Subject: Map Projections and Contour Plots.
Posted by Grady Daub on Thu, 10 Jun 1999 07:00:00 GMT
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I have data that corresponds to latitude and longitude. example. data=40, lat=20, lon=20

How would I...

...make the correct arrays expected by CONTOUR? /IRREGULAR and TRIANGULATION work, but, I think they're causing problems.

...smooth the contours?

The documentation says something about MIN\_CURVE\_SURF, but, it seems to need the same format array as CONTOUR.

...plot the contours correctly over a map projection?

When I try to CONTOUR over a map projection, I get some lines across the

plot. The lines look like the contour tried to plot from, say, longitude

180 to -180.

So far, I'm only able to put a map ONTO a CONTOUR, not the other way around. This doesn't help me when I want to use, say, /MOLLWEIDE.

-Grady Daub GFDI

To reply be email, please, remove "ZOOKS" and "MMER".

Subject: Re: Map Projections and Contour Plots.
Posted by Grady Daub on Tue, 15 Jun 1999 07:00:00 GMT
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Martin Schultz wrote:

- > LONs and LATs have to be monotonically increasing for a contour plot.
- > Default is -180 to 180 for a global map, but if you want to center your
- > map say on the Pacific, you need to "convert" your longitude coordinates

- > to e.g. 0 to 360. You can try my convert\_lon program (attached) for
- > this. It is called as
- > convert\_lon,lon [,/ATLANTIC] [,/PACIFIC]
- > and makes sure you get longitudes modulo 360.

>

Your convert\_lon program was not attached.

Would your program make my non-monotonic lat,lon,data arrays in a form expected by CONTOUR?

I've tried TRIANGULATE and TRIGRID and SPH\_SCAT (the latter exactly as shown on dfanning.com, except with my own data) and the results are weird. Is SPH\_SCAT, when applied to data with max/min of around 200/-200, supposed to produce output past 50000? That's the weird part.

TRIANGULATE and TRIGRID just don't like me. :-( What's the deal with FVALUE?

- > Finally (to complete the most prominent issues with contours on maps),
- > if you plan to plot filled contours, there are occasions when you need
- > the /CELL\_FILL keyword \*AND\* CONTOUR will use the first fill color for
- > values ABOVE your first threshold, i.e. you should add a very low number
- > to your C\_LEVEL specification if you have one.

Where is /CELL\_FILL documented? It's not it the index and I've not found it anywhere near the CONTOUR section.

-Grady Daub

(Remove MMER and ZOOKS to reply by email.)

Subject: Re: Map Projections and Contour Plots.
Posted by Martin Schultz on Wed, 16 Jun 1999 07:00:00 GMT
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Grady Daub wrote:

>

> Martin Schultz wrote:

>

> Your convert\_lon program was not attached.

sorry! this time it should be ...

>

> Would your program make my non-monotonic lat,lon,data arrays in a form expected by CONTOUR?

no. it just converts lon value by lon value to fall into the range of

-180 to +180 or 0 to 360. You woul dneed to use the SORT function to get monotonic values first.

>

- > I've tried TRIANGULATE and TRIGRID and SPH\_SCAT (the latter exactly as shown on dfanning.com, except with my own data)
- > and the results are weird. Is SPH SCAT, when applied to data with max/min of around 200/-200, supposed to produce
- > output past 50000? That's the weird part.

I haven't used triangulate and the likes for a long time, and I must have deleted the code where I last did it. But I remember it had helped me a great deal to actually plot the triangles returned by triangulate in order to believe what IDL (and I) were doing...

(The CELL FILL question was already answered by wmc) Regards. Martin Martin Schultz, DEAS, Harvard University, 29 Oxford St., Pierce 109, phone (617) 496 8318 fax (617) 495 4551 Cambridge, MA 02138 e-mail mgs@io.harvard.edu web http://www-as/people/staff/mgs/ \$Id: convert lon.pro,v 1.11 1999/05/20 00:58:48 mgs Exp \$ ;+ NAME: CONVERT LON **PURPOSE:** Convert longitudes from -180..180 to 0..360 or vice versa. CATEGORY: Tools **CALLING SEQUENCE:** CONVERT\_LON, data, names, Pacific=Pacific, Atlantic=Atlantic, \$ minval=minval **INPUTS:** DATA -> A data array (lines, vars) or vector containing longitude data. If DATA is a 2D array, the NAMES

parameter must be given to identify the LONgitude variable.

NAMES -> A string list of variable names. The longitude data must be labeled 'LON', unless specified with the LONNAME keyword. The NAMES parameter is not needed, if a data vector is passed.

## **KEYWORD PARAMETERS:**

PACIFIC -> Convert longitudes from -180..180 to 0..360

ATLANTIC -> Convert from 0..360 to -180..180

LONNAME -> Name of the longitude variable if a name other than 'LON' is used.

## **OUTPUTS:**

The longitude column in the data array will be changed.

SUBROUTINES:

REQUIREMENTS:

NOTES:

**EXAMPLE:** 

londat = [-180.,-179.,-0.1,0.1,179.,180.,270.,359.]CONVERT\_LON,londat,/Pacific print,londat

CONVERT LON, londat, / Atlantic print, londat

## MODIFICATION HISTORY:

mgs, 25 Aug 1998: VERSION 1.00 mgs, 19 May 1999: - now makes sure that longitude range does not exceed -180..180 or 0..360

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```
pro convert lon,data,names,pacific=pacific,atlantic=atlantic,$
    lonname=lonname
  minval = -180.0001
  if (n_elements(lonname) eq 0) then lonname = 'LON'
  if (n_elements(data) It 2) then return
```

```
; get size information of data and find LON column
s = size(data)
if (s[0] eq 1) then ind = 0 $ ; data is vector
else begin
 ; Find LON variable
 ind = where(strupcase(names) eq lonname)
 if (ind[0] It 0) then begin
   print, '*** CONVERT LON: Cannot find ',lonname,' in data set!'
   return
 endif
endelse
; Atlantic: Convert longitudes greater 180 by subtracting 360
 also add N*360 to longitude values less than -180
if (keyword set(Atlantic)) then begin
  repeat begin
    lon = data[*,ind[0]]
    index = where(lon gt 180.,count)
    if (index[0] ge 0) then data[index,ind[0]] = lon[index]-360.
  endrep until(count eq 0)
  repeat begin
    lon = data[*,ind[0]]
    index = where(lon lt -180.,count)
    if (index[0] ge 0) then data[index,ind[0]] = lon[index]+360.
  endrep until(count eq 0)
endif
; Pacific: convert negative longitudes by adding 360
; also subtract N*360 for longitude values greater than 360
if (keyword_set(Pacific)) then begin
  repeat begin
    lon = data[*,ind[0]]
    index = where(lon gt minval AND lon lt 0.)
    index = where(lon lt 0., count)
```

if (index[0] ge 0) then data[index,ind[0]] = lon[index]+360.

```
endrep until(count eq 0)
    repeat begin
        lon = data[*,ind[0]]
        index = where(lon gt 360., count)
        if (index[0] ge 0) then data[index,ind[0]] = lon[index]-360.
        endrep until(count eq 0)
        endif

    return
end

File Attachments
1) convert_lon.pro, downloaded 92 times
```

Subject: Re: Map Projections and Contour Plots. Posted by wmc on Wed, 16 Jun 1999 07:00:00 GMT

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Grady Daub <gadZOOKS8371@garnet.acns.fsummer.edu> wrote:

> Martin Schultz wrote:

- > I've tried TRIANGULATE and TRIGRID and SPH\_SCAT (the latter exactly as shown on dfanning.com, except with my own data)
- > and the results are weird. Is SPH\_SCAT, when applied to data with max/min of around 200/-200, supposed to produce
- > output past 50000? That's the weird part.

I have had problems with sph\_scat, especially near the (South) pole - see my recent post with sph\_scat in the title and the reply I received which might help you.

For my part, to get acceptable interpolation near the poles, I had to go via device coordinates. The following code fragment might help (or not...)

```
;
; Use sph_scat
;
if (keyword_set(sphere)) then begin
lo=data(0,*)
la=data(1,*)
d2=data(2,*)
res=sph_scat(lo,la,d2,gs=gs,bounds=[xr(0),yr(0),xr(1),yr(1)])
;
; Go via device coords
;
endif else if (keyword_set(by_dev)) then begin
; Convert from data coords to device coords. Its up to you to make sure that the
; mapping you want has been set up - eg by set_ps_map
```

```
xy=convert_coord(data(0,*),data(1,*),/data,/to_dev)
 triangulate,xy(0,*),xy(1,*),triangles
; Now, regrid onto a grid regular in device space
 res1=trigrid(xy(0,*),xy(1,*),data(2,*),triangles,nx=int_res, ny=int_res,xg=xg,yg=yg)
; Now, generate the lat-lon grid we want and convert it too into device coord
 x=xc(pp,/arr,/as) & y=yc(pp,/arr)
 xy1=convert coord(x,y,/data,/to dev)
; Now, interpolate from our new regular grid onto the xformed lat-lon grid...
 Since interpolate assumes that the input grid has coords 0..n-1 we need to xform
; the coords into this range...
; Compute scaling that *would* xform xg, yg to 0...int_res-1
 xr=makerange(xg) & yr=makerange(yg)
 mn=[xr(0),yr(0)] \& sc=1./[xr(1)-xr(0),yr(1)-yr(0)]
 xy1a=xy1 \& for i=0,1 do xy1a(i,*)=(int_res-1)*(xy1(i,*)-mn(i))*sc(i)
 res=interpolate(res1,xy1a(0,*),xy1a(1,*))
 res=reform(res,pp.lbnpt,pp.lbrow)
 Or just do it in lat-lon coords - OK if not too near the pole
endif else begin
 triangulate,data(0,*),data(1,*),triangles
 res=trigrid(data(0,*),data(1,*),data(2,*),triangles,gs,[xr(0),yr(0),xr(1),yr(1)])
endelse
>> Finally (to complete the most prominent issues with contours on maps),
>> if you plan to plot filled contours, there are occasions when you need
>> the /CELL_FILL keyword ...
> Where is /CELL FILL documented? It's not it the index and I've not found it anywhere near the
CONTOUR section.
/cell fill was supposed to be obsolete and was actually removed in one release
(5.0?) - it fills cell-by-cell not contour-by-contour. I too find that it needs
to be used sometimes, which is annoying because it is slow and doesn't work with
patterns. RSI please note and fix this!
```

- William

\_\_

William M Connolley | wmc@bas.ac.uk | http://www.nbs.ac.uk/public/icd/wmc/ Climate Modeller, British Antarctic Survey | Disclaimer: I speak for myself

Subject: Re: Map projections
Posted by Liam E. Gumley on Mon, 12 Nov 2001 16:16:11 GMT
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James Kuyper wrote:

- > Is there any way to get at the coordinate conversion function for the
- > currently active map projection? I'm talking about a function that takes
- > a physical position in latitude and longitude coordinates, and converts
- > it into an image position using either data, device, or normal
- > coordinates. It doesn't matter which; once the position is in any one of
- > those forms, I can get the others by using CONVERT\_COORD. Such functions
- > have to exist in order for IDL to perform mapping, but they don't seem
- > to be publically exposed. I'd also like to have access to the inverse
- > function, to get a lat/lon corresponding to an image position.

## James,

When a map projection is active, longitude and latitude correspond to x/y data coordinates. Therefore CONVERT\_COORD will allow you to obtain the device or normal coordinates for a given lon/lat. For example:

```
window, /free
map_set, 45, -90, scale=20e6, /usa
lon = -89.6
lat = 43.5
print, convert_coord(lon, lat, /data, /to_device)
               217.622
   326.465
                          0.000000
print, convert_coord(lon, lat, /data, /to_normal)
  0.510102
               0.425044
                           0.000000
```

Cheers. Liam. Practical IDL Programming http://www.gumley.com/