



Strategic Implementation Plan (SIP) for a Community-based Unified Forecast System



Physics Working Group

Presented by

Jack Kain (NOAA/NCEP/EMC)

On behalf of

Co-Chairs Chris Bretherton, Jim Doyle, and Georg Grell

Presented at SIP Coordination Meeting

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Physics WG Membership



- *Chris Bretherton** (Univ. Washington)*
- *Jim Doyle** (NRL)*
- *Georg Grell** (NOAA/ESRL)*
- *Jack Kain** (NCEP/EMC)*
- Ligia Bernardet (NOAA/ESRL, DTC, CU/CIRES)
- Jim Dudhia (NCAR)
- Louisa Nance (NCAR, DTC)
- Bill Kuo (NCAR, DTC)
- Shrinivas Moorthi (NCEP/EMC)
- Bill Putman (NASA GMAO)
- Vijay Tallapragada (NCEP/EMC)

***Co-Chair*



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Project Milestones/Accomplishments

- **SIP project accomplishments to date:**

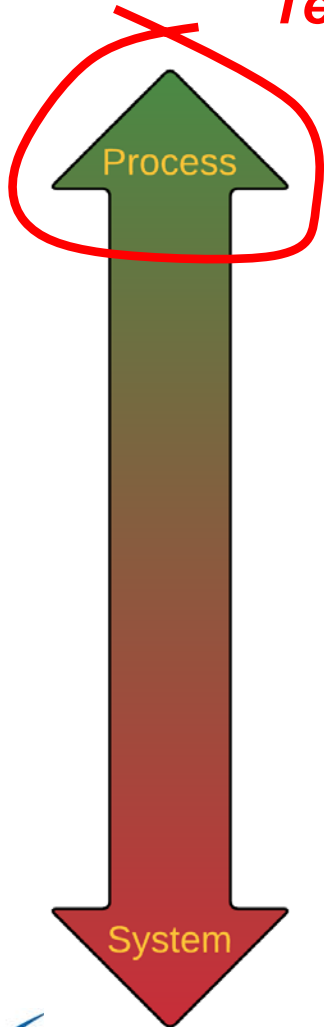
- *Operational GSM physics package ported to FV3-GFS for beta-implementation testing, including upgrades:*
 - Zhao-Carr MP replaced with GFDL MP
 - NRL O₃ photochemistry, Stratosphere H₂O parameterization implemented
 - RRTMG updates
- *Advanced Physics options ported to FV3-GFS, currently being evaluated against operational baselines (Q1 FY19 decision point):*
 - Deep Convection (**Meso** to **S2S**): Chukira-Sugiyama/Arakaw-Wu, Grell-Freitas
 - PBL/shallow convection: SHOC, EDMF, others
 - Microphysics: Morrison-Gottelman 2, Thompson, others
 - Radiation: RRTMGP
 - Land SFC: Noah-MP, multi-layer snow, Flake model
- *GMTB developments, including CCPP*



Hierarchical Testing Framework

Global Model Test Bed (GMTB)

Testing/Eval of candidates for new Model Physics



1. Individual Parameterizations

2. Single Column Model

3. Limited-Area Domains

4. Global (Cold-Started w/o DA)

5. Global (Cycled w/ DA)

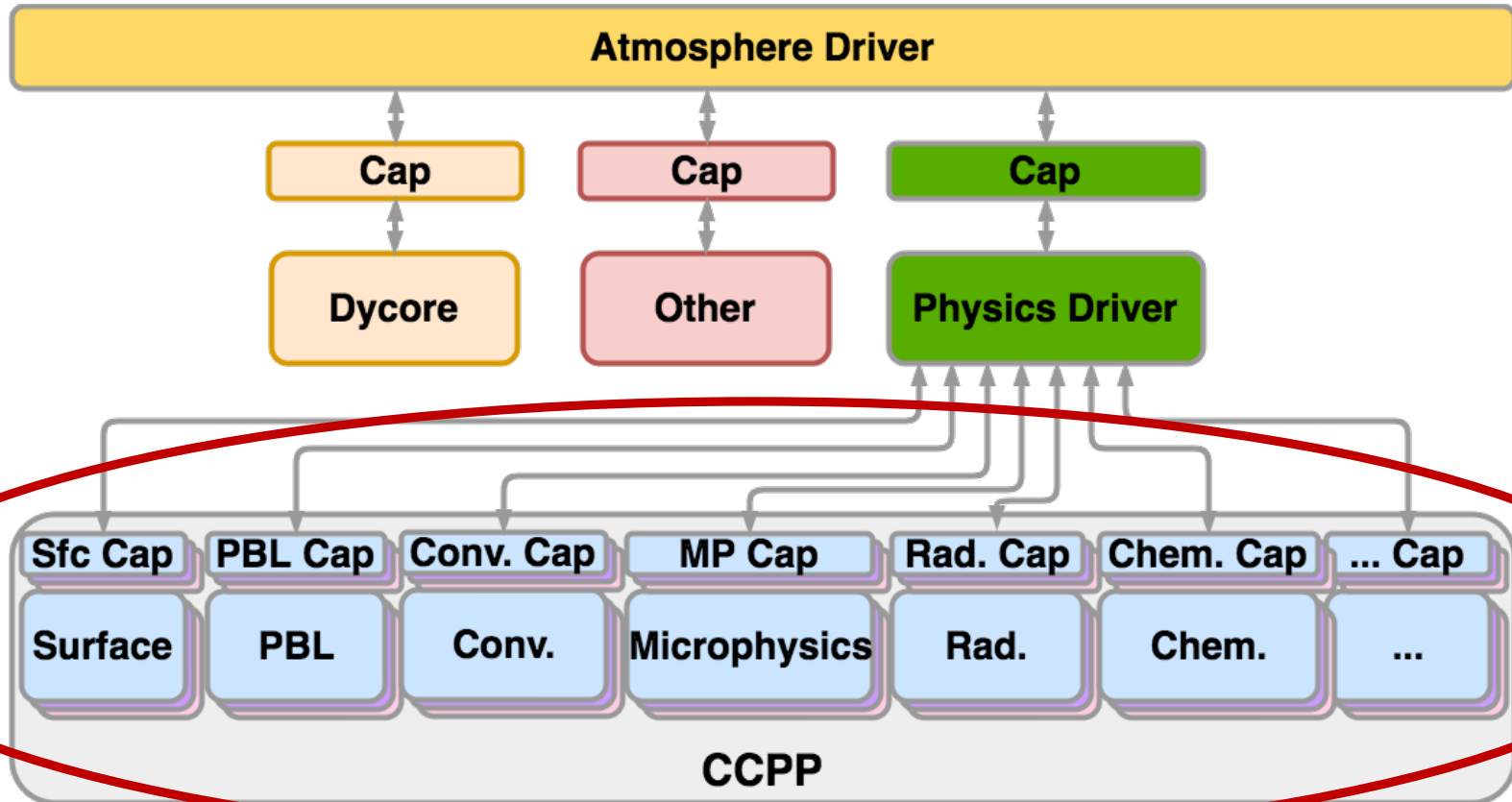
For each tier, the testing protocol is to:

1. Define relevant test cases.
2. Provide initialization and/or forcing for each case.
3. Create benchmarks using operational codes.
4. Compare candidate model runs with benchmarks and observations.





Common Community Physics Package (CCPP)





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Issues, Coordination, Dependencies



- **Project issues:**
 - **Time:** Development, optimization, and implementation of even one “new” physical parameterization can take years.
 - **Computer resources**
 - **Performance metrics**
- **Coordination:**
 - EMC, NOAA Labs, Navy, DTC, Universities, other
- **Dependencies**
 - **Hierarchical testing framework and CCPP:** GMTB's scope and focus must be clear in order to be effective
 - **Support from Funding Agencies** (e.g., CPO, NGGPS, OWAQ JTTI, Testbeds, etc.)
 - **Computer Resources**