### 地球科学学院大气科学系《诊断分析与绘图实验》报告

### 实验六 绘制直方图

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1. **目的：**

掌握直方图的绘制；练习各种相关资源的使用。

1. **方法：（见实验指导书）**
2. **回答习题（可逐题回答，也可以把执行的命令或脚本一次写完，把要说明的内容加成注释或在最后说明）：**

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| 从实验四处理得到的云南124站年降水量数据中选取任意10站的数据绘制直方图，并对直方图的属性进行设置。 |
| begin  ;read data  data\_all\_one = new((/2,124,51/),"float")  data\_all = new((/12,124,50/),"float");create new varible  month = (/"01","02","03","04","05","06","07","08","09","10","11","12"/)  do i = 0,11,1  file\_path = "nc/0413/yn124std/r" + month(i) + "-1961n.dat"  if (i .eq. 1 .or. i .eq. 0) then  data\_all\_one(i,:,:) = asciiread(file\_path,(/124,51/), "float")  data\_all(i,:,:) = data\_all\_one(i,:,0:49)  else  data\_all(i,:,:) = asciiread(file\_path,(/124,50/), "float")  end if  end do  data = data\_all(0,0:9,1)  stations = data\_all(0,0:9,0)  sts\_num = tostring\_with\_format(stations, "%5.0f")  x = fspan(0.5,9.5,10) |
| 读取云南1961年1月前10个站点的数据。 |
| wks = gsn\_open\_wks("png", "test1")  res = True  res@gsnXYBarChart = True  res@trYMaxF = 8  res@trXMinF = 0  res@trXMaxF = 10  res@tiYAxisString = "(mm)"  res@tiMainString = "Precipitation of 10 stations in Yunnan province in 1961"  res@tiMainFontHeightF = 0.02 |
| 设置横纵坐标范围（类似mpLatMaxF等），Y轴单位即标题和标题字体大小。 |
| ;ref line and colors/patterns  ;res@gsnYRefLine = 5  res@gsnYRefLine = 0  ;res@gsnAboveYRefLineBarColors = (/"navy","blue","SkyBlue","SlateBlue"/)  ;res@gsnBelowYRefLineBarColors = (/"firebrick","red","orange","green"/)  ;res@gsnAboveYRefLineBarPatterns = (/0,1,2,3/)  ;res@gsnBelowYRefLineBarPatterns = (/4,6,8,7/) |
| 设置参考线和尝试在参考线上下分别设置不同填充线型和颜色。 |
| ;x line  res@tmXBMode = "explicit"  res@tmXBLabelsOn = True  res@tmXBValues = fspan(0.5,9.5,10)  res@tmXBLabels = sts\_num;  res@tmXBLabelFontHeightF = 0.013;font size |
| 设置x轴，自定义x轴站点名称和字体大小。 |
| ;setting  res@gsnXYBarChartFillOpacityF = 0.9;toumingdu  res@gsnXYBarChartColors = (/"firebrick","red","orange","green","navy","blue","SkyBlue","SlateBlue"/);filling colors  res@gsnXYBarChartPatterns2 = (/0,5,1,3,4,17/);filling styles  res@gsnXYBarChartOutlineOnly = False;true is only the outline  res@gsnXYBarChartBarWidth = 0.8;out of range will be x or y  res@gsnXYBarChartFillDotSizeF = 0.01;dot size  res@gsnXYBarChartFillScaleF = 2  res@gsnXYBarChartFillLineThicknessF = 5;lines thickness in bars  plot = gsn\_csm\_xy(wks, x, data, res)  end |
| 对相关属性进行设置。结果如图： |
| 使用实验四云南省124站1961-2009年的月平均降水资料，计算每个测站的气候平均降水量（所有年份对应月份降水量的平均值）；参考http://www.ncl.ucar.edu/Applications/Scripts/unique\_5.ncl脚本尝试在同一个图中绘制任意3个测站的逐月降水量序列。 |
| begin  data\_all\_one = new((/2,124,51/),"float")  data\_all = new((/12,124,50/),"float");create new varible  month = (/"01","02","03","04","05","06","07","08","09","10","11","12"/)  do i = 0,11,1  file\_path = "nc/0413/yn124std/r" + month(i) + "-1961n.dat"  if (i .eq. 1 .or. i .eq. 0) then  data\_all\_one(i,:,:) = asciiread(file\_path,(/124,51/), "float")  data\_all(i,:,:) = data\_all\_one(i,:,0:49)  else  data\_all(i,:,:) = asciiread(file\_path,(/124,50/), "float")  end if  end do  data = data\_all(:,:,1:49)  ;print(data(0,:,:))  avg\_month = dim\_avg\_n(data,2)  data\_choose = avg\_month(:,0:2)  data\_choose!0 = "mon"  data\_choose!1 = "sta"  data\_p = data\_choose(sta|:,mon|:)  x = ispan(0,11,1)  wks = gsn\_open\_wks("png", "test2")  res = True  res@gsnXYBarChart = True  res@trYMaxF = 280  res@trYMinF = 0  res@trXMaxF = 12.4  res@trXMinF = 0.1  ;x line  res@tmXBMode = "explicit"  res@tmXBLabelsOn = True  res@gsnFrame = False  res@gsnDraw = True  res@tmXBValues = fspan(0.75,11.75,12)  res@tmXBLabels = (/"Jan","Feb","Mar","Apr","May","Jun","Jul","Aug","Sep","Oct","Nov","Dec"/)  res@tmXBLabelFontHeightF = 0.013;font size  res@gsnYRefLine = 0  res@gsnXYBarChartBarWidth = 0.25  res@tiMainString = "The climatic average precipitation of three stations in Yunnan Province"  res@tiMainFontHeightF = 0.02  res@tiYAxisString = "(mm)" |
| 读取数据，计算每个测站的气候平均量，并对图像属性进行设置。注意的是res@gsnFrame = False和res@gsnDraw = True，不输入的话无法将数据进行叠加。也可以在代码末尾添加; overlay(plot1,plot2) overlay(plot1,plot3) draw(plot1) frame(wks)，这样会得到每个plot单独的图像和一张全部叠加的图像。 |
| res@gsnXYBarChartColors = (/"red"/)  plot1 = gsn\_csm\_xy(wks,fspan(0.5,11.5,12),data\_p(0,:),res)  res@gsnXYBarChartColors = (/"green"/)  plot2 = gsn\_csm\_xy(wks,fspan(0.75,11.75,12),data\_p(1,:),res)  res@gsnXYBarChartColors = (/"blue"/)  plot3 = gsn\_csm\_xy(wks,fspan(1,12,12),data\_p(2,:),res)  lbres = True ; labelbar only resources  lbres@vpWidthF = 0.3 ; labelbar width  lbres@vpHeightF = 0.1 ; labelbar height  lbres@lbBoxMajorExtentF = 0.36 ; puts space between color boxes  lbres@lbFillColors = (/"red","green","blue"/)  lbres@lbMonoFillPattern = True ; Solid fill pattern  lbres@lbLabelFontHeightF = 0.035 ; font height. default is small  lbres@lbLabelJust = "CenterLeft" ; left justify labels  lbres@lbPerimOn = False  lbres@lgPerimColor = "white"  lbres@lbLabelFontHeightF = 0.016  labels = (/"56778","56772","56863"/)  gsn\_labelbar\_ndc(wks,3,labels,0.55,0.13,lbres) ; draw right labelbar column  ; overlay(plot1,plot2)  ; overlay(plot1,plot3)  ; draw(plot1)  frame(wks)  end |
| 参考官网进行三个数据的叠加绘图并对colorbar的属性如颜色、位置和字体等进行设置。结果如图： |

1. **实验小结（本次实验收获的经验、教训、感受等）：**

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| 直方图、折线图可以修改的属性还是很多的，能满足大多数情况的需求，主要还是了解哪些可以进行设置和修改，在真正需要的时候就可以现查现用。  值得一说的是，利用好x轴的数值以及xy轴的数值范围可以使生成的图像更美观（与轴有一定距离）。具体调试的时候若对于直方条宽度和x轴数值难以把握可以使用overlay()和darw()获得单个数据的图像并进行调整（感觉直接提前安排好更方便，如本题提前设置直方图宽度0.25，不同直方图也相对错位0.25） |