4th ENSEMBLE USER WORKSHOP
TENTATIVE AGENDA

Tuesday, May 13

7:30-8:00 Coffee

Introductions

8:00-8:15 Welcome Remarks (Louis Uccellini, Steve Lord)
8:15-8:30 The NWS Forecast Uncertainty Program (Douglas Hilderbrand)
8:30-8:35 Logistics (Zoltan Toth)

Ensemble systems overview (New products, plans)

8:35-8:55 NAEFS (Yuejian Zhu)
8:55-9:15 Short Range Ensemble Forecast System (Jun Du)
9:15-9:30 Climate Forecast System (Hua-Lu Pan)
9:30-9:50 Discussion
9:50-10:05 Break
10:05-10:20 Wave Ensemble (Degui Cao)
10:20-10:35 Hydrological applications (DJ Seo)
10:35-10:55 Statistical post-processing – 1 (Matt Peroutka)
10:55-11:15 Statistical post-processing – 2 (Roman Krzysztofowicz)
11:15-11:30 Verification of probab./ensemble forecasts (J. Brown & M. Charles)
11:30-12:00 Discussion

12:00-13:00 Lunchtime talks (Kent Johnson & Lewis Poulin - MSC, Rene Lobato - NMSM)

NCEP Service Center applications (Recent developments and plans)

13:00-13:15 HPC (Mike Brennan)
13:15-13:30 OPC (Joe Sienkiewicz)
13:30-13:45 TPC (Mike Fiorino)
13:45-14:00 SPC (David Bright)
14:00-14:15 CPC (Ed Olenic)
14:15-14:30 AWC (Steve Silberberg)
14:30-15:00 Discussion
15:00:15:15 Break

WFO & RFC applications (Recent developments and plans)

15:15-15:30 Pacific Region
15:30-15:45 Alaska Region
15:45-16:00 Western Region (Andy Edman)
16:00-16:15 Central Region (Peter Browning)
16:15-16:30 Southern Region
16:30-16:45 Eastern Region (Kenneth Johnson, Richard Grumm)
16:45-17:30 Discussion

18:30- Dinner at local restaurant

Wednesday, May 14

7:30-800	Coffee
8:00-8:15	NOMADS for flexible distribution of data (Jordan Alpert)
8:15-8:30	NAWIPS & AWIPS2 ensemble tools (David Plummer/ Paul Schultz)
8:30-9:00	Review of recommendations from previous workshop (Zoltan Toth)
9:00-9:30	Discussion
9:30-9:45	Charge to working groups (WG)
9:45-10:00	Break
10:00-12:00	WG discussions – Topic 1
12:00-13:00	Lunchtime talks (Evan Kuchera - AFWA, Tom Hamill - ESRL)
13:00-14:30	Plenary discussion - WG Topic 1 presentations
14:30-15:00	Break
15:00-17:00	WG discussions – Topic 2

Thursday, May 15

7:30-8:00	Coffee
8:00-9:30	Plenary discussion – WG Topic 2 presentations
9:30-9:45	Break
9:45-11:30	WG discussions – Synthesis of Topics 1-2
11:30-13:00	Plenary discussion – Synthesis of all topics, action items
13:00	Adjourn Ensemble User Workshop

Note:
NAEFS Workshop postponed to 7-9 October 2008

WORKING GROUPS (WG)

Charge: Report current status, recommend changes for short (2-3 yrs) and long term (5-10 yrs)

WG1

Topic 1: Operational forecast requirements (Joan Von Ahn / Regional rep)

How operational forecast requirements should be changed to reflect probabilistic nature of weather, water, and climate prediction? Currently NWS has no requirement for generating probabilistic information? First add general statement about need for including probabilistic information into products in operations manual? When existing products change / new products are developed, document changes in operational requirements manual?

Topic 2: Corporate outreach (Doug Hildebrand / David Bright)

How to inform about, and solicit feedback on NWS plans regarding forecast uncertainty? How to solicit / gather feedback regarding quality and value of various aspects of probabilistic guidance? What is the role and goal of the AMS ACUF process? How can we build on RISA & WASIS programs? How to engage with emergency management and commercial users regarding uncertainty information? Hold special user/training workshops directed at various user groups?

WG2

Topic 1: Ensemble forecasting (Yuejian Zhu / Tom Hamill)

How to improve ensemble techniques for better representation of initial condition and model related uncertainty? How can we engage a broader segment of the data assimilation and numerical modeling communities in forecast uncertainty related efforts (THORPEX)? How can we determine the optimal distribution of resources regarding: (a) global vs. regional vs. local scale ensemble applications? Up to what lead time regional and local ensemble improves statistical resolution/skill, vs. improving only reliability/fidelity – ie, “dynamical downscaling”? (b) Number of ensemble members vs. sophistication of models - eg, model resolution? (Enhanced resolution in probability space vs. enhanced fidelity of solutions) (c) Generation of current operational ensemble vs. hind-cast generation? (Benefits evaluated after bias correction). For WG session 3: What ensemble verification measures should be used to answer these and other questions?

Topic 2: Statistical post-processing (Kathy Gilbert / DJ Seo)

What are the best techniques to improve statistical reliability (consistency, calibration) while maintaining statistical resolution (skill)? How to address lead-time dependent model drift (arising due to initial conditions being off of model attractor – forecast sample needed), vs. lack of spatiotemporal details due to truncated resolution (downscaling – only re/analysis, but no forecast sample needed)? What is the relative contribution of bias correction vs. downscaling?

Which methods may require a smaller sample of forecast – proxy for truth pairs for bias correction / downscaling? What sample size of forecast – proxy for truth pairs needed for good bias correction? Dis/advantages of using a large hind-cast dataset (large sample, costly to generate) vs. smaller sample of most recent forecasts (small but regime dependent sample)? Can a sample of single forecasts be used to statistically correct an ensemble made with the same model, along with sample of recent ensemble forecasts? If so, what value is lost compared to using ensemble hind-casts? What is the role of the new global high resolution reanalysis (climatological reference), RTMA (observationally based fine resolution analysis), and other analysis efforts in statistical post-processing? What are the limitations of statistical downscaling? Is sample size of NWP re/analysis, observationally based analysis (RTMA), and/or observations large enough to derive climatology, and/or achieve regime/case dependent statistical downscaling? What are the observational data needs for downscaling? Is computational cost of statistical bias correction and downscaling methods a concern, or sample size is biggest limitation? When is it justified to use more expensive dynamical NWP integrations for case dependent downscaling? A single integration or an entire ensemble is needed? What are the best statistical methods to combine information from different sources such as single high resolution, lower resolution ensemble, global, limited area, etc forecasts? For WG session 3: What probabilistic verification measures should be used for answering above and other questions?

WG3

Topic 1: Ensemble data depository/access (Paula Freeman / Jordan Alpert)

How to store and distribute ensemble data for use at: (a) NCEP, (b) NWS, (c) External users? Take what you need approach to data distribution – what tools are needed (NOMADS)? How to integrate ensemble data depository with other NOAA & external datasets? Links with web based services, geospatial framework, WIS, GIFS, etc? Can WFOs access all ensemble data for their area of interest in ~2 yrs? If not, can summary forecast information (eg, 10 & 90 percentile of forecast distribution, in addition to midpoint estimate) be made available? What telecom/storage etc resources are needed for WFO access to summary information (limited information, 3-fold increase in data volume), vs. all ensemble data (all information, any question can be answered including joint probabilities across variables/space/time, O(10-100) increase in data volume).

Topic 2: Database interrogation/forecaster tools (Paul Schultz / Matt Peroutka)

What is needed to convert full ensemble or other pdf distribution into summary info? Can existing software be used if summary info (e.g., 10, 50, 90 percentile value of forecast distribution) is used when forecasters manipulate forecast distribution? How to back-propagate information added by forecasters into summary data so final ensemble data depository (“official” forecast, generalized NDFD database) reflects added value? What statistical methods are needed for display and manipulation of forecast uncertainty / probabilistic information based

on summary or full ensemble data? What tools are needed to interrogate ensemble forecast database (e.g., derive joint probabilities based on a sample of ensemble trajectories)? Can these tools be made available to internal/external users via web-type interface to answer any weather forecast related questions? Can NAWIPS ensemble tools be transferred to AWIPS-2? What's needed for these tools to be shared in a community-wide (TIGGE-GIFS) toolbox for the mutual benefit of all contributors?

WG4

Topic 1: Forecasters' role (Mike Brennan / Regional Rep)

How does the forecasters' role change in probabilistic forecast process? NWS will produce more information (including uncertainty/probabilities) – does this mean that only a smaller portion of all products can be manually generated, inspected/modified? Identify focus areas where, and manipulation processes through which forecasters can add most value to objective bias corrected and downscaled ensemble/probabilistic guidance. Focus on critical / high impact events? What objective tools forecasters can use to identify critical forecast events? Alerts based on automated methods to identify threatening events based on ensemble forecasts? Alert levels connected with user feedback? What is the best approach for the forecasters to change probabilistic information? Would manipulation of 10, 50, 90 percentile values of forecast distribution be a good choice? Can forecasters, at least initially, continue editing mid-point estimate of distribution (eg, 50 percentile value), and shift automatically the objectively determined bounds of distribution?

Topic 2: Forecaster training (Richard Grumm / Bill Bua)

What human factors limit the use of probabilistic forecast uncertainty information in the forecast process? How to prepare forecasters for new role in forecast process, including interpretation, modification, and communication of numerical probabilistic guidance? What training is required to understand: (a) need for probabilistic approach – natural sciences (chaos); user applications (cost-lost analysis etc) (b) review of basic statistical concepts; (c) interpretation of ensemble/probabilistic products; (d) use & manipulation of ensemble/probabilistic products in forecast process; (e) Perception of forecast uncertainty by lay (general public) and expert (quantitative applications) user communities to support outreach activities? Review of existing resources - What modules are available internally and externally? Prior training workshops – What lessons can we learn? How to consolidate existing training material for NWS use? What is missing, how can it be added?