NWS/AFS11 Survey on Global Forecast Systems [Non-NOAA Version]

This is a voluntary survey developed by the Analysis and Forecast Branch (AFS11) in the Analyze, Forecast, and Support Office of the National Weather Service, regarding the Global Forecast System (GFS), Global Ensemble Forecast System (GEFS), and Climate Forecast System (CFS). The Seasonal Forecast System (SFS) is not explicitly asked about in this survey, as it is in early stages of development. However, any feedback regarding the CFS could assist in the improvement of the SFS. Since SFS covers the time frame beyond what CFS covers (i.e., from beyond months up to a year), any wished features to be included in SFS can be added. It should take you about 15 minutes or so to complete the survey. We would appreciate it if you could complete the survey by January 19, 2024.

The information that you provide will be used to develop "requirements" (guidelines for system developers) and inform developers at the National Center for Environmental Prediction (NCEP) Environmental Modeling Center (EMC) what users need in operations regarding global forecast systems. These recommended improvements will ultimately help you obtain better forecast output.

If you have any questions about this survey, please contact the NWS AFS11 GFS Project Team (nws.afs.afs11.gfs@noaa.gov).

* Reference Materials

1. GFS Parameters and near-term data access (all, links on page):
2. GEFS Parameters and near-term data access (all, links on page):
3. EMC's GFS Homepage
4. EMC's GEFS Homepage
5. EMC's CFSv2 Homepage
6. CFSv2 Documentation (Incl. Analysis and Forecast Variables)

7. GFS 0.25 Degree Data Archive (2019-)
8. GEFS Data Archive (2017-)

* Indicates required question

(a) Where do you work? *

Your answer

(b) What is your job title?

Your answer

1-1) How often do you use the GFS for your purpose? Select a number on a scale from 1 to 5, where 1 is “rarely” and 5 is “always”. If you don’t use the GFS, please select “Other” and list the tool you use instead and state the reason, or if none, put “None” . *

- 1 (rarely)
- 2
- 3
- 4
- 5 (always)
- Other:

1-2) How often do you use the GEFS for your purpose? Select a number on a scale from 1 to 5, where 1 is “rarely” and 5 is “always”. If you don’t use the GEFS, please select “Other” and list the tool you use instead and state the reason, or if none, put “None” . *

- ◯ 1 (rarely)
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5 (always)
- ◯ Other:

1-3) How often do you use CFS for your purpose? Select a number on a scale from 1 to 5, where 1 is “rarely” and 5 is “always”. If you don’t use the CFS, please select “Other” and list the tool you use instead and state the reason, or if none, put “None” . *

- ◯ 1 (rarely)
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5 (always)
- ◯ Other:

2) Data from the GFS/GEFS/CFS can be accessed through many different sources. Please specify the methods [separated by a comma if more than one] by which you look at and utilize GFS/GEFS/CFS data in your forecast process. *

Your answer

3) Please provide more detail from your answer to (2). Why do you use the method of accessing GFS/GEFS/CFS data that you indicated?

Your answer

4) What are the top three GFS/GEFS/CFS products that you use for your purpose? * If needed, please refer to the list of parameters in the links above for samples.

Your answer

5) =Skipped for non-NOAA users=

Your answer

6) =Skipped for non-NOAA users=

Your answer

7) For the following situations with GFS and/or GEFS, have you noticed biases that could negatively affect your forecasting capabilities? Please skip those that you have not been exposed to (for example, have never looked at GFS/GEFS tropical cyclone forecasts).

7-1) Right-of-track bias in tropical cyclone (TC) forecast tracks (e.g., southwestern North Atlantic)

- ○ 1 (rarely)
- ○ 2
- ○ 3
- ○ 4
- ○ 5 (always)
- ○ Other:

7-2) Left-of-track bias in TC forecast tracks (e.g., southwestern North Atlantic)

- ○ 1 (rarely)
- ○ 2
- ○ 3
- ○ 4
- ○ 5 (always)
- ○ Other:

7-3) TC genesis false alarms

- ○ 1 (rarely)
- ○ 2
- ○ 3
- ○ 4
- ○ 5 (always)
- ○ Other:

7-4) Failure to forecast TC genesis during certain large-scale patterns (e.g., during El Niño, La Niña)

- ○ 1 (rarely)
- ○ 2
- ○ 3
- ○ 4
- ○ 5 (always)
- ○ Other:

7-5) Significant forecast track errors for potential winter storm systems

- ○ 1 (rarely)
- ○ 2
- ○ 3
- ○ 4
- ○ 5 (always)
- ○ Other:

7-6) Over-amplification of winter storms, resulting in excessively high snowfall forecast

- ○ 1 (rarely)
- ○ 2
- ○ 3
- ○ 4
- ○ 5 (always)
- ○ Other:

7-7) Under-amplification of winter storms, resulting in excessively low snowfall forecast

- ◯ 1 (rarely)
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5 (always)
- ◯ Other:

7-8) Under-amplification of winter-time synoptic troughs occurring with comparable frequency to over-amplification in questions 7-6 and 7-7.

- ◯ Yes
- ◯ No
- ◯ Unsure
- ◯ Other:

7-9) Under-forecast of CAPE values prior to a severe weather event

- ○ 1 (rarely)
- ○ 2
- ○ 3
- ○ 4
- ○ 5 (always)
- ○ Other:

7-10) High bias in daytime temperatures during heat waves

- ○ 1 (rarely)
- ○ 2
- ○ 3
- ○ 4
- ○ 5 (always)
- ○ Other:

7-11) Significant degradation of model performance during heat waves depending on antecedent hydrometeorological conditions (i.e., drought conditions or recent rainfall). If Yes, state exactly what in "Other".

- ◯ Yes
- ◯ No
- ◯ Unsure
- ◯ Other:

7-12) Noticeable high bias in either daytime and nighttime temperatures during extreme cold Arctic air mass events

- ◯ 1 (rarely)
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5 (always)
- ◯ Other:

7-13) Significant degradation of model performance during those extreme cold events (from question 7-10 above) caused by change of characteristics (e.g., depth) of Arctic air mass. If Yes, state exactly what in "Other".

- ◯ Yes
- ◯ No
- ◯ Unsure
- ◯ Other:

7-14) High bias in overnight temperatures during clear, calm, and dry nights

- ◯ 1 (rarely)
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5 (always)
- ◯ Other:

7-15) High bias in dew points, particularly during a low-level inversion

- ◯ 1 (rarely)
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5 (always)
- ◯ Other:

7-16) Underestimation of wind speeds during synoptic scale high-wind events

- ○ 1 (rarely)
- ○ 2
- ○ 3
- ○ 4
- ○ 5 (always)
- ○ Other:

7-17) =Skipped for non-NOAA users=

- ○ Yes
- ○ No
- ○ Unsure
- ○ Other:

7-18) Systematic low bias in QPF during training convection events

- ○ 1 (rarely)
- ○ 2
- ○ 3
- ○ 4
- ○ 5 (always)
- ○ Other:

7-19) Excessive forecasts of QPF for synoptic-scale events, especially in winter

- ○ 1 (rarely)
- ○ 2
- ○ 3
- ○ 4
- ○ 5 (always)
- ○ Other:

7-20) Occurrence of inconsistency between snow accumulations and precipitation types (e.g., sleet is primarily forecast for 1” of QPF, yet the GFS shows mostly snow accumulation resulting in several inches of snow forecast)

- ○ 1 (rarely)
- ○ 2
- ○ 3
- ○ 4
- ○ 5 (always)
- ○ Other:

7-21) Low bias for wave heights when forecast values exceed 2 m (~7 ft)

- ○ 1 (rarely)
- ○ 2
- ○ 3
- ○ 4
- ○ 5 (always)
- ○ Other:

7-22) Excessively rapid dissipation of large swell forecasts

- ○ 1 (rarely)
- ○ 2
- ○ 3
- ○ 4
- ○ 5 (always)
- ○ Other:

8) In order to quantify potential model improvements by developing requirements, it will be helpful to collect numerical values for the biases that you recognized in the previous survey questions. If possible, please provide needed thresholds in the questions below for the parameters with a known bias. For example, if you have observed high biases of up to 20 F within 48 hours for low temperatures during clear, calm nights, perhaps a realistic threshold should be to try to get errors down to 10 F in that forecast time. So for that, one may write: +/- 10 in 0-48 hours. See table below as a reference.

GFS/GEFS Product/Bias	Desired Error Threshold	Forecast Time
Example: MinT	+/- 10 °F	0-48 hours
8-1) Tropical Cyclone Right-of-Track Errors	(+/- n mi)	
8-2) Tropical Cyclone Left-of-Track Errors	(+/- n mi)	
8-3) Tropical Cyclone Genesis False Alarms	(max %)	
8-4) Tropical Cyclone Missed Genesis	(max %)	
8-5) Winter Storm Track Errors	(+/- miles)	
8-6) Winter Storm Over-Amplificated	(+/- hPa)	
8-7) Winter Storm Under-Amplificated	(+/- hPa)	
8-8) Underestimated CAPE	(+/- J/kg)	
8-9) Overestimated T During Heat Waves	(+/- °F)	
8-10) Max and Min T High Bias During Extreme Cold Arctic Events	(+/- °F)	
8-11) Min T High Bias on Clear/Calm/Dry Nights	(+/- °F)	
8-12) High Dew Point Bias when Low-Level Inversion Occurs	(+/- °F)	
8-13) Low Bias in Wind Speeds During Synoptic-Scale High Wind Events	(+/- mph)	
8-14) Low Bias in QPF During Training Convection Events	(+/- in)	
8-15) High Bias in QPF During Certain Winter Synoptic Events	(+/- in)	
8-16) Low Bias in Wave Heights	(+/- ft)	
8-17) Other Error(s) Not Noted?		

8-1) Tropical Cyclone Right-of-Track Errors (Error in n mi and needed lead time)

Your answer

8-2) Tropical Cyclone Left-of-Track Errors (Error in n mi and needed lead time)

Your answer

8-3) Tropical Cyclone Genesis False Alarms (Max false alarm rate in % for lead times of 0-48h; 48-120h; >120 h)

Your answer

8-4) Tropical Cyclone Missed Genesis (Max miss rate in % for lead times of 0-48h; 48-120h; >120 h)

Your answer

8-5) Winter Storm Track Errors (Error in n mi and needed lead time)

Your answer

8-6) Winter Storm Over-Amplificated (Error in hPa and needed lead time)

Your answer

8-7) Winter Storm Under-Amplificated (Error in hPa and needed lead time)

Your answer

8-8) Underestimated CAPE (Error in J/kg and needed lead time)

Your answer

8-9) Overestimated T During Heat Waves (Error in T and needed lead time)

Your answer

8-10) Max and Min T High Bias During Extreme Cold Arctic Events (Error in T and needed lead time)

Your answer

8-11) Min T High Bias on Clear/Calm/Dry Nights (Error in T and needed lead time)

Your answer

8-12) High Dew Point Bias when Low-Level Inversion Occurs (Error in Td and needed lead time)

Your answer

8-13) Low Bias in Wind Speeds During Synoptic-Scale High Wind Events (Error in mph and needed lead time)

Your answer

8-14) Low Bias in QPF During Training Convection Events (Error in inches and needed lead time)

Your answer

8-15) High Bias in QPF During Certain Winter Synoptic Events (Error in inches and needed lead time)

Your answer

8-16) Low Bias in Wave Heights (Error in feet and needed lead time)

Your answer

8-17) Other Error(s) Not Noted?

Your answer

9) Do you find any other deficiencies in model performance (e.g., in the areas of model variability, ensemble spread or dispersiveness, teleconnection)? *

Your answer

10) Are there any other biases or anything else regarding the GFS/GEFS systems or any other systems not mentioned in this survey that you want to make sure we know about? *

Your answer

11) Do you feel that GEFS can replace SREF as planned (see documentation link in references)? If not, do you have any suggestions for improvement? *

- Yes
- No
- Other:

12) Have you noticed any issues or biases with the operational CFS that you want to make sure we know about?

Your answer

13) Do you have any suggested features for SFS to include, especially for the time range beyond that of the CFS?

Your answer

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