

How is the Common Community Physics Package Governed?

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DTC Developmental Testbed Center

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Common Community Physics Package

CCPP Physics

- A library of physical parameterizations

CCPP Framework

- Software infrastructure that allows using the CCPP Physics in a host model

CCPP Single Column Model

- A simple host model that employs the CCPP Physics and CCPP Framework

Central hub: https://dtcenter.org/ccpp
All codes in public repositories
CCPP v7 (September 2024)

Motivations for the CCPP

COMMON COMMUNITY PHYSICS PACKAGE

Hierarchical capability

- A resource for research, development, and operations

Interoperability to foster collaborations

- Designed for use by multiple models and modeling groups

Code Management

- Efficiency in physics development via centralization

Host Models Using CCPP

CCPP Single Column Model

- For hierarchical testing with CCPP

Unified Forecast System (UFS)

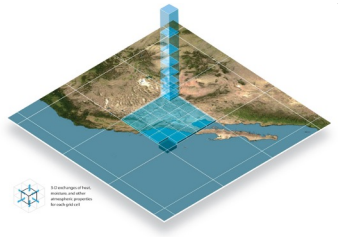
- For research and NOAA operations (operational since 2023)

US Navy Research Laboratory NEPTUNE model

- Using CCPP for pre-operational implementation tests

NSF NCAR CAM-SIMA

- Experimental research model



Role of DTC versus other groups

- CCPP Physics: DTC manages and reviews code; advises, supports
  - Parameterizations are contributed by developers
- CCPP Framework: DTC designed and developed
  - Second generation framework is now being developed under NCAR lead
- CCPP SCM: DTC designed and developed
  - Cases contributed by community or DTC

CCPP @ DTC sponsors

- NOAA
- NCAR

Scope of DTC work

- Guided by funding agencies
- Reviewed and approved by Management Board
- Approved by Executive Committee

Meets approx. biweekly; additional scientists/engineers included

CCPP Physics Code Management Group

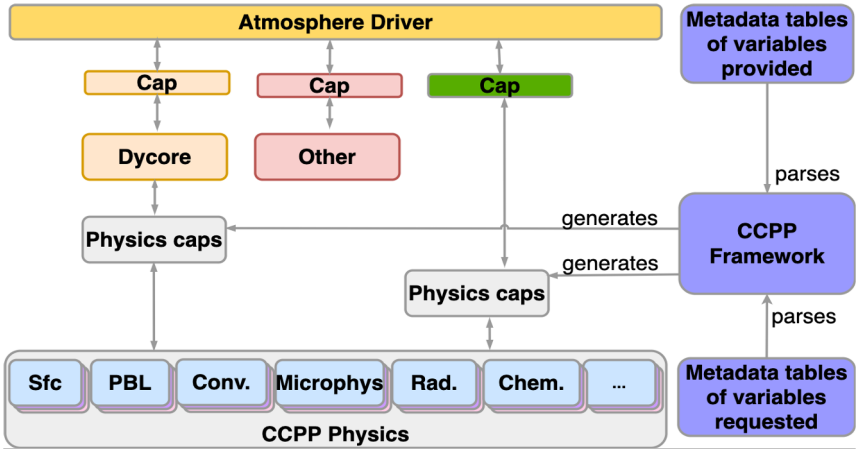
- Developmental Testbed Center (DTC)
- Navy Research Laboratory – Jim Doyle
- NSF NCAR
  - Atmos Chemistry Observations and Modeling (ACOM) Lab – Matt Dawson
  - Climate and Global Dynamics (CGD) Lab – Peter Lauritzen
  - Mesoscale and Microscale Meteorology (MMM) Lab – Laura Fowler
  - Research Applications Lab (RAL) – Pedro Jimenez
- NOAA
  - Environmental Modeling Center (EMC) – Fanglin Yang and Jeff McQueen
  - Atlantic Oceanographic and Meteorological Lab (AOML) – S. Gopal
  - Global System Lab (GSL) – Mike Toy and Kate Zhang (CU/CIRES)
  - Physical Sciences Lab (PSL) – Lisa Bengtsson
  - National Severe Storms Lab (NSSL) – Ted Mansell

Selected Topics Addressed by CCPP Physics Team

- Criteria for inclusion of new parameterizations
- Collaborative development
- Improved interoperability
- Unification of duplicate codes
- Code Management
- Testing
- Public releases capabilities
- Scientific documentation

CCPP Framework Developers Committee

- DTC
- NSF NCAR
  - ACOM – Matt Dawson
  - CGD - Cheryl Craig, Courtney Peverly, Mike Waxmonsky, Jesse Nusbaumer, Adam Herrington
  - MMM - Jordan Powers
- NOAA EMC
  - RhaeSung Kim
- NRL
  - Dom Heinzeller



Meets weekly; open to all developers

Selected Topics Addressed by Framework Team

- Initial collection of requirements
- Format for physics interfaces
- Documentation of standards (CCPP Technical Documentation)
- Changes to CCPP rules
- Collaborative development so it works for all hosts
- Testing
- Cross-institutional code management practices
- Standard names

CCPP Standard Names

- Used to define and communicate quantities between host models and physics
- Promote interoperability
  - *t, temp, t2m, sfcT, … -> air_temperature_at_2m*
- Public Access: https://github.com/ESCOMP/CCPPStandardNames
  - Rules
  - Dictionary
- Adopted by JEDI
  - And thus, used by UKMO, Air Force, NASA
- Under consideration for adoption by NUOPC (for field dictionary)

A new governance is forming to address this collaborative effort

Community Engagement

- GitHub discussions for questions, exchanges
  - https://github.com/NCAR/ccpp-physics/discussions
  - https://github.com/NCAR/ccpp-framework/discussions
  - https://github.com/NCAR/ccpp-scm/discussions
- CCPP Visioning Workshop (2023)
  - Multi-day discussions on emerging requirements and improvements
  - BAMS paper by Firl et al. (2024)
- DTC Visitor Program (**dtcenter.org/visitors**)
  - PI – Up to 2 months salary, travel and per diem
  - Grad Student - Up to 1 year of temporary living per diem and travel expenses for graduate student, plus support for advisor visit

Final Thoughts

- **Working Well**
  - CCPP is a useful and mature product for R, D, and O
  - There are well-established mechanisms for communication
- **Challenges**
  - Funding (direct and in-kind) is challenging to secure
  - Original vision of one physics package shared by all has evolved into a decentralized constellation of physics packages supported by the various groups
  - Modeling groups have different missions and timelines

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