



# NGGPS-MAPP Principal Investigator's Meeting

## August 2-3 2017

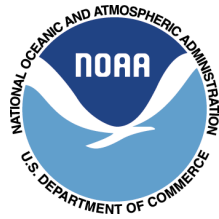


- **NGGPS**: Next Generation Global Prediction System (NWS/STI)
- **MAPP**: Modeling, Analysis, Predictions and Projections (OAR/CPO)





# PI Meeting Agenda



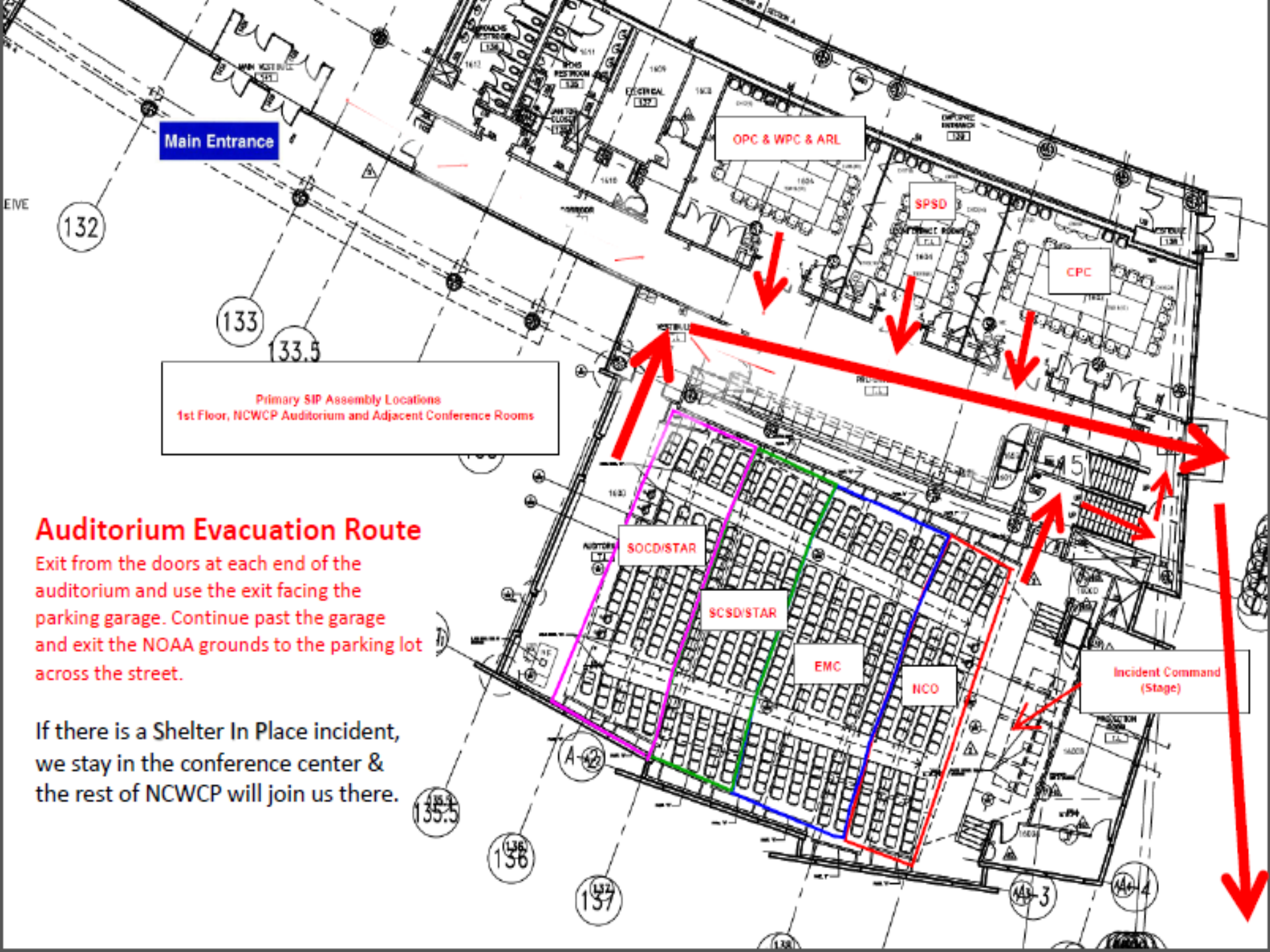
- **Wednesday, August 2**
  - Introduction (Ming Ji, Christopher Hedge, Annarita Mariotti)
  - Session I: Testbeds
  - lunch
  - Session II: Model Physics and Modeling Framework
- **Thursday, August 3**
  - Session III: Data Assimilation
  - Poster session
  - lunch
  - Session IV: Verification and Validation
  - Session V: Multi-model Ensembles, Post-processing and Applications



# Administrative Notes



- For those on the phone: **mute your phones** during the talks
  - During Q&A, use “raise hand” or “chat” option in GoToMeeting
- For those in the audience: **silence your phones**
  - During Q&A, use microphones in the aisles
- Facility: (1) access and security (2) Restroom locations
- Meals and coffee breaks: *no food/drinks in auditorium!*
  - \$10 for beverage/snacks
  - Lunches on your own. Pre-order boxes will be labeled & on table
- **Wifi:** (NOAAGuest): type your email into browser, click button
- Note there are two other global modeling planning meetings going on: SIP and UMAC. Please be respectful and keep noise levels down when outside of the auditorium.
- Safety and evacuation (see next slides)



Main Entrance

OPC & WPC & ARL

SPSD

CPC

Primary SIP Assembly Locations  
1st Floor, NCWCP Auditorium and Adjacent Conference Rooms

### Auditorium Evacuation Route

Exit from the doors at each end of the auditorium and use the exit facing the parking garage. Continue past the garage and exit the NOAA grounds to the parking lot across the street.

If there is a Shelter In Place incident, we stay in the conference center & the rest of NCWCP will join us there.

SOC/DSTAR

SCSD/STAR

EMC

NCO

Incident Command (Stage)

# Auditorium Evacuation Route

NCWCP



Earth System Science  
Interdisciplinary Center  
Joint Global Change  
Research Institute

Ronald Reagan  
center wash DC

Evacuation  
Assembly Area



Construction Zone

River Road



# NGGPS-MAPP PI Meeting



## STI Modeling Program Overview



Dr. Ming Ji, Director  
Office of Science and Technology Integration (STI)

Principal Investigators Meeting  
August 2-3, 2017

# Implementation Plan for FV3-GFS (FY2017-2020)

FY17				FY18				FY19				FY20			
Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Evaluate, prepare and document FV3 dycore for GFS															
Implement FV3 dycore in NEMS®															
	Couple FV3 to GFS physics (NUOPC physics driver) perform forecast-only experiments, tuning and														
	Develop DA techniques % (native grid vs physics grid; New data)														
	Cycled experiments, benchmarking, efficiency and optimization														
		Real-time parallel FV3GFS forecasts to the field													
		Pre- and post-processing, verification & downstream													
			3-year retrospective + real-time parallels, EMC and Community Evaluation												
			Experimental (beta) implementation of FV3GFS*					NCO Parallel		NEMS/FV3GFS in operations					
			Further advancements of FV3GFS with inputs from NGGPS and community contributions & Global-Meso unification												

\* Q3FY18 FV3GFS will be very similar to operational GFS being implemented in May 2017

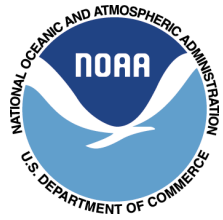
'@ Q3FY19 FV3GFS target resolution is ~10km grid with 127 layers, extends up to 80 km.

'& Advanced physics: Scale-aware convection, SHOC PBL, Double-moment microphysics, Unified convective and orographic gravity wave drag etc

'% DA system will be @35 km 127 levels using 4d-Hybrid EnVAR



# Extra slides



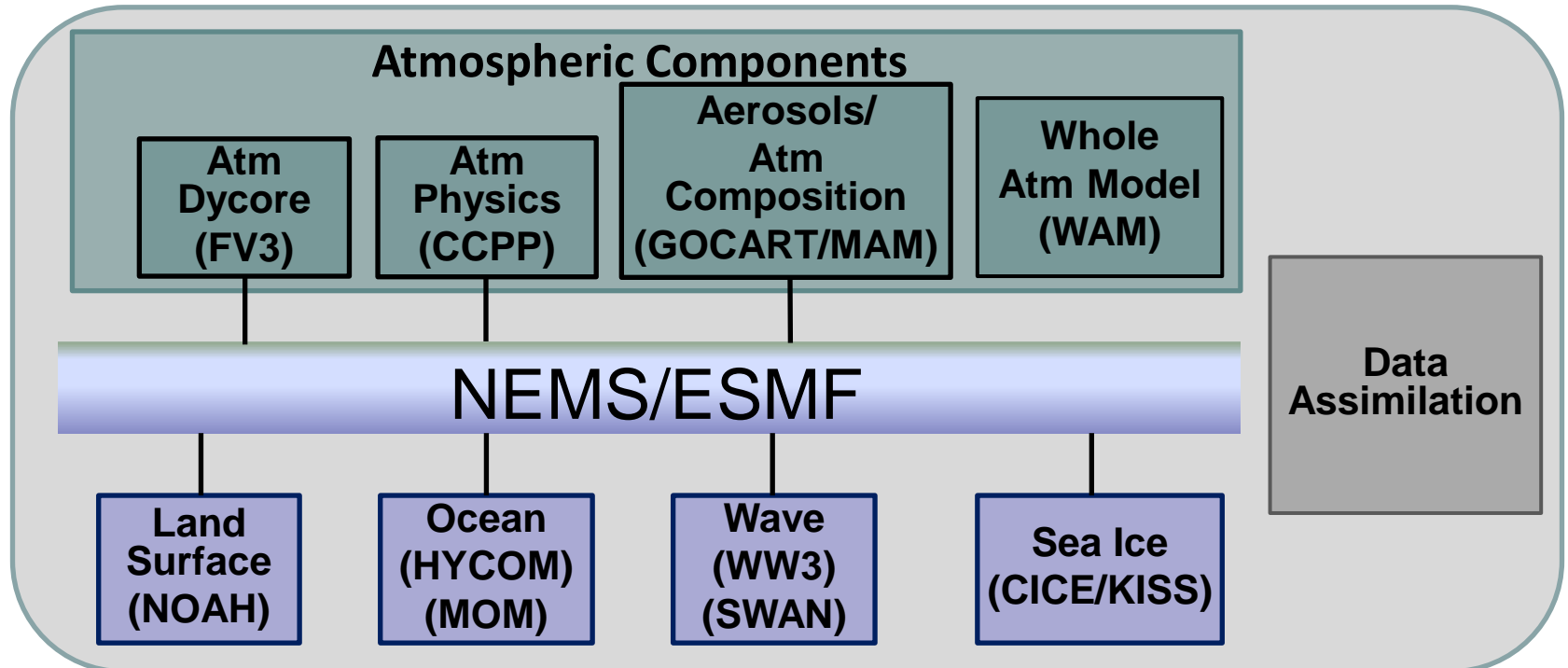




# NGGPS Description



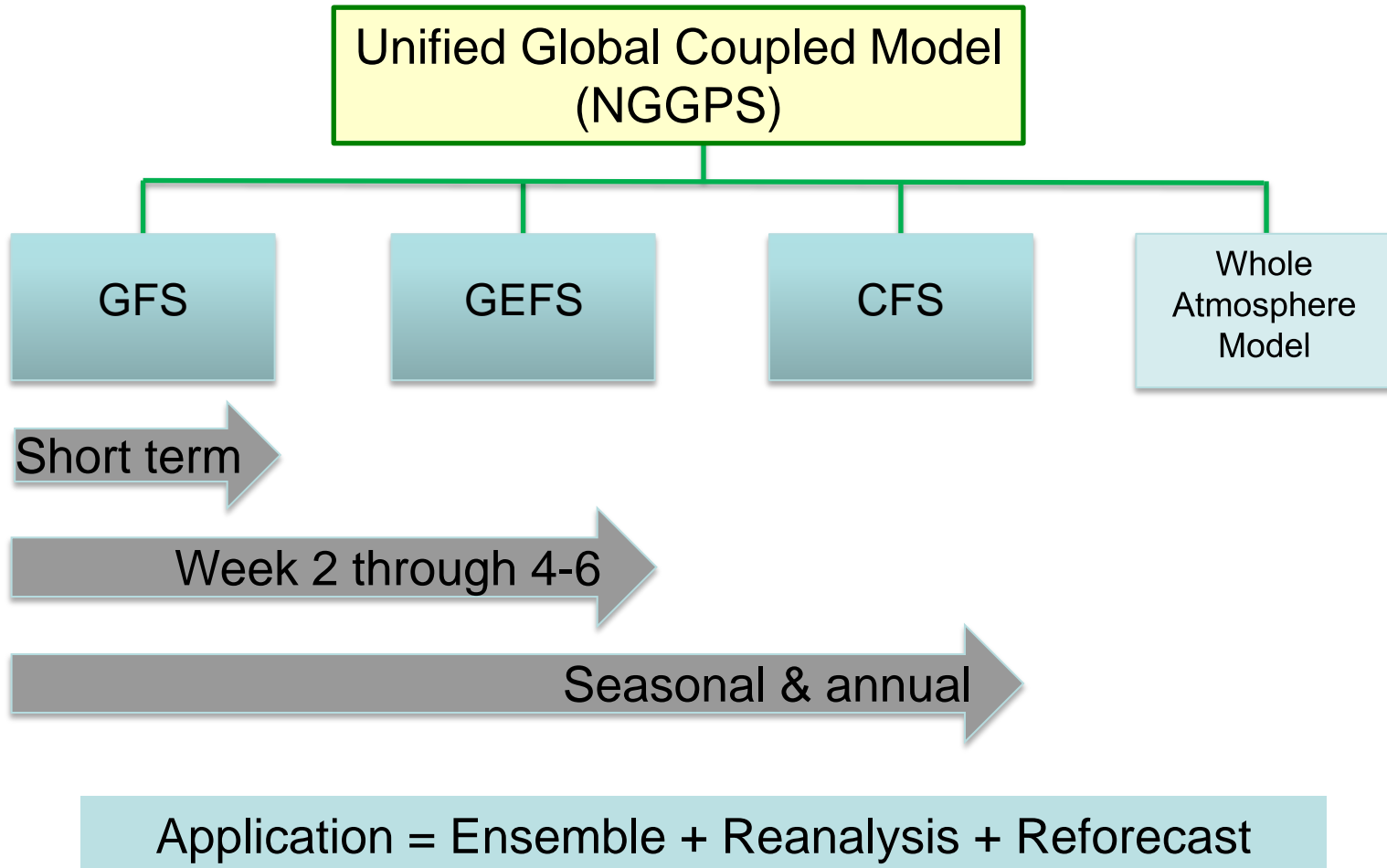
- Fully coupled system: ocean, waves, sea ice, land surface, atmosphere, aerosols and atmospheric composition
- Built using NEMS/Earth System Modeling Framework
- Each component model will be community code





# NGGPS

## Planned Operational Applications



Research needs to fit into strategy



# Weather Bill



- H.R.353 - Weather Research and Forecasting Innovation Act of 2017
- Authorization not an Appropriation
- Requires NOAA to prioritize weather research to improve weather data, modeling, computing, forecasts, and warnings
- OAR must collaborate with and support the non-federal weather research community by making funds available through competitive grants, contracts, and cooperative agreements (30%)
- NOAA must establish a tornado warning improvement and extension program
- NWS must plan and maintain a project to improve hurricane forecasting
- NWS must collect and utilize information to make reliable and timely foundational forecasts of subseasonal and seasonal temperature and precipitation.



# Initial implementation configuration for FV3GFS in FY19

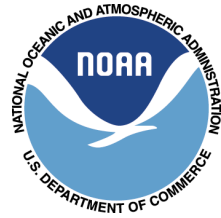


- **Planned/Projected FY19 FV3GFS configuration**
  - **Resolution:** ~9 km 128 levels
  - **Physics:** New physics options implemented in FY18 tuned for FV3
    - Scale and aerosol aware Chikira-Sugiyama Convection Scheme with Arakawa-Wu extension
    - Unified representation of turbulence and shallow convection (SHOC)
    - Double moment microphysics
    - Upgraded LSM, radiation, GWD and Ozone Physics
  - **DA configuration:** Similar to FY18 NEMS/GSM GDAS with additional developments required for FV3 dynamic core, new datasets (GOES-R, JPSS etc.)
  - Run times optimized for production suite requirements
  - End-to-end system testing for stability, robustness of scientific and technical solutions, non-negative impact for downstream dependencies
  - **Modern workflow** (CROW\* for development, T&E; ecfow for production)

\***CROW: Community Research and Operational Workflow**



# Strategic Implementation Plan (SIP) merged with NGGPS Working Groups



- *Governance*
  - Decision making, roles/responsibilities, advisory boards, org. alignment, etc.
- *Communications and Outreach*
  - Common messaging strategy
- *Convective Allowing Models (CAMs)*
  - Intermediate steps to CAM ensembles, Warn on Forecast; test/eval w/community
- System Architecture
  - NEMS evolution; community approach
- Infrastructure
  - Standards/doc; CM; code repository; etc.
  - Role of testbeds; regression testing; etc.
- Verification & Validation (V&V)
  - V&V of ops forecasts vs. R&D testing/eval
  - Unified/standard tools and data formats
- Dynamics and Nesting
  - FV3 transition on global wx/S2S/climate
  - Nests for hurricanes (moving?)
- Model Physics
  - Common Comm. Physics Pkg (CCPP); stochastic, scale-aware physics
- Data Assimilation
  - NOAA, NASA integ. w/FV3; coupled DA
  - Joint Effort for DA Integration (JEDI)
- Ensembles
  - Strategy across scales; model uncertainty
- Post-Processing
  - Comm. PP infrastructure; std formats/tools
- Component Model groups
  - Marine models + *NOS coastal/bay models*
  - Aerosols and Atmospheric Composition
  - Land Sfc Models (LSMs) + *hydrology (OWP)*

- *New WG or addition*

- Augmentation of existing NGGPS group



# Community Modeling



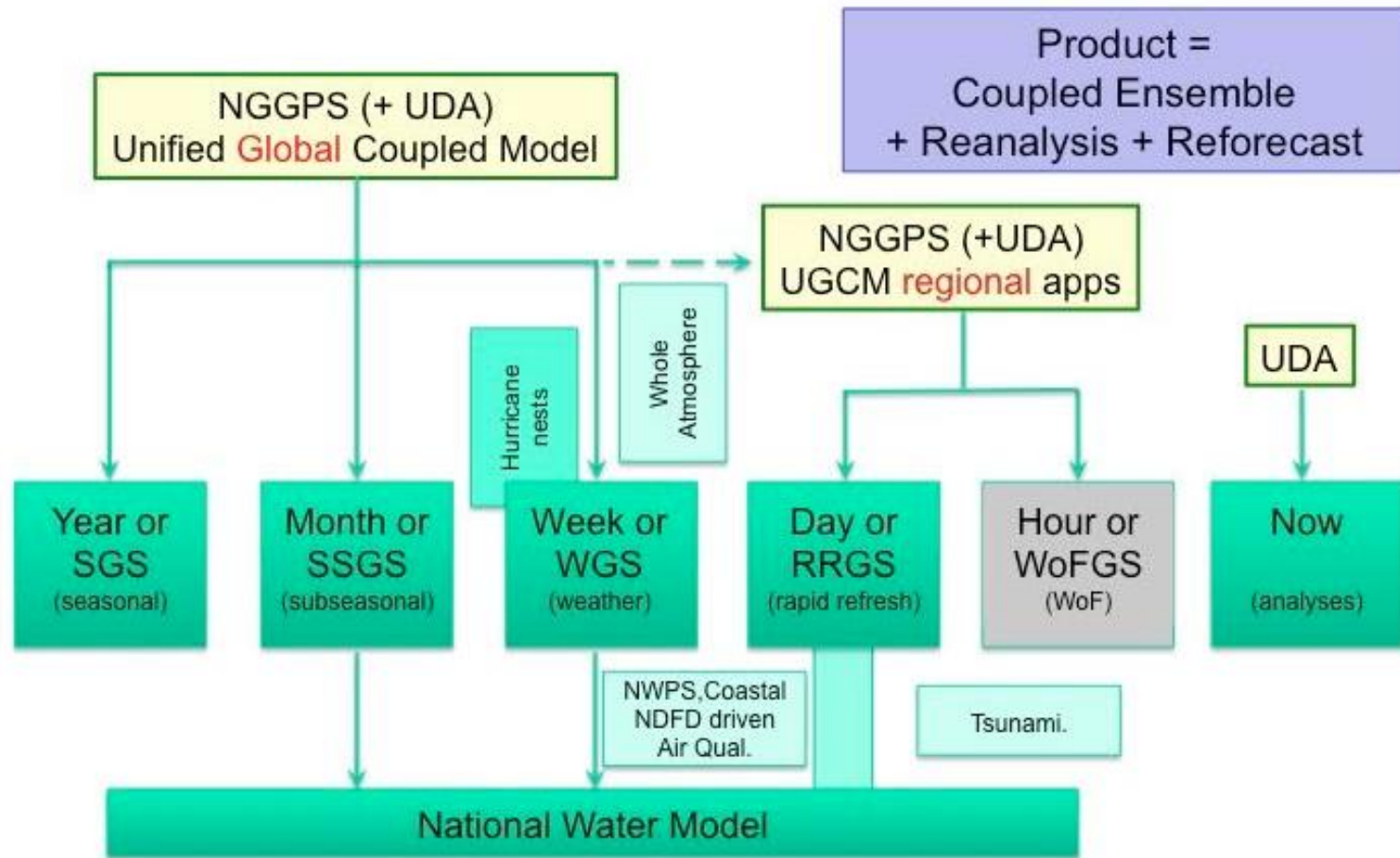
- The UMAC emphasized the importance of NCEP to more effectively work with the community: private sector, federal, and academic

With NGGPS selection of the FV3 dynamical core, NCEP is seeking to assure that the global model is developed as a community model

- Goals and needs of a community unified modeling system including governance, infrastructure, and modeling component priorities
- Balance between operations and research
  - Degree of support
  - Well-defined path for research to operations transition
- Resources to support the research community participation
  - Partnership with R&D agencies and universities



# Roadmap



UDA: Unified Data assimilation  
 SGS: Seasonal Guidance System  
 SSGS: Subseasonal Guidance System

WGS: Weather Guidance System  
 RRGs: Rapid Refresh Guidance System  
 WoFGS; WoF Guidance System



# Schematic of NEMS FV3GFS

