UEO Committee

Co-chairs: Chuck Skupniewicz &Yuejian Zhu

October 26, 2016

David McCarren

Current NUE Model Configurations

	NCEP	CMC	FNMOC	NUE
Model	GFS	GEM	NAVGEM v1.2	NCEP+CMC+FNMOC
Initial uncertainty	EnKF F06	EnKF	(9) Banded ET w/analysis error adjustments	
Model uncertainty Stochastic	Yes (STTP)	Yes (multi-physics and Stochastic)	SKEB w/moisture convergence mask	
Tropical storm	Relocation	None	None	
Daily frequency	00,06,12 and 18UTC	00 and 12UTC	00 and 12UTC	00 and 12UTC
Resolution	T574L64 (d)-d8)~34km T382L64 (d8-16)~55km	800*400 (50km) L72	T239L50 ~ 53km	1*1 degree 0.5*0.5 degree
Control	Yes	Yes	Yes	Yes (3)
Ensemble members	20 for each cycle	20 for each cycle	20 for each cycle	60+3 for each cycle
Forecast length	16 days	16 days 32 days once per week	16 days	16 days
Post-process	Bias correction for ensemble mean	Bias correction for each member	Bias correction for member mean	Yes
Last implementation	December 2015	November 2014	NAVGEM analysis March, 2015 (SKEB)	0.5 deg late FY16

NUE = National Unified Ensemble

Planned Upgrades to NUE Baseline

	2016	2017/18	Future (to ~5 yrs)
NCEP	- T574 (34km)/L64 SL model - GEFS (day 0-16) - GFS upgrade - Hybrid EnKF-f06 initialization - Physical uncertainties (STTP) - Produce and exchange 0.5d ensemble fields and 3hrly for 0-8 days - Improved NAEFS post-process	- T574L64 SL model - GEFS (day 0-16) - Introduce additional stochastic scheme to improve forecast uncertainty and reliability - 20 years GEFS hindcast (reforecast), 5 members, 00UTC only for every 5 days	- T1148/L64 (17km) SL; 0-10days (17km); 10-35days (34km) - Coupled ocean - Perturbed land surface - Extended range (out to 35 days) forecast - Bias correction for model variables
FNMOC	- T359L60 NAVGEM EFS Scaled analysis error variance - NAVGEM 1.4 - Produce and exchange 0.5 deg ensemble fields	- NAVGEM T359L60 Ensemble - SST initial perturbations - Simple SST diurnal cycle model - NAVGEM 2.0	Increased resolution (TBD) as resources permit - Coupled to HYCOM
CMC	- 2016 is a for HPC migration - GEPS 4.0 Feb 2016 - Resolution: 50km, L74 - 16 and 32 days, 20 members, 4 runs per day, - Reforecast for last 20 years updated in real-time	- GEPS Feb 2018 - Resolution: 35km, L80 - 16 days and 32 days, 20 members, 4 runs per day - 8 assimilation cycles per day - Coupled with ocean (25km, L75) in forecast mode	- GEPS Feb 2020 - Resolution 25km , L120 - 16 and 32 days, 20 members, 4 runs perday - Coupled with ocean (25km, L75) in forecast and Data Assimilation

NAEFS Global Grid Exchange Variables for 1.0°

Update: June 2013

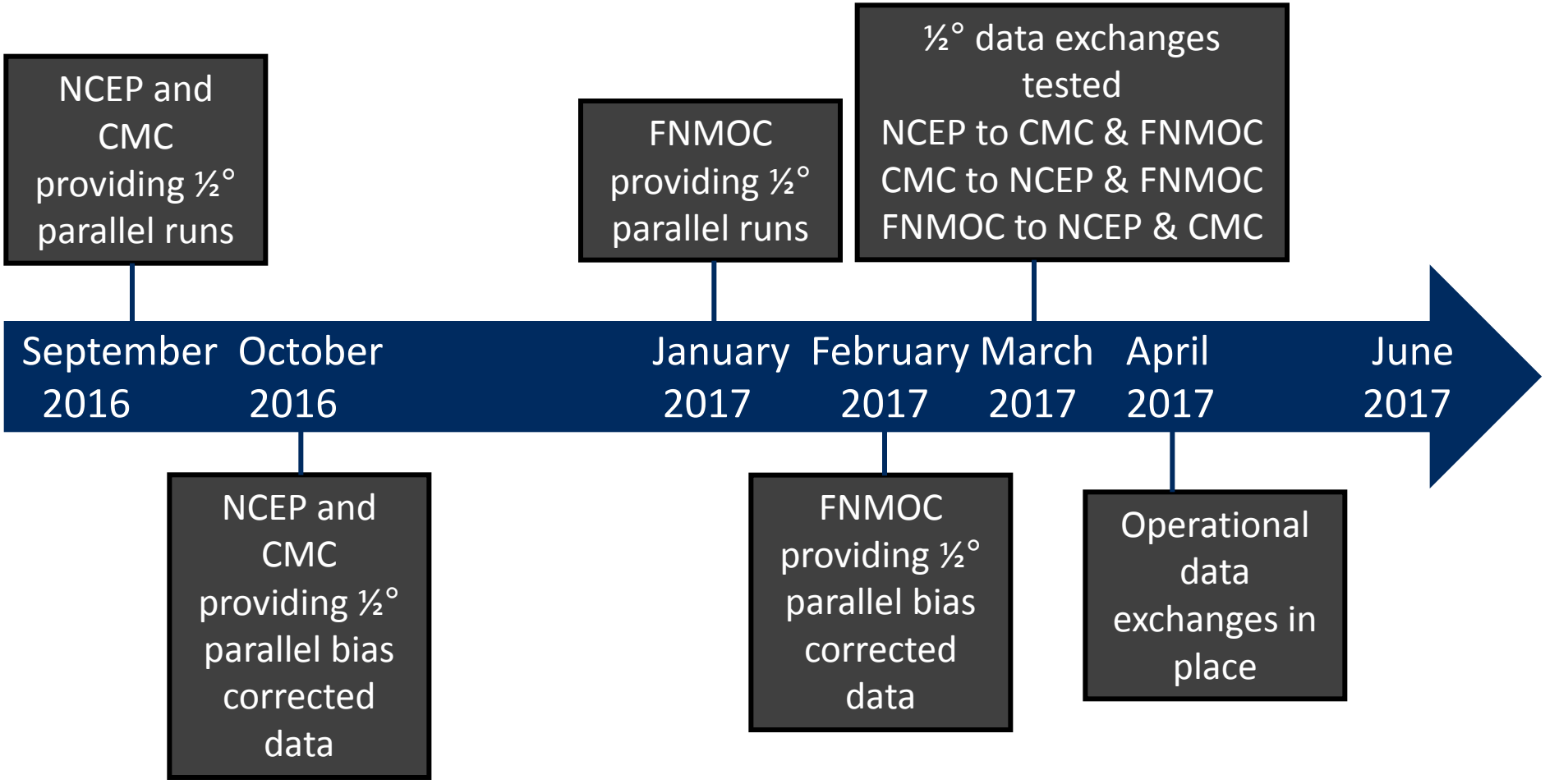
Variables	Levels and Categories	Total 80
GHT	Surface, 10, 50, 100, 200, 250, 500, 700, 850, 925, 1000 hPa	11
TMP	2m, 2mMax, 2mMin, 10, 50, 100, 200, 250, 500, 700, 850, 925, 1000 hPa	13
RH	2m, 10, 50, 100, 200, 250, 500, 700, 850, 925, 1000 hPa	11
UGRD	10m, 10, 50, 100, 200, 250, 500, 700, 850, 925, 1000 hPa	11
VGRD	10m, 10, 50, 100, 200, 250, 500, 700, 850, 925, 1000 hPa	11
PRES	Surface, PRMSL	2
PRCP	APCP, CRAIN, CSNOW, CFRZR, CICEP	5
FLUX (surface)	LHTFL, SHTFL, DSWRF, DLWRF, USWRF, ULWRF	6
FLUX (top)	ULWRF (OLR)	1
PWAT	Total precipitable water at atmospheric column	1
TCDC	Total cloud cover at atmospheric column	1
CAPE	Convective available potential energy, Convective Inhibition	2
SOIL/SNOW	SOILW(0-10cm) , TMP(0-10cm down), WEASD(water equiv. of accum. Snow depth), SNOD(surface)	4
Other	850 hPa vertical velocity	1
Notes	Current NAEFS grids at 1*1 degree	

NAEFS Global Grid Exchange Variables for 0.5°

Update: 8 August 2016

Variables	Levels and Categories	Total 86/43
GHT	Surface, 10, 50, 100, 200, 250, 300, 500, 700, 850, 925, 1000 hPa	12/(5)
TMP	2m, 2mMax, 2mMin, 10, 50, 100, 200, 250, 500, 700, 850, 925, 1000 hPa	13/(6)
RH	2m, 10, 50, 100, 200, 250, 500, 700, 850, 925, 1000 hPa	11/(4)
UGRD	10m, 10, 50, 100, 200, 250, 300, 400, 500, 700, 850, 925, 1000 hPa	13/(8)
VGRD	10m, 10, 50, 100, 200, 250, 300, 400, 500, 700, 850, 925, 1000 hPa	13/(8)
PRES	Surface, PRMSL	2/(2)
PRCP	APCP, CRAIN, CSNOW, CFRZR, CICEP	5/(5)
FLUX (surface)	LHTFL, SHTFL, DSWRF, DLWRF, USWRF, ULWRF	6/(0)
FLUX (top)	ULWRF (OLR)	1/(0)
PWAT	Total precipitable water at atmospheric column	1/(1)
TCDC	Total cloud cover at atmospheric column	1/(1)
CAPE	Convective available potential energy, Convective Inhibition	2/(2)
SOIL/SNOW	SOILW(0-10cm) , TMP(0-10cm down), WEASD(water equiv. of accum. Snow depth), SNOD(surface)	4/(0)
Other	850 hPa vertical velocity, Ice thickness (ICETK)	2/(1)
Notes	Current NAEFS grids at 1*1 degree New 0.5 degree fields already exchanged at 1 degree New 0.5 degree added from users request	

Half Degree Timeline



Output Size Comparison NAEFS prod vs. NAEFS v6

Update: 15 September 2016

NAEFS Prod

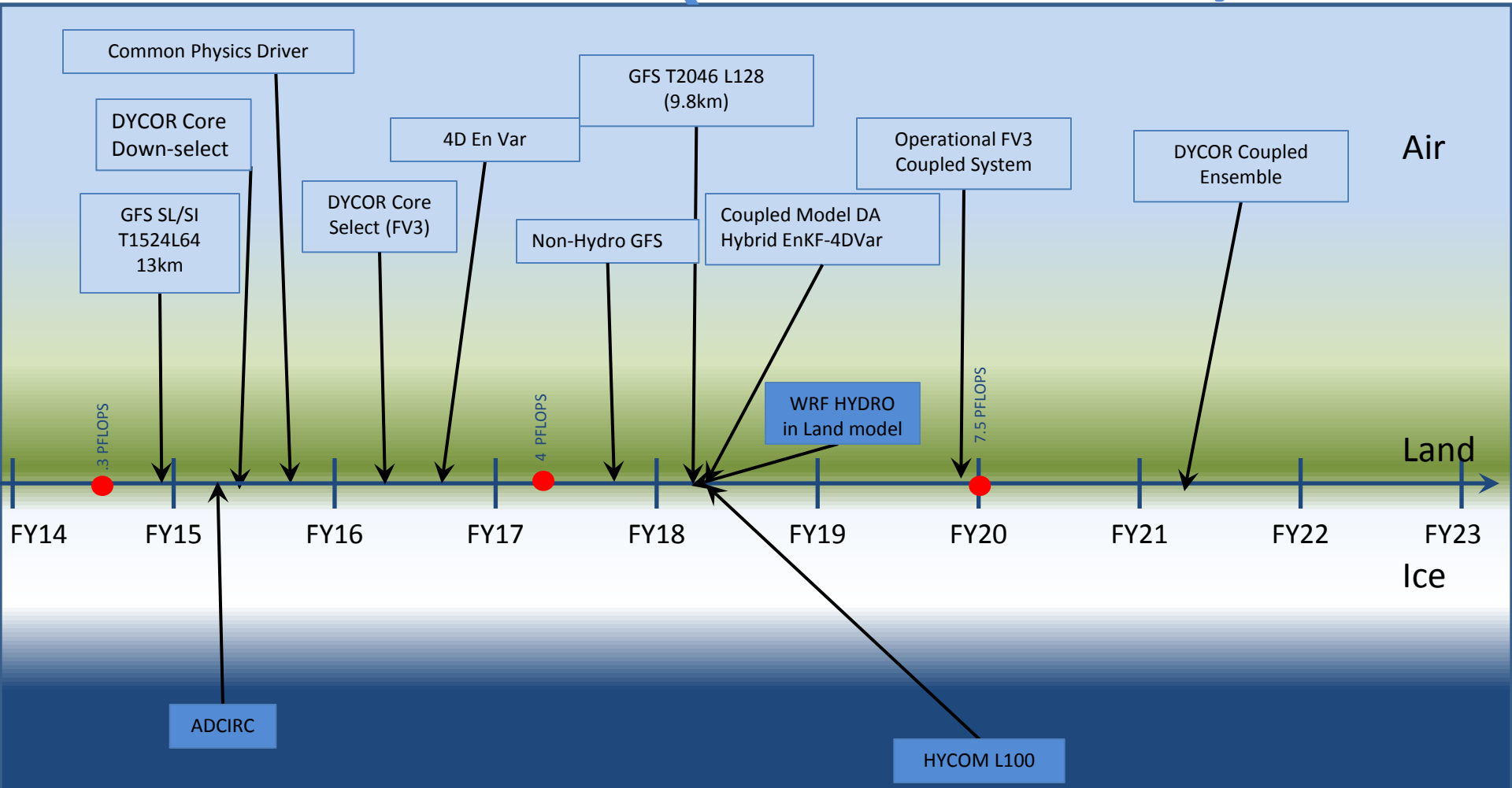
- NCEP/GEFS
  - 1.0d bias corrected forecasts (6 hourly, pgrb2a_bc, 4.8GB)
  - 1.0d anomaly forecast (pgrb2a_an, 2GB)
- CMC
  - 1.0d raw forecast (pgrb2a, 4.2GB)
  - 1.0d bias corrected forecast (/dcom, 3GB)
- FNMOC
  - 1.0d raw forecast (pgrb2a, 4.2GB)
  - 1.0d bias corrected forecast (/dcom, 3GB)
- NAEFS
  - 1.0d probabilistic forecasts (pgrb2a_bc, 944MB)
  - 1.0d anomaly forecast (pgrb2a_an, 69M)

NAEFS v6

- NCEP/GEFS
  - 0.5d bias corrected forecasts (3 hourly for day 8, new pgrb2ap5_bc, 22GB)
  - 0.5d anomaly forecast (new pgrb2ap5_an, 10GB)
  - 0.5d bias corrected prcp (prcp_gb2, 1GB)
  - 2.5km bias corrected and downscaled prcp for CONUS (new ndgd_prcp_gb2, 1GB)
- CMC
  - 0.5d raw forecast (new pgrb2ap5, 28GB)
  - 0.5d bias corrected forecast (/dcom, 21GB)
- FNMOC
  - 0.5d raw forecast (new pgrb2ap5, 28GB)
  - 0.5d bias corrected forecast (/dcom, 21GB)
- NAEFS
  - 0.5d probabilistic forecasts (new pgrb2ap5_bc, 4GB)
  - 0.5d anomaly forecast (new pgrb2ap5_an, 1GB)

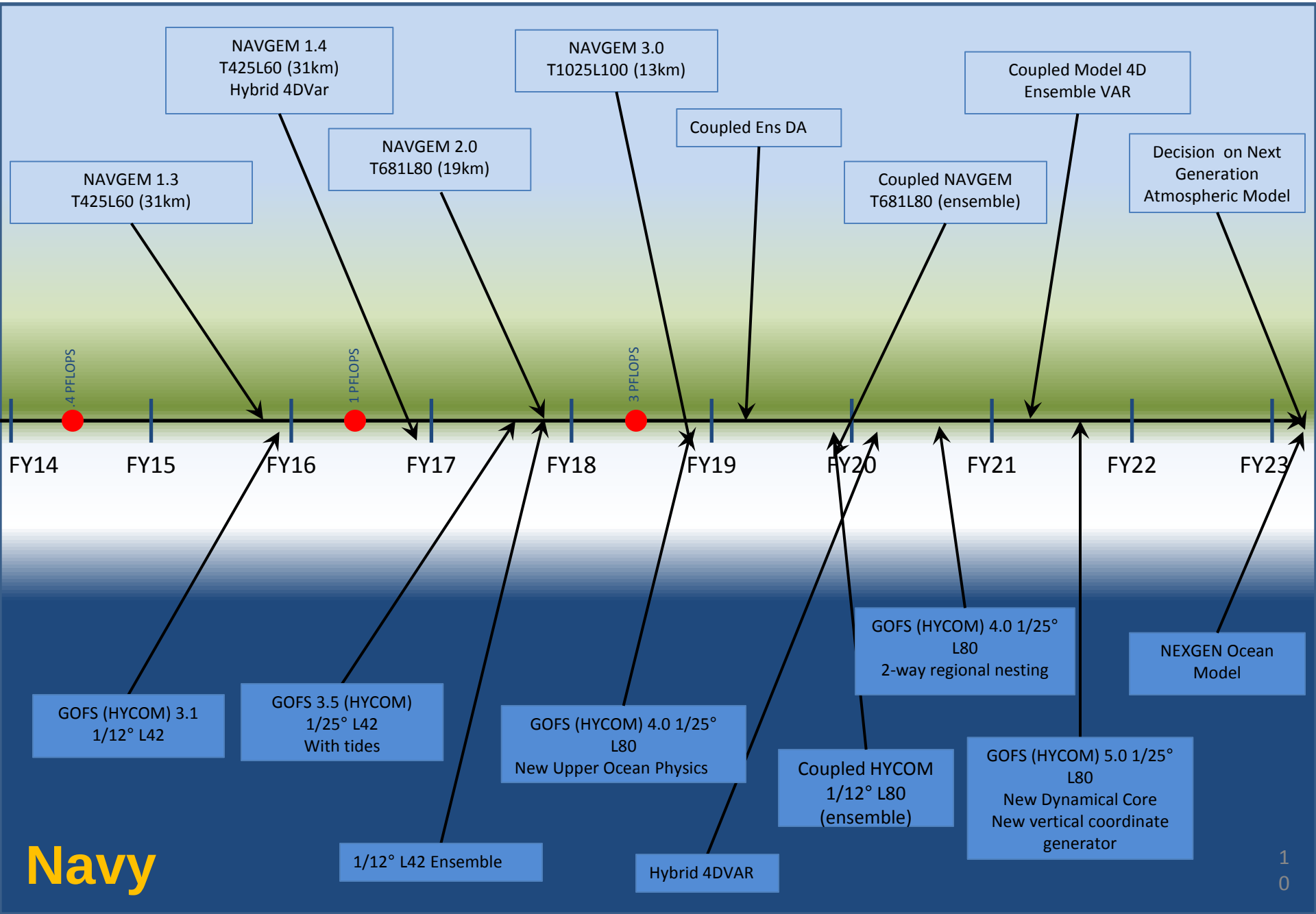
Backup Slides

NEMS (ESMF/NUOPC)

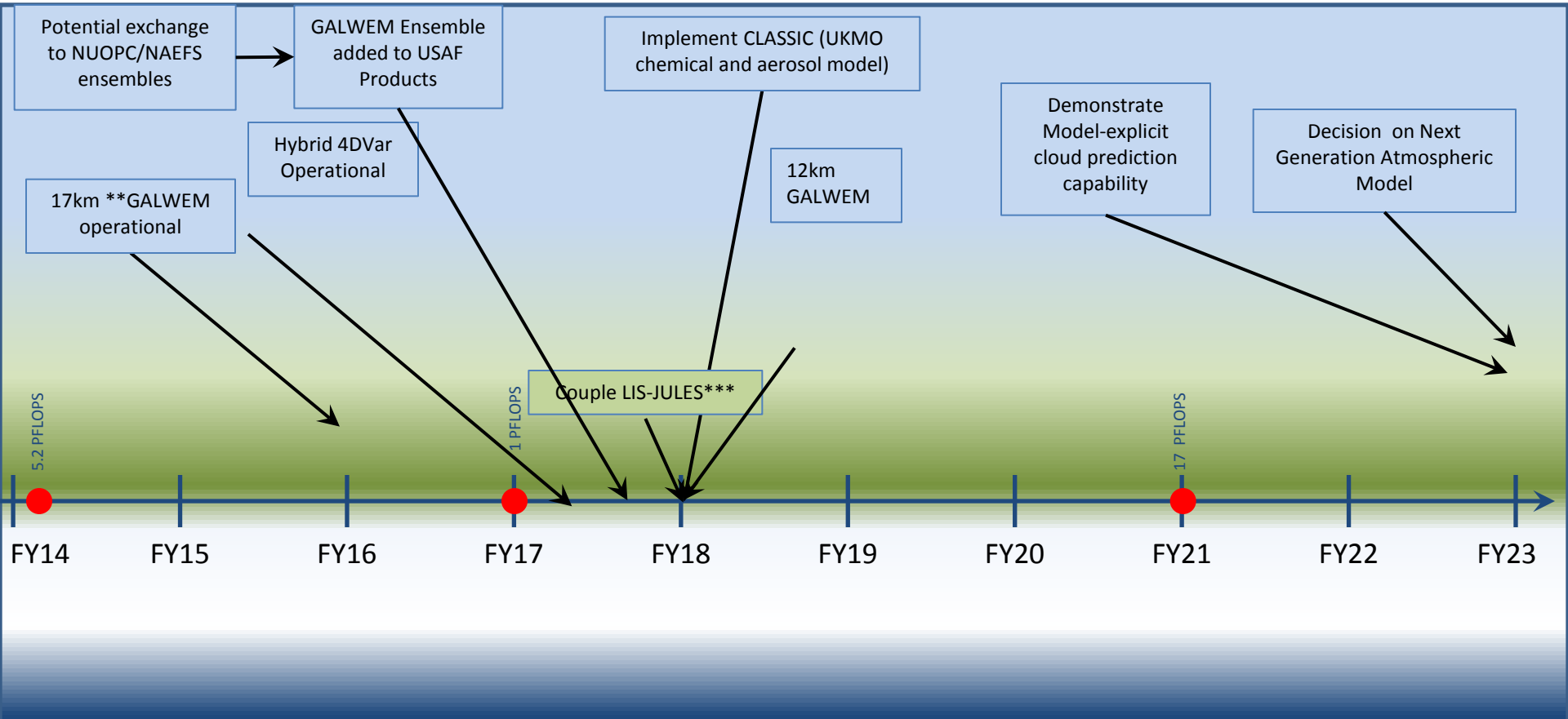


NOAA

ESMF/NUOPC



Navy



*557 WW
557th Weather Wing
**GALWEM
Global Air-Land Weather Exploitation Model Version of UKMO UM
***JULES
Joint UK Land Information Simulator

Air Force

23 September ESG Action Items

- **AI #1: National ESPC Charter amendment**
  - ESG will be organizationally aligned under FCMSSR paragraph; Amend the charter to reflect this new structure
- **AI #2: Brief FCMSSR on the National ESPC charter amendment and realignment**
  - Scheduled for 20 October 2016
- **AI #3: Brief CENRS on the progress and future path of the National ESPC**
  - Dr. Sullivan responded positively and will work to get on agenda
- **AI #4: Unified Roadmap**
  - Combine briefed roadmap slides into agreed upon unified roadmap for the Agencies; brief at next ESG
- **AI #5: Inventory of work**
  - Provide a summary of work by Agencies that contribute to the National ESPC effort
- **AI #6: One pager for transition planning**
  - Develop a white/point paper for use by the ESG leaders in communicating the importance of the National ESPC to the long term national enterprise; update and attach the National ESPC two pager for additional information
- **AI #7: Brief NSCI on the National ESPC and future HPC Needs**
  - Staff to work with Dr. Harr to set up briefing
- **AI #8: Exascale computing strategy**
  - Work with Agency leads to ensure discussions of exascale computing to support the Climate, Weather, Ocean Focus Areas to find commonalities and a coordinated path forward
- **AI #9: Brief DOE Dr. Steve Binkley** (Associate Director for Advanced Scientific Computing Research**)**
  - Staff to work with Dr. Geernaert to set up brief; exascale computing