CCPP Physics Code Mgmt Meeting

02/09/2021

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Agenda

- Reminder/Overview of 2/16 aerosol/chemistry interface workshop
  - With Matt Dawson and special guest Alma Hodzic (NCAR/ACOM)
- Upcoming CCPP public release

Aerosol/Chemistry Interface Workshop

- We're here because we share a problem *as a community*
  - **How can we make it easier for atmospheric models to use different aerosol/chemistry packages, evaluate their results, and compare their differences?**

- If this problem were easy to solve, someone would have solved it already *in a way that works for all of us*

- It's not impossible (and not even uniquely difficult), but *the details matter to us*

From Matt Dawson and the workshop commitee

CCPP Public Release

CCPP v6 planned no later than June 2022

Release goals, audience, methods

- **Goals**
  - Enable research using CCPP-compliant weather and climate models (UFS and SCM)
  - Enable the development of parameterizations
- **Audience**
  - Broader research community
  - Physical parameterization developers
  - UFS developers
- **Methods**
  - Provide a well-documented and supported joint release of CCPP Physics and CCPP Framework, packaged with the CCPP SCM (simple host to enable running CCPP)
  - Release jointly/simultaneously with UFS Medium-Range Weather and/or UFS Short-Range Weather Applications so that a single CCPP release can be used with SCM or UFS, simplifying doc and support
  - Include operational and developmental schemes/suites

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CCPP public releases

Ver.	Date	Host
1.0	2018 Apr	CCPP Single Column Model
2.0	2018 Aug	CCPP Single Column Model
3.0	2019 Jul	CCPP Single Column Model
4.0	2020 Mar	CCPP Single Column Model UFS Weather Model / UFS **MRW** App v1.0
4.1	2020 Oct	CCPP Single Column Model UFS Weather Model / UFS **MRW** App v1.1
5.0	2021 Mar	CCPP Single Column Model UFS Weather Model / UFS **SRW** App v1.0

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CCPP public releases

SCM only   SCM and UFS MRW App   SCM and UFS SRW App

Ver.	Physics Suites	
	Operational	**Developmental**
1.0	GFS_operational_2017 (GFS v14)	N/A
2.0	GFS_2017_updated (GFS v14)	GFS_2018_updated (GFS v15)
3.0	GFS_v15	GFSv15plus (GFS v16) csawmg GSD_v0
4.x	GFS_v15p2, GFSv_15p2_no_nsst*	GFS_v16beta, GFS_v16beta_no_nsst GSD_v1 csawmg
5.0	GFS_v15p2 GFS_v16beta	RRFS_v1alpha csawmg GSD_v1

* no_nsst is needed for initializing from GFS GRIB2 files as it does not have the same variables as NetCDF file

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Suites/ Schemes	GFS_ 2017	GFS_2018_ updated	GFS_ v15, v15p2	GFS_ v15plus	GFS_ v16beta	GSD _v0 _v1	csawmg	RRFS_v1al pha
Microp	Z-C	GFDL	GFDL	GFDL	GFDL	Thomp	M-G3	Thomp
PBL	K-EDMF	K-EDMF	K-EDMF	TKE EDMF	TKE EDMF	MYNN	K-EDMF	MYNN
Sfc layer	GFS	GFS	GFS	GFS	GFS	GFS	GFS	GFS
Deep cu	saSAS	saSAS	saSAS	saSAS	saSAS	Grell-Freitas	CS + AW	N/A
Shal cu	saMF	saMF	saMF	saMF	saMF	GF+ MYNN	saMF	MYNN
Radiation	RRTMG	RRTMG	RRTMG	RRTMG	RRTMG	RRTMG	RRTMG	RRTMG
GWP	GFS O+nO[*]	GFS O+nO[*]	GFS O+nO[*]	GFS O+nO[*]	uGWPv0	uGWPv0	uGWPv0	uGWPv0
LSM	Noah	Noah	Noah	Noah	Noah	RUC	Noah	Noah-MP
Strat Ozone	NRL 2009	NRL 2009	NRL 2015	NRL 2015	NRL 2015	NRL 2015	NRL 2015	NRL 2015
Strat H2O	NRL	NRL	NRL	NRL	NRL	NRL	NRL	NRL

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Colors denote the various schemes used on a given line   [*]Later repackaged as uGWD v0

Challenge with suites and their names

- First of all, suites are the business of host models
- Sometimes named after an operational implementation (GFS_v15, GFS_v16)
- Sometimes names after a modified operational implementation (GFS v15plus, GFSv15p2)
- Sometimes named after a prototype (GFSv16beta, RRFS_v1alpha)
- Sometimes named after an organization (GSD_v0, GSD_v1)
- Sometimes names after contents (csawmg)
- Note that while we can guarantee that a suite has the same parameterizations as an operational implementation (e.g., GFS_v15 has the same suite as the operational GFS v15), the code of the schemes in the release are more advanced than what is used in operations because we cure the releases from top of CCPP main branch.
  - Goal is to release state of the art schemes, and not document the operational release

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Context for upcoming v6 release

- **EPIC is planning UFS App releases**
    - SRW - early May 2022.
        - Suite(s) TBD (RRFS, CAM ensemble, still consulting with App leads)
    - MRW - June 2022
        - Two suites: GFS v16 and prototype 8 (plan for GFS v17)
    - Release branches will be created from CCPP main branch, timeline TBD
- **CCPP+SCM v6 release**
    - Should happen by June 2022 (per DTC statement of work)
    - Scope: Physics, Framework and SCM
    - Should have code as close as possible as what is used in SRW and MRW releases to facilitate documentation and support
    - Include any schemes being used in NCAR models?

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Possibilities for CCPP v6

- MRW and SCM
  - GFS_v16 (operational)
  - Prototype 8 for GFS v17
  - Developmental
    - GSL?
    - ~~csawmg?~~
- SRW and SCM
  - GFS_v16 (reference)
  - RRFS_v1alpha/beta
  - Additional SRW suites for CAM ensemble?
- More?

Missing documentation

- RRTMGP
- Cloud-radiation
- Use of MERRA-2 aerosols
- uGWD v1 + GSL drag suite
- NSSL and F-A mp, if needed

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Schemes/Suites	GFS_v16	GFS_v17proto8	GSL	~~csawmg~~	RRFS_v1alpha/beta	CAM ensemble 1?	CAM ensemble 2?
Microp	GFDL	Thomp?	Thomp	~~M-G3~~	Thomp	NSSL	F-A
PBL	TKE EDMF	TKE EDMF	MYNN	~~K-EDMF~~	MYNN		
Sfc lay	GFS	GFS	GFS	~~GFS~~	GFS->MYNN		
Deep cu	saSAS	saSAS	Grell-Freitas	~~CS + AW~~	N/A		
Shal cu	saMF	saMF	GF(+MYNN?)	~~saMF~~	MYNN		
Radiation	RRTMG	RRMTGP?	RRTMG	~~RRTMG~~	RRTMG		
GWP	uGWPv0	uGWPv1 + GSL drag suite?	uGWPv0	~~uGWPv0~~	uGWPv0 -> add GSD drag suite		
LSM	Noah	NoahMP	RUC	~~Noah~~	Noah-MP		
Ozone	NRL 2015	NRL 2015	NRL 2015	~~NRL 2015~~	NRL 2015		
H2O	NRL	NRL	NRL	~~NRL~~	NRL		

Tentative Timeline

- Feb 28 - schemes/suites defined
- May 1 - documentation drafted, branches cut
- May 13 - documentation and online finalized
- May 20 - tests successfully completed
- June 5 - release

We are open to feedback about

- Release scope
- Release code management
- Naming of suites (perhaps tie them to operational targets)
  - GFSv16dev, GFSv16, GFSv16plus
- Timeline
- Documentation
- Training
- Dissemination
- Etc.

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