Subject: Re: vectors on maps
Posted by hcp on Wed, 25 Nov 1998 08:00:00 GMT
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In article <365B6CBB.F3134DCE@atmos.washington.edu>, Varavut Limpasuvan
<var@atmos.washington.edu> writes:

|> Is it possible to overlay vectors (say wind vectors) on a stereographic
|> (or any other type) projection map? I dont think "velovect" works for
|> this situation. Help.

Not as supplied it doesn't. I hacked it to work in this situation
(doable as it is written in IDL, not a core part of the language).

I append the hacked version below: I changed the name to velo.pro so
it doesn't conflict with the official version. You should be able to do
(e.g.)

IDL> map_set,-90,0,0,/stereo,/continents,/isotropic
IDL> velo,zonw,merw,windlongs,windlats,/overplot

(The zonal winds are in zonw, the meridional in merw)

I don't promise that the arrows point exactly where you think they will, but they
certainly provide a useful-looking visual aid.

All the best

Hugh

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 ..................................................................... ...............
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;; ;;;;;;;;;;;;;;;
PRO VELO,U,V,X,Y, Missing = Missing, Length = length, Dots = dots,  $
      Color=color, noerase=noerase, xrange=xrange,yrange=yrange, $
      xstyle=xstyle,ystyle=ystyle, _EXTRA = extra,overplot=overplot
;
;+
; NAME:
; VELO
;
; PURPOSE:
; Produce a two-dimensional velocity field plot.
;
; A directed arrow is drawn at each point showing the direction and
; magnitude of the field.
;
; CATEGORY:
; Plotting, two-dimensional.
;
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```
; CALLING SEQUENCE:
; VELO, U, V [, X, Y]
;
; INPUTS:
; U: The X component of the two-dimensional field.
;  U must be a two-dimensional array.
;
; V: The Y component of the two dimensional field.  Y must have
;  the same dimensions as X.  The vector at point (i,j) has a
;  magnitude of:
;
;   (U(i,j)^2 + V(i,j)^2)^0.5
;
;  and a direction of:
;
;   ATAN2(V(i,j),U(i,j)).
;
; OPTIONAL INPUT PARAMETERS:
;  X: Optional abcissae values.  X must be a vector with a length
;  equal to the first dimension of U and V.
;
; Y: Optional ordinate values.  Y must be a vector with a length
;  equal to the first dimension of U and V.
;
; KEYWORD INPUT PARAMETERS:
;      MISSING: Missing data value.  Vectors with a LENGTH greater
;  than MISSING are ignored.
;
; LENGTH: Length factor.  The default of 1.0 makes the longest (U,V)
;  vector the length of a cell.
;
; DOTS: Set this keyword to 1 to place a dot at each missing point.
;  Set this keyword to 0 or omit it to draw nothing for missing
;  points.  Has effect only if MISSING is specified.
;
; COLOR: The color index used for the plot.
;
; Note:   All other keywords are passed directly to the PLOT procedure
;  and may be used to set option such as TITLE, POSITION,
;  NOERASE, etc.
; OUTPUTS:
; None.
;
; COMMON BLOCKS:
; None.
;
; SIDE EFFECTS:
; Plotting on the selected device is performed.  System
```

```
; variables concerning plotting are changed.
;
; RESTRICTIONS:
; None.
;
; PROCEDURE:
; Straightforward.  Unrecognized keywords are passed to the PLOT
; procedure.
;
; MODIFICATION HISTORY:
; DMS, RSI, Oct., 1983.
; For Sun, DMS, RSI, April, 1989.
; Added TITLE, Oct, 1990.
; Added POSITION, NOERASE, COLOR, Feb 91, RES.
; August, 1993.  Vince Patrick, Adv. Visualization Lab, U. of Maryland,
;  fixed errors in math.
; August, 1993. DMS, Added _EXTRA keyword inheritance.
; January, 1994, KDB. Fixed integer math which produced 0 and caused
;             divide by zero errors.
; December, 1994, MWR. Added _EXTRA inheritance for PLOTS and OPLOT.

;  .... Which prevents /noerase from working. /noerase put back as
; explicit keyword by HCP of the meteorology dept
;       at the University of Edinburgh
;       xrange and yrange also had to be done like this; this might
;       be true of any keywords which are useful for plot but which
;       cause plots and oplot to foul up. Function name changed to
;       VELO to avoid conflicts with the official version.

;-
;
       on_error,2                   ;Return to caller if an error occurs
       s = size(u)
       t = size(v)
       if s(0) ne 2 then begin
baduv:   message, 'U and V parameters must be 2D and same size.'
             endif
       if total(abs(s(0:2)-t(0:2))) ne 0 then goto,baduv
;
       if n_params(0) lt 3 then x = findgen(s(1)) else $
             if n_elements(x) ne s(1) then begin
badxy:                 message, 'X and Y arrays have incorrect size.'
                    endif
       if n_params(1) lt 4 then y = findgen(s(2)) else $
             if n_elements(y) ne s(2) then goto,badxy
;
       if n_elements(missing) le 0 then missing = 1.0e30
       if n_elements(length) le 0 then length = 1.0
```

```
        mag = sqrt(u^2.+v^2.)           ;magnitude.
              ;Subscripts of good elements
        nbad = 0                        ;# of missing points
        if n_elements(missing) gt 0 then begin
              good = where(mag lt missing)
              if keyword_set(dots) then bad = where(mag ge missing, nbad)
        endif else begin
              good = lindgen(n_elements(mag))
        endelse

        if n_elements(xrange) ne 2 then xrange=[x(0),x(n_elements(x)-1)]
        if n_elements(yrange) ne 2 then yrange=[y(0),y(n_elements(y)-1)]
        if n_elements(xstyle) ne 1 then xstyle=1
        if n_elements(ystyle) ne 1 then ystyle=1
        ugood = u(good)
        vgood = v(good)
        x0 = min(x)                     ;get scaling
        x1 = max(x)
        y0 = min(y)
        y1 = max(y)
 x_step=float(x1-x0)/float(s(1))   ; Convert to float. Integer math
 y_step=float(y1-y0)/float(s(2))   ; could result in divide by 0

 maxmag=max([max(abs(ugood/x_step)),max(abs(vgood/y_step))])
 sina = length * (ugood/maxmag)
 cosa = length * (vgood/maxmag)
;
        if n_elements(title) le 0 then title = ''
        ;--------------  plot to get axes  ---------------
        if n_elements(color) eq 0 then color = !p.color
        x_b0=x0-x_step
 x_b1=x1+x_step
 y_b0=y0-y_step
 y_b1=y1+y_step
        if n_elements(overplot) ne 1 then overplot=0
        if overplot ne 1 then begin
           if n_elements(position) eq 0 then begin
              plot,[x_b0,x_b1],[y_b1,y_b0],/nodata, $
                color=color, _EXTRA = extra,xstyle=xstyle,$
                noerase=noerase,xrange=xrange,yrange=yrange,ystyle=ystyle
           endif else begin
              plot,[x_b0,x_b1],[y_b1,y_b0],/nodata, $
                color=color, _EXTRA = extra, noerase=noerase,$
                xrange=xrange,yrange=yrange,ystyle=ystyle,xstyle=xstyle
           endelse
        endif
;
```

```
        r = .3                      ;len of arrow head
        angle = 22.5 * !dtor        ;Angle of arrowhead
        st = r * sin(angle)         ;sin 22.5 degs * length of head
        ct = r * cos(angle)
;
        for i=0,n_elements(good)-1 do begin     ;Each point
                x0 = x(good(i) mod s(1))        ;get coords of start & end
                dx = sina(i)
                x1 = x0 + dx
                y0 = y(good(i) / s(1))
                dy = cosa(i)
                y1 = y0 + dy
  xd=x_step
  yd=y_step
                plots,[x0,x1,x1-(ct*dx/xd-st*dy/yd)*xd, $
   x1,x1-(ct*dx/xd+st*dy/yd)*xd], $
                        [y0,y1,y1-(ct*dy/yd+st*dx/xd)*yd, $
   y1,y1-(ct*dy/yd-st*dx/xd)*yd], $
                        color=color, _EXTRA=extra,/clip
                endfor
        if nbad gt 0 then $             ;Dots for missing?
                oplot, x(bad mod s(1)), y(bad / s(1)), psym=3, color=color, $
         _EXTRA=extra
end
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