Create Sentinel-1 Coverage Maps Workflow

InSAR Team, April 2018

1. create_S1_zipfile_list.bash

- Get list of all SLC zip files in the archive @ 'today'
- Includes yyyy-mm and grid directory location in list (for GAMMA processing later)
- Option to compare with a previous zip file list, so only new zip files are retrieved
- Creates `Sentinel-1_archive/SLC/'today'_SLC_lists` directory
  - `zip_list_name_errors_SLC_'today'` (any zip files with name errors)
  - `all_files_list_SLC_'today'` (all files in each dir *.png, *.zip, *.xml)
  - `all_zip_list_SLC_'today'` (*.zip files only)
  - `zip_list_IW_SLC_'today'` (IW zip files)
  - `zip_list_SM_SLC_'today'` (SM zip files)
  - `zip_list_WV_SLC_'today'` (WV zip files)
  - `zip_list_EW_SLC_'today'` (EW zip files)

2. create_S1_pbs_jobs.bash

- Split `zip_list_<IW or SM>_SLC_'today'` into yyyy-mm lists (pseudo parallel processing)
- Creates `Sentinel-1_archive/SLC/'today'_<IW or SM>_SLC_shapefiles` directory
  - Creates yyyy-mm directory for each list and corresponding PBS job
- Create and auto start PBS jobs that call `create_S1_SLC_shapefiles.py`
- *.e* and *.o* files are customised to enable easy identification of problem zip files

`create_S1_SLC_shapefiles.py`

- Uses 'pyshp' python library
- Creates a shapefile with polygons for each zip file
- Attribute data extracted from xml and kml files
- Calculates relative orbit number using a formula

3. collate_S1_results.bash

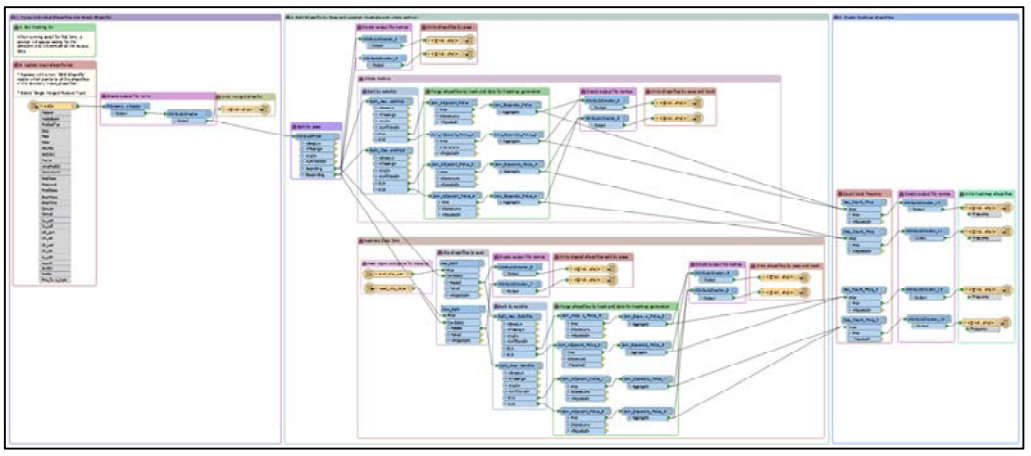
- Collate all shapefiles into a single directory

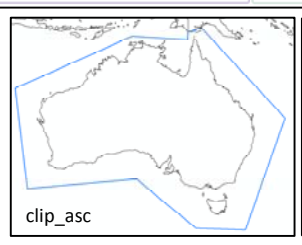
4. Copy directory to GA network

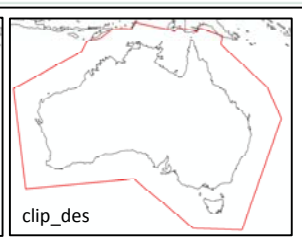
- Add to 'input_shapefiles' directory
- Copy 'all' shapefile created from previous heat map generation process into this directory

5. Use FME to count frequency of overlapping polygons

- `S1_SLC_shapefiles_create_archive-map_heatmaps.fmw`
  1. Assign working directory to enable auto generation of output file names
  2. Combine shapefiles into single shapefile
  3. Split by 'ascending' and 'descending' passes
  4. For 'Australia only' region, crop passes by pre-determined shapefiles (clip_asc, clip_des)
  5. Split whole archive and 'Australia only' by satellite (S1A and S1B), merge tracks and date to create 'tracks' from scene polygons
  6. Count track frequency
- Output polygon shapefiles:
  - `Sentinel-1_<IW or SM>_coverage_'today'_all`
  - `Sentinel-1_<IW or SM>_coverage_'today'_asc_all`
  - `Sentinel-1_<IW or SM>_coverage_'today'_asc_aust`
  - `Sentinel-1_<IW or SM>_coverage_'today'_asc_all_tracks`
  - `Sentinel-1_<IW or SM>_coverage_'today'_asc_aust_tracks`
  - `Sentinel-1_<IW or SM>_coverage_'today'_asc_all_heatmaps`
  - `Sentinel-1_<IW or SM>_coverage_'today'_asc_aust_heatmaps`
  - `Sentinel-1_<IW or SM>_coverage_'today'_des_all`
  - `Sentinel-1_<IW or SM>_coverage_'today'_des_aust`
  - `Sentinel-1_<IW or SM>_coverage_'today'_des_all_tracks`
  - `Sentinel-1_<IW or SM>_coverage_'today'_des_aust_tracks`
  - `Sentinel-1_<IW or SM>_coverage_'today'_des_all_heatmaps`
  - `Sentinel-1_<IW or SM>_coverage_'today'_des_aust_heatmaps`





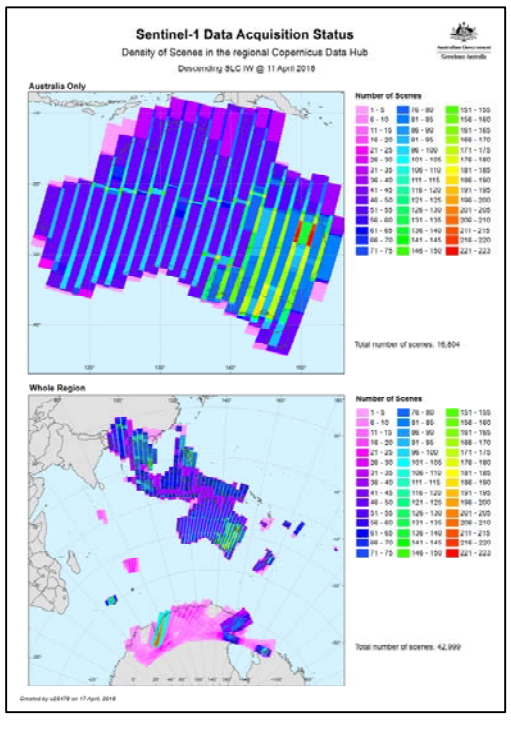


Use FME as ArcGIS is extremely slow and can't cope with the large data volume.

FME took ~12 hrs to run above workflow. Can be split into parts, but requires more intervention to apply output file names. The above is automated as much as possible.

6. Create Coverage Maps

- Add 'heatmap' shapefiles to templates
- Update symbology
- Save as png files
- Create PDF by combining png files



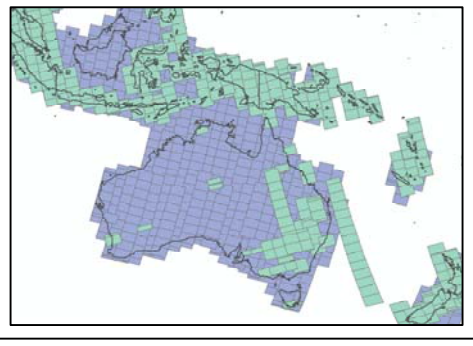
7. Create ArcGIS query map

- Add shapefiles to ArGIS map for searching

GAMMA Processing

- From Attribute Table, create list of zip files to copy
- Provide list to GAMMA workflow and it automatically copies the zip files
  - Needs grid directory locations for each zip file to do this

For GAMMA, need bulk copy of zip files to NCI processing directory



```
20161120  00N120E-05S125E  S1B_IW_SLC__1SSV_20161120T100951_20161120T101018_003040_0052B9_5185.zip
20170910  05N095E-00N100E  S1A_IW_SLC__1SDV_20170910T115038_20170910T115105_018313_01ECE1_C9AC.zip
```