

## Noah-MP Options (v3.8) With Indicators of usage with WRF-Hydro/NWM

Last updated: 2019/3/5

! =====options for different schemes=====

! \*\* = NoahMP recommended options

!      = WRF-HYDRO recommended options

!      = NOAA National Water Model ver. 2.0 options (if different from "recommended")

!      = unsupported in WRF-Hydro

### ! DYNAMIC\_VEG\_OPTION

INTEGER :: DVEG ! options for dynamic vegetation:

! 1 -> off (use table LAI; use FVEG = SHDFAC from input)

! 2 -> on (together with OPT\_CRIS = 1)

! 3 -> off (use table LAI; calculate FVEG)

! \*\*4 -> off (use table LAI; use maximum vegetation fraction)

! \*\*5 -> on (use maximum vegetation fraction)

! 6 -> on (use FVEG = SHDFAC from input)

! 7 -> off (use input LAI; use FVEG = SHDFAC from input)

! 8 -> off (use input LAI; calculate FVEG)

! 9 -> off (use input LAI; use maximum vegetation fraction)

### ! CANOPY\_STOMATAL\_RESISTANCE\_OPTION

INTEGER :: OPT\_CRIS ! options for canopy stomatal resistance

! \*\*1 -> Ball-Berry

! 2 -> Jarvis

### ! BTR\_OPTION

INTEGER :: OPT\_BTR ! options for soil moisture factor for stomatal resistance

! \*\*1 -> Noah (soil moisture)

! 2 -> CLM (matric potential)

! 3 -> SSiB (matric potential)

### ! RUNOFF\_OPTION

INTEGER :: OPT\_RUN ! options for runoff and groundwater

! \*\*1 -> TOPMODEL with groundwater (Niu et al. 2007 JGR)

! 2 -> TOPMODEL with an equilibrium water table (Niu et al. 2005 JGR)

! 3 -> original surface and subsurface runoff (free drainage)

! 4 -> BATS surface and subsurface runoff (free drainage)

! 5 -> Miguez-Macho&Fan groundwater scheme (Miguez-Macho et al. 2007 JGR;

! Fan et al. 2007 JGR)

### ! SURFACE\_DRAG\_OPTION

INTEGER :: OPT\_SFC ! options for surface layer drag coeff (CH & CM)

! \*\*1 -> M-O

! \*\*2 -> original Noah (Chen97)

### ! SUPERCOOLED\_WATER\_OPTION

INTEGER :: OPT\_FRZ ! options for supercooled liquid water (or ice fraction)

! \*\*1 -> no iteration (Niu and Yang, 2006 JHM)

! 2 -> Koren's iteration

### ! FROZEN\_SOIL\_OPTION

INTEGER :: OPT\_INF ! options for frozen soil permeability

! \*\*1 -> linear effects, more permeable (Niu and Yang, 2006, JHM)

! 2 -> nonlinear effects, less permeable (old)

! RADIATIVE\_TRANSFER\_OPTION

INTEGER :: OPT\_RAD ! options for radiation transfer

! 1 -> modified two-stream (gap = F(solar angle, 3D structure ...)<1-FVEG)

! 2 -> two-stream applied to grid-cell (gap = 0)

! \*\*3 -> two-stream applied to vegetated fraction (gap=1-FVEG)

! SNOW\_ALBEDO\_OPTION

INTEGER :: OPT\_ALB ! options for ground snow surface albedo

! 1 -> BATS

! \*\*2 -> CLASS

! PCP\_PARTITION\_OPTION

INTEGER :: OPT\_SNF ! options for partitioning precipitation into rainfall & snowfall

! \*\*1 -> Jordan (1991)

! 2 -> BATS: when SFCTMP<TFRZ+2.2

! 3 -> SFCTMP < TFRZ

! 4 -> Use WRF microphysics output

! TBOT\_OPTION

INTEGER :: OPT\_TBOT ! options for lower boundary condition of soil temperature

! 1 -> zero heat flux from bottom (ZBOT and TBOT not used)

! \*\*2 -> TBOT at ZBOT (8m) read from a file (original Noah)

! TEMP\_TIME\_SCHEME\_OPTION

INTEGER :: OPT\_STC ! options for snow/soil temperature time scheme (only layer 1)

! \*\*1 -> semi-implicit; flux top boundary condition

! 2 -> full implicit (original Noah); temperature top boundary condition

! 3 -> same as 1, but FSNO for TS calculation (generally improves snow; v3.7)

! SURFACE\_RESISTANCE\_OPTION

INTEGER :: OPT\_RSUF ! options for surface resistant to evaporation/sublimation

! \*\*1 -> Sakaguchi and Zeng, 2009

! 2 -> Sellers (1992)

! 3 -> adjusted Sellers to decrease RSURF for wet soil

! 4 -> option 1 for non-snow; rsurf = rsurf\_snow for snow (set in MPTABLE); AD v3.8

! GLACIER\_OPTION

INTEGER :: OPT\_GLA ! options for glacier treatment

! \*\*1 -> include phase change of ice

! 2 -> ice treatment more like original Noah (slab)