

NCL

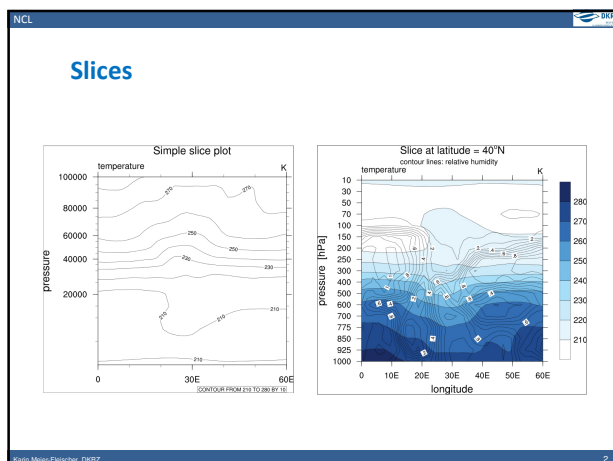


Part IV

Slices

Exercises and Tasks

Karin Meier-Flaschke, DLR



NCL

Simple slice plot

```

begin
  f = addfile("$NCL_TUT/data/rectilinear_grid_3D.nc", "r")
  var = f->t(0, :, {40}, {0:60}) ; 1st time step, latitude=40N,
                                   ; longitude=0-60E.
  lon_t = f->lon({0:60})          ; longitude=0-60E
  lev_t = f->lev                    ; currently 17 levels

  wks = gsn_open_wks("png", "plot_part_IV_simple_slice")

  res = True
  res@tiMainString = "Simple slice plot" ; draw title

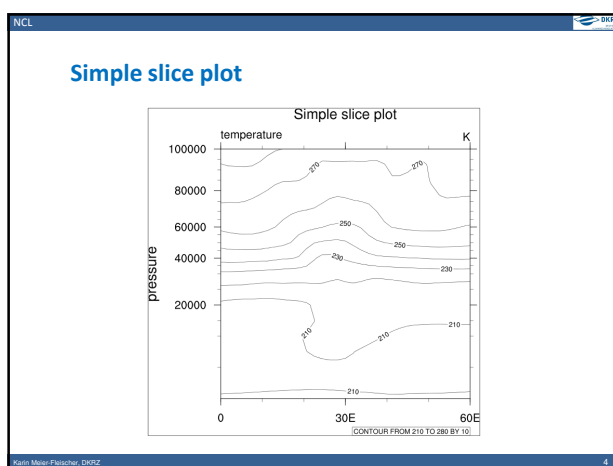
  res@sfXArray = lon_t ; uses lon_t as plot x-axis
  res@sfYArray = lev_t ; uses lev_t in hPa as plot y-axis

  plot = gsn_csm_contour(wks, var, res)

end

```

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Slice plot with contour line overlay (1/3)

```
begin
  f = addfile("$NCL_TUT/data/rectilinear_grid_3D.nc", "r")
;-- variables: first time step, latitude=40N, longitude=0-60E
  t = f->t(0, :, {40}, {0:60})
  rhum = f->rhumidity(0, :, {40}, {0:60})
  lon_t = f->lon({0:60}) ; select longitude=0-60E
  lev_t = f->lev/100 ; convert to hPa units

  llabels = ""+lev_t ; define level labels

  wks = gsn_open_wks("png", "plot_part_IV_slice_rhumidity_overlay")

  res = gsnDraw = True ; don't draw the plot
  res@gsnDraw = False ; don't advance the plot
  res@gsnFrame = False ; don't advance the plot
```

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Slice plot with contour line overlay (2/3)

```
res@cnFillOn = True ; turn on color fill
res@cnFillPalette = "WhiteBlue" ; choose colormap
res@cnLineLabelsOn = False ; turns off contour line labels
res@cnInfoLabelOn = False ; turns off contour info label

res@lbOrientation = "vertical" ; vertical label bar

res@sfxArray = lon_t ; uses lon_t as plot x-axis
res@sfxArray = lev_t ; uses lev_t in hPa as plot y-axis

res@trYReverse = True ; reverses y-axis

res@tmXBtickSpacingF = 10. ; label x-axis every 10 degrees
res@tmYMode = "Explicit" ; set y-axis labeling to explicit
res@tmYValues = lev_t ; values for y-axis tickmarks
res@tmYLabels = llabels ; set labels equal to values
; (type string)
```

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Slice plot with contour line overlay (3/3)

```

res@tiXAxisString = f->lon@long_name      ; draw y-axis title
res@tiYAxisString = f->lev@long_name + " [hPa]" ; draw y-axis title
res@tiMainString = \
"Slice at latitude = 40-S-o-N-N-C-~270~contour lines: "+rhum@long_name

plot1 = gsn_csm_contour(wks,t,res) ; create but don't draw
res@cnFillOn = False ; turn off color fill
res@cnLineLabelsOn = True ; turns on contour line labels
res@gsnLeftString = "" ; don't draw left string

plot2 = gsn_csm_contour(wks,rhum,res) ; create but don't draw
overlay(plot1, plot2) ; overlay plot2 on plot1

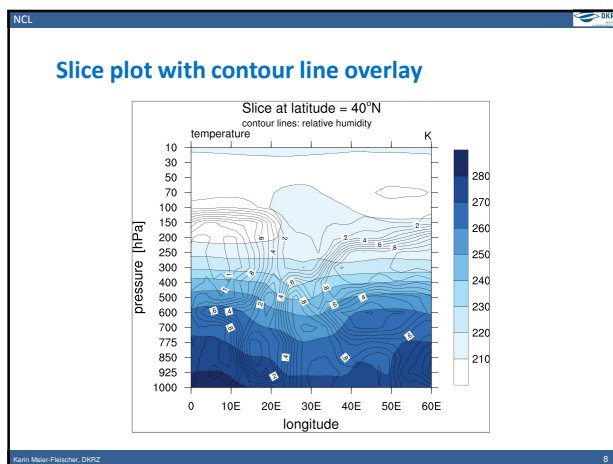
;-- draw plots and advance the frame
draw(plot1)
frame(wks)

end

```

~S- Superscript
~N- Normal
~C- Carriage return (new line)
~270- Font size 70%

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NCL

Task: overlay contour lines of rhum and var3

- Use the script **part_IV_Overlay_slice_rhumidity.ncl**
- Modify:
 - Load variable **var3** (wind speed)
 - Use **colormap "MPL_greys"** for contouring the variable **t**
 - Draw the variable **var3** with color **"red"**
 - Draw the line label of **var3** with background color **"yellow"**
 - Draw the variable **rhum** with the color **"blue"**
 - Draw the line label of **rhum** with background color **"lightblue"**
 - Use a reversed logarithmic y-axis

Tipps:
 ➤ **cnLineColor**
 ➤ **cnLineLabelBackgroundColor**
 ➤ **gsnYAxisIrregularLog**
 ➤ **txBackgroundColor**
 ➤ **overlay**

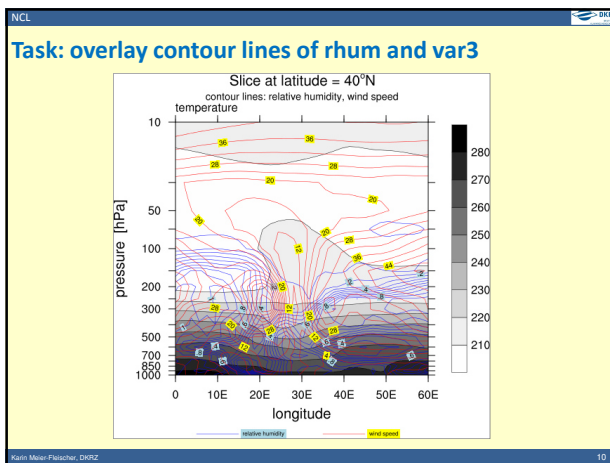
Slice at latitude = 40°N
contour lines: relative humidity, wind speed

temperature K

pressure [hPa]

longitude

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NCL

Task: overlay contour lines of rhum and var3 (1/6)

```
begin
  f = addfile("$NCL_TUT/data/rectilinear_grid_3D.nc", "r")

  ;-- first time step, latitude=40N, longitude=0-60E.
  t = f->t(0, :, {40}, {0:60})
  rhum = f->rhumidity(0, :, {40}, {0:60})
  rhum@long_name = f->rhumidity@long_name ; set long_name attribute
  var3 = f->var3(0, :, {40}, {0:60})
  var3@long_name = "wind speed" ; set long_name attribute
  lon_t = f->lon({0:60}) ; longitude=0-60E
  lev_t = f->lev/100 ; convert to hPa units

  ;-- create levels array for y-axis labeling
  llabels = "" + lev_t

  ;-- define workstation
  wks = gsn_open_wks("png", "task_IV_slice_wind_speed_overlay")
```

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Task: overlay contour lines of rhum and var3 (2/6)

```
res = True
res@gsnDraw = False ; don't draw the plot
res@gsnFrame = False ; don't advance the frame
res@gsnRightString = "" ; don't draw right string

res@cnFillOn = True ; turn on color fill
res@cnLineLabelsOn = False ; turns off contour line labels
res@cnInfoLabelOn = False ; turns off contour info label
res@cnFillPalette = "MPL_greys" ; choose colormap

res@lbOrientation = "vertical" ; vertical label bar

res@sfXArray = lon_t ; uses lon_t as plot x-axis
res@sfYArray = lev_t ; uses lev_t in hPa as plot y-axis

res@gsnYAxisIrregular2Log = True ; converts y-axis irregular to linear depth
```

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Task: overlay contour lines of rhum and var3 (3/6)

```

res@trYReverse      = True           ; reverses y-axis

res@tmXBTickSpacingF = 10.           ; label x-axis every 10 degrees
res@tmYLMMode       = "Explicit"     ; set y-axis labeling to explicit
res@tmYLValues      = lev_t          ; values for y-axis tickmarks
res@tmYLLabels      = llabels        ; set labels
res@tmYLLabelStride  = 2             ; draw every 2nd label

res@tiXAxisString   = f->lon@long_name ; draw y-axis title
res@tiYAxisString   = f->lev@long_name + " [hPa]" ; y-axis title
res@tiMainString = \
"    Slice at latitude = 40-S-o-N-N-C--Z70~contour lines:"\
+ rhum@long_name + ", " + var3@long_name

plot1 = gsn_csm_contour(wks,t,res) ; create, but don't draw it yet

```

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Task: overlay contour lines of rhum and var3 (4/6)

```

res@cnFillOn        = False          ; turn off color fill
res@cnLineLabelsOn  = True           ; turns on contour line labels
res@gsnLeftString   = ""            ; don't draw left string
res@cnLineColor     = "blue"        ; contour line color
res@cnLineLabelBackgroundColor = "lightblue"

plot2 = gsn_csm_contour(wks,rhum,res) ; create, but don't draw it

res@cnLineColor     = "red"         ; contour line color
res@cnLineLabelBackgroundColor = "yellow"

plot3 = gsn_csm_contour(wks,var3,res) ; create, but don't draw it

;-- legend x,y-position - x1: line and string 1
;--                      x2: line and string 2
x  = 0.25                      ; legend start x-position
x1 = (/x,x+0.1/)              ; legend line 1 x-position
x2 = (/x1(1)+0.2,x1(1)+0.3/)   ; legend line 2 x-position
y  = 0.06                      ; legend y-position at bottom
y1 = (/y,y/)

```

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Task: overlay contour lines of rhum and var3 (5/6)

```

;-- create a legend with a colored line and string label
txres = True                   ; text resource object
txres@txFontHeightF = 0.010    ; set legend text font size
txres@txJust        = "CenterLeft" ; text justification

plres = True                   ; polyline resource object
plres@gsLineColor   = "blue"    ; polyline color

txres@txBackgroundFillColor = "lightblue" ; legend string 1
; background color
gsn_polyline_ndc(wks,x1,y1,plres) ; draw legend line 1
gsn_text_ndc(wks,rhum@long_name,x1(1)+0.01, y, txres) ; draw legend
; string 1

txres@txBackgroundFillColor = "yellow" ; legend string 2
; background color

```

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