Subject: Create ortho-rectified radiance image from HDF5 data
Posted by Sean Hartling on Tue, 10 Nov 2015 20:38:52 GMT
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Hello,

Does anyone have any advice on how to create an ortho-rectified ENVI data file that is geolocated from the lat/longs of HDF swath data?

Here is the code I am working with. This code produces a radiance image; however, it is not ortho-rectified according to the lat/lon from the HDF swath data, rather it creates the array from the tie point. I would like to tie the lat/lons from the original HDF5 data to each radiance pixel in the output. Any advice would be greatly appreciated.

```
PRO Hdf5_classic_VIS_projection
  compile_opt idl2
  ;
  ;e = ENVI(/HEADLESS)
  ; First restore all the base save files. This programs uses some ENVI routines
  envi, /restore_base_save_files
  ; Initialize ENVI and send all errors and warnings to the file batch.txt
  envi_batch_init, log_file='batch.txt'
  ;
  file_path = 'C:\Users\Sean\Desktop\Ball\'
  file = file_path + 'L1B_20150216_VIS.he5'
  ;
  ; Use a graphical user interface for viewing and reading HDF5 files.
  ; Result = H5_BROWSER(file)
  ; Define file dimentions
  exponent = intarr(1033, 99, 1072)
  Mantissa = intarr(1033, 99, 1072)
  L_lambda = fltarr(1033, 99, 1072)
  lat = fltarr(1033, 99)
  lon = fltarr(1033, 99)
  Solar_Zenith_Angle = fltarr(1033, 99)
  Sensor_refl = fltarr(1033, 99, 1072)
  surface_refl = fltarr(1033, 99, 1072)
  ; sample, row, spectral bands
  ;Dimensions: [1033, 99, 1072]
  ;
  ; Open the file
  file_id = H5F_OPEN(file)
  ; Acessing the datasets.
  ; This is located within '\SWATHS\').
  ; We could also have used H5G_OPEN to open up the group first.
  ;
  ; open, read and close radiance information
  dataset_id_exponent= H5D_OPEN(file_id,
```

```
'/HDFEOS/SWATHS/Radiance/DataFields/RadianceExponent')
  exponent = H5D_Read(dataset_id_exponent) ; read teh file
  H5D_CLOSE, dataset_id_exponent ; Close identifiers so we don't leak resources.
  dataset_id_Mantissa= H5D_OPEN(file_id,
'/HDFEOS/SWATHS/Radiance/DataFields/RadianceMantissa')
  Mantissa = H5D_Read(dataset_id_Mantissa)
  ; Open up the dataspace associated with the Mantissa image.
  ; dataspace_id = H5D_GET_SPACE(dataset_id_Mantissa)
  H5D_CLOSE, dataset_id_Mantissa
  ; Calculate the radiance
  Radiance = Mantissa*10.^(Exponent)
  ;
  ; open, read and close geolocation information
  dataset_id_lat= H5D_OPEN(file_id, '/HDFEOS/SWATHS/Radiance/GeolocationFields/Latitude')
  lat = H5D_Read(dataset_id_lat) ; read teh file
  H5D_CLOSE, dataset_id_lat ; Close identifiers so we don't leak resources.
  dataset_id_lon= H5D_OPEN(file_id,
'/HDFEOS/SWATHS/Radiance/GeolocationFields/Longitude')
  lon = H5D_Read(dataset_id_lon)
  H5D_CLOSE, dataset_id_lon
  ;
  ; open, read and close Earth Sun Distance (ESD) information
  ; just one value, 1.5155510e+011
  dataset_id_ESD= H5D_OPEN(file_id,
'/HDFEOS/SWATHS/Radiance/GeolocationFields/EarthSunDistance' )
  Earth_Sun_Distance = H5D_Read(dataset_id_ESD) ; read the distance file in meters
  ESD = Earth_Sun_Distance*6.68458712*10.^(-12) ; should be in astronomical units
  H5D_CLOSE, dataset_id_ESD ; Close identifiers so we don't leak resources.
  ; print, Earth_Sun_Distance
  ;
  ; read solar zenith angle (SZA)
  dataset_id_SZA= H5D_OPEN(file_id,
'/HDFEOS/SWATHS/Radiance/GeolocationFields/SolarZenithAngle' )
  Solar_Zenith_Angle = H5D_Read(dataset_id_SZA)
  SZA = !pi*Solar_Zenith_Angle/180 ; convert degrees to radian
  H5D_CLOSE, dataset_id_SZA
  ;
  ; Convert photon radiance Lq(nm) to spectral radiance  L_lambda(um)
  h = 6.626*10.^(-34) ; Plank's constant in Jeol per second J s
  c = 2.99*10.^8 ; Speed of light in m/s
  Wavelength_index = FINDGEN(1072) + 1.0
  Wavelength =  0.279772*Wavelength_index + 404.68 - 3 ; wavelengths in VIS (nm)
  ;lambda = 550. ; Wavelength in nm
  lambda = Wavelength*10.^(-9); Wavelength in meters
  ;Lq = 1.86*10.^13 ; extracted radiance value from GeoTASO image in Photons/(s cm^2 sr nm)
  ; conver the units of radiance to standard units
  Lq = Radiance/(10.^(-4)*10.^(-3)) ; radiance in W/(m^2 sr um) <-- 1cm sq = 10.^(-4) sq m; nm =
10.^(-3) um
```

```
  ; read the solar constant for each wavelengths
  ESUN=5000
  ; now calculate radiance
  FOR k=0, n_elements(lambda)-1 DO BEGIN
    L_lambda[*,*,k]= Lq[*,*,k] * ((h*c)/lambda[k])   ; spectral radiance in W/(m^2 sr um)
    Sensor_refl[*,*,k] = !pi*L_lambda[*,*,k]*(ESD)^2/(ESUN*cos(SZA))
    ; surface_refl= Sensor_L_lambda[*,*,k]/((ts*tv)+(1-sp))
  ENDFOR
  ;
  ; use IDL routines to write the radiance file into a directory
  Outputfile = 'C:\Users\Sean\Desktop\Ball\Out\Radiance_6.dat'
  OpenW, Lun, Outputfile, /GET_LUN
  WriteU,lun,L_lambda
  Free_lun, Lun
  ;
  ; extract the lon/lat of the the first pixel
  lo0 = lon[0]   ; longitude of the first pixel
  la0 = lat[0]   ; latitude of the first pixel
  ;print, la0, lo0
  ;
  units = envi_translate_projection_units('Degrees')
  ps = [0.00007735D, 0.00246768D]      ; Set the pixel size in degree (default)
  mc = [0D, 0D, lo0, la0]   ;and map tie point, -90.5597, 38.7053
  map_info = envi_map_info_create(/geographic, mc=mc, ps=ps, units = units)

  ;create the header of file
  ENVI_SETUP_HEAD, fname=outputfile, $
    ns=1033, nl=99, nb=1072, $
    interleave=0, data_type=4, $
    Sensor_type=Sensor_type, $
    map_info=map_info,$
    WAVELENGTH_UNIT=1,  WL=Wavelength, $
    offset=0, /write, /open
  ; close the batch mode
  ;Envi_Batch_Exit
END
```