Subject: matching of GFS surface types to CRTM
From: Ronald.Vogel@noaa.gov
Date: Thu, 24 Dec 2009 11:25:27 -0500
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Hi Michiko,

Below is a code snipet that matches GFS Vegetation Types (used in both
GFS and GDAS) to CRTM's surface types.  The same matching is used in the
GSI code.

The GFS/GDAS vegetation types are (numbered 1 to 13):
   broadleaf evergreen tree (tropical forest)
   broadleaf deciduous tree (mid-latitude forest)
   broadleaf & needleleaf tree (mixed forest)
   needleleaf evergreen tree (high-latitude pine forest)
   needleleaf deciduous tree (high-lat pine forest, Siberia only)
   broadleaf tree with groundcover (savanna)
   groundcover (grassland)
   broadleaf shrub with perennial groundcover (desert, dry grassland)
   broadleaf shrub with bare soil (desert)
   dwarf tree and shrub with groundcover (tundra)
   bare soil (desert)
   cultivations (agricultural land)
   glacial-ice (Greenland/Antarctica ice sheet only)

Let me know if you have questions,
Ron


CODE TO CONVERT GFS/GDAS Vegetation Type to CRTM Surface Type

!Variable declarations

    INTEGER  ::  gdas_vegtype   ! vegetation type from GDAS files
    INTEGER  ::  crtm_surftype  ! variable to hold CRTM types converted
from GDAS

    ! match GDAS veg types (integers 1-13) to
    ! CRTM surface type _integer_
    INTEGER, DIMENSION(13), PARAMETER :: crtm_types = &
                         (/ 8, 8, 12, 9, 9, 17, 7, 7, 19, 10, 1, 2, 1 /)
    ! OR match GDAS veg types (integers 1-12) to CRTM surface type names:
    !  CHARACTER(21), DIMENSION(13), PARAMETER :: stype_crtm = &
    !           (/ 'BROADLEAF_FOREST     ', 'BROADLEAF_FOREST     ', &
    !              'BROADLEAF_PINE_FOREST', 'PINE_FOREST          ', &
    !              'PINE_FOREST          ', 'BROADLEAF_BRUSH      ', &
    !              'SCRUB                ', 'SCRUB                ', &
    !              'SCRUB_SOIL           ', 'TUNDRA               ', &
    !              'COMPACTED_SOIL       ', 'TILLED_SOIL          ', &
    !              'COMPACTED_SOIL       ' /)


!Code to determine CRTM's surface type

    ! check for gdas_vegtype = 0 (water pixel)
    ! and then convert remainder gdas_vegtype (1-13)
    ! to CRTM surface type:
    IF ( gdas_vegtype .eq. 0 ) THEN   ! 0 indicates water pixel
            crtm_surftype = 0     ! i.e., CRTM "invalid land" type
    ELSE
            crtm_surftype = crtm_types(gdas_vegtype)
                            !GDAS veg type mapped to CRTM surface type
    END IF
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!Load CRTM Surface structure

    Surface(iprof)%Land_Type = crtm_surftype


Note that snow surface is treated differently.  As long as snow has a
depth of 0.1 mm then one of CRTM's two snow types is used (fresh snow or
old snow), regardless of the vegetation type.  When I run CRTM, I always
use old snow (code below) -- I don't know what GSI does.

    Surface(iprof)%Snow_Type = 13
                      ! CRTM 'CRUST_SNOW' maps to 'old snow' emissivity
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