The Irish Earth Observation (IEO) Python Module: Localised Open-Source Data Management for Landsat and Beyond

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What is the IEO Python module?

```
802 lines (734 sloc)    32 KB

1   #/usr/bin/python
2   # By Guy Serbin, Environment, Soils, and Land Use Dept., CELUP, Teagasc,
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4   # email: guy <dot> serbin <at> teagasc <dot> ie
5
6   # Irish Earth Observation (IEO) Python Module
7   # version 1.0.6
8
9   import os, datetime, time, shutil, sys, glob, csv, ENVIfile, modistools, numpy, numexpr
10  from xml.dom import minidom
11  from subprocess import Popen
```

- An open-source Python library utilising GDAL and Numpy.

  - On Github: https://github.com/Teagasc/ieo

- Currently only supports Landsat:

  - Other sensors will be added.

- Can be adapted for any location and projection.

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Some basics on IEO

- The defaults are for Ireland and Irish Transverse Mercator (ITM) projection.

- Uses ENVI format for outputs via ENVIfile.py submodule – easier to manage, exploit metadata compared to GeoTIFF, HDF:

  - Band names

  - Wavelength information

  - Temporal data

  - Custom metadata like parent data sets

IEO Python module

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What else does IEO do?

- Stores Landsat image library metadata in a shapefile:

  - Footprints and metadata for all available scenes from the USGS/EROS in the local projection.

  - Local file locations of ingested data.

- These routines are used by IEOtools (https://github.com/Teagasc/IEOtools) to manage our local Landsat archive:

  - Creation of LEDAPS/ LaSRC processing lists for USGS/EROS/ESPA.

  - Ingestion of those data after ESPA processing.

- Can be incorporated with other Python code for output file creation and management.

IEO Python module

Irish Landsat scene catalogue shapefile

IEO provides input data information for Python code

Data	Subdirectory
Surface reflectance	ieo.srdir
Thermal data	ieo.btdir
Cloud and cloud shadow mask	ieo.fmaskdir
NDVI	ieo.ndvidir
EVI	ieo.evidir
Image catalogue	ieo.catdir

Included shapefiles in ITM
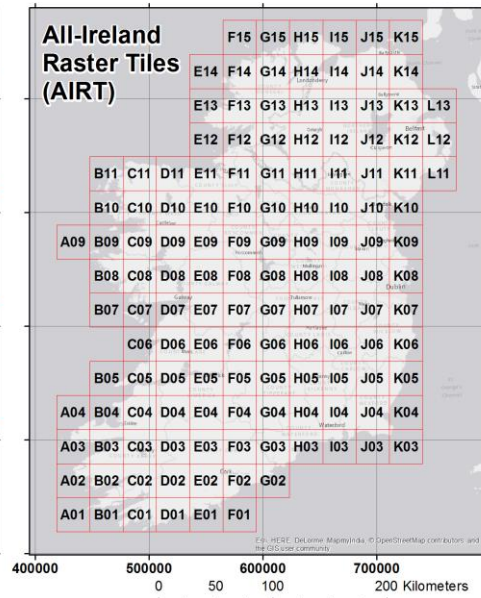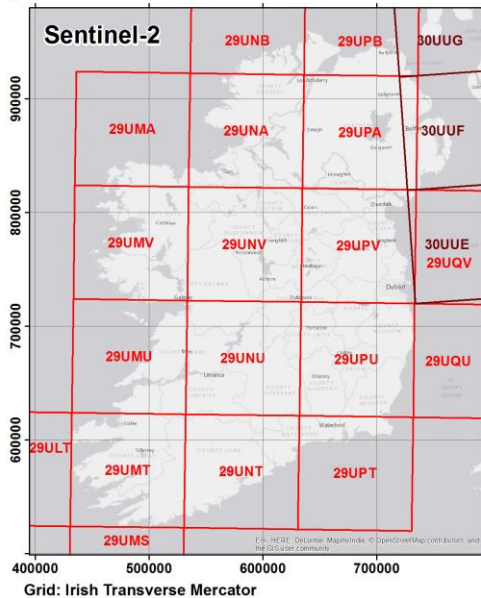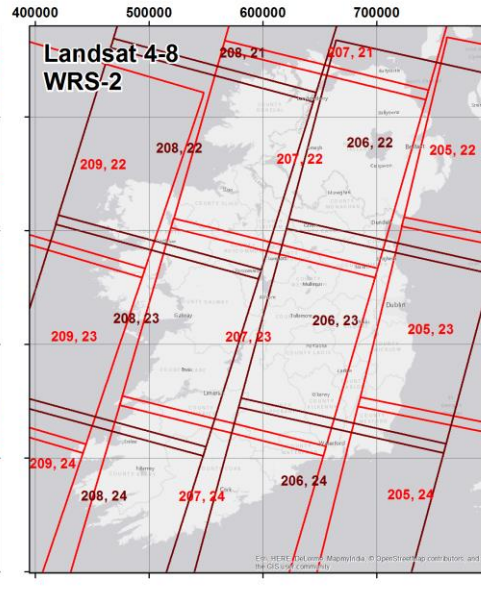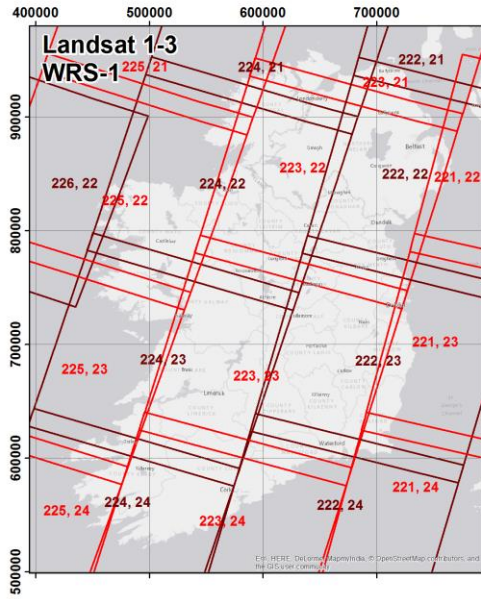
- Landsat WRS-1, WRS-2 path and row locations over Ireland.

- Sentinel-2 tiles.

- All-Ireland Raster Tiles (AIRT, 29 × 30 km grid cells).

Future plans

- Fix bugs with Landsat code.

- Add support for the following data products:

  - MÉRA

  - Sentinel-2 surface reflectance

  - Sentinel-1 SAR data

  - EO-1 Hyperion, ALI

  - Venμs

  - Other sensors

  - DEM

My vision for this module

- I want IEO to be a collaborative project that suits the needs of the Irish and broader EO communities.

- You are all welcome to join me in developing this module on Github:

  - **IEO module: https://github.com/Teagasc/ieo**

  - **IEOtools: https://github.com/Teagasc/IEOtools**