
Subject: Re: Satellite image remapping

Posted by [Paul van Delst](#) on Tue, 03 Jul 2001 18:09:15 GMT

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Sean Raffuse wrote:

>
> Hello, I just found out about this newsgroup. I think it will be a godsend.
>
> Anyway, I'm just getting started with IDL. I have done a few things in the
> past few months and am working up to a major project. I know there is an
> extensive amount of code out there so maybe my problem is already solved.
>
> What I am doing is remapping satellite images, specifically full-disk images
> from a GOES satellite. These images are not internally georeferenced.
> However, there is available a navigation file which gives the lat/lon for
> each pixel. What I would like to do is remap this image onto a flat
> projection. I know I can do it with a brute force method, but I have the
> sneaky suspicion that this sort of thing has been done before. Does anyone
> have any experience in this arena? I would be thrilled.

Here is something I slapped together one afternoon back in '97 after some bods at JPL asked me for GOES images. It uses Liam Gumley's IMAGEMAP routine (<http://cimss.ssec.wisc.edu/~gumley/imagemap.html>) and some of his color handling routines (<http://cimss.ssec.wisc.edu/~gumley/colortools.html>). I think Liam may have changed the calling sequence to IMAGEMAP since I used it back then so after you get his new version, check the call in the code below.

My code looks like a dogs dinner but it got the job dun (back when you could create gifs). The single argument "descriptor" was a file that contained the following:

```
9631000Z
9631003Z
9631006Z
9631009Z
9631012Z
9631015Z
9631018Z
9631021Z
9631100Z
9631103Z
9631106Z
9631109Z
9631112Z
9631115Z
```

Each time tag let me construct filenames like

9631000Z.HDR,9631000Z.LON,9631000Z.LAT,9631000Z.001 which contained all the gory info (they were "flat file" outputs from McIDAS area files (don't ask.)

Anyway, most of remap.pro is reading data files. What you want is something like right at the end:

```
range = [ min( data ), max( data ) ]
erase, 7
pos = [ .05, .05, .9, .95 ]
map_set, limit = [ 25, -125, 50, -60 ], pos = pos, /noerase
title = sat_inst_id + ' Band ' + string( this_band, format = '(i2)' ) + $
      ' ' + parameter[ j ] + '; ' + date + ' @ ' + time
xyouts, 0.5, 0.975, title, /normal, align = 0.5, color = 0, charsize = 1.5
**->  imagemap, data, lat, lon, range = range, /noerase, ncolors = ncolors, bottom =
bottom, $
**->      missing = 7B
      map_continents, /hires, color = 1
      map_continents, /hires, /usa, color = 1
      map_grid, label = 1, color = 2
      plots, [ pos(0), pos(2), pos(2), pos(0), pos(0) ], [ pos(1), pos(1), pos(3),
pos(3), pos(1) ], $
      /normal, color = 0
      colorbar, pos = [ .935, .05, .96, .95], title = parameter[ j ], format = '(f5.1)',
$
      /right, /vertical, min = range[ 0 ], max = range[ 1 ], divisions = 8, $
      ncolors = ncolors, bottom = bottom, color = 0
```

which does all the pretty remapping, etc.

Liam's IMAGEMAP routine is a beaut - sure as hell made my life much simpler.

paulv

<-----cut here----->

```
pro remap, descriptor, ps = ps, gif = gif, no_pause = no_pause
```

```
colors
ncolors = !d.table_size - 16
bottom = 16
```

```
; -----
; Create a window
; -----
```

```
if ( keyword_set( gif ) ) then pixmap = 1 else pixmap = 0
```

```
if ( not keyword_set( ps ) ) then begin
```

```
    window, /free, xsize = 900, ysize = 600, title = 'Remap Display', pixmap = pixmap
```

```
    wset, !d.window
```

```
endif
```

```
; -----
```

```
; Read in all the file tags
```

```
; -----
```

```
openr, lun_desc, descriptor, /get_lun
```

```
n_files = 0
```

```
this_tag = "
```

```
while ( not eof( lun_desc ) ) do begin
```

```
    n_files = n_files + 1
```

```
    readf, lun_desc, this_tag
```

```
    if ( n_files eq 1 ) then $
```

```
        file_tag = [ this_tag ] $
```

```
    else $
```

```
        file_tag = [ file_tag, this_tag ]
```

```
endwhile
```

```
free_lun, lun_desc
```

```
; -----
```

```
; Loop over files
```

```
; -----
```

```
for i = 0, n_files - 1 do begin
```

```
; -----
```

```
; Read HDR file to determine line/element #s
```

```
; -----
```

```
hdr_file = file_tag[ i ] + '.HDR'
```

```
openr, lun_hdr, hdr_file, /get_lun
```

```
cbuf = "
```

```
line = -1
```

```
element = -1
```

```

n_data_files = 1

while ( not eof( lun_hdr ) ) do begin

    readf, lun_hdr, cbuf
    c_data_file = '.' + string( n_data_files + 1, format = '(i3.3)' )

    case 1 of

;       -----
;       Get satellite/instrument character ID
;       -----
;

        ( strpos( cbuf, 'Satellite' ) ne -1 ): begin
            sat_inst_id = strtrim( strmid( cbuf, 12, 28 ) )
        end

;
;       -----
;       Get image date and start time
;       -----
;

        ( strpos( cbuf, 'Image Date' ) ne -1 ): begin
            date = strtrim( strmid( cbuf, 14, 9 ) )
            time = strtrim( strmid( cbuf, 59, 12 ) )
        end

;
;       -----
;       Read parameters from first occurrence of data
;       -----
;

        ( strpos( cbuf, '.001' ) ne -1 ): begin
            n_data_files = 1
            parameter = strtrim( strmid( cbuf, 14, 12 ) )
            band      = fix( strmid( cbuf, 27, 4 ) )
            n_bands   = 1
            line      = fix( strmid( cbuf, 32, 7 ) )
            element   = fix( strmid( cbuf, 40, 8 ) )
            data_scale = float( strmid( cbuf, 74, 5 ) )

            case 1 of
                ( strpos( cbuf, 'Short Integer (8 bit)' ) ne -1 ): itype = 1
                ( strpos( cbuf, 'Integer (16 bit)' ) ne -1 ): itype = 2
                ( strpos( cbuf, 'Long Integer (32 bit)' ) ne -1 ): itype = 3
            else: begin
                message, 'Invalid Element Format', /info
            end
        end
    end
end

```

```

        close, /all
        return
    end
endcase

```

```

end

```

```

; -----
; Determine how many files are represented
; -----

```

```

( strpos( cbuf, c_data_file ) ne -1 ): begin
    n_data_files = n_data_files + 1
    parameter = [ parameter, strtrim( strmid( cbuf, 14, 12 ) ) ]
    band = [ band, fix( strmid( cbuf, 27, 4 ) ) ]
    if ( band[ n_data_files - 1 ] ne band[ n_data_files - 2 ] ) then $
        n_bands = n_bands + 1
    data_scale = [ data_scale, float( strmid( cbuf, 74, 5 ) ) ]

    case 1 of
        ( strpos( cbuf, 'Short Integer (8 bit)' ) ne -1 ): itype = [ itype, 1 ]
        ( strpos( cbuf, 'Integer (16 bit)' ) ne -1 ): itype = [ itype, 2 ]
        ( strpos( cbuf, 'Long Integer (32 bit)' ) ne -1 ): itype = [ itype, 3 ]
    else: begin
        message, 'Invalid Element Format', /info
        close, /all
        return
    end
endcase
end

```

```

; -----
; Get LAT and LON scale factors
; -----

```

```

( strpos( cbuf, '.LAT' ) ne -1 ): begin
    lat_scale = float( strmid( cbuf, 74, 5 ) )
end

( strpos( cbuf, '.LON' ) ne -1 ): begin
    lon_scale = float( strmid( cbuf, 74, 5 ) )
end

```

```

; -----
; Default

```

```

; -----
;
;     else:
;
;     endcase
;
; endwhile
;
; free_lun, lun_hdr
;
; -----
;
; Check that dimensional info has been read in
; -----
;
; if ( ( line eq -1 ) or ( element eq -1 ) ) then begin
;     message, 'Invalid LINE and ELEMENT values', /info
;     close, /all
;     return
; endif
;
; -----
;
; Read in the latitude and longitude information
; -----
;
; ilat = intarr( element, line )
; openr, lun_lat, file_tag[ i ] + '.LAT', /get_lun
; readu, lun_lat, ilat
; free_lun, lun_lat
; lat = float( ilat ) / lat_scale
; ilat = 0B
;
; ilon = intarr( element, line )
; openr, lun_lon, file_tag[ i ] + '.LON', /get_lun
; readu, lun_lon, ilon
; free_lun, lun_lon
; lon = -1.0 * float( ilon ) / lon_scale
; ilon = 0B
;
; -----
;
; Loop over the number of bands
; -----
;
; for j = 0, n_data_files - 1 do begin

```

```

; -----
; Get current band # and data file name
; -----

this_band = band[ j ]
this_data_file = file_tag[ i ] + '.' + string( j + 1, format = 'i3.3' )
out_file_tag = file_tag[ i ] + '.' + strcompress( sat_inst_id, /remove_all ) + $
               '.band' + string( this_band, format = 'i2.2' ) + '.' + $
               parameter[ j ]

; -----
; Only concerned with Albedo, Radiance, and Temperature
; -----

if ( ( parameter[ j ] eq 'Albedo' ) or $
    ( parameter[ j ] eq 'Radiance' ) or $
    ( parameter[ j ] eq 'Temperature' ) ) then begin

; -----
; Read data and scale it
; -----

print, format = '( /5x, "Remapping ", a, "...")', this_data_file

idata = make_array( element, line, type = itype[ j ] )

openr, lun_data, this_data_file, /get_lun
readu, lun_data, idata
free_lun, lun_data
data = float( idata ) / data_scale[ j ]
idata = 0B

; -----
; Call imagemap routine
; -----

if ( keyword_set( ps ) ) then begin

    ;- get the current color table

    tvlct, r, g, b, /get
    ncolors = !d.table_size - 16 & bottom = 16
    r_old = r( bottom : bottom + ncolors - 1 )
    g_old = g( bottom : bottom + ncolors - 1 )
    b_old = b( bottom : bottom + ncolors - 1 )

```

```

;- change to Postscript mode

set_plot, 'PS'

;- load the interpolated color table, and make sure bottom entry is black

ncolors = !d.table_size - 16
r_new = congrid( r_old, ncolors, /interp )
g_new = congrid( g_old, ncolors, /interp )
b_new = congrid( b_old, ncolors, /interp )
tvlct, r_new, g_new, b_new, bottom
tvlct, 0, 0, 0, 0

;- set Postscript options

!p.font = 0
device, /landscape, bits_per_pixel = 8, /color, /helv, font_size = 9

endif

range = [ min( data ), max( data ) ]
erase, 7
pos = [ .05, .05, .9, .95 ]
map_set, limit = [ 25, -125, 50, -60 ], pos = pos, /noerase
title = sat_inst_id + ' Band ' + string( this_band, format = '(i2)' ) + $
      ' ' + parameter[ j ] + ' '; ' + date + ' @ ' + time
xyouts, 0.5, 0.975, title, /normal, align = 0.5, color = 0, charsize = 1.5
imagemap, data, lat, lon, range = range, /noerase, ncolors = ncolors, bottom =
bottom, $
      missing = 7B
map_continents, /hires, color = 1
map_continents, /hires, /usa, color = 1
map_grid, label = 1, color = 2
plots, [ pos(0), pos(2), pos(2), pos(0), pos(0) ], [ pos(1), pos(1), pos(3),
pos(3), pos(1) ], $
      /normal, color = 0
colorbar, pos = [ .935, .05, .96, .95], title = parameter[ j ], format = '(f5.1)',
$,
      /right, /vertical, min = range[ 0 ], max = range[ 1 ], divisions = 8, $
      ncolors = ncolors, bottom = bottom, color = 0

if ( keyword_set( ps ) ) then begin
device, /close
spawn, 'mv idl.ps ' + out_file_tag + '.ps'
print, format = '( 5x, "File ", a, " created" )', out_file_tag + '.ps'
set_plot, 'X'
!p.font = -1

```

```
    tvlct, r_old, g_old, b_old, bottom
endif
```

```
if ( keyword_set( gif ) ) then begin
    tvlct, r, g, b, /get
    write_gif, out_file_tag + '.gif', tvrd(), r, g, b
    print, format = '( 5x, "File ", a, " created" )', out_file_tag + '.gif'
endif
```

```
if ( not keyword_set( no_pause ) ) then begin
    print, format = '( 5x, "Press any key to continue, <x> to quit..." )'
    result = get_kbrd( 1 )
    if ( strlowercase( result ) eq 'x' ) then return
endif
```

```
endif else begin
```

```
    print, format = '( 5x, "Ignoring ", a, ", Element Format: ", a )', $
        this_data_file, parameter[ j ]
```

```
endelse
```

```
endfor
```

```
endfor
```

```
end
```

```
<-----cut here----->
```

```
--
```

```
Paul van Delst      A little learning is a dangerous thing;
CIMSS @ NOAA/NCEP   Drink deep, or taste not the Pierian spring;
Ph: (301)763-8000 x7274 There shallow draughts intoxicate the brain,
Fax:(301)763-8545    And drinking largely sobers us again.
                    Alexander Pope.
```
