EMIT Workshops

Workshop 1: Intro to EMIT Mission and Data

* EMIT: investigate gap in knowledge of the mineral composition of earth’s desert regions
* File names: emit20220910t140408\_o25309\_s001\_l1b\_rdn\_b0106\_v01.img
* Timestamp, orbit, scene, product level, build/version all separated by underscores
* WISER: Caltech software for viewing data cubes – similar to envi
  + Can look at both radiance and reflectance spectra
* LP DAAC
  + Need an EARTHDATA login to access the data
  + Search “EMIT”
    - Collection available on EarthData Cloud, so can use AWS to access it
  + For each granule, there is reflectance, uncertainty and mask data
  + Draw polygons to filter, or select specific dates, or percentage cloud cover
  + Download process
    - Number of ways to download
* Data format
  + The NetCDF4 format – machine-independent, hierarchical
    - Built-in metadata, supports compression, chunking
    - Different than ENVI / GeoTiFF – format not inherently geospatial
    - Datasets have 3 main groups
      * Root
        + Dimensions – contain all variable dimensions
        + Variables – where sensor data is located
      * Sensor\_band\_parameters (band names)
      * Location – info about where each pixel located
    - ex. L1B: Radiance (same for obs, and refl)
      * Radiance
        + (1280, 1242, 285)
      * Location
        + Lat
        + Lon
        + Elev
        + Glt\_x (for orthorectification)
        + Glt\_y
      * Sensor\_band\_names
    - Mask file
      * Water mask, cloud mask, aggregate map
      * Capture AOD and H2O

Workshop 2: Working with EMIT Data – Basics

VISIONS portal

* Layers
  + Without RGB, just a base map – just all the tiles of the coverage
  + Target mask – intended coverage regions
  + Forecast – where EMIT planning to cover over the next 2 weeks
* Click on scene – metadata pops up
  + Series of links: all the data products on EARTHDATA
  + Blue is ready for download, yellow not yet
  + There’s a way to send a link to a particular view
  + Time function to filter scenes
  + Can filter scenes by elevation, solar zenith angle (turns out 10 degrees is quite favorable)

Launching the cloud workspace

* Link to launch cloud workspace
* Select large server option

EMIT-Data-Resources

* Tutorials folder: Exploring L2A reflectance
  + Learning Objectives
    - Open EMIT .nc file as an xarray.Dataset
      * Import relevant python libraries and the downloaded .nc file
      * EMIT L2A reflectance are distributed in a non-orthocorrected spatially raw NetCDF4 (.nc) format consisting of data and its associated metadada. 3 groups within, containers that store different parts of the data
      * Xarray only reads in the root group, so sensor band parameters and location need to be read in separately
      * We can then merge the reflectance and the location into a single dataset using xarray – however, we don’t merge the sensor band parameters
    - Visualizing Non-Orthorectified Spectra
      * Plot spectra for a single pixel and remove bad band
      * Plot entire image for one single wavelength band
    - Apply geometry lookup tables (GLT) to orthorectify image
      * ‘real’ orthorectification has been done already for EMIT data
    - How to plot spectra of pixels
    - How to plot specific bands as images
    - How to make an interactive plot to visualize spectra