Subject: EOF analysis
Posted by siumtesfai on Tue, 11 Aug 2015 16:06:15 GMT
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Dear All,

I have tried to use EOF analysis on my data. Any suggestion on how to fix my code below using NCEP/NCAR Sea level pressure.

Best regards

```
;============================

filename=['ncep1']

FOR imodel = 0 ,n_elements(filename)-1 do begin

source ='F:\Data\CMIP5\geopot\1979-2012\zg_Amon_'
    file=source+filename(imodel)+'_r1i1p1_combine_za.sav'

    restore,file
    print,file

    check,time


    xt=where(time GE 1950. and time LT 2006)
    time=time(xt)
    lon=long
    xp=where(ref_press eq 1000)
    new_data1=reform(new_data1(*,*,xp,xt))

    ;============================
    ;   Interpolate models to NCEP resolution (2.5 by 2.5)
    ;   ============================

    if imodel eq 0 then sst=fltarr(n_elements(filename),144,73,n_elements(time))


    FOR timeindx=0,n_elements(time)-1 do begin

      ice=new_data1[*,*,timeindx]
      nx = 144
      ny = 73
      slon  = findgen(144)*2.5
      slat  = findgen(73)*2.5-90
```

```
      x = Interpol(Findgen(N_Elements(lon)), lon, slon)
      y = Interpol(Findgen(N_Elements(lat)), lat, slat)
      xx = Rebin(x, nx, ny, /SAMPLE)
      yy = Rebin(Reform(y, 1, ny), nx, ny, /SAMPLE)
      newwind = INTERPOLATE(ice, xx, yy,missing=1e20)



      sst(imodel,*,*,timeindx)=newwind

    ENDFOR ; timeindx loop


    lat=slat
    lon=slon

    ;====================
    ntime=n_elements(time)/12

 ; over NH 20N-90N

 xlat=where(lat GE 20 and lat LE 90)
 xlon=where(lon GE 0 and lon LE 360)

tempdata=reform(sst(imodel,xlon,xlat,*))


  xmonth=where(time GE 1950 and time LT 2006)
 data=tempdata(*,*,xmonth)
 lon=lon(xlon)
 lat=lat(xlat)

 ; Calculate and apply cosine weighting to the values.
 dims = Size(data, /Dimensions)
 nlon = dims[0] & nlat = dims[1] & ntime = dims[2]
 dlon = Abs(lon[1]-lon[0])
 dlat = Abs(lat[1]-lat[0])
 weights = Sqrt(Cos((lat - dlat/2.) * !DtoR))

 fac=!pi/180.

 FOR k=0,nlon-1 do begin
   FOR m=0,nlat-1 do begin
    FOR j=0,ntime-1 DO begin

      data[k,m,j] = data[k,m,j] * weights(m)

    ENDFOR
```

```
  ENDFOR
ENDFOR


data = Reform(data, nlon*nlat, ntime, /OVERWRITE)
data_anomalies = data

FOR jj=0,nlon*nlat-1 DO data_anomalies[jj,*] = data[jj,*] - Mean(data[jj,*])

matrix = (1/ntime-1) * (Double(data_anomalies) ## Transpose(data_anomalies))

LA_SVD, matrix, W, U, V

dims = Size(data_anomalies, /Dimensions)
eof1 = FltArr(dims[1], dims[0])

FOR j=0,dims[1]-1 DO BEGIN
  t = Transpose(data_anomalies) ## U[j,*]
  eof1[j,*]  = t / SQRT(Total(t^2))
ENDFOR

pc = FltArr(dims[1], dims[1])

FOR j=0,dims[1]-1 DO pc[j,*]  = data_anomalies ## eof1[j,*]


percent_variance = W / TOTAL(W) * 100.0

mode = 1
theEOF = eof1[mode-1,*]

theEOF = Reform(theEOF, nlon, nlat, /OVERWRITE)

pctmp=reform(pc(0,*))
pc1=fltarr(ntime)

FOR k=0,ntime-1 DO pc1[k] = pctmp[k] / stddev(pctmp)  ; PC1 is the AO index

AO=pc1


ENDFOR ;  end of main loop

END
```

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## Subject: Re: EOF analysis

Hello all,

I am waiting for your suggestion . This is a follow up question

I followed David EOF analysis which worked for him. I have only changes data set from NCEP/NCAR . I used Geopotential Height . I am wondering why the variance of the first mode of my PC is higher ( 53 %) . Literature says PC1 explain around 20 % variance.

Please help if you can see any error the source code below

Best regards

On Tuesday, August 11, 2015 at 12:06:18 PM UTC-4, siumt...@gmail.com wrote:
> Dear All,
>
>
> I have tried to use EOF analysis on my data. Any suggestion on how to fix my code below using NCEP/NCAR Sea level pressure.
>
>
> Best regards
>
> ;============================
>
> filename=['ncep1']
>
> FOR imodel = 0 ,n_elements(filename)-1 do begin
>
> source ='F:\Data\CMIP5\geopot\1979-2012\zg_Amon_'
> file=source+filename(imodel)+'_r1i1p1_combine_za.sav'
>
> restore,file
> print,file
>
> check,time
>
>
> xt=where(time GE 1950. and time LT 2006)
> time=time(xt)
> lon=long
> xp=where(ref_press eq 1000)
> new_data1=reform(new_data1(*,*,xp,xt))
>
> ;============================
> ; Interpolate models to NCEP resolution (2.5 by 2.5)
> ; ============================

```
>
>       if imodel eq 0 then sst=fltarr(n_elements(filename),144,73,n_elements(time))
>
>
>       FOR timeindx=0,n_elements(time)-1 do begin
>
>         ice=new_data1[*,*,timeindx]
>         nx = 144
>         ny = 73
>         slon  = findgen(144)*2.5
>         slat  = findgen(73)*2.5-90
>         x = Interpol(Findgen(N_Elements(lon)), lon, slon)
>         y = Interpol(Findgen(N_Elements(lat)), lat, slat)
>         xx = Rebin(x, nx, ny, /SAMPLE)
>         yy = Rebin(Reform(y, 1, ny), nx, ny, /SAMPLE)
>         newwind = INTERPOLATE(ice, xx, yy,missing=1e20)
>
>
>
>         sst(imodel,*,*,timeindx)=newwind
>
>       ENDFOR ; timeindx loop
>
>
>       lat=slat
>       lon=slon
>
>       ;====================
>       ntime=n_elements(time)/12
>
>    ; over NH 20N-90N
>
>    xlat=where(lat GE 20 and lat LE 90)
>    xlon=where(lon GE 0 and lon LE 360)
>
>   tempdata=reform(sst(imodel,xlon,xlat,*))
>
>
>      xmonth=where(time GE 1950 and time LT 2006)
>    data=tempdata(*,*,xmonth)
>    lon=lon(xlon)
>    lat=lat(xlat)
>
>    ; Calculate and apply cosine weighting to the values.
>    dims = Size(data, /Dimensions)
>    nlon = dims[0] & nlat = dims[1] & ntime = dims[2]
>    dlon = Abs(lon[1]-lon[0])
>    dlat = Abs(lat[1]-lat[0])
```

```
>   weights = Sqrt(Cos((lat - dlat/2.) * !DtoR))
>
>   fac=!pi/180.
>
>   FOR k=0,nlon-1 do begin
>     FOR m=0,nlat-1 do begin
>       FOR j=0,ntime-1 DO begin
>
>         data[k,m,j] = data[k,m,j] * weights(m)
>
>       ENDFOR
>     ENDFOR
>   ENDFOR
>
>
>   data = Reform(data, nlon*nlat, ntime, /OVERWRITE)
>   data_anomalies = data
>
>   FOR jj=0,nlon*nlat-1 DO data_anomalies[jj,*] = data[jj,*] - Mean(data[jj,*])
>
>   matrix = (1/ntime-1) * (Double(data_anomalies) ## Transpose(data_anomalies))
>
>   LA_SVD, matrix, W, U, V
>
>   dims = Size(data_anomalies, /Dimensions)
>   eof1 = FltArr(dims[1], dims[0])
>
>   FOR j=0,dims[1]-1 DO BEGIN
>     t = Transpose(data_anomalies) ## U[j,*]
>     eof1[j,*]  = t / SQRT(Total(t^2))
>   ENDFOR
>
>   pc = FltArr(dims[1], dims[1])
>
>   FOR j=0,dims[1]-1 DO pc[j,*]  = data_anomalies ## eof1[j,*]
>
>
>   percent_variance = W / TOTAL(W) * 100.0
>
>   mode = 1
>   theEOF = eof1[mode-1,*]
>
>   theEOF = Reform(theEOF, nlon, nlat, /OVERWRITE)
>
>   pctmp=reform(pc(0,*))
>   pc1=fltarr(ntime)
>
>   FOR k=0,ntime-1 DO pc1[k] = pctmp[k] / stddev(pctmp)  ; PC1 is the AO index
```

```
>
>   AO=pc1
>
>
> ENDFOR ;  end of main loop
>
> END
```