最大上升气流脚本详解

```
load "$NCARG_ROOT/lib/ncarg/nclscripts/csm/gsn_code.ncl"
load "$NCARG_ROOT/lib/ncarg/nclscripts/csm/gsn_csm.ncl"
load "$NCARG_ROOT/lib/ncarg/nclscripts/csm/contributed.ncl"
load "$NCARG_ROOT/lib/ncarg/nclscripts/wrf/WRFUserARW.ncl"
load "$NCARG_ROOT/lib/ncarg/nclscripts/csm/shea_util.ncl"
;begin
;---------------------------------------
; 读取nc文件
 a  = addfile("./wrfout_d02_2011-05-05_00_00_00","r")
; 建立图形工作站,赋予输出类型、路径
 wks = gsn_open_wks("png","./wmax/W-MAX")
; 调色矩阵,可以是命名颜色的字符串数组, 红色/蓝色/绿色（RGB）三元组的数组或预定义的颜色图。
 cmap=(/(/255,255,255/),(/0,0,0/),\
       (/255,255,253/),(/255,255,253/),\
       (/255,240,187/),(/255,172,117/),\
       (/255,120,86/),(/255,61,61/),\
       (/246,39,53/),(/216,21,47/),\
       (/166,0,32/)/)/255.0
; 为给定的工作站定义一个颜色图。
gsn_define_colormap(wks,cmap)
; 读取nc文件时间
times=wrf_user_getvar(a,"times",-1)
; 时刻数
ntimes=dimsizes(times)
; 提取纬度矩阵
lat0              := a->XLAT
; 提取矩阵[south_north]维度, 得到纬度范围
lat:=lat0(0,:,0)
; 提取纬度矩阵
lon0            = a->XLONG
; 提取矩阵[west_east]维度, 得到经度度范围
lon=lon0(0,0,:)
; 提取质量坐标系上的风速W分量(http://www.ncl.ucar.edu/Document/Functions/WRF_arw/wrf_us
w0=wrf_user_getvar(a, "wa", -1)
;---------------------------------------
w_00=new((/109,29,285,348/), "float")
w_01=new((/109,29,285,348/), "float")
; 提取full model 气压单位hPa
p1 = wrf_user_getvar(a,"pressure",-1)
; 提取质量坐标系上的风速U分量
ua1 = wrf_user_getvar(a,"ua",-1)
; 提取质量坐标系上的风速V分量
va1 = wrf_user_getvar(a,"va",-1)
; 插值出650hPa高度的风速UV分量
var2d_u1=wrf_interp_3d_z(ua1, p1, 650.)
var2d_v1=wrf_interp_3d_z(va1, p1, 650.)
; 设置插值风速的缺省值为-999
```

```
var2d_u1@_FillValue=-999
var2d_v1@_FillValue=-999
;---------------------------------------
; 小于等于0的设为缺省值
do i = 0, 347,1
    do j = 0, 284,1
        do k = 0, 28,1
            do m = 0, 108,1
             if (w0(m,k,j,i) .gt. 0) then
                w_00(m,k,j,i)=w0(m,k,j,i)
            else
                w_00(m,k,j,i)=-999
             end if
            end do
        end do
    end do
print(i)
end do
;---------------------------------------
w_00@_FillValue=-999
w_00!2="south_north"
w_00&south_north=lat
w_00!3="west_east"
w_00&west_east=lon
;---------------------------------------
; 返回输出变量的尺寸信息
nw1=dimsizes(w_00)
; 时刻数
ntimes=nw1(0)
; 纬度数
nlatis=nw1(2)
; 经度数
nlongis=nw1(3)
; 定义最大垂直风速(时间, 经度, 维度)
max_w2=new((/ntimes,nlatis,nlongis/), "float")
;---------------------------------------
do t= 0, ntimes-1,1
    do i2= 0, nlatis-1,1
      do j2 = 0, nlongis-1,1
        max_w2(t,i2,j2)=max(w_00(t,:,i2,j2))
      end do
    end do
  end do
;---------------------------------------
max_w2@_FillValue=-999
max_w2!1="south_north"
max_w2&south_north=lat
max_w2!2="west_east"
max_w2&west_east=lon
;---------------------------------------
lat2d             = a->XLAT
lon2d             = a->XLONG
;---------------------------------------
cnres                   =  True              ; contour/map resources
  vcres                   =  True              ; vector resources
  cnres@gsnDraw           = False              ; Turn these off. We
```

```
  cnres@gsnFrame          = False             ; will overlay plots
  vcres@gsnDraw           = False             ; later.
  vcres@gsnFrame          = False
;
; Lambert conformal projections are limited using
; the corners method rather than the latlon method
; seen for cylindrical equidistant projections.
;
   cnres@mpOutlineOn                = True
cnres@mpDataBaseVersion       = "MediumRes"
cnres@mpDataSetName           = "Earth..4"
cnres@mpProvincialLineThicknessF =4

cnres@mpGeophysicalLineThicknessF= 2.
cnres@mpNationalLineThicknessF= 2.
cnres@mpOutlineBoundarySets = "AllBoundaries"

cnres@pmTickMarkDisplayMode = "Always"


    cnres@mpProjection      = "CylindricalEquidistant"
     cnres@mpMinLatF         = 40
     cnres@mpMaxLatF         = 47.3
     cnres@mpMinLonF         = 120.5
     cnres@mpMaxLonF         = 132
     ;cnres@mpMinLatF         = 27.5
     ;cnres@mpMaxLatF         = 32
     ;cnres@mpMinLonF         = 117
     ;cnres@mpMaxLonF         = 122
     cnres@mpCenterLonF      = (cnres@mpMinLonF + cnres@mpMaxLonF) / 2.
cnres@cnLevelSelectionMode="ManualLevels"

  cnres@cnMinLevelValF=0
  cnres@cnMaxLevelValF=8
  cnres@cnLevelSpacingF=1
  cnres@gsnAddCyclic            = False            ; regional data
  cnres@cnFillOn                = True
  cnres@cnLinesOn               = False           ; turn off contour lines


  vcres@vcRefMagnitudeF          = 10.0             ; define vector ref mag
  vcres@vcRefLengthF             = 0.045            ; define length of vec ref
  vcres@vcGlyphStyle             = "CurlyVector"    ; turn on curly vectors
  vcres@vcMinDistanceF           = 0.017            ; thin vectors
  vcres@vcRefAnnoString1On=False
  vcres@vcRefAnnoString2On=True
  vcres@vcRefAnnoString2="10 m/s"
  vcres@vcRefAnnoSide="Top"
  vcres@vcRefAnnoOrthogonalPosF=-0.12
  vcres@vcRefAnnoParallelPosF=0.95
  ;vcres@vcRefAnnoOrthogonalPosF  = -1.6              ; move ref vector down
  vcres@gsnAddCyclic            = False            ; regional data

;---Make sure vector plot doesn't have subtitles
  vcres@gsnLeftString     = ""
  vcres@gsnRightString    = ""
```

```
do nt = 0,ntimes-1,1
     cnres@tiMainString         = times(nt)


     var2d_u11=var2d_u1(nt,:,:)
     var2d_v11=var2d_v1(nt,:,:)
     var2d_u11@lat2d             = a->XLAT(nt,:,:)
     var2d_u11@lon2d             = a->XLONG(nt,:,:)
     var2d_v11@lat2d             = a->XLAT(nt,:,:)
     var2d_v11@lon2d             = a->XLONG(nt,:,:)
     rainnc=max_w2(nt,:,:)
     rainnc@lat2d             = a->XLAT(nt,:,:)
     rainnc@lon2d             = a->XLONG(nt,:,:)

     contour_fill_plot = gsn_csm_contour_map(wks,rainnc,cnres)
     vector_plot       = gsn_csm_vector(wks,var2d_u11,var2d_v11,vcres)
     ;plot = gsn_csm_contour(wks,rainnc,resc)

   overlay(contour_fill_plot,vector_plot)

  draw(contour_fill_plot)    ; This will draw everything
  frame(wks)

end do
```