```
PRO gfsht, directory, dirout, resolution, model, exit_status, $
                     dataroot=dataroot, time1=time1, time2=time2, field1=field1, field
2=field2, stretch2=stretch2
; **********************************************************************
;  PURPOSE
;  =======
;  Read and compare visible albedo from two different times on a split screen
;
;  ARGUMENTS
;  =========
;  directory    Input   String          path for input model data
;  dirout       Input   String          path for output image
;  dataroot     Keyword String          Path to lapsprd
;                   If not set, it uses GETENV
;  resolution   Input   Real            Degrees per grid point of model input
;  time1        Keyword String          Time of interest YYJJJHHMM
;  time2        Keyword String          Time of interest YYJJJHHMM
;  field1       Keyword String          Satellite of interest
;  field2       Keyword String          Satellite of interest
;  stretch2     Keyword String          Stretch factor for 2nd satellite
;
;  HISTORY
;  =======
;  2003 - Initial Version -- Steve Albers, NOAA/FSL/FRD/LAPB (CIRA)
;
; **********************************************************************

exit_status = 0

IF (field1 EQ "PCP") THEN BEGIN
    n_interp = 1
ENDIF ELSE IF (model EQ "gfs") THEN BEGIN
    n_interp = 3
ENDIF ELSE IF (model EQ "fim") THEN BEGIN
    n_interp = 3
ENDIF ELSE BEGIN
    n_interp = 1
ENDELSE

; All LAPS netcdf variables are lowercase and have leading/trailing
; blanks removed, so lets make sure the variable name passed in
; conforms

;lapsvar = STRTRIM(parameter,2)
extension = "lvd"
;  This routine only use for analysis fields!
  IF (not KEYWORD_SET(dataroot)) THEN BEGIN
    dataroot = GETENV('LAPS_DATA_ROOT')
    IF dataroot eq '' THEN BEGIN
      PRINT, 'No LAPS_DATA_ROOT environment variable set and '
      PRINT, 'no dataroot keyword set, so I am going to assume'
      PRINT, 'you are in the data directory of your domain!'
      dataroot = '.'
    ENDIF
  ENDIF
  IF KEYWORD_SET(balance) THEN $
    datadir = dataroot + '/lapsprd/balance/' + extension $
  ELSE $
    datadir = dataroot + '/lapsprd/' + extension

  cint=100. ; contour interval for GH
  ilevel = 12 ; Level for height field
  ilevel500 = ilevel

  IF (model EQ "fim") THEN BEGIN
      gh_name = "GpH"
  ENDIF ELSE IF(resolution EQ 1.0) THEN BEGIN ; gfs
      gh_name = "GH"
      pmsl_name = "PMSL"
  ENDIF ELSE BEGIN ; assume 0.5 for gfs
      gh_name = "GpH"
      pmsl_name = "pmsl"
  ENDELSE

  if(field1 EQ gh_name) THEN BEGIN
      field_img=field1
      field_con=field1
      dimfield_img=3 & k_img=ilevel500
      dimfield_con=3 & k_con=ilevel500
      clow = 4600.
      chigh = 6150.
      cntlow = 0.
      cntint = 100.
  ENDIF ELSE if(field1 EQ "PMSL") THEN BEGIN
      field_img=gh_name
      field_con=pmsl_name
      dimfield_img=3 & k_img=ilevel500
      dimfield_con=2 & k_con=0
      clow = 4600.
      chigh = 6150.
      cntlow = 90000.
      cntint = 400.
  ENDIF ELSE if(field1 EQ "PWMSL") THEN BEGIN
      field_img="PW"
      field_con=pmsl_name
      dimfield_img=2 & k_img=0
      dimfield_con=2 & k_con=0
      clow = 0.
      chigh = 60.
      cntlow = 90000.
      cntint = 400.
  ENDIF ELSE if(field1 EQ "PW") THEN BEGIN
      field_img="PW"
      field_con=gh_name
      dimfield_img=2 & k_img=0
      dimfield_con=3 & k_con=ilevel500
      clow = 0.
      chigh = 60.
      cntlow = 0.
      cntint = 100.
  ENDIF ELSE if(field1 EQ "PCP") THEN BEGIN
      field_img="APCP"
      field_con=gh_name
      dimfield_img=2 & k_img=0
      dimfield_con=3 & k_con=ilevel500
      clow = 0.
      IF (model EQ "fim") THEN BEGIN
          chigh = 30. ; 3 hr precip
      ENDIF ELSE BEGIN
          chigh = 60. ; 6 hr precip
      ENDELSE
      cntlow = 0.
      cntint = 100.
  ENDIF ELSE if(field1 EQ "WIND5") THEN BEGIN
      field_img="spd" ; "uW"
      field_con=gh_name
      dimfield_img=3 & k_img=ilevel500
      dimfield_con=3 & k_con=ilevel500
      clow = -100.
      chigh = +100.
      cntlow = 0.
      cntint = 100.
  ENDIF ELSE BEGIN
      print,' ERROR in gfsht.pro: Unrecognized field - ',field1
      return
  ENDELSE

; Read LAPS static data
  read_laps_static, geog
```

```
; Hard code actual cylindrical global geog info
  geog.proj = 'cylindrical'

  IF (resolution EQ 1.0) THEN BEGIN
      geog.nx = 360
      geog.ny = 181
      geog.center[0] = 0.0
      geog.center[1] = 0.0
      geog.corners[0]=-89.
      geog.corners[1]=-179.
      geog.corners[2]=+89.
      geog.corners[3]=-179.
      geog.corners[4]=+89.
      geog.corners[5]=+179.
      geog.corners[6]=-89.
      geog.corners[7]=+179.
  ENDIF ELSE BEGIN ; assume 0.5
      geog.nx = 720
      geog.ny = 361
      geog.center[0] = 0.0
      geog.center[1] = 0.0
      geog.corners[0]=-89.5
      geog.corners[1]=-179.5
      geog.corners[2]=+89.5
      geog.corners[3]=-179.5
      geog.corners[4]=+89.5
      geog.corners[5]=+179.5
      geog.corners[6]=-89.5
      geog.corners[7]=+179.5
  ENDELSE

  geog.orientation=0.0

  help, geog, /st
  print,'geog=',geog

; Read Image Field at Time 1
  print,'Reading field for image ',field_img,' level ',k_img
  get_2d_model_field, field_img, directory, "lvd", data1_img, k_img, exit_status, sat=
sat1, time=time1
  IF(exit_status ne 0)THEN BEGIN
      print,'exit_status from read_gfs_grid = ',exit_status
      return
  ENDIF

  help, data1_img, /st

; Pull out 2D image field
  print,' element (1,1) = ',data1_img.value(1,1)
  data1_2d_img = data1_img.value

; QC check for data1_2d_img
  range_min = MIN(data1_2d_img)
  range_max = MAX(data1_2d_img)
  if (range_min LT -200. OR range_max LT -200.) then begin
      print, 'ERROR in data1_2d_img range - ',range_min,range_max
      print, 'filetime = ',time1,' return from gfsht.pro '
      RETURN
  ENDIF

  IF (n_interp GT 1) THEN BEGIN

;   Read Image Field at Time 2
    get_2d_model_field, field_img, directory, "lvd", data2_img, k_img, exit_status, sa
t=sat2, time=time2
    IF(exit_status ne 0)THEN BEGIN
      print,'exit_status from read_gfs_grid = ',exit_status
      return
    ENDIF
    help, data2_img, /st

;   Pull out 2D image field
    print,' element (1,1) = ',data2_img.value(1,1)
    data2_2d_img = data2_img.value

;   QC check for data2_2d_img
    range_min = MIN(data2_2d_img)
    range_max = MAX(data2_2d_img)
    if (range_min LT -200. OR range_max LT -200.) then begin
      print, 'ERROR in data2_2d_img range - ',range_min,range_max
      print, 'filetime = ',time2,' return from gfsht.pro '
      RETURN
    ENDIF

  ENDIF

; Read Contour Field at Time 1
  print,' ' & print,'Reading field for contours ',field_con
  get_2d_model_field, field_con, directory, "lvd", data1_con, k_con, exit_status, sat=
sat1, time=time1
  help, data1_con, /st
  print,' element (1,1) = ',data1_con.value(1,1)

; Pull out 2D contour field
  data1_2d_con = data1_con.value

  IF (n_interp GT 1) THEN BEGIN

;   Read Contour Field at Time 2
    get_2d_model_field, field_con, directory, "lvd", data2_con, k_con, exit_status, sa
t=sat2, time=time2
;   help, data2, /st
    print,' element (1,1) = ',data2_con.value(1,1)

;   Pull out 2D contour field
    data2_2d_con = data2_con.value

  ENDIF

  FOR interp=0,n_interp-1 DO BEGIN

    frac = float(interp) / float(n_interp)

    print,' '
    print,'time interpolation frac/n_interp = ',frac,n_interp

    IF (n_interp GT 1) THEN BEGIN ; Perform time interpolation of img
      data_img = data1_2d_img[*,*] * (1.0 - frac) + data2_2d_img[*,*] * frac
      data_con = data1_2d_con[*,*] * (1.0 - frac) + data2_2d_con[*,*] * frac
    ENDIF ELSE BEGIN ; time interpolation disabled
      data_img = data1_2d_img
      data_con = data1_2d_con
    ENDELSE

    ftime1  = FLOAT(STRMID(time1,10,4))
    ftime2  = FLOAT(STRMID(time2,10,4))
    ftime_interp = fix( (ftime1 * (1.0 - frac) + ftime2 * frac) + 0.5)

    IF(ftime_interp le 9)THEN BEGIN
      ctime_interp = '000' + string(ftime_interp,format='(I1)')
    ENDIF ELSE IF(ftime_interp le 99)THEN BEGIN
      ctime_interp = '00'  + string(ftime_interp,format='(I2)')
    ENDIF ELSE IF(ftime_interp le 999)THEN BEGIN
      ctime_interp = '0'   + string(ftime_interp,format='(I3)')
    ENDIF

    print,'ftime1/2/i/c = ',ftime1,ftime2,ftime_interp,ctime_interp

    fileout = STRMID(time1,1,9) + ctime_interp
```

```
    colors = bytarr(3,256)

;   Fill color table array
    if(field_img EQ gh_name OR field1 EQ "PCP" OR field1 EQ "WIND5") THEN BEGIN ; Blue
 to Green to Red
      power = 2.0
      FOR ic=0,255 DO BEGIN
          ratio = float(ic)/255.
          colors[0,ic] = (255. * ratio^power + 0.5)
          colors[1,ic] = 200 - abs(128-ic)*2.0 > 0
          colors[2,ic] = (255. * (1. - ratio)^power + 0.5)
      END
    ENDIF ELSE BEGIN ; Red to Green to Blue
      power = 2.0
      FOR ic=0,255 DO BEGIN
          ic1 = 255-ic
          ratio = float(ic)/255.
          colors[0,ic1] = (255. * ratio^power + 0.5)
          colors[1,ic1] = 200 - abs(128-ic)*2.0 > 0
          colors[2,ic1] = (255. * (1. - ratio)^power + 0.5)
      END
    ENDELSE

    print,'call disp_img: dirout / fileout=',dirout,fileout

;   Display LAPS image
;   disp_img,data_interp.value[*,*,ilevel],geog,dirout,fileout,colors="yes"
    disp_img,data_img,data_con,resolution,geog,dirout,fileout,cntlow,cntint,colors=col
ors,scale=[clow,chigh],interp=1,winnum=0 ; ,veg="yes"

  END ; time interp

IF exit_status NE 0 THEN data=-1
RETURN
END
```