Strategic Implementation Plan (SIP) for a Community-based Unified Forecast System (UFS)

Ensemble Working Group

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(also Yuejian Zhu, Ryan Torn)

Coordination Meeting for UFS SIP
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Ensemble WG Membership

- *Tom Hamill (ESRL/PSD)***
- *Yuejian Zhu (NCEP/EMC)***
- *Ryan Torn (U. Albany)***
- Vijay Tallapragada (EMC)
- Walter Kolczynski (EMC)
- Dingchen Hou (EMC)

- Carolyn Reynolds (NRL/Monterey)
- Xuguang Wang (U. Oklahoma)
- Fanyou Kong (U. Oklahoma)
- Phil Pegion (ESRL/PSD)
- Isidora Jankov (ESRL/GSD)
- Jon Gottschalck (CPC)

**Co-Chair

Big NGGPS priorities to improve ensembles

- Beat down the systematic errors in the prediction system.

- Sometimes this involves stochastic physics:
  - MJO: stochastification of deep convective parameterization improves MJO (noise-induced drift). [currently funded, Lisa Bengtsson, Bao, ESRL/PSD]
  - ENSO: stochastification of ocean-atmo fluxes [not funded…NGGPS or S2S?]

- Sometimes it doesn't:
  - systematic land-surface errors ($\rightarrow$ coupled land/atmo DA, improved LSMs, improved representations of cloud radiative forcing) [funded at level commensurate with importance?]

Ensemble WG Accomplishments

- **Accomplishments:**
  - 20-year GEFS reanalysis in progress, 5 parallel streams; some accuracy improvement over CFSv2 reanalysis.
  - Reforecast data to begin production soon. 2x weekly, 11 members.
  - Data to be saved and select fields made available to community.
  - Tests of FV3 GEFS v12 shows significant improvements over spectral v11, with new dycore, new stochastic physics (supplemental slides)

- **Issues:**
  - Unable to progress with coupled MOM6 ocean for v12, postponed to v13.
  - Timelines and computations tight for timely completion of reanalysis and reforecast with allocated computational resources.
  - Hydrologic customers continue to request 30-year, every day, 5-member reforecasts, an additional computational burden.
  - Should we revisit list of suggested projects (next slide).
  - The usual: funding, HPC.

Currently SIP projects: should we re-evaluate?

1: FV3-GEFS v12 implementation.

2: Improve uncertainty treatments in the ensemble system to make them suitable for sub-seasonal forecasts and for a full spectrum of environmental prediction.

3: High-resolution shorter-term global ensemble forecast system (HRGEFS) previously suggested.   Still a priority?

4: Ensuring consistency between global and regional ensemble systems. Does CAM team agree?

- **Ensemble team depends most upon:**
  - Marine, infrastructure (for ocean coupling).
  - Land surface (fixing substantial systematic errors that bias T2m).
  - Parameterization team (co-development of physically based stochastic parameterizations).

- **Other teams depending on ensemble team:**
  - Postprocessing (delivering reforecast data).
  - Marine (driving wave ensemble).
  - Data assimilation (development of improved stochastic parameterizations).
  - CAM. Per UMAC, head toward one system across regional/global. Consistency desired between regional and global ensemble approaches.
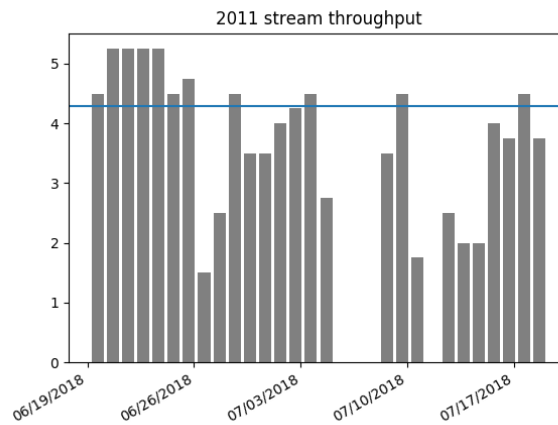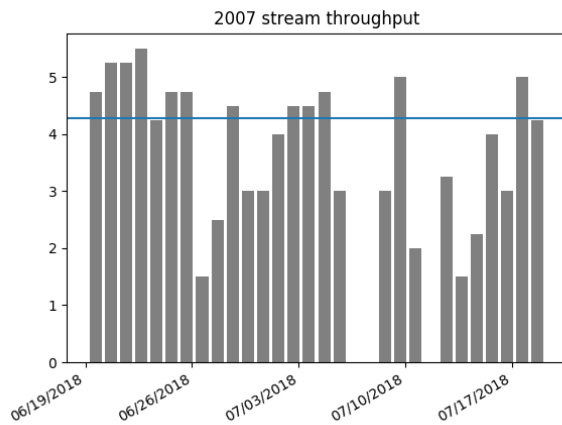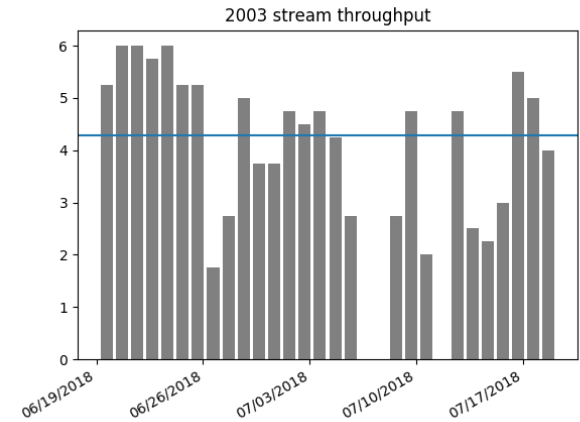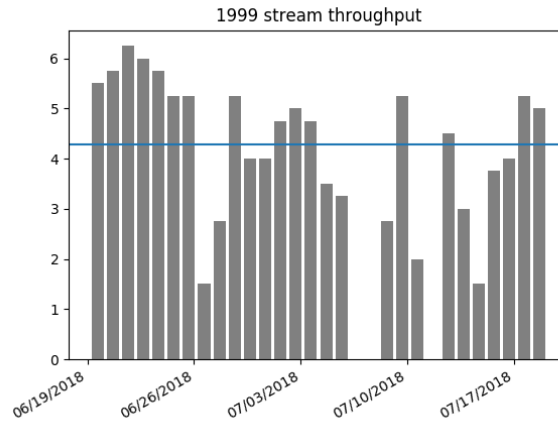
Reanalysis throughput (gaea)

Production throughput (in days of reanalysis done per day)

Blue line is the expected month/week production rate (for rough estimate of finishing production in June 2019)

P (obs>5 mm); 60-84 hrs

c/o Yuejian Zhu and EMC team