NCEP PROJECT CHARTER 12/05/2013

NAEFS Adding New Products (Minor Implementation)

Description:

The Global Ensemble Forecast System (GEFS) runs in the NCEP production suite on the NOAA Central Computer System. This system is developed and supported by the Environmental Modeling Center (EMC) and operated and managed by NCEP Central Operations (NCO). The GEFS is a subset of a larger global ensemble system called the North American Ensemble Forecast System (NAEFS). Currently, the NAEFS consists of the NCEP GEFS and the Canadian Meteorological Centre's global ensemble system.

The objective of this project is to improve the probabilistic forecast skill of the GEFS. This objective will be accomplished by adding new products within GEFS/GFS and NAEFS. This project will incrementally improve the values of GEFS/NAEFS by adding the new products of the four cycle times daily. This project is a minor implementation for 2nd quarter of fiscal year 2014, and the milestone maps to NCEP's strategic goal to produce and deliver the best products and services.

Background (for reference only):

This project is a continuation of an ongoing effort to add new products to the NAEFS processing. Products that have been added during the past several years are as follows:

- GEFS bias corrected product files at one degree resolution (done:12/04/2007, upgraded on 2/23/2010)
- Adding new NAEFS product files from combined NCEP/GEFS (20 members) and CMC/GEFS (20 members) for 00UTC, 06UTC, 12UTC and 18UTC cycles, 1*1 latitude/longitude resolution, globally (done: 12/04/2007, upgraded on 2/23/2010)
    - 48 variables – bias corrected
    - 10%, 50%, 90%, mean, mode and spread
- Generating new ensemble product files at ~5km resolution for CONUS, four daily cycles (for NCEP/GEFS) and two daily cycles (for NAEFS). (done for CONUS: 12/04/2007)
    - 4 variables (sfc prs, T2m, U10m and V10m)
    - 10%, 50%, 90%, mean, mode and spread
    - Every 6 hours out to 16 days
- Generating new ensemble product files at ~6km (NDFD) resolution for ALASKA, four daily cycles for NCEP/GEFS and two daily cycles for NAEFS. (done for ALASKA: 03/02/2011)
    - 8 variables (sfc prs, T2m, T2max, T2min, U10m, V10m, Ws10m and Wd10m)
    - 10%, 50%, 90%, mean, mode and spread
    - Every 6 hours out to 16 days

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Scope:

The scope of the project includes:

- Additional bias corrected forecast from NCEP GEFS and GFS
  - GRIB2 data format (GRIB2 encode & decode)
  - At 1*1 degree resolution globally
  - 2 additional variables (Td2m and RH2m)
  - 21 ensemble members
  - 4 times daily
  - Output every 6 hours out to 384 hours
- Additional bias corrected forecast from FNMOC
  - GRIB2 data format (GRIB2 encode & decode)
  - At 1*1 degree resolution globally
  - 2 additional variables (Td2m and RH2m)
  - 20 ensemble members
  - 2 times daily
  - Output every 6 hours out to 384 hours
  - One year HPSS archive for the data in the sub-directory pgrb2a_bc
  - Data distribution: NCEP ftp, NOMADS
- Additional GEFS probabilistic products from NCEP bias corrected GEFS
  - GRIB2 data format (GRIB2 encode & decode)
  - At 1*1 degree resolution globally
  - 2 additional variables (Td2m and RH2m)
  - 10%, 50%, 90%, mean, mode and spread
  - 4 times daily
  - Output every 6 hours out to 384 hours
  - Generating GEMPAK data (from NCO)
  - One year HPSS archive for the data in the sub-directory pgrb2a_bc
  - Data distribution: NCEP ftp, NOMADS
- Additional NAEFS probabilistic products
  - GRIB2 data format (GRIB2 encode & decode)
  - At 1*1 degree globally
  - 2 additional variables (Td2m and RH2m)
  - 10%, 50%, 90%, mean, mode and spread
  - 4 times per daily (06UTC and 18UTC:NCEP GEFS based products only)
  - Output every 6 hours out to 384 hours
  - Generating GEMPAK data (from NCO)

  - One year HPSS archive for the data in the sub-directory pgrb2a_bc
  - Data distribution: NCEP ftp, TOC (or AWIPS), NOMADS
- Additional downscaled probabilistic products for CONUS from NCEP GEFS
  - GRIB2 data format (GRIB2 encode & decode)
  - at 5km for CONUS
  - 6 additional variables (T2max, T2min, Ws10m and Wd10m, Td2m and RH2m)
  - 10, 50, 90%, mean, mode, and spread
  - 4 times daily
  - Every 6 hours out to 16 days
  - Generating GEMPAK data (from NCO)
  - One year HPSS archive for the data in the sub-directory ndgd_gb2
  - Data distribution: NCEP ftp, NOMADS
- Additional downscaled probabilistic products for CONUS from NAEFS
  - GRIB2 data format (GRIB2 encode & decode)
  - at 5km for CONUS
  - 6 additional variables (T2max, T2min, Ws10m and Wd10m, Td2m and RH2m)
  - 10, 50, 90%, mean, mode, and spread
  - 4 times daily (06UTC and 18UTC:NCEP GEFS based products only)
  - Every 6 hours out to 16 days
  - Generating GEMPAK data (from NCO)
  - One year HPSS archive for the data in the sub-directory ndgd_gb2
  - Data distribution: NCEP ftp, TOC (or AWIPS), NOMADS
- Additional downscaled probabilistic products for Alaska from NCEP GEFS
  - GRIB2 data format (GRIB2 encode & decode)
  - at 6km for Alaska
  - 6 additional variables (T2max, T2min, Ws10m and Wd10m, Td2m and RH2m)
  - 10, 50, 90%, mean, mode, and spread
  - 4 times daily
  - Every 6 hours out to 16 days
  - Generating GEMPAK data (from NCO)
  - Data distribution: NCEP ftp, NOMADS
- Additional downscaled probabilistic products for Alaska from NAEFS
  - GRIB2 data format (GRIB2 encode & decode)
  - at 6km for Alaska
  - 2 additional variables (Td2m and RH2m)
  - 10, 50, 90%, mean, mode, and spread
  - 4 times daily (06UTC and 18UTC:NCEP GEFS based products only)
  - Every 6 hours out to 16 days

  - Generating GEMPAK data (from NCO)
  - Data distribution: NCEP ftp, TOC (or AWIPS), NOMADS
- New bias corrected Quantitative Precipitation Forecast (QPF) from NCEP GEFS and GFS
  - GRIB2 data format (GRIB2 encode & decode)
  - At 1*1 degree resolution globally
  - 21 ensemble members
  - 6-hour accumulation
  - 4 times daily
  - Output every 6 hours out to 384 hours
  - Save to new directory /com/gens/prod/gefs.yyyymmdd/cyc/prcp_gb2
  - One year HPSS archive for the data in the sub-directory prcp_gb2
  - Generating GEMPAK data for GFS/GEFS control deterministic forecasts (by NCO)?
- New bias corrected Probabilistic QPF (PQPF) from NCEP GEFS
  - GRIB2 data format (GRIB2 encode & decode)
  - At 1*1 degree resolution globally
  - 14 thresholds
  - 6-hour accumulation
  - 4 times daily
  - Output every 6 hours out to 384 hours
  - Save to new directory /com/gens/prod/gefs.yyyymmdd/cyc/prcp_gb2
  - Generating GEMPAK data (by NCO)?
  - Data distribution: NCEP ftp; TOC (or AWIPS), NOMADS
- New downscaled QPF products for CONUS from NCEP GEFS and GFS
  - GRIB2 data format (GRIB2 encode & decode)
  - at 5km for CONUS
  - 21 ensemble members
  - 6-hour accumulation
  - 4 times daily
  - Output every 6 hours out to 384 hours
  - Save to new directory /com/gens/prod/gefs.yyyymmdd/cyc/ndgd_prcp_gb2
  - One year HPSS archive for the data in the sub-directory ndgd_prcp_gb2
  - Generating GEMPAK data for GFS/GEFS control deterministic forecasts (by NCO)?
- New downscaled PQPF products for CONUS from NCEP GEFS
  - GRIB2 data format (GRIB2 encode & decode)
  - at 5km for CONUS
  - 14 thresholds
  - 6-hour accumulation
  - 4 times daily

- Output every 6 hours out to 384 hours
- Save to new directory /com/gens/prod/gefs.yyyymmdd/cyc/ndgd_prcp_gb2
- Generating GEMPAK data (by NCO)?
- Data distribution: NCEP ftp; TOC or AWIPS; NOMADS

- Relocation of 24-hour PQPF GRIB2 files from existing directory prcp to new directory prcp_gb2 under gefs

Attention:

- NCEP GEFS precipitation bias estimation files in prcp_gb2 and ndgd_prcp_gb2 are not sent to public users
- Stop sending the directory prcp to public users
- Save all files in prcp_gb2 and ndgd_prcp_gb2 for 18 days

Major Deliverables:

Planning

- Project charter
- Scope statement
- Project schedule
- Sign-off package for plan acceptance
- List of subjective assessment participants

Scientific Test and Evaluation

- Subjective assessment results from participants
- Objective verification results
- Computational resource analysis (estimations)

Technical Test and Evaluation

- Code available to NCO
- Network, service and storage capacity analysis
- Product format and content analysis
- Parallel production runs
- Analysis of production resource and schedule impact

Review

- Mid-term and final scientific implementation briefing
- Mid-term and final technical implementation briefing
- Signed implementation approval memorandum

Implementation

- TOC change notification
- Change requests in PMB JIF database
- Final code implemented in production

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Justification:
This project will incrementally improve the overall probabilistic forecast skill of NAEFS by producing additional products. The NAEFS mean, mode, spread, 10%, 50% and 90% probabilistic forecasts which combining NCEP and CMC's ensembles will be best ensemble products from multi-model and bias corrected ensemble forecasts. The combination of lower resolution ensemble and higher resolution control forecasts will provide best numerical guidance product available. The down-scaling for NAEFS from 100 km to 5km/6km for CONUS/Alaska could be future uncertainty forecast for NDGD.

Organizational Scope:
The organizational scope of the project includes all of the NCO Branches, the EMC Global Modeling Branch, all the NCEP Service Centers, the NWS Telecommunications Gateway (TOC), the NOAA Web Operations Center (WOC) and the NWS OS&T. EMC will be responsible for developing the code changes, running retrospective runs and validating the quality of the new products. The NCO will be responsible for the technical testing, evaluation and implementation of the new products. The NCO will also be responsible for coordinating the product and volume changes with the TOC, WOC, NOMADS and NWS OS&T. The NCEP Service Centers will be responsible for the subjective evaluation of the new products. The TOC, WOC and NOMADS will be responsible for allocating and approving the necessary resources needed for the new products on the downstream ftp servers. The NWS OS&T will be responsible for issuing and approving the change notification to the field.

Risk:
Due to the large nature of the global ensembles at NCEP, network capacity is always a concern. If network capacity is not available for this upgrade, some scope elements may have to either be postponed or implemented on the WCOSS but not disseminated off the system.

Project Authorization

Appointment of Project Manager:
To achieve the objectives of this project, I appoint the team leader of Production Management Branch's Production Control Team as Project Manager for this project. In this capacity, this team leader has the authority to expend NCO human and financial resources to accomplish objectives of the project.

Project Budget Authority:
In support of this project, I authorize the use of staff time to meet the scope/objectives. A time estimate will be provided for review and approval during the project planning phase.

Project Reporting Frequency:
Status will be reported on a monthly basis or as required by Sponsor.

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Project Expected Duration:
A roll-up duration estimate is four months. Actual effort will be determined from the project plan and submitted to the Sponsor for review and approval.

Project Sponsor(s):
Ben Kyger, Acting Director NCEP Central Operations
Stephen Lord, Director NCEP Environmental Modeling Center

Signature(s) of the project Sponsor(s) indicates the project charter has been reviewed and approved by the Project Sponsor(s).

Project Sponsor Approval: _____ Date: _____
Ben Kyger, Director NCO

Project Sponsor Approval: _____ Date: _____
Stephen Lord, Director EMC

NTOP Project Number: NCO*xx* *Look at the RMS project list to get the proper NTOP number (confirm with Sponsor/PMO)*
PMO Project Number: PMO*xxx* *PMO will assign this number once the project is signed by Sponsor (signed copy goes to PMO)*

Document Information and Revision History

Version	Date	Author(s)	Revision Notes
1.0	05/04/2009	Yuejian Zhu	New
2.0	01/25/2009	Yuejian Zhu	Move party of scope to back ground
3.0	3/15/2010	Yuejian Zhu	Adding NOMADS as data distribution
4.0	12/05/2013	Bo Cui/Yan Luo	Submitted to NCO