

Working group III report

Post-processing

Members participating

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Ensemble prediction + post-processing: a necessary marriage.

- In the past, post-processing was an afterthought in end-to-end design.
Opportunity to change this with SREF.
 - Need to plan supercomputer resources to conduct adequate reforecasts
 - Need to prep the observational / analysis data sets
 - Need to provide codes.
 - Need to work together, modelers + statisticians.

Ensemble post-processing proposal (already proposed within NOAA)

- Requirements Definition - Define problems to work on based on user feedback (e.g., post-process for icing), format for output, rules for evaluation.
- Collect data sets (reforecasts, obs, analyses), existing algorithms to be used in testing and developing post-processing algorithms.
- Develop algorithms (ESRL, MDL, EMC, academia, etc).
- DTC to verify, synthesize, recommend candidates for tech transition.
- MDL and EMC implement.
- Monitor (independent organization like DTC?)

Some general considerations

- SREF change management process needs to change. How do we allow non-NCEP personnel to weigh in on configuration?
- How do we ensure that post-processing concerns end up being reflected in the overall SREF system design rather than be an afterthought?
 - Multi-model may be preferable when considering raw ensemble guidance as an end in itself, less desirable when post-processing is part of the equation. More models, more reforecasts needed.
 - Changing SREF member characteristics → good for raw forecasts, complicates the post-processing. Need standard method for doing this, agreement to have training data sets in place before model changes.
- Role of human involvement in modifying post-processed guidance still up for debate.
 - Opn'l proving ground in NOAA offers way to sort this out.
 - Roles may be changing with time. Inherit deterministic forecaster role, tough transition
 - Forecaster role may emphasize the high-impact events.
 - Challenge: post-processed guidance needed in regions with no observations. Existing techniques developed for data-rich environment; crucial problems in data-poor.
 - For many, need access to raw data, not post-processed output. That way, different users can massage the data to their own needs.

(1) Requirements definition

- Need to carefully understand how users will interact with the data, what format allows them to make best decisions.
 - Expression of output info (pdfs, bias corrected members); many users, many desired formats.
 - A good point to collaborate with social scientists.
- Decide whether training and evaluation will be done with observations and/or analyses. Perhaps both, but end product will include gridded, so important to evaluate in the end its skill in gridded context.
 - Obs need to be gathered from many new sources; e.g., NCAR has been collecting aircraft data.
- Requirements will specify that inconsistencies in variables (temp/dewpoint) must be handled.
- Preferable that software works well for rare + common events, not require radical changes with changing model configurations.

Collect data sets (reforecasts, obs, analyses), existing algorithms.

- Need common data set for inter-comparing post-processing methods
- Need reforecasts
 - The length of the training data set will depend on what variable is considered
 - Unfortunately, for parallel post-proc and SREF system development, post-proc must be done with earlier version of model than what will be operational several years hence.
- Need to determine what obs data sets to use, what new ones we need to develop in order to do post-proc for variables of interest.
- Will collect existing codes (MDL's regression, NCEP's stepwise bias correction & downscaling, Adrian's BMA, etc.).
- Reanalyses ("analysis of record") needed.

Develop algorithms

- Funding provided inside NOAA & to academic community to develop advanced techniques according to requirements above, using data sets above.
- Still a lot to be learned inter-comparing methods, especially for the unusual variables, discontinuous variables.

DTC to verify, synthesize, recommend candidates for tech transition.

- Need standard verification procedures, access to statistics
- Recommended algorithms for tech transition might be blend or refinement of ideas from those submitted.

MDL and NCEP/EMC implement DTC recommendations, run real-time.

- This is a labor-intensive step.
 - Post-processing software must be robust, maintainable,

Monitor (DTC again?)

- Independent organization, or by the producing organization?
 - Note: NEXGEN program is funding independent verification system development.
 - Note: NCEP, MDL already have in-house verification software.
- Standard verification statistics, and made readily available to the community