Subject: Re: Day/Night Terminator on Map Projection
Posted by kBob on Sat, 08 Apr 2006 06:23:04 GMT
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Try the code below. It uses routines from the Johns Hopkins University/Applied Physics Laboratory.

Example:

```
  IDL> TestSL, Longitude, Latitude
```

Kelly Dean
Fort Collins, Colorado

```
FUNCTION InitColorID
;
;  Load discrete color table.
;
tek_color
;
;  Match color indices to colors we want to use
;
IF ( !D.N_COLORS GT 256 ) THEN BEGIN
  TVLCT, RedTable, GreenTable, BlueTable, /GET
  black   = ( 256L * BlueTable(0) + GreenTable(0) ) * 256L +
RedTable(0)
  white   = ( 256L * BlueTable(1) + GreenTable(1) ) * 256L +
RedTable(1)
  red     = ( 256L * BlueTable(2) + GreenTable(2) ) * 256L +
RedTable(2)
  green   = ( 256L * BlueTable(3) + GreenTable(3) ) * 256L +
RedTable(3)
  dk_blue = ( 256L * BlueTable(4) + GreenTable(4) ) * 256L +
RedTable(4)
  lt_blue = ( 256L * BlueTable(5) + GreenTable(5) ) * 256L +
RedTable(5)
  six     = ( 256L * BlueTable(6) + GreenTable(6) ) * 256L +
RedTable(6)
  yellow  = ( 256L * BlueTable(7) + GreenTable(7) ) * 256L +
RedTable(7)
ENDIF ELSE BEGIN
  black=0 & white=1 & red=2 & green=3 & dk_blue=4 & lt_blue=5 & six=6 &
yellow=7
ENDELSE

ColorID = { ColorID,        $ ; Color Index
```

```
          Black:black,    $
          White:white,    $
          Red:red,        $
          Green:green,    $
          DkBlue:dk_blue, $
          LtBlue:lt_blue, $
          Six:six,        $
          Yellow:Yellow   }
RETURN, ColorID
END

 ;------------------------------------------------------------ -----------

PRO FOV2, longitude, latitude, SatRadius, ColorNum
;
; Procedure FOV2 will determine the maximum field of view
; and draw a circle around the subsatellite point.
;
; Input:
;       latitude  : Earth latitude of subsatellite point
;       longitude : Earth latitude of subsatellite point
;       SatRadius : Satellite radius from earth center
;       ColorNum  : Color number (default : 2)
;
IF ( N_ELEMENTS(ColorNum) EQ 0 ) THEN ColorNum = 2
EarthRadius = 6.371009D6 ; Mean Earth Radius
ScanAngle = ASIN( EarthRadius / SatRadius)
Arc_Dist = !DPI - 1.57080D - ScanAngle
LonLat0 = [longitude, latitude]     ; Initial point specified in
radians
lon = FLTarr(37)
lat = FLTarr(37)
FOR lcv = 0, 36 DO BEGIN
  Az = lcv * 10.0
  Results = LL_ARC_DISTANCE(LonLat0, Arc_Dist, Az, /Degrees)
  lon(lcv) = results(0)
  lat(lcv) = results(1)
ENDFOR
oPLOT, lon, lat, COLOR=ColorNum
END

;+
; NAME:
PRO SunPlot, Init=Init
;
; PURPOSE:
;    Procedure SunPlot will plot the location of the sun on a map.
;
```

```
; INPUTS:
;       None
;
; KEYWORD PARAMETERS:
;    Init - Create sun symbol to be plotted
;
; SIDE EFFECTS:
;   Requires public domain IDL routines from JHU
;   Assumes that MAP_SET and plotting window are already set.
;
;
; MODIFICATION HISTORY:
;   Created by Kelly Dean : December 1997
;-
;
;  Load discrete color table.
;
ColorID = InitColorID()
;
IF ( KEYWORD_SET(Init)) THEN BEGIN
;-----  Sun Symbol  -----------
 a = maken(0,360,17)
 r = maken(1,1,17)+(1-findgen(17) mod 2)
 polrec,r,a,x,y,/deg
 usersym,x,y,color=ColorID.yellow,/fill
 SunTLE = -1
ENDIF

;--------  Handle  time  ---------------
dt0 = systime()         ; Current time is def.
dt  = dt0           ; Copy date/time string.
off = gmt_offsec()   ; Find correction from local to UT.
dt_tm_inc, dt, off      ; Convert to UT.
dt_tm_brk, dt, dd, tt   ; Break input into date and time.
date2ymd, dd, y, m, d   ; Break date into y,m,d.
jd  = ymd2jd(y,m,d)     ; Find Julian Day number.
ut  = secstr(tt)/3600.  ; Convert time to UT in hours.
;--------  Solar RA/Dec  ---------------
sun, y, m, d, ut, app_ra=ra, app_dec=dec, dist=dist
;--------  GMST (Greenwich Mean Sidereal Time)  -----
st = lmst(jd,ut/24.,0)*24
;------  Subsolar point  ------------
lat = dec
lng = 15.0*(ra-st)
;
; Plot sun's location and terminator
;
plots, lng, lat, psym=8
```

```
FOV2, lng, lat, (dist * 1.4956D11), ColorID.yellow
END

 ;---------------------------------------------------------- ----------

PRO LACMap, lon, lat
;
;  Load discrete color table.
;
ColorID = InitColorID()
;
;  Set up an orthographic projection centered over the north Atlantic.
;  Fill the hemisphere with dark blue.
;  Specify black gridlines
;
MAP_SET, /ORTHO, lat, lon, 0, $
        /ISOTROPIC, $
        /HORIZON, $
        E_HORIZON={FILL:1, COLOR:ColorID.dkblue}, $
        /NoBorder, $
        COLOR=lt_blue
;  Fill the continent boundaries with solid white.
MAP_CONTINENTS, /FILL_CONTINENTS, COLOR=ColorID.white
;  Overplot coastline data.
MAP_CONTINENTS, /COASTS, COLOR=ColorID.black
;  Add rivers, in light blue.
MAP_GRID, LatDel = 15, LonDel = 30, Color = ColorID.black
END

 ;---------------------------------------------------------- -----------

PRO TestSL, Lon, Lat

; Hint: Color works best when decompose=1
; Hint: Default map location Colorado, USA

IF ( N_ELEMENTS( Lon ) EQ 0 ) THEN Lon = -105.0
IF ( N_ELEMENTS( Lat ) EQ 0 ) THEN Lat = 45.0

WINDOW, 0, XSize=512, YSize=512, TITLE='Sun Location'
LACMAP, Lon, Lat
SUNPLOT, /Init

END
```

Subject: Re: Day/Night Terminator on Map Projection

Posted by Andrew Cool on Sat, 08 Apr 2006 06:41:36 GMT
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David,

Try
http://www.astro.washington.edu/deutsch/idl/htmlhelp/slibrar y09.html

Andrew

David Fanning wrote:
> Hi Folks,
>
> Does anyone have IDL code for calculating the day/night
> terminator on a map projection? Or perhaps an example of
> a map in which you have done this?
>
> If the code is not proprietary, maybe I'll write an article
> about this. It can't be the first time someone has needed
> such a thing. Direct graphics, is what has been requested of
> me. :-)
>
> Cheers,
>
> David
> --
> David Fanning, Ph.D.
> Fanning Software Consulting, Inc.
> Coyote's Guide to IDL Programming: http://www.dfanning.com/

Subject: Re: Day/Night Terminator on Map Projection
Posted by David Fanning on Sat, 08 Apr 2006 13:54:26 GMT
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Kelly Dean writes:

> Try the code below. It uses routines from the Johns Hopkins
> University/Applied Physics Laboratory.

Ah, I had no doubt the routines were in the JHUAPL library,
but the tough sledding was in going from the one-line
descriptions of the routines to code that actually *did*
something useful! This helps a LOT!

Thanks,

David

--
David Fanning, Ph.D.
Fanning Software Consulting, Inc.
Coyote's Guide to IDL Programming: http://www.dfanning.com/

Subject: Re: Day/Night Terminator on Map Projection
Posted by Ken Mankoff on Sat, 08 Apr 2006 15:16:49 GMT
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SUNCLOCK in JHU.

On Fri, 7 Apr 2006, David Fanning wrote:

> Hi Folks,
>
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> on a map projection? Or perhaps an example of a map in which you
> have done this?
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>
