

# Grell-Freitas

## Convective Parameterization Scheme: Recent new “HIWPP” implementations

1. Momentum transport (as in SAS or ECMWF)
2. Additional closure for deep convection: Diurnal cycle effect (Bechtold )
3. Mass conserving transport completed for shallow scheme
4. Mass conserving transport for deep currently being tested
5. Additional closures for shallow convection (including the SAS shallow convection closure, and one from Renno and Ingersoll, JAS 1996)
6. PDF approach for normalized mass flux profiles was implemented (fitting LES modeling for shallow convection and allows easy application of stochastic perturbation of vertical heating and moistening profiles)
7. GF scheme was fully immersed into GFS 2012 and 2015 physics (replacing the call to SAS deep and/or shallow schemes)
8. Rain evaporation (by parameter choice) after tendency calculations