Global Model Test Bed

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External Collaborators:

NOAA Environmental Modeling Center

NOAA Earth System Research Laboratory

NOAA Geophysical Fluid Dynamics Laboratory

NCAR

ESPC Physics interoperability Team

NGGPS and EMC SIP working groups

U. Wisconsin

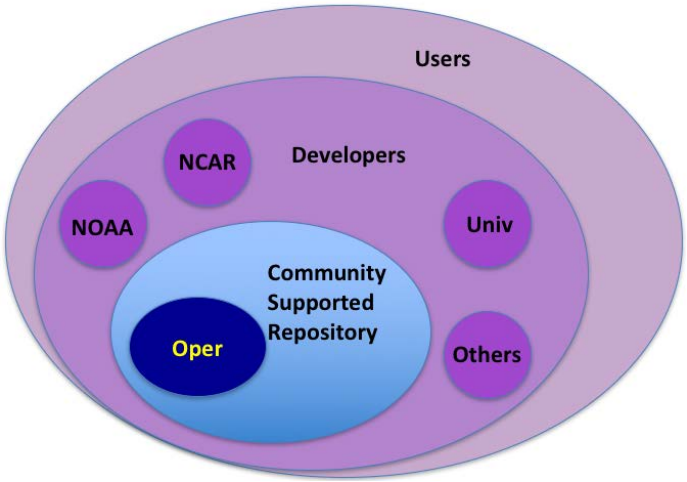
NOAA Weather Prediction Center

Global Model Test Bed (GMTB)

A NGGPS-funded effort aimed at accelerating transition of community developments into NOAA's global prediction system – current focus on atmospheric physics

- Common Community Physics Package (CCPP)
- Development of hierarchical physics testbed
- Assessment of physics innovations

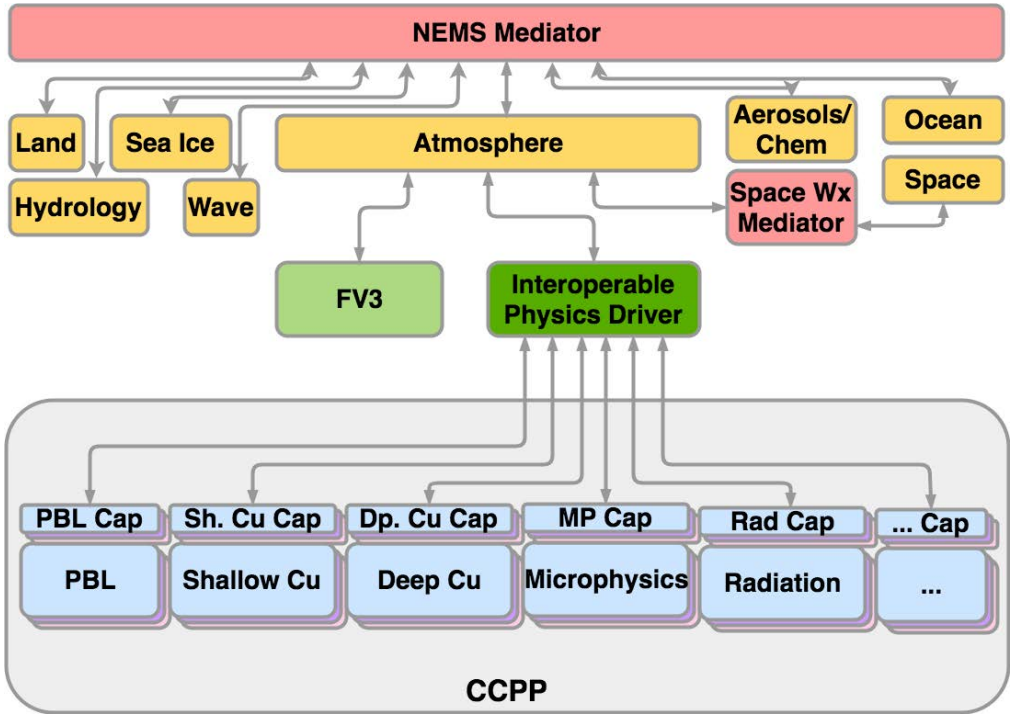
CCPP Ecosystem



The CCPP is a collection of model-agnostic physical parameterizations that can be used for experimentation, development, and enhanced R2O

https://dtcenter.org/community-code/ipd-ccpp

CCPP in the NGGPS Architecture

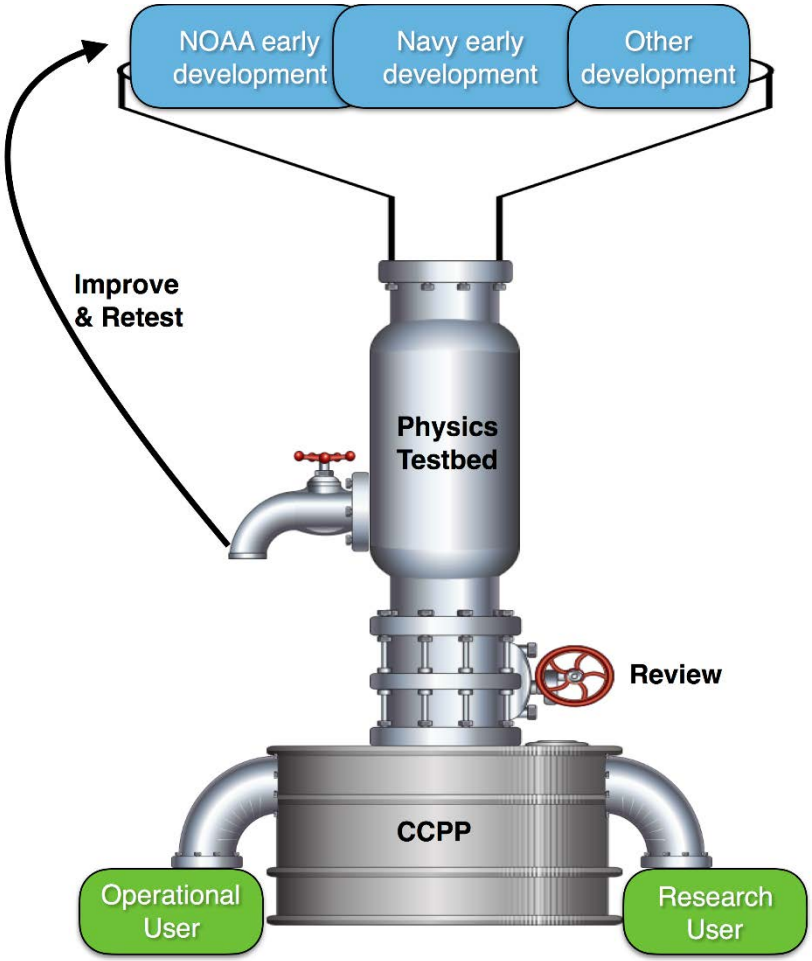


GMTB, EMC & GFDL are developing an **Interoperable Physics Driver (IPD)**, which allows connection of multiple models (including Single Column Model) to multiple suites within the CCPP, facilitating testing

Upcoming CCPP public releases

- Spring 2018 CCPP v1: GFS FY17 physics for SCM
- Summer 2018 CCPP v2: with FV3 capability

CCPP as a resource for O & R



Developers from various agencies contribute innovations to the CCPP

Testing is conducted in collaboration with GMTB

Contributions are evaluated based on transparent and well established criteria

CCPP is entry point for R & D and operational consideration

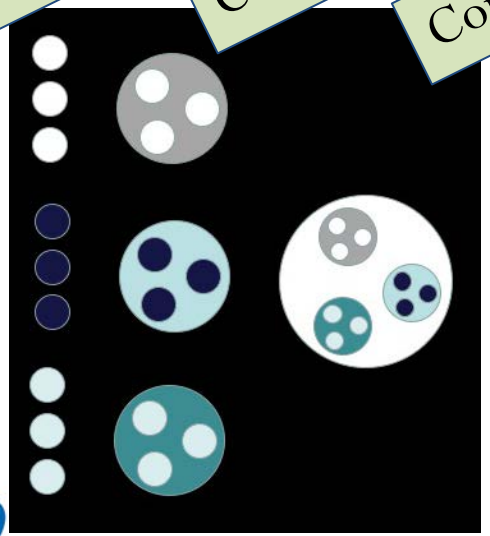
Physics Testbed: Hierarchical concept

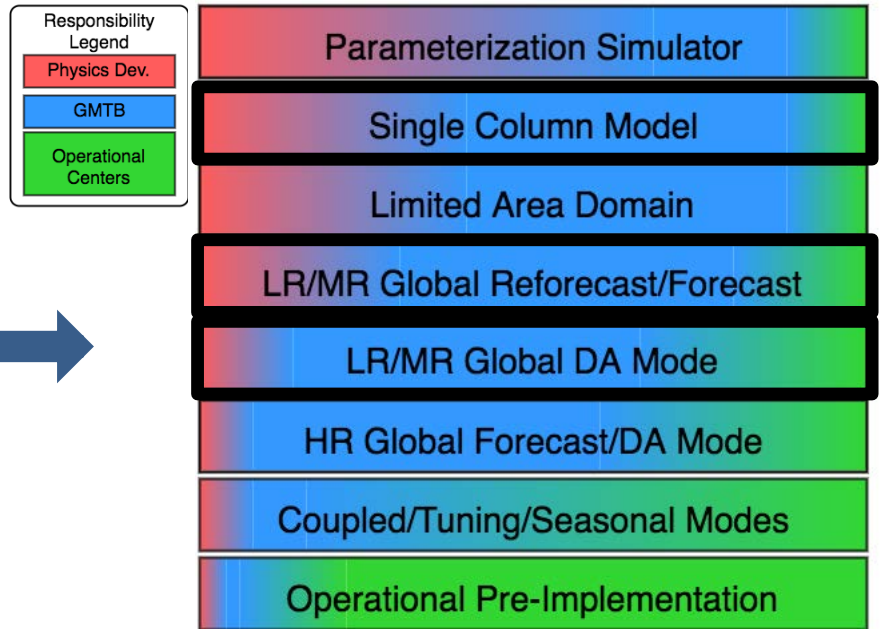
Tests of variable complexity are needed to inform development and operations

Parameterization

Component

Coupled





Available to the community: Single Column Model and Global Workflow (EMC version augmented with MET and diagnostics)

Illustration of testbed framework

Grell-Freitas vs Simplified Arakawa Schubert convection within GFS physics suite

SCM

Global (GSM)

Phase 1 (GFS FY16)

Cu	Initial Conditions
GF	1 case: maritime convection
SAS	

Cu	Initial Conditions	Period
GF	GFS analyses (cold start)	JJA 2016
SAS		

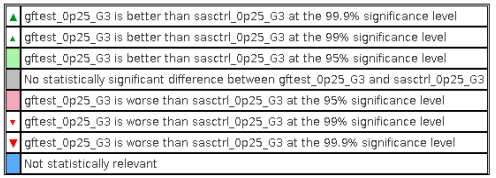
Phase 2 (GFS FY17)

Cu	Initial Conditions
GF	2 cases: maritime and continental convection
SASAS	

Cu	Initial Conditions	Period
GF	GFS analyses (cold start)	Jun 1-15, 2016
GF	Cycled DA	
SASAS	Cycled DA	

Test planned and conducted in close collaboration with developer, EMC, and NGGPS Physics team and Program Office

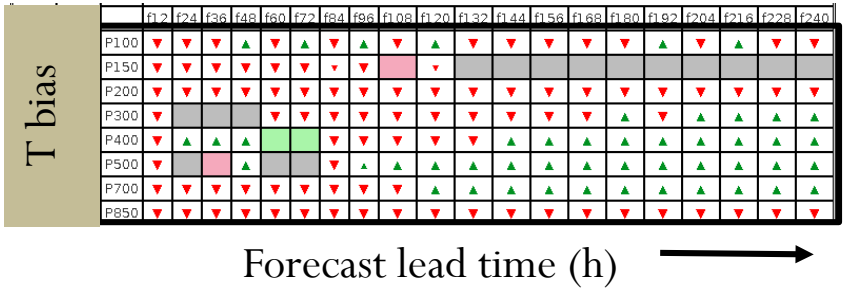
Global verification



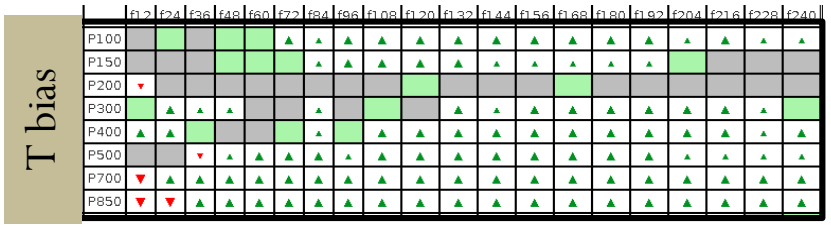
SAS better

GF better

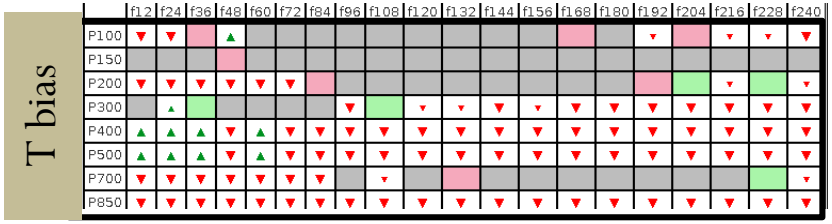
Cold starts: GF NH bias better later in forecast (hypothesis: hindered by cold starts)



Cycled starts: GF NH improved bias



Cycled starts: GF Tropics more bias than SAS



GF parameterization needs revision/tuning by developer before it is ready for further testing by GMTB

Future direction and discussion

- GMTB should continue its focus on atmospheric physics innovations: software infrastructure, testbed, evaluation
- CCPP must be ahead of operations: goal is to quickly add the advanced suite so tests can be conducted and compared against control with current GFS suite
- CCPP and hierarchical testbed must be integrated into EMC's assessment and decision-making process
- To be successful, GMTB relies on support of UFS to the community, which includes availability on non-NOAA platforms. This is a gap that SIP needs to address going forward.