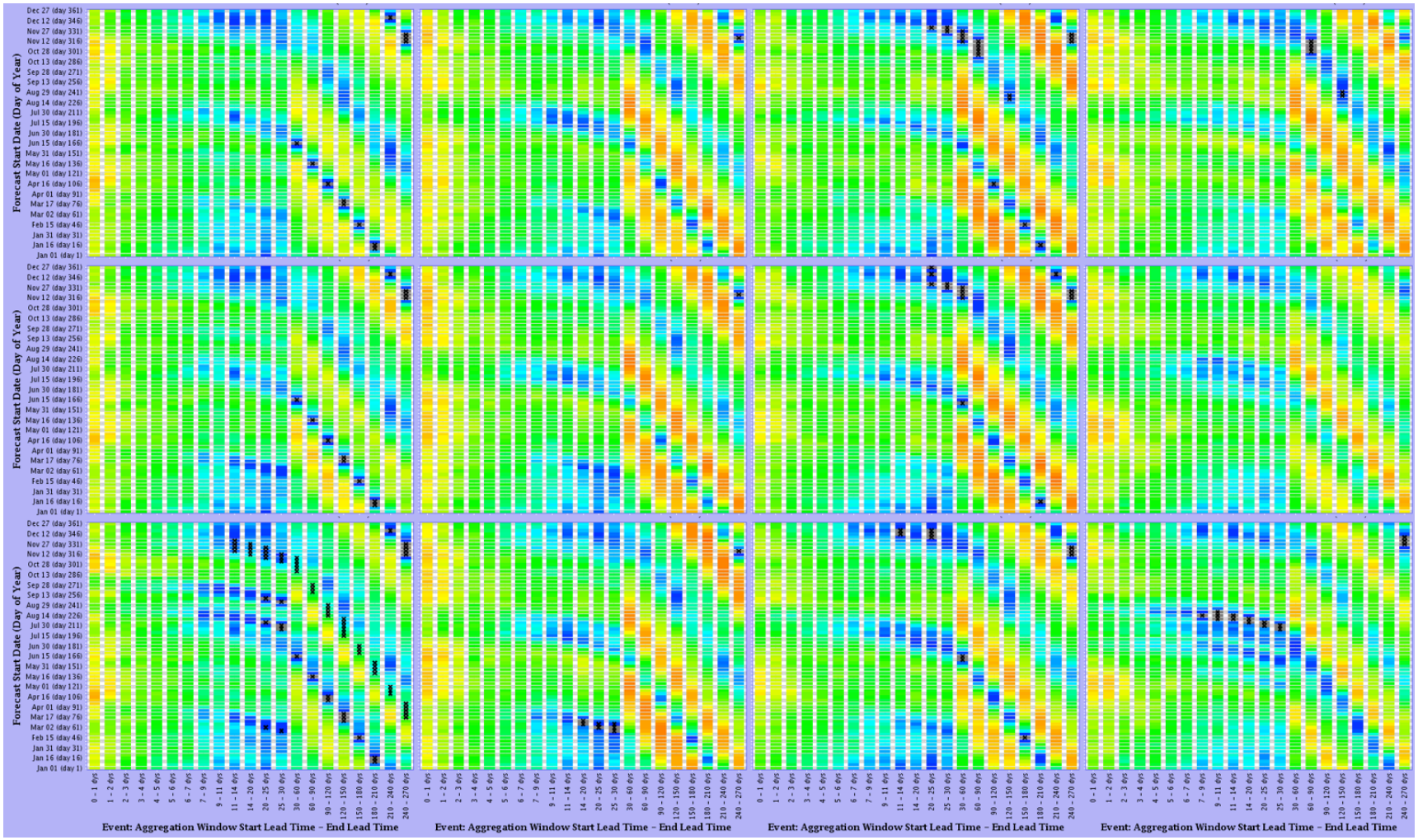
CFSv2 Temperature MIN Skill

Green: Warren Bridge | Elk: Milner | East: Almont | Animas: Durango

Lower

Mid

Upper



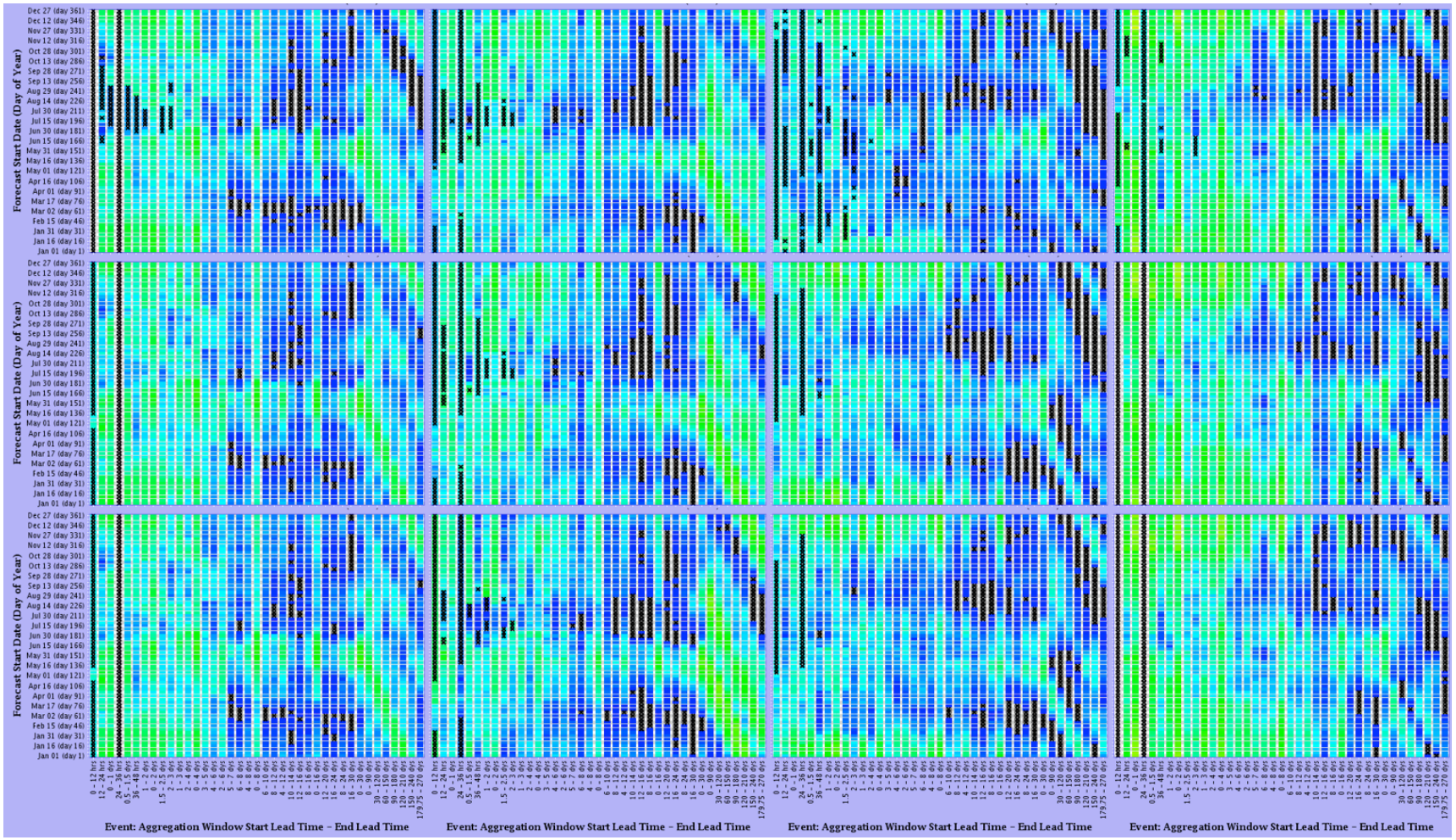
CFSv2 Precipitation Skill

Green: Warren Bridge Elk: Milner East: Almont Animas: Durango

Lower

Mid

Upper

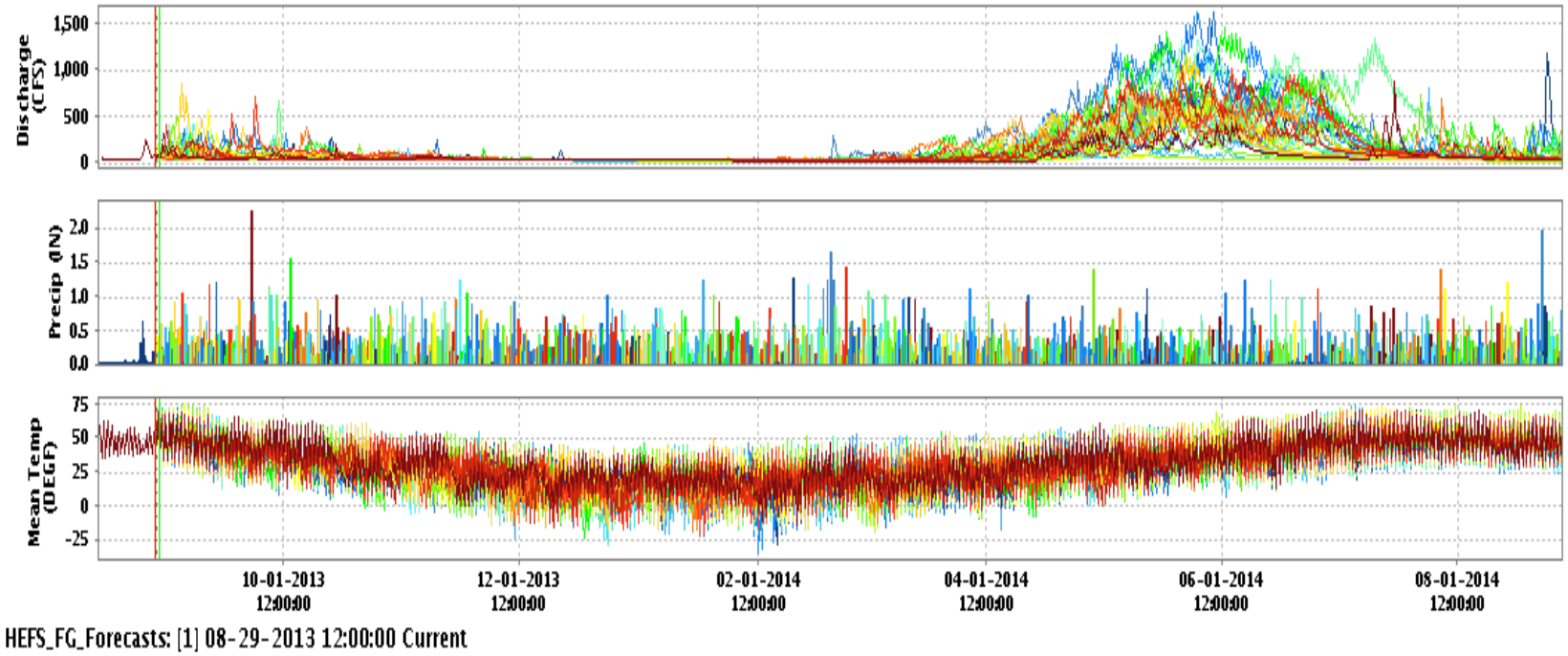


GEFS and CFSv2 in Stream Forecast

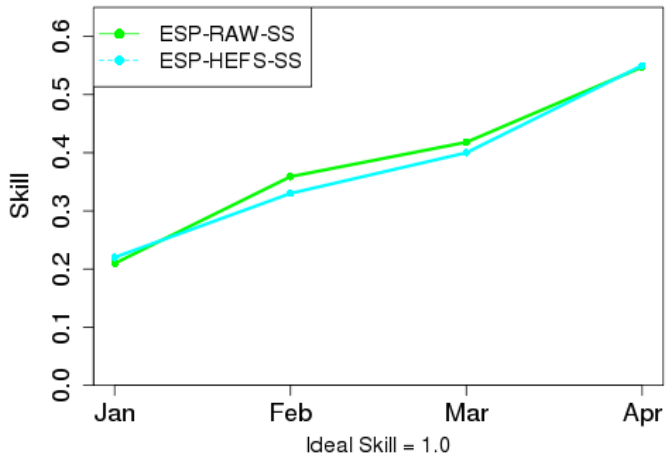
Forcings are used in ESP

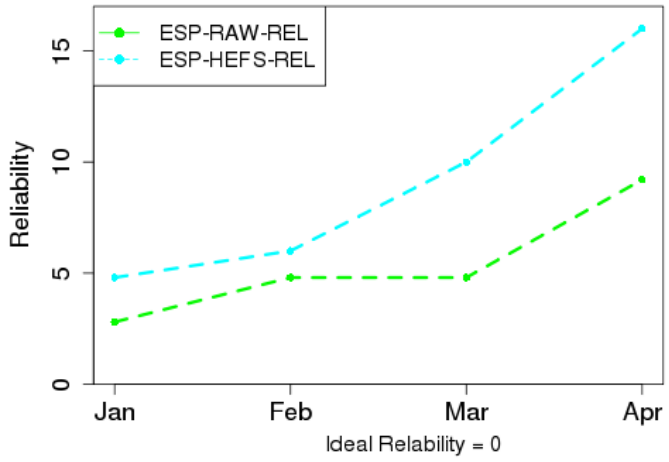
Output is a standard mean daily flow

This is the Hydrologic Ensemble Forecast Service (HEFS)

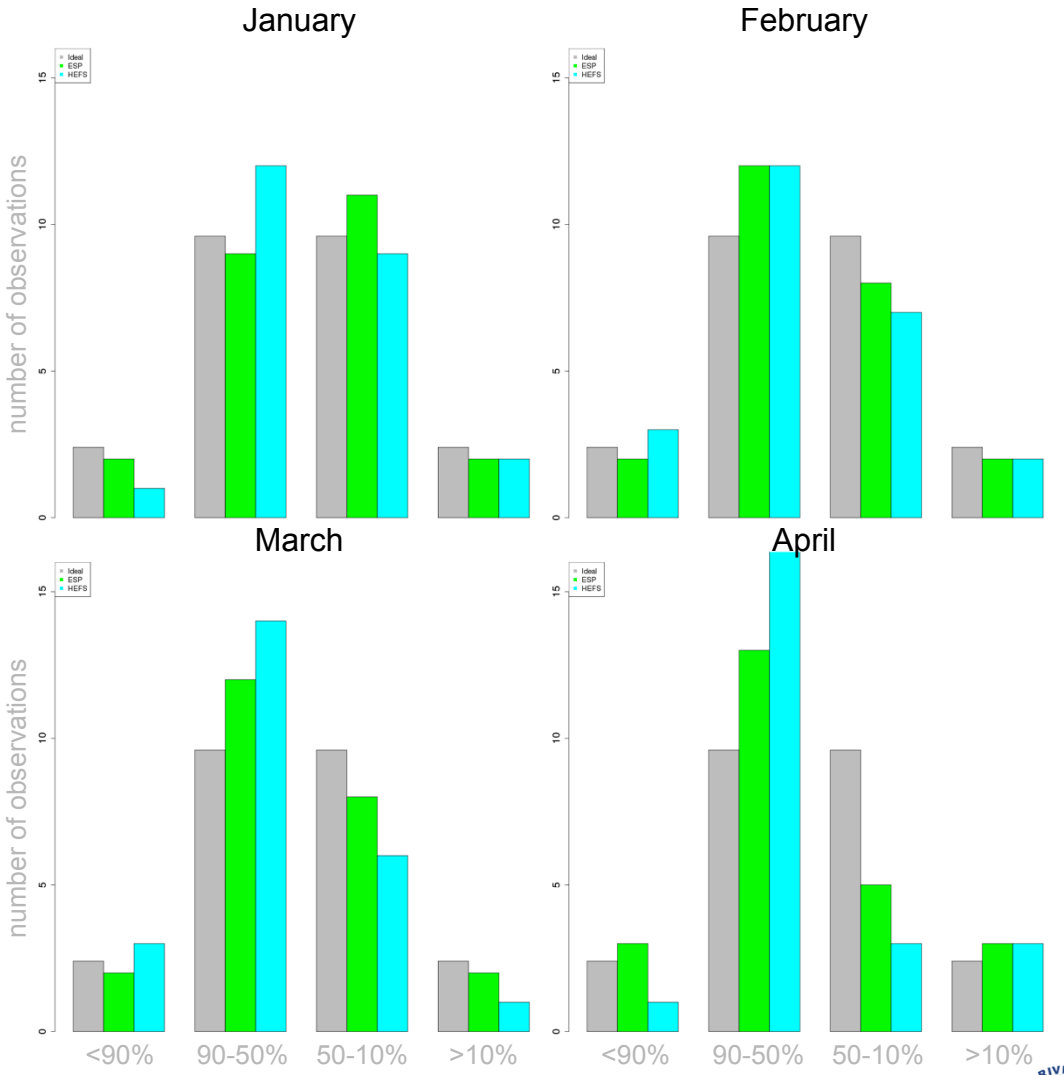


April - July Volume HEFS Skill

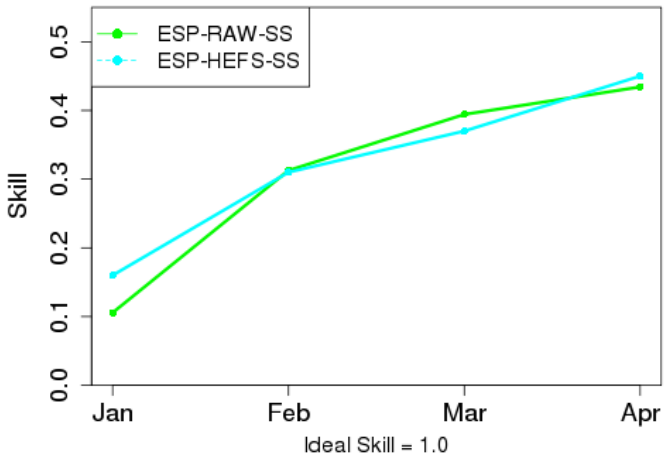


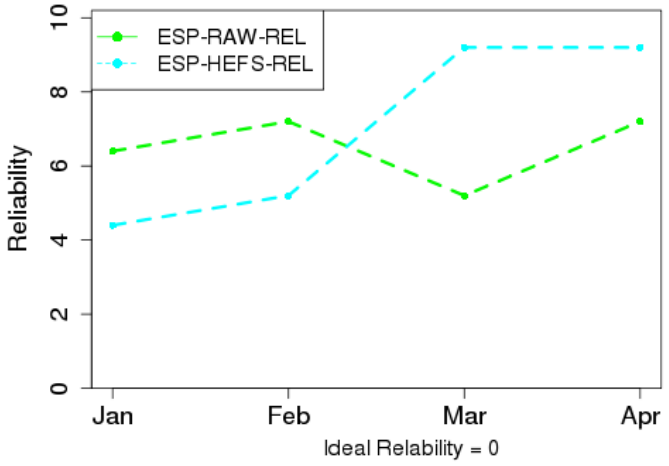


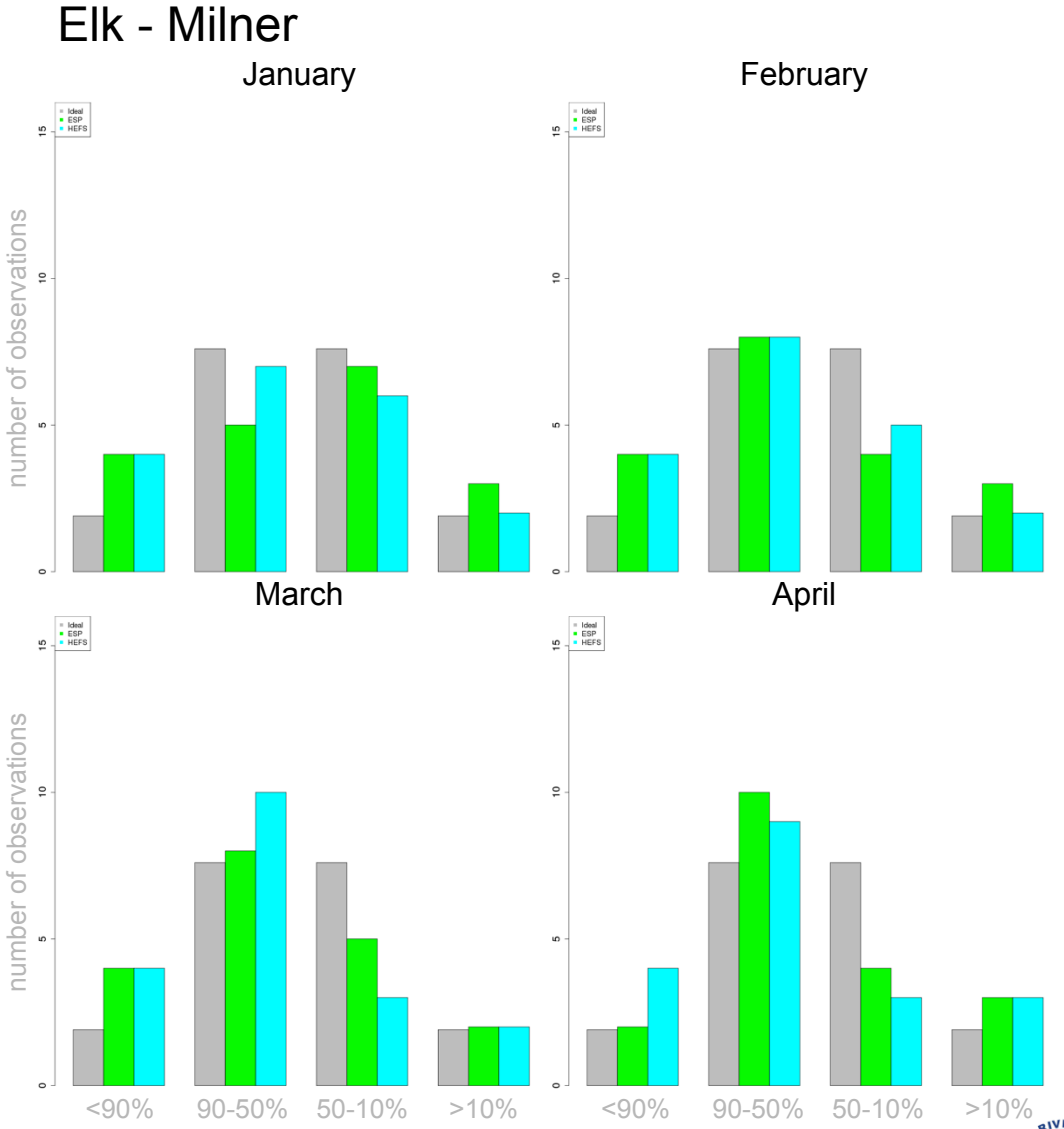
Green Warren Bridge



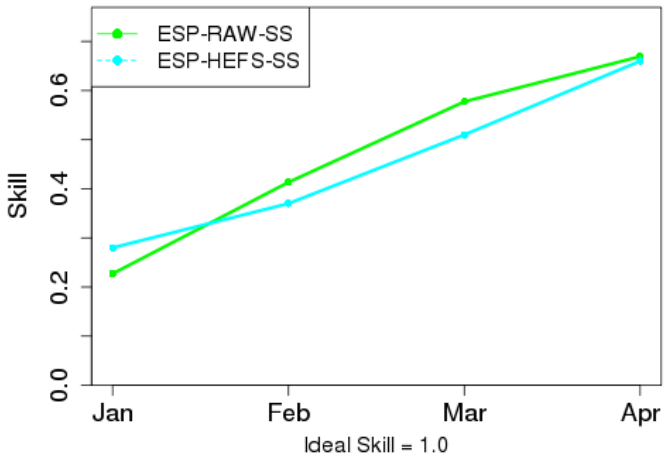
April - July Volume HEFS Skill

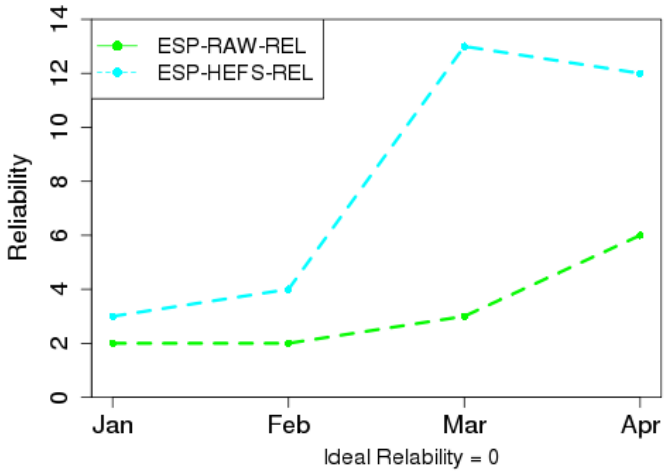


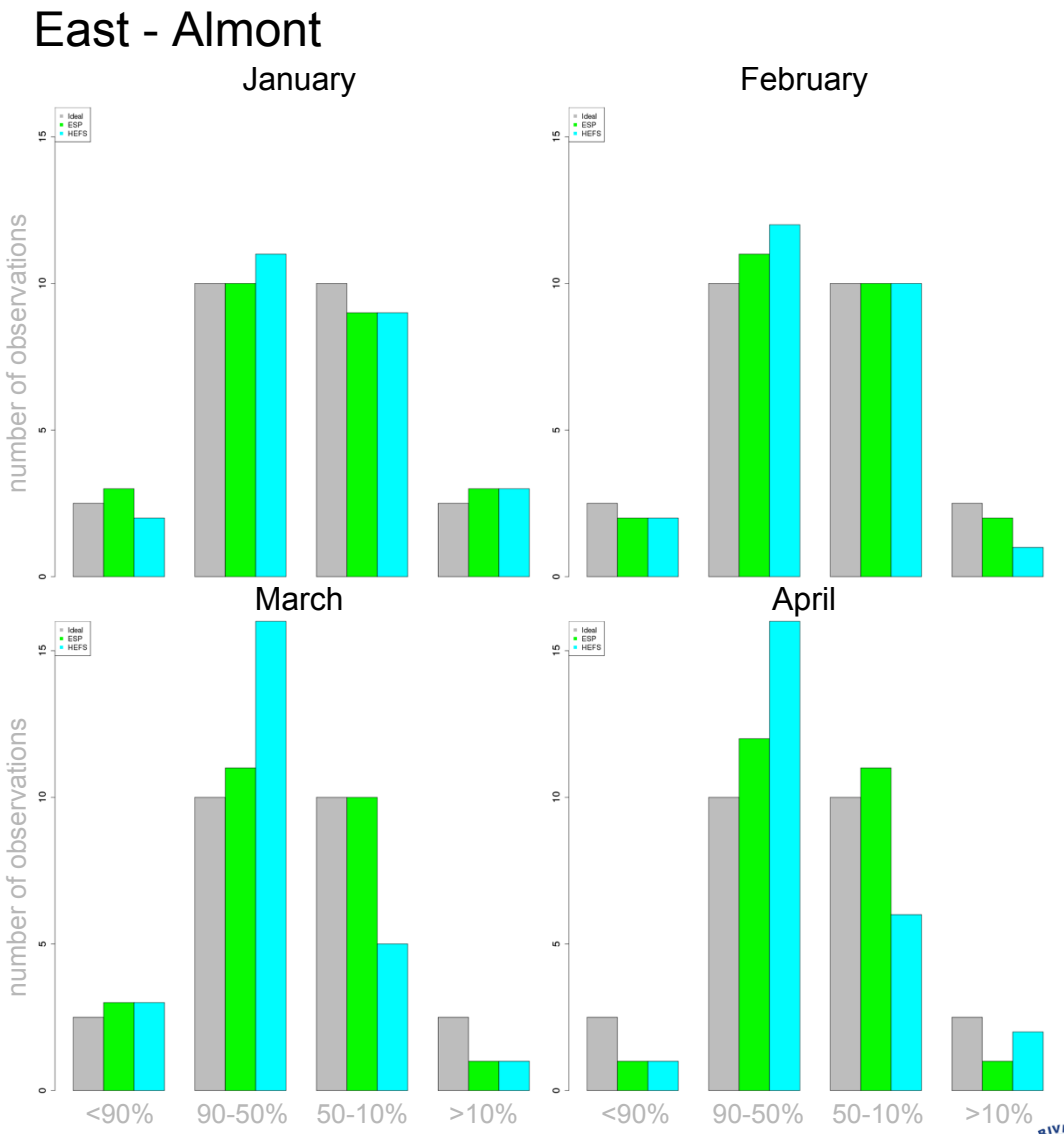




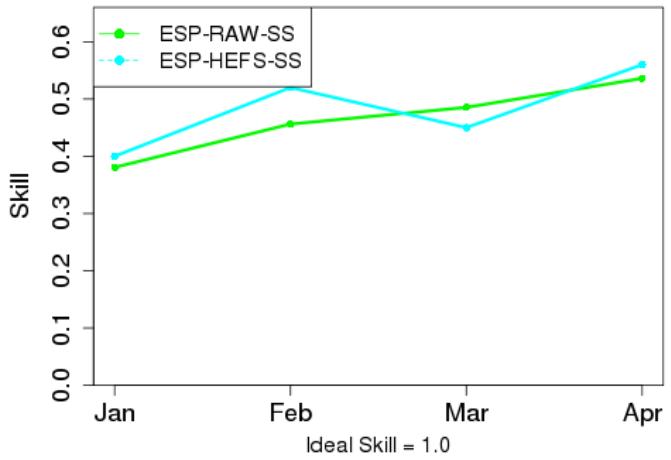
April - July Volume HEFS Skill

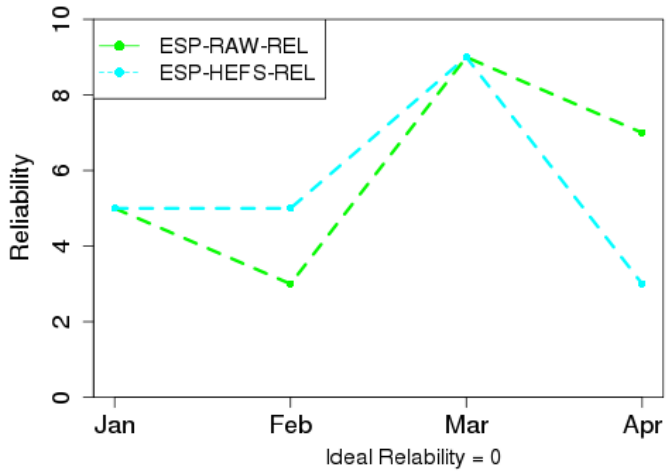




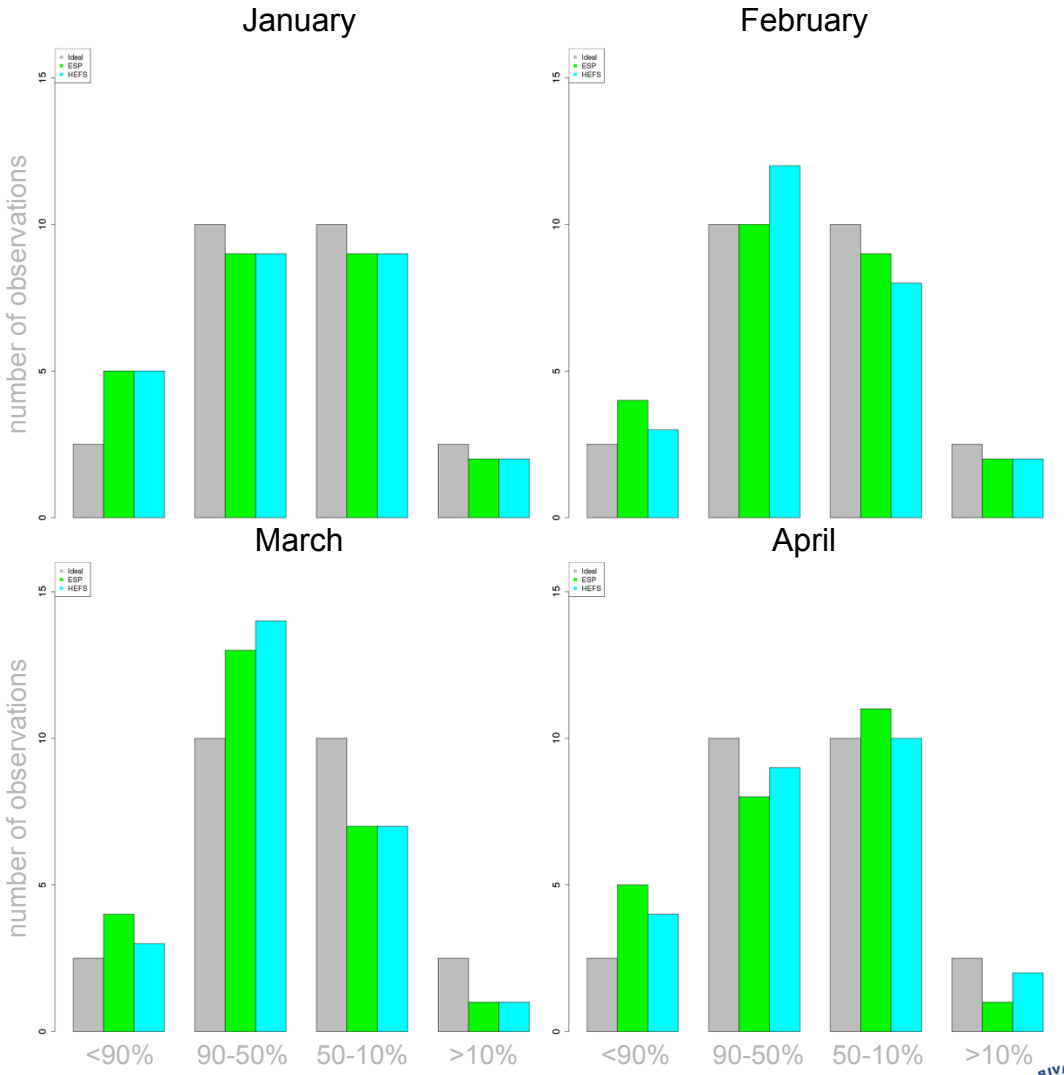


April - July Volume HEFS Skill





Animas - Durango



Initial Conclusions / More Questions

- Little, if any, skill added with GEFS/CFS forecast
  - not unexpected given not much skill in CFSv2
- Need to do more analysis on a monthly scale
- Does adding GEFS/CFS improve forecasts in Lower Basin
  - in process of generating parameters
- How does CFS forecast fair when looking at ENSO signal
  - limited sample size so it will be difficult to draw any conclusions from