NCL 绘图示例（四）：兰伯特投影图

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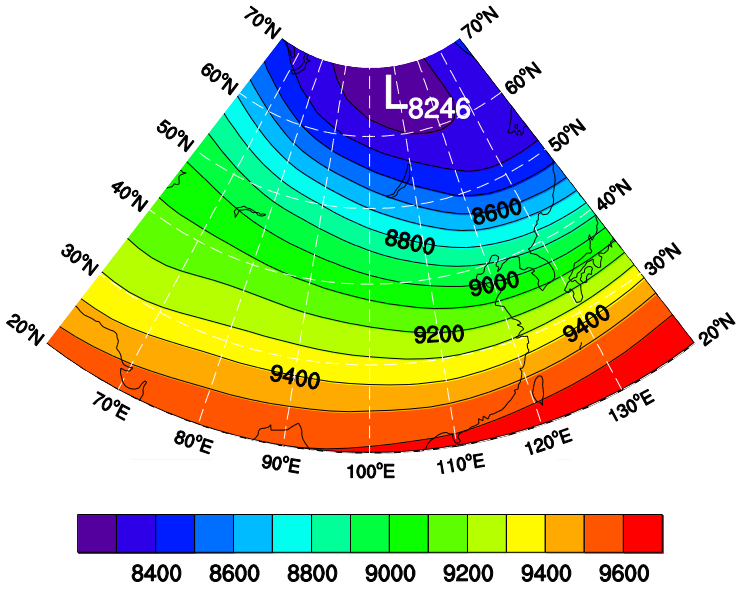


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procedure add_lc_labels(wks,map,minlat,maxlat,minlon,maxlon,fontheight)
local lat_values, nlat, lat1_ndc, lat2_ndc, lon1_ndc, lon2_ndc,slope,txres, \
lon_values, PI, RAD_TO_DEG, dum_lft, dum_rgt, dum_bot
begin
   PI              = 3.14159
   RAD_TO_DEG = 180./PI

   ;挑出“较好”的纬度标签
   lat_values = ispan(toint(minlat),toint(maxlat),10) * 1.
   nlat           = dimsizes(lat_values)

   ;计算图形左右两边线条的斜率（基于 NDC 坐标）
   lat1_ndc = new(1,float)
   lon1_ndc = new(1,float)
   lat2_ndc = new(1,float)
   lon2_ndc = new(1,float)
   datatondc(map,minlon,lat_values(0),lon1_ndc,lat1_ndc)
   datatondc(map,minlon,lat_values(nlat-1),lon2_ndc,lat2_ndc)
   slope_lft = (lat2_ndc-lat1_ndc)/(lon2_ndc-lon1_ndc)

   datatondc(map,maxlon,lat_values(0),lon1_ndc,lat1_ndc)
   datatondc(map,maxlon,lat_values(nlat-1),lon2_ndc,lat2_ndc)
   slope_rgt = (lat2_ndc-lat1_ndc)/(lon2_ndc-lon1_ndc)
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```
  txres                       = True
  txres@txFontHeightF = fontheight
  txres@txPosXF             = 0.1

  dum_lft = new(nlat,graphic)       ; Dummy array to hold attached strings.
  dum_rgt = new(nlat,graphic)       ; Dummy array to hold attached strings.
  do n=0,nlat-1
    ;添加适当的空白
    lat_label_rgt = "                  "    + lat_values(n) + "~S~o~N~"

    ;检查是否在北纬、南纬或赤道上
    if(lat_values(n).lt.0) then
      lat_label_lft = lat_values(n) + "~S~o~N~S                  "
      lat_label_rgt = lat_label_rgt + "S"
    end if
    if(lat_values(n).gt.0) then
      lat_label_lft = lat_values(n) + "~S~o~N~N                  "
      lat_label_rgt = lat_label_rgt + "N"
    end if
    if(lat_values(n).eq.0) then
      lat_label_lft = lat_values(n) + "~S~o~N~                   "
    end if

    ;添加左边坐标标签
    txres@txAngleF = RAD_TO_DEG * atan(slope_lft) - 90 ; 适当旋转字体，更加美观
    dum_lft(n) = gsn_add_text(wks,map,lat_label_lft,minlon,lat_values(n),txres)

    ;添加右边坐标标签
    txres@txAngleF = RAD_TO_DEG * atan(slope_rgt) + 90
    dum_rgt(n) = gsn_add_text(wks,map,lat_label_rgt,maxlon,lat_values(n),txres)
  end do

;---------------------------------------------------------------------
  ; 添加经度标签
  delete(txres@txPosXF)
  txres@txPosYF = -5.0

  ;挑出“较好”的经度标签
  lon_values = ispan(toint(minlon+10),toint(maxlon-10),10) * 1.
  nlon             = dimsizes(lon_values)
```

```
   dum_bot = new(nlon,graphic)

   do n=0,nlon-1
      ;  对于每个经度标签，计算其需旋转的角度，以使字体更加美观。
      datatondc(map,lon_values(n)-0.25,minlat,lon1_ndc,lat1_ndc)
      datatondc(map,lon_values(n)+0.25,minlat,lon2_ndc,lat2_ndc)
      slope_bot = (lat1_ndc-lat2_ndc)/(lon1_ndc-lon2_ndc)
      txres@txAngleF    = atan(slope_bot) * RAD_TO_DEG

      ;检查是否在东经、西经或 0 度上
      lon_label_bot = "    ~C~    ~C~" + abs(lon_values(n)) + "~S~o~N~"
      if(lon_values(n).lt.0) then
         lon_label_bot = lon_label_bot + "W"
      end if
      if(lon_values(n).gt.0) then
         lon_label_bot = lon_label_bot + "E"
      end if

      dum_bot(n) = gsn_add_text(wks,map,lon_label_bot,lon_values(n),minlat,txres)
   end do
end
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;

;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/csm/shea_util.ncl"

begin
   ;  绘制的空间范围
   minlat =    20.
   maxlat =    70.
   minlon =    60.
   maxlon =    140.
   fontheight = 0.012 ;  设置坐标标签字体大小

   ;;;;读取数据
   f      = addfile("./h300-197901-201412.nc", "r")
   var := short2flt(f->hgt(0,{300},{minlat:maxlat},{minlon:maxlon}))

   wks    = gsn_open_wks("eps","plot-hgt-lambert")
   gsn_define_colormap(wks,"rainbow")

   res=True
```

```
  res@gsnDraw          = False
  res@gsnFrame         = False
  res@gsnAddCyclic = False

  res@gsnLeftString = ""
  res@gsnRightString = ""

  res@gsnMaskLambertConformal = True

  res@mpProjection      = "LambertConformal" ; 投影类型
  res@mpMinLatF           = minlat
  res@mpMaxLatF           = maxlat
  res@mpMinLonF           = minlon
  res@mpMaxLonF           = maxlon

  res@mpGridAndLimbOn              = True
  res@mpGridLatSpacingF            = 10
  res@mpGridLonSpacingF            = 10
  res@mpGridLineDashPattern      = 1
  res@mpGridLineColor              = "white"

  ;; 设置等值线
  res@cnFillOn = True
  res@cnLineLabelsOn = True
  res@cnLineLabelFontHeightF = 0.015
  res@lbLabelFontHeightF         = 0.015

  ; 低值中心用“L”标记
  res@cnLowLabelsOn                    = True         ; turn on L labels
  res@cnLowLabelFontColor              = "white"
  res@cnLowLabelBackgroundColor    = "transparent"
  res@cnHighLabelFontHeightF         = 0.03          ; cnLowLabelFontHeightF 无效，
这是 ncl 自身的问题，低值中心标签字体的大小只能通过 cnHighLabelFontHeightF
设定。

  plot = gsn_csm_contour_map(wks,var,res)
  add_lc_labels(wks,plot,minlat,maxlat,minlon,maxlon,fontheight)

  draw(plot)
  frame(wks)
end
```