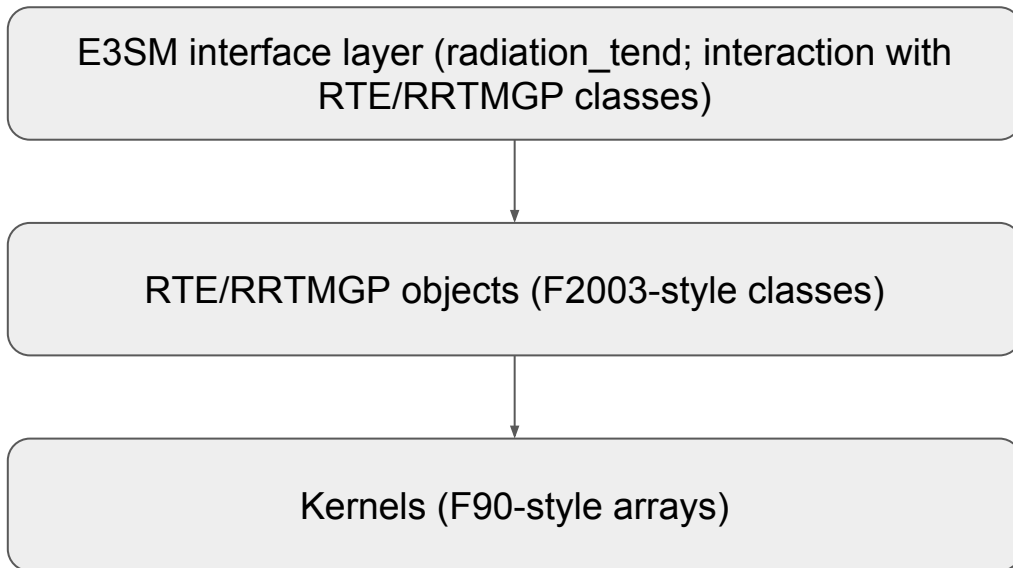# RRTMGP Status

Benjamin R. Hillman

What is RRTMGP

Complete rewrite of the widely used RRTMG radiation package

Written from the ground up to expose as much parallelism as possible

E3SM interface layer (radiation_tend; interaction with RTE/RRTMGP classes)

↓

RTE/RRTMGP objects (F2003-style classes)

↓

Kernels (F90-style arrays)

Status of RRTMGP in E3SM

RRTMGP added as an option for radiation at build time (./xmlchange -append CAM_CONFIG_OPTS="-rad rrtmgp")

Uses existing aerosol and cloud optics routines

McICA sampling assumes *maximum-random overlap* and *homogeneous condensate* -- this is probably "fine" for 3 km resolution, but we should evaluate these assumptions, and if P3/SHOC assumes subgrid-variability in condensate, we should mimic that here (relatively straightforward to implement now)

OpenACC port exists on repo, but *under development* (big push next week)

Differences relative to RRTMG
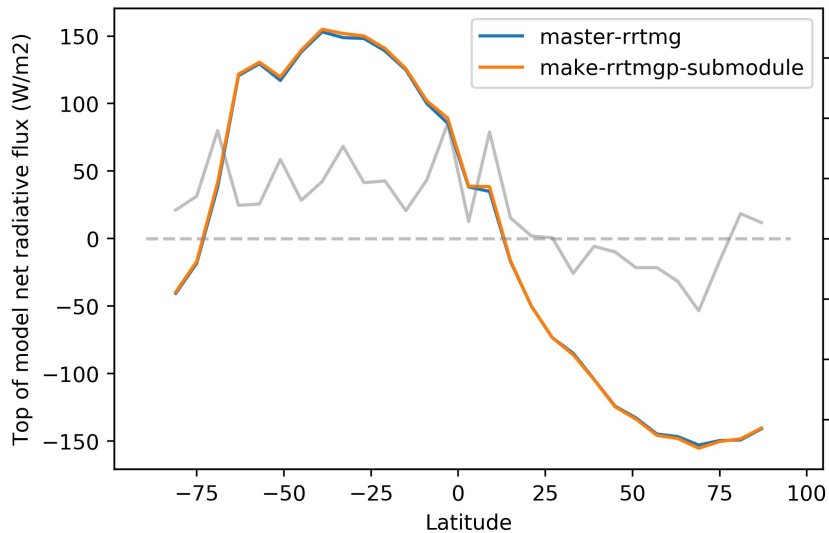
Differences in fluxes are small
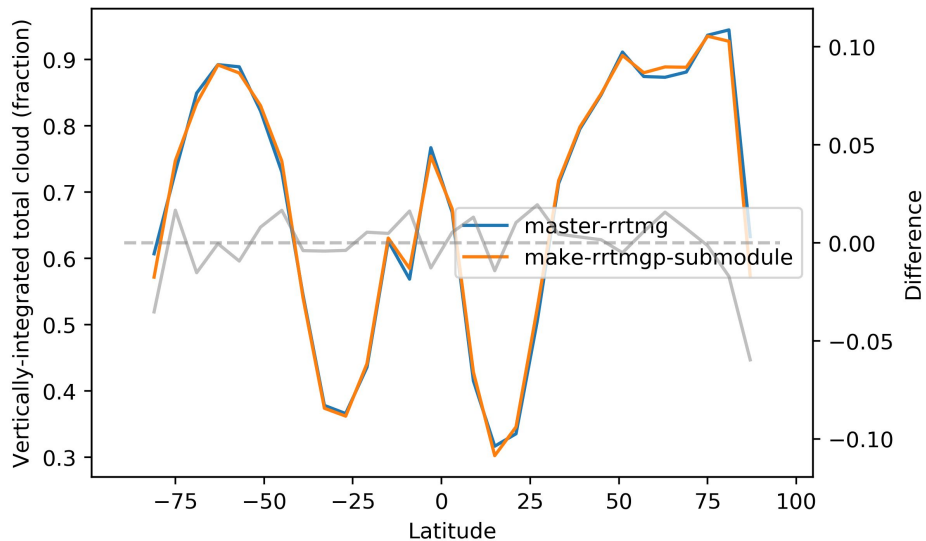
Resulting differences in clouds are small

Performance

Current implementation has twice the spectral accuracy of RRTMG

With this doubled spectral accuracy, RRTMGP within E3SM runs ~1.7x slower than RRTMG

Reduced set of absorption coefficient data is in the works, which will make RRTMGP faster than RRTMG overall

Port of RRTMGP to GPU promises to be faster once data movement is minimized

Next steps

Minimize data movement for GPU port (next week with Robert Pincus and Matt Norman)

Fix bug for threading

Test with other SCREAM components

Simplify upper bound treatment