

Tip of the Week

Thursday, November 6th, 2014

November 6, 2014

Tip: Remote Sensing Utilities

GDAL

Command Line Utilities

- ▶ Useful for almost all preprocessing

Command Line Utilities

- ▶ Useful for almost all preprocessing
 - ▶ Metadata: `gdalinfo`

Command Line Utilities

- ▶ Useful for almost all preprocessing
 - ▶ Metadata: `gdalinfo`
 - ▶ Reproject: `gdalwarp`

Command Line Utilities

- ▶ Useful for almost all preprocessing
 - ▶ Metadata: `gdalinfo`
 - ▶ Reproject: `gdalwarp`
 - ▶ Format conversion: `gdal_translate`

Command Line Utilities

- ▶ Useful for almost all preprocessing
 - ▶ Metadata: `gdalinfo`
 - ▶ Reproject: `gdalwarp`
 - ▶ Format conversion: `gdal_translate`
 - ▶ Stack / mosaic: `gdal_merge.py`

Command Line Utilities

- ▶ Useful for almost all preprocessing
 - ▶ Metadata: `gdalinfo`
 - ▶ Reproject: `gdalwarp`
 - ▶ Format conversion: `gdal_translate`
 - ▶ Stack / mosaic: `gdal_merge.py`
 - ▶ Vector to Raster: `gdal_rasterize`

Command Line Utilities

- ▶ Useful for almost all preprocessing
 - ▶ Metadata: `gdalinfo`
 - ▶ Reproject: `gdalwarp`
 - ▶ Format conversion: `gdal_translate`
 - ▶ Stack / mosaic: `gdal_merge.py`
 - ▶ Vector to Raster: `gdal_rasterize`
- ▶ module load `gdal/1.10.0`

Command Line Utilities

- ▶ Useful for almost all preprocessing
 - ▶ Metadata: `gdalinfo`
 - ▶ Reproject: `gdalwarp`
 - ▶ Format conversion: `gdal_translate`
 - ▶ Stack / mosaic: `gdal_merge.py`
 - ▶ Vector to Raster: `gdal_rasterize`
- ▶ `module load gdal/1.10.0`
- ▶ `http://www.gdal.org/gdal_utilities.html`

Write your own code? Use GDAL API:

- ▶ Python

Write your own code? Use GDAL API:

- ▶ Python

- ▶ `module load gdal/1.10.0 (loads python/2.7.5)`

Write your own code? Use GDAL API:

- ▶ Python

- ▶ `module load gdal/1.10.0 (loads python/2.7.5)`
- ▶ `from osgeo import gdal`

Write your own code? Use GDAL API:

- ▶ Python
 - ▶ `module load gdal/1.10.0` (loads python/2.7.5)
 - ▶ `from osgeo import gdal`
- ▶ R (via `rgdal` and `raster` packages)

Write your own code? Use GDAL API:

- ▶ Python

- ▶ `module load gdal/1.10.0` (loads python/2.7.5)
- ▶ `from osgeo import gdal`

- ▶ R (via rgdal and raster packages)

- ▶ `module load R-earth/3.1.0`

Write your own code? Use GDAL API:

- ▶ Python

- ▶ `module load gdal/1.10.0` (loads python/2.7.5)
- ▶ `from osgeo import gdal`

- ▶ R (via rgdal and raster packages)

- ▶ `module load R_earth/3.1.0`
- ▶ `library(raster)`

Write your own code? Use GDAL API:

- ▶ Python

- ▶ `module load gdal/1.10.0` (loads python/2.7.5)
- ▶ `from osgeo import gdal`

- ▶ R (via rgdal and raster packages)

- ▶ `module load R_earth/3.1.0`
- ▶ `library(raster)`

- ▶ C/C++:

Write your own code? Use GDAL API:

- ▶ Python

- ▶ `module load gdal/1.10.0` (loads python/2.7.5)
- ▶ `from osgeo import gdal`

- ▶ R (via rgdal and raster packages)

- ▶ `module load R_earth/3.1.0`
- ▶ `library(raster)`

- ▶ C/C++:

- ▶ `module load gdal/1.10.0`

Write your own code? Use GDAL API:

- ▶ Python

- ▶ `module load gdal/1.10.0` (loads python/2.7.5)
- ▶ `from osgeo import gdal`

- ▶ R (via rgdal and raster packages)

- ▶ `module load R_earth/3.1.0`
- ▶ `library(raster)`

- ▶ C/C++:

- ▶ `module load gdal/1.10.0`
- ▶ `#include "gdal.h"`

Write your own code? Use GDAL API:

- ▶ Python

- ▶ `module load gdal/1.10.0 (loads python/2.7.5)`
- ▶ `from osgeo import gdal`

- ▶ R (via rgdal and raster packages)

- ▶ `module load R_earth/3.1.0`
- ▶ `library(raster)`

- ▶ C/C++:

- ▶ `module load gdal/1.10.0`
- ▶ `#include "gdal.h"`
- ▶ GDAL_LIB and GDAL_INC paths

OGR

Command Line Utilities

▶ ogrinfo

Command Line Utilities

- ▶ ogrinfo

- ▶ Basic information: `ogrinfo -so -al vector.shp`

Command Line Utilities

- ▶ ogrinfo

- ▶ Basic information: `ogrinfo -so -al vector.shp`
- ▶ Simple queries: `ogrinfo -al -where "FEATURE > 5" vector.shp`

Command Line Utilities

- ▶ ogrinfo
 - ▶ Basic information: `ogrinfo -so -al vector.shp`
 - ▶ Simple queries: `ogrinfo -al -where "FEATURE > 5" vector.shp`
 - ▶ SQL for more advanced queries (`-sql`)

Command Line Utilities

▶ ogrinfo

- ▶ Basic information: `ogrinfo -so -al vector.shp`
- ▶ Simple queries: `ogrinfo -al -where "FEATURE > 5" vector.shp`
- ▶ SQL for more advanced queries (`-sql`)
- ▶ Combine with `grep`, `wc`, etc. . . to quickly summarize vector data

Command Line Utilities

- ▶ ogrinfo
 - ▶ Basic information: `ogrinfo -so -al vector.shp`
 - ▶ Simple queries: `ogrinfo -al -where "FEATURE > 5" vector.shp`
 - ▶ SQL for more advanced queries (`-sql`)
 - ▶ Combine with `grep`, `wc`, etc. ... to quickly summarize vector data
- ▶ ogr2ogr

Command Line Utilities

▶ ogrinfo

- ▶ Basic information: `ogrinfo -so -al vector.shp`
- ▶ Simple queries: `ogrinfo -al -where "FEATURE > 5" vector.shp`
- ▶ SQL for more advanced queries (`-sql`)
- ▶ Combine with `grep`, `wc`, etc... to quickly summarize vector data

▶ ogr2ogr

- ▶ Format conversion: `ogr2ogr -f KML vector.kml vector.shp`

Command Line Utilities

▶ ogrinfo

- ▶ Basic information: `ogrinfo -so -al vector.shp`
- ▶ Simple queries: `ogrinfo -al -where "FEATURE > 5" vector.shp`
- ▶ SQL for more advanced queries (`-sql`)
- ▶ Combine with `grep`, `wc`, etc... to quickly summarize vector data

▶ ogr2ogr

- ▶ Format conversion: `ogr2ogr -f KML vector.kml vector.shp`
- ▶ Reproject: `ogr2ogr -t_srs "EPSG:4326" vector_wgs84.shp vector.shp`

Command Line Utilities

▶ ogrinfo

- ▶ Basic information: `ogrinfo -so -al vector.shp`
- ▶ Simple queries: `ogrinfo -al -where "FEATURE > 5" vector.shp`
- ▶ SQL for more advanced queries (`-sql`)
- ▶ Combine with `grep`, `wc`, etc... to quickly summarize vector data

▶ ogr2ogr

- ▶ Format conversion: `ogr2ogr -f KML vector.kml vector.shp`
- ▶ Reproject: `ogr2ogr -t_srs "EPSG:4326" vector_wgs84.shp vector.shp`
- ▶ Merge: `ogr2ogr -append combined.shp part2.shp`

Command Line Utilities

- ▶ `ogrinfo`
 - ▶ Basic information: `ogrinfo -so -al vector.shp`
 - ▶ Simple queries: `ogrinfo -al -where "FEATURE > 5" vector.shp`
 - ▶ SQL for more advanced queries (`-sql`)
 - ▶ Combine with `grep`, `wc`, etc... to quickly summarize vector data
- ▶ `ogr2ogr`
 - ▶ Format conversion: `ogr2ogr -f KML vector.kml vector.shp`
 - ▶ Reproject: `ogr2ogr -t_srs "EPSG:4326" vector_wgs84.shp vector.shp`
 - ▶ Merge: `ogr2ogr -append combined.shp part2.shp`
- ▶ http://www.gdal.org/ogr_utilities.html

QGIS

- ▶ On par with ArcGIS in some regards, better than in most.

- ▶ On par with ArcGIS in some regards, better than in most.
- ▶ Built on GDAL/OGR

- ▶ On par with ArcGIS in some regards, better than in most.
- ▶ Built on GDAL/OGR
- ▶ QGIS vs ENVI

- ▶ On par with ArcGIS in some regards, better than in most.
- ▶ Built on GDAL/OGR
- ▶ QGIS vs ENVI
- ▶ Plugin architecture

- ▶ On par with ArcGIS in some regards, better than in most.
- ▶ Built on GDAL/OGR
- ▶ QGIS vs ENVI
- ▶ Plugin architecture
- ▶ `module load qgis/2.0.1`

Landsat Data

Bulk Download Application for L1 products:

- ▶ `module load bda/1.1.2`

Bulk Download Application for L1 products:

- ▶ `module load bda/1.1.2`
- ▶ Use qsh session for big downloads – very CPU intensive!

Bulk Download Application for L1 products:

- ▶ `module load bda/1.1.2`
- ▶ Use qsh session for big downloads – very CPU intensive!
- ▶ Updating is grief inducing... ask IT if update is required

Preprocess

Parallel SR / Fmask for Landsat 4, 5, 7, and 8 in one command:

- ▶ `module load batch_landsat/v4`

Preprocess

Parallel SR / Fmask for Landsat 4, 5, 7, and 8 in one command:

- ▶ `module load batch_landsat/v4`
- ▶ `landsatPrepSubmit.sh -h`

Preprocess

Parallel SR / Fmask for Landsat 4, 5, 7, and 8 in one command:

- ▶ `module load batch_landsat/v4`
- ▶ `landsatPrepSubmit.sh -h`
- ▶ Surface reflectance only suggested for Landsat 8 (as of Nov 6th, 2014)

Preprocess

Parallel SR / Fmask for Landsat 4, 5, 7, and 8 in one command:

- ▶ `module load batch_landsat/v4`
- ▶ `landsatPrepSubmit.sh -h`
- ▶ Surface reflectance only suggested for Landsat 8 (as of Nov 6th, 2014)
 - ▶ LEDAPS for Landsat 4/5/7 from ESPA

Preprocess

Parallel SR / Fmask for Landsat 4, 5, 7, and 8 in one command:

- ▶ `module load batch_landsat/v4`
- ▶ `landsatPrepSubmit.sh -h`
- ▶ Surface reflectance only suggested for Landsat 8 (as of Nov 6th, 2014)
 - ▶ LEDAPS for Landsat 4/5/7 from ESPA
 - ▶ Landsat 8 version still in development

Preprocess

Parallel SR / Fmask for Landsat 4, 5, 7, and 8 in one command:

- ▶ `module load batch_landsat/v4`
- ▶ `landsatPrepSubmit.sh -h`
- ▶ Surface reflectance only suggested for Landsat 8 (as of Nov 6th, 2014)
 - ▶ LEDAPS for Landsat 4/5/7 from ESPA
 - ▶ Landsat 8 version still in development
 - ▶ We have ancillary data until 2014 DOY 282

Preprocess

Parallel SR / Fmask for Landsat 4, 5, 7, and 8 in one command:

- ▶ `module load batch_landsat/v4`
- ▶ `landsatPrepSubmit.sh -h`
- ▶ Surface reflectance only suggested for Landsat 8 (as of Nov 6th, 2014)
 - ▶ LEDAPS for Landsat 4/5/7 from ESPA
 - ▶ Landsat 8 version still in development
 - ▶ We have ancillary data until 2014 DOY 282
- ▶ See tutorial from May 2014

Timeseries interactive visualization in QGIS:

- ▶ “Stable” - `module load CCDCTools/latest`

Timeseries interactive visualization in QGIS:

- ▶ “Stable” - `module load CCDCTools/latest`
- ▶ “Development” - `module load CCDCTools/_beta`

Version control system (VCS)

- ▶ Usable version on GEO/SCC

- ▶ Usable version on GEO/SCC
- ▶ Cannot push / pull using HTTPS

- ▶ Usable version on GEO/SCC
- ▶ Cannot push / pull using HTTPS
- ▶ Must generate crypto keypair and give Github your public key

- ▶ Usable version on GEO/SCC
- ▶ Cannot push / pull using HTTPS
- ▶ Must generate crypto keypair and give Github your public key
- ▶ <https://help.github.com/categories/ssh/>

Reproducibility

IPython Notebook

Use Python? Want to share or explain your work, or just save and document your explorations?

- ▶ Nature: Interactive notebooks: Sharing the code
(doi:10.1038/515151a)

IPython Notebook

Use Python? Want to share or explain your work, or just save and document your explorations?

- ▶ Nature: Interactive notebooks: Sharing the code
(doi:10.1038/515151a)
- ▶ On GEO:

IPython Notebook

Use Python? Want to share or explain your work, or just save and document your explorations?

- ▶ Nature: Interactive notebooks: Sharing the code
(doi:10.1038/515151a)
- ▶ On GEO:
 - ▶ `module load python/2.7.5`

IPython Notebook

Use Python? Want to share or explain your work, or just save and document your explorations?

- ▶ Nature: Interactive notebooks: Sharing the code
(doi:10.1038/515151a)
- ▶ On GEO:
 - ▶ `module load python/2.7.5`
 - ▶ `ipython notebook`

IPython Notebook

Use Python? Want to share or explain your work, or just save and document your explorations?

- ▶ Nature: Interactive notebooks: Sharing the code
(doi:10.1038/515151a)
- ▶ On GEO:
 - ▶ `module load python/2.7.5`
 - ▶ `ipython notebook`
 - ▶ Remember the port it uses!

IPython Notebook

Use Python? Want to share or explain your work, or just save and document your explorations?

- ▶ Nature: Interactive notebooks: Sharing the code
(doi:10.1038/515151a)
- ▶ On GEO:
 - ▶ `module load python/2.7.5`
 - ▶ `ipython notebook`
 - ▶ Remember the port it uses!
- ▶ Locally:

IPython Notebook

Use Python? Want to share or explain your work, or just save and document your explorations?

- ▶ Nature: Interactive notebooks: Sharing the code (doi:10.1038/515151a)
- ▶ On GEO:
 - ▶ `module load python/2.7.5`
 - ▶ `ipython notebook`
 - ▶ Remember the port it uses!
- ▶ Locally:
 - ▶ `ssh -L [local port]:localhost:[remote port]
[user]@geo.bu.edu`

IPython Notebook

Use Python? Want to share or explain your work, or just save and document your explorations?

- ▶ Nature: Interactive notebooks: Sharing the code
(doi:10.1038/515151a)
- ▶ On GEO:
 - ▶ `module load python/2.7.5`
 - ▶ `ipython notebook`
 - ▶ Remember the port it uses!
- ▶ Locally:
 - ▶ `ssh -L [local port]:localhost:[remote port]
[user]@geo.bu.edu`
 - ▶ Visit `localhost:[port]` in browser

IPython Notebook

Use Python? Want to share or explain your work, or just save and document your explorations?

- ▶ Nature: Interactive notebooks: Sharing the code (doi:10.1038/515151a)
- ▶ On GEO:
 - ▶ `module load python/2.7.5`
 - ▶ `ipython notebook`
 - ▶ Remember the port it uses!
- ▶ Locally:
 - ▶ `ssh -L [local port]:localhost:[remote port] [user]@geo.bu.edu`
 - ▶ Visit `localhost:[port]` in browser
- ▶ Secure your notebook session

Installed as part of RStudio!