
Subject: Re: Modis Georeferencing

Posted by [devin.white](#) on Sat, 17 Mar 2007 14:22:47 GMT

[View Forum Message](#) <> [Reply to Message](#)

ENVI's MODIS georeferencing capabilities are only accessible through the GUI. Why this is the case is a very long story. There is an alternative approach you can use, though. To programmatically georeference MODIS data (swaths only--grids are already georeferenced), you could build a custom program that does the following:

- Retrieves the Scientific Dataset (SD) of interest, by name, from the MODIS HDF file
- Converts the SD from its stored byte or integer version to a scientifically meaningful version (floating point, via scale and offset factors stored in the SD)
- Retrieves the Longitude and Latitude geofields
- Uses the geofields to either (1) create tie points for warping using Image to Map Registration, as in the GUI, or (2) create a Geographic Lookup Table (GLT) which can be used to place each image pixel in its proper location in a georeferenced output image. The latter is far more accurate than the former and doesn't take much more time. It also takes care of the infamous bowtie effect.

The above process is not straightforward, though. There are over 100 types of MODIS data and each type has its own set of products, spatial extents, and spatial resolutions. Products can occur in two, three, or even four dimensions. Three and four dimensional data can exist in all three interleave types (BSQ, BIL, BIP). Files can contain more than seven hundred valid SDs, although a dozen or so is more common. To make matters more complicated, swath geofields can exist at a different spatial resolution than the image data, so interpolation becomes necessary to make the geofields work correctly. The geofields are also sometimes stored in integer rather than floating point, so they have to be converted before being used. In a few cases, the geofields aren't even stored in the standard locations or under the standard SD names. Then there's the challenge of accounting for the International Dateline during the georeferencing process. Let's just say that it is not fun. For grid data, the georeferencing has already been taken care of, but the data and the georeferencing information can be stored in ways that ENVI doesn't recognize as being valid so little to none of your data will show up in the Available Bands List. You can around this, but it is not easy. In other words, there is a great deal that you have to account for when attempting to both georeference MODIS data and open it in ENVI.

I've been working on a universal MODIS data conversion and georeferencing tool for ENVI for a few weeks now and I have a

prototype up and running. Believe me, it was no small task to account for the wide variability in MODIS data across the four communities (Atmosphere, Land, Cryosphere, Oceans). At the moment, it works with all but one type (MOD14), which is going to require some additional special case coding due to how its datafields are constructed. It has a GUI version (very simple at present), but is accessible programmatically as well. All you have to provide is the full path to the input file, an output path for the converted data, and yes/no decision with respect to georeferencing. You get floating point output, with all relevant scale and offset factors applied. Georeferencing is handled via GLTs for swaths. Rather than suggesting that you reinvent the wheel, I'd be happy to let you play with the prototype as a beta tester. I could use the feedback. =)

On Mar 15, 9:06 am, raval.chin...@gmail.com wrote:

> Dear All,
>
> Does any one know how to georeference the Modis data programmatically
> in ENVI?
> I am not able to find any ENVI_MODIS_GEOREF_DOIT in envi routines
> though the routines to georeference the envisat, radarsat data are
> available.
>
> If it is not available, how can I georeference the Modis data
> programatically in ENVI?
>
> -Chintan Raval

Subject: Re: Modis Georeferencing
Posted by [BLesht](#) on Wed, 21 Mar 2007 15:03:55 GMT
[View Forum Message](#) <> [Reply to Message](#)

Chitan,

Devin's GUI tool will be a welcome addition. I've played with an early version using MODIS ocean data and it is fine for doing interactive analysis - I haven't tried using it in batch mode, though. The batch mode programming isn't that difficult using existing ENVI routines, however. Assuming that you have ENVI+IDL, you just open the MODIS hdf file, extract the data you want including latitude and longitude using the HDF routines, write your data as an ENVI file, open the ENVI file, create the GLT file, and georeference using the GLT. Here is a extract from my code that does the above:

```

; Processing logic:
;       1. Write the calibrated MODIS L2 data to an ENVI
file in memory
;       2. Open that file
;       3. Create a GLT file mapping the original pixel
lat/lon to the standard projection (in memory)
;       4. Georeference the MODIS L2 data using the GLT
map (in memory)
;       5. Get map coordinages from geographic
definition of area of interest
;       6. Extract data from area of interest
;       7. Write extracted data
;
; geoData = calibrated data from original image
; enviName = ENVI file with calibrated data - mapped image
; geo_Points= A 16-element double floating array of geographic
coordinates for the four corners of the input data.
;
ENVI_WRITE_ENVI_FILE, geoData, BNames=geoNames,
GEOPOINTS=geo_Points, NB=nGeo, NL=nlines, NS=nsamps, $
    /NO_OPEN,/IN_MEMORY, R_FID = fid1
ENVI_FILE_QUERY, fid1, NS=ns, NL=nl, NB=nb, DIMS=dims
;
ENVI_DOIT, 'ENVI_GLT_DOIT', DIMS=dims, I_PROJ=dataProj,
O_PROJ=gridProj, /IN_MEMORY, $
    PIXEL_SIZE=pixel_size, R_FID=glT_FID, ROTATION=rotation,
$
    X_FID=fid1, X_POS=xpos, Y_FID=fid1, Y_POS=ypos, /
NO_REALIZE
;
ENVI_FILE_QUERY, glt_Fid, DIMS=glt_dims, NS=nsglt, NL=nlgt
;
; At this point we've created the GLT file which gives the map
location for
; every pixel in the input file. Note the input file pixels are
referred to
; in a one-based coordinate system.
;
ENVI_DOIT, 'ENVI_GEOREF_FROM_GLT_DOIT', FID=fid1, GLT_DIMS=glt_dims,
GLT_FID=glt_FID, /IN_MEMORY, $
    MIN_PIXELS=1, $
    POS=LIndGen(nb), R_FID=map_FID
;

```

I hope this helps. Barry
