SNAP2StaMPS v2:
Increasing Features and Supported Sensors in the Open Source SNAP2StaMPS Processing Scheme

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SNAP2StaMPS – What is it for?

SNAP2StaMPS:

- Open source package
- Python wrapper for the execution of SNAP graphs
- Enabled the SNAP user community to generate single master/reference DINSAR data compatible with StaMPS for PSI processing

- It was created to fulfill the need of the greatest user community seeking for open source software to use as InSAR processor for PSI.

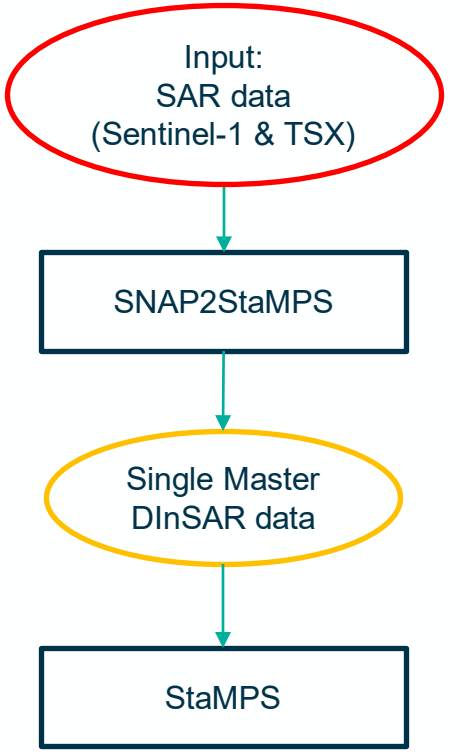
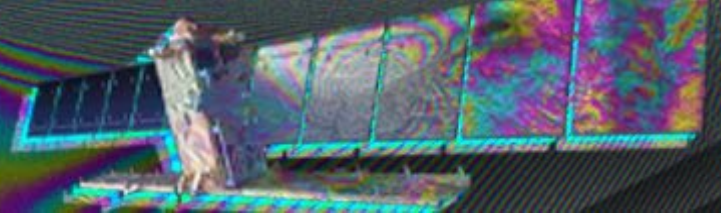


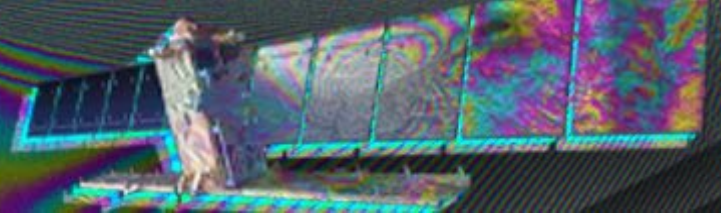
Fig.1: General workflow of SNAP2StaMPS

Why SNAP2StaMPS v2?



- → Continuing to support the SNAP user community
  - → Research, publications, courses, (online) trainings, universities
- → SNAP2StaMPS v1 became outdated as it was released in July 2018
  - → Developed using python 2.7 and SNAP v6
- → Includes more features (subwath merging, plotting, disk optimisation, and more)
- → Extends the list of sensors supported (Stripmap format) including and enhancing the TSX2StaMPS package (https://github.com/jziemer1996/TSX2StaMPS) that was developed based on SNAP2StaMPS v1
- → Easing the installation and execution of the SNAP2StaMPS package

Snap2StaMPS – New release



New release features (selection):

- SNAP2StaMPS update to **Python 3.11 and SNAP v9.0**
- Autorun script to automate full processing steps
  - Scripts can still be run in a step-by-step mode
- Support to Sentinel-1 IW **multi-subswath** processing (until now only single swath)
- Support **single burst** Sentinel-1 processing (smart)
- Support to **TerraSAR-X Stripmap** data with DEM-assisted coregistration
- Support to BBOX, WKT, SHP, KML, GeoJSON formats for AOI definition
- Support to **External DEM** usage (DEM preparation routines not included)
- **Plotting** subsets, coregistered slcs and ifgs
- Smart options for **disk optimization**
- Sentinel-1 data **autodownload** (currently from ASF)

Snap2StaMPS – New release

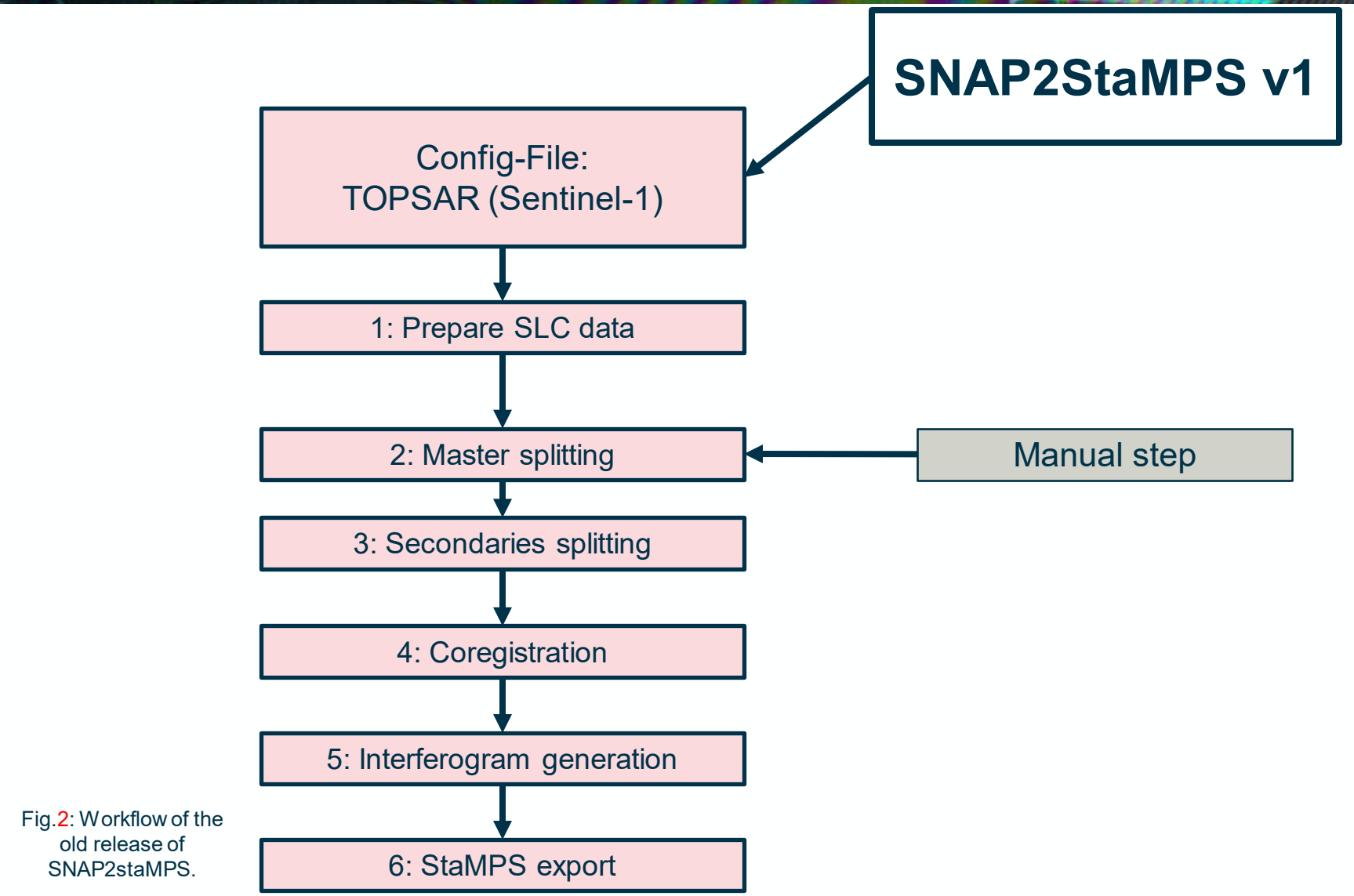


Fig.2: Workflow of the old release of SNAP2staMPS.

Snap2StaMPS – New release

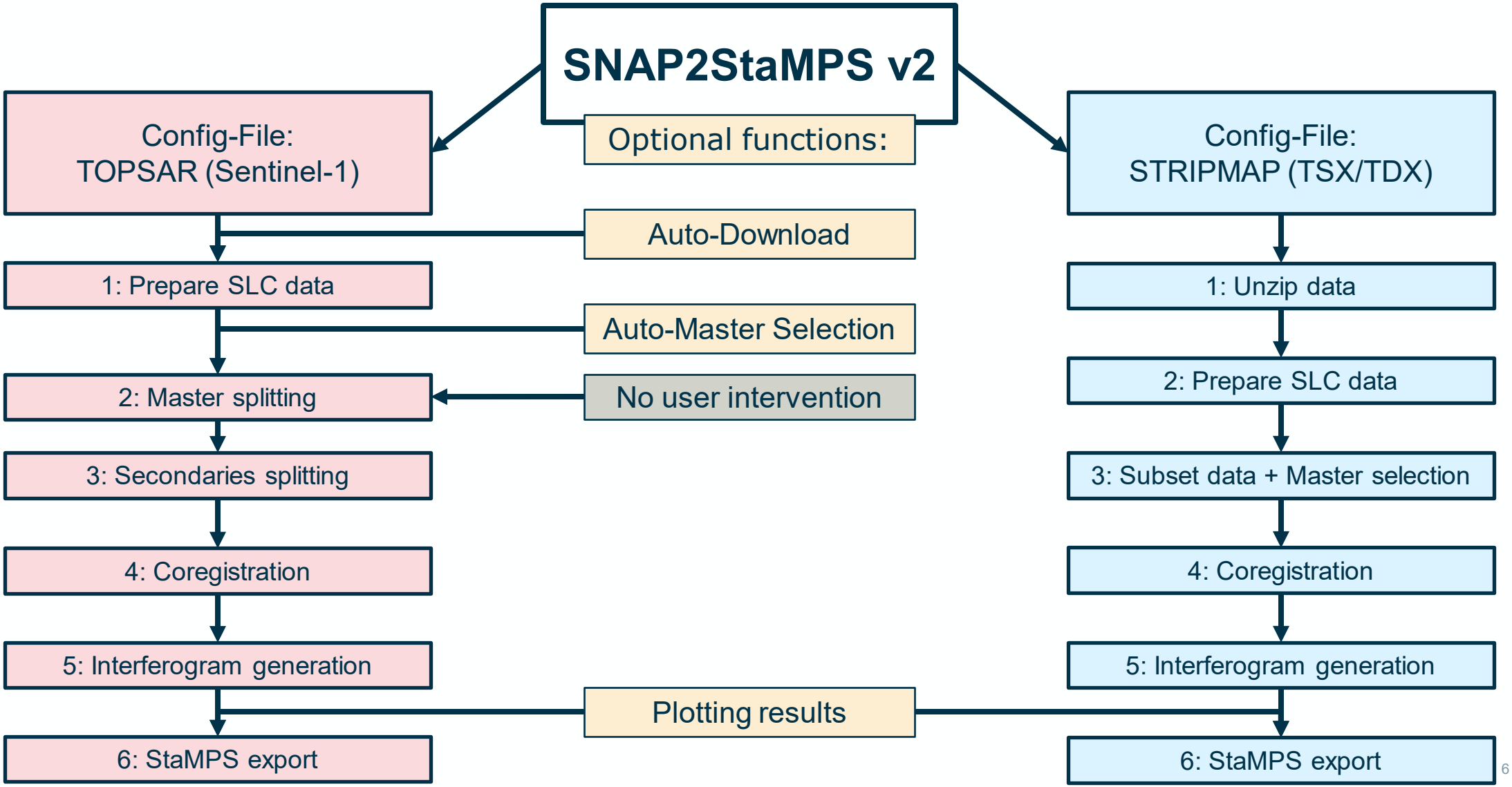
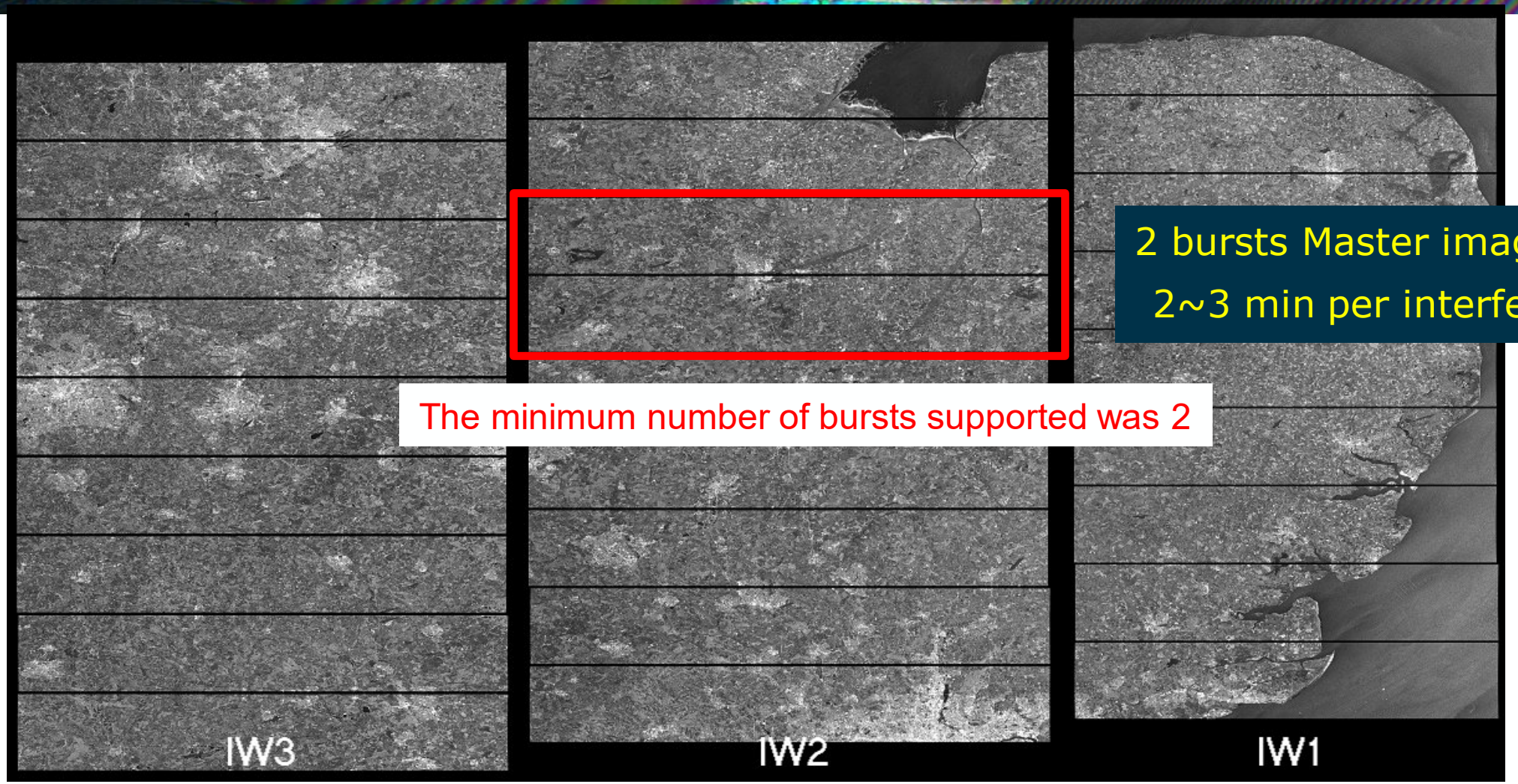


Fig.3: Workflow of the new release of SNAP2staMPS.

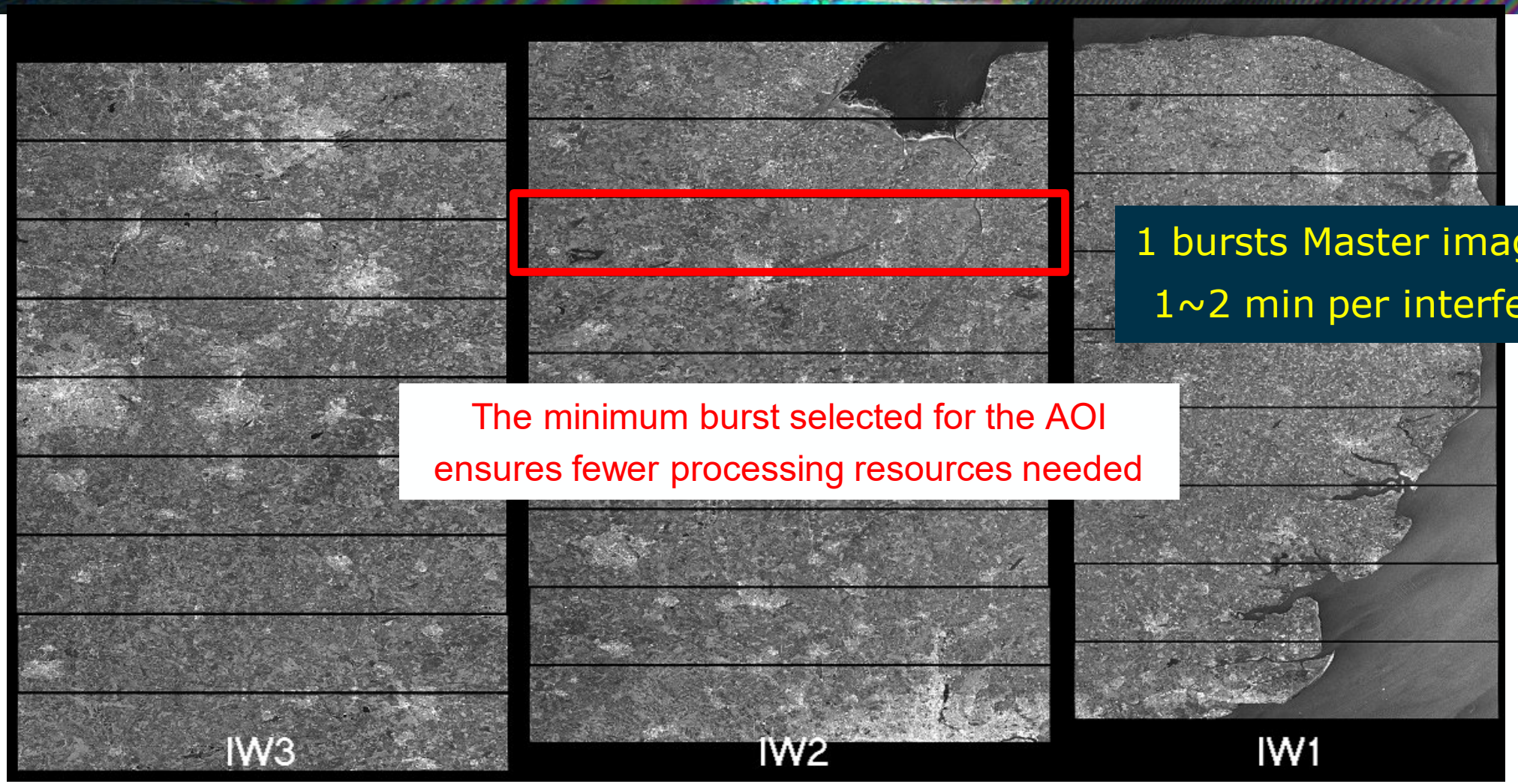
Master subsetting (v1)



2 bursts Master image needs
2~3 min per interferogram

The minimum number of bursts supported was 2

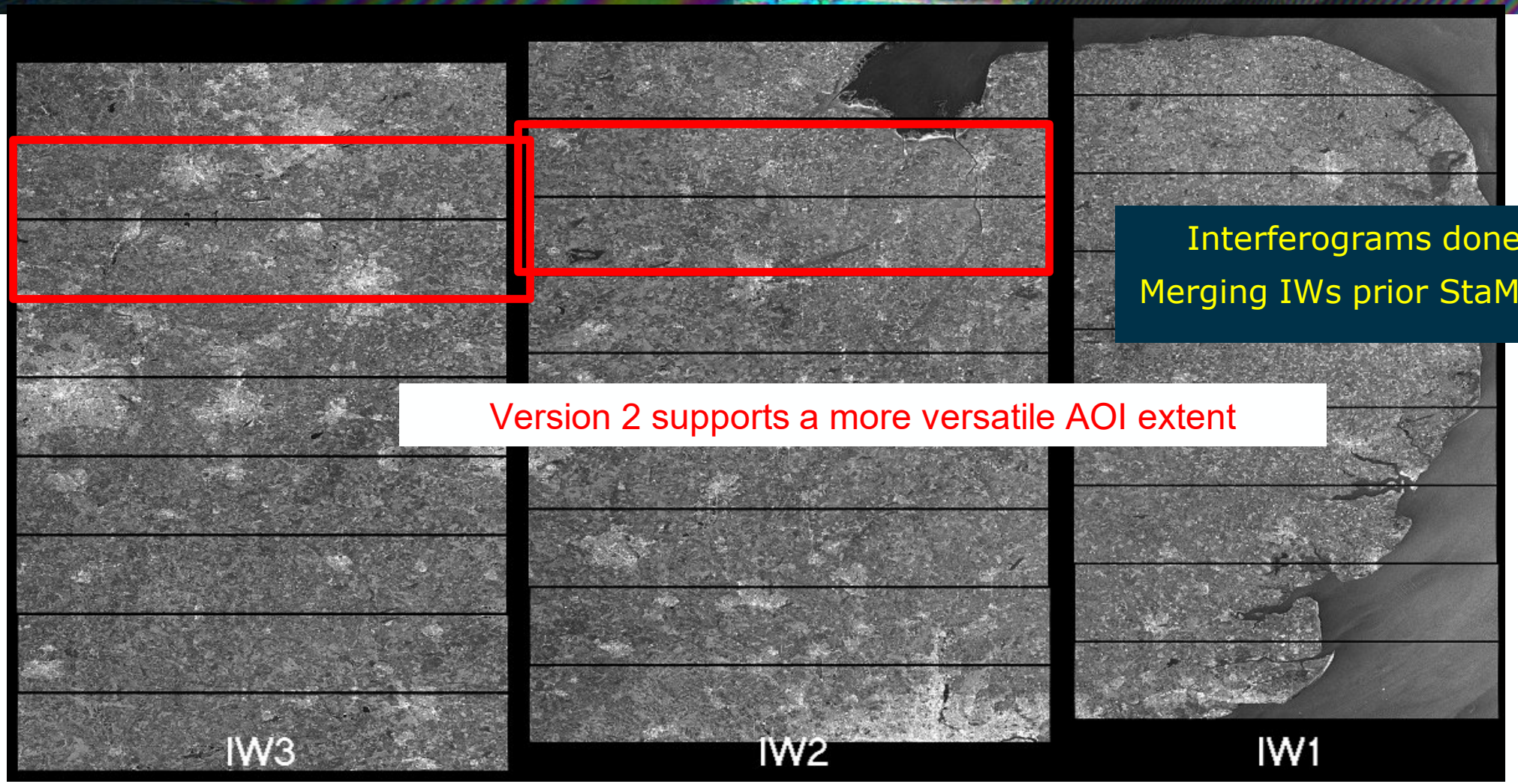
Master subsetting (v2)



1 bursts Master image needs
1~2 min per interferogram

The minimum burst selected for the AOI
ensures fewer processing resources needed

Master subsetting (v2)



Interferograms done by IW

Merging IWs prior StaMPS export

Version 2 supports a more versatile AOI extent

Extended support to AOI definition

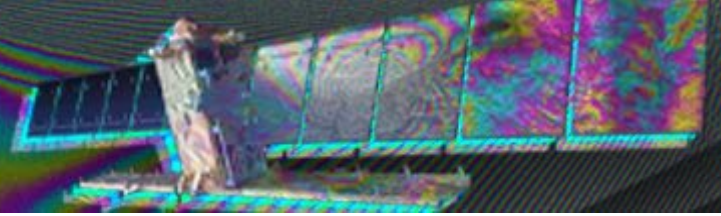
The new version supports:

- Bounding box definition
- Well-Known Text (WKT)
- Shapefile
- KML
- GeoJSON

project.conf

```
##########################################################################
[AOI_DEFINITION]
#AOI_MODE OPTIONS WKT / BBOX / SHP / KML / GeoJSON
AOI_MODE = BBOX
LONMIN = 7.43
LATMIN = 51.20
LONMAX = 7.57
LATMAX = 51.28
WKT = POLYGON((11.997 41.455,11.997 42.294,12.936 42.294,12.936 41.455,11.997 41.455))
AOI_FILE = /tmp/my_aoi.shp
##########################################################################
```

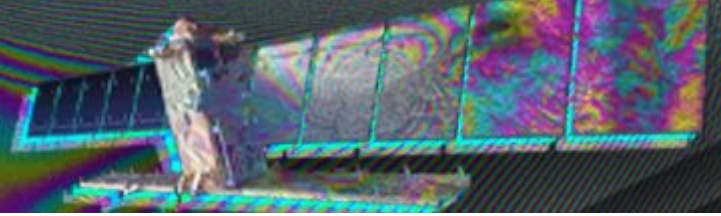
Plotting processed data



It is always recommended to spend some time visualising the data prior exporting the data for StaMPS PSI processing.

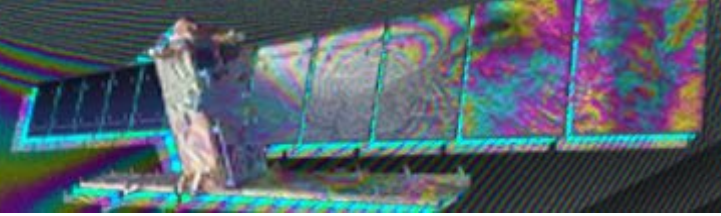
- Identification of possible issues with data / DEM
- In some cases SLC subsetting can produce issues (not totally clear yet why).
    - Possible reason could be that data is acquired near areas of acquisition mode changes IW/EW, and SNAP in some cases fails to proper subset the data.

Configuration file (I/III)



```
##################### TOPSAR CONFIGURATION FILE ####################
####################################################################
[PROJECT_DEFINITION]
PROJECTFOLDER = D:/project
GRAPHSFOLDER = D:/project/graphs
####################################################################
[PROC_OPTIONS]
# Y / N OPTIONS
OVERWRITE = N
SMARTHDD = N
PLOTTING = Y
####################################################################
[PROC_PARAMETERS]
# SENSOR : S1 / TSX / TDX
SENSOR = S1
POLARISATION = VV
MASTER = D:/project/master/
# MASTER SEL : AUTO / FIRST / LAST / MANUAL
MASTERSEL = AUTO
EXTDEM = C:/Users/Desktop/DGM/external_dgm.tif
```

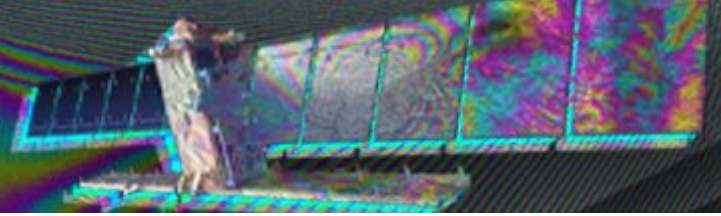
Configuration file (II/III)



```
#####################################################################
[AOI_DEFINITION]
#AOI_MODE OPTIONS WKT / BBOX / SHP / KML / GeoJSON
AOI_MODE = BBOX
LONMIN = 7.43
LATMIN = 51.20
LONMAX = 7.57
LATMAX = 51.28
WKT = POLYGON((11.997 41.455,11.997 42.294,12.936 42.294,12.936 41.455,11.997 41.455))
AOI_FILE = /tmp/my_aoi.shp
#####################################################################
```

```
#####################################################################
[SEARCH_PARAMS]
# autoDownload : Y / N
autoDownload = Y
TRACK = 95
# beamMode : SLC / GRD
beamMode = SLC
# START/ STOP in YYYY-MM-DD
START = 2022-01-01
END = 2022-04-16
# SAT : S1 / S1A / S1B
SAT= S1A
ASF_USER =
ASF_PASS =
# Number of Parallel Downloads (NPD)
[SEARCH_PDOWNLOADS]
NPD = 4
#####################################################################
```

Configuration file (III/III)



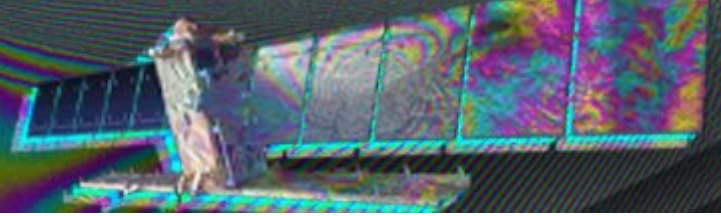
```
#####################################################################
[SNAP_GPT]
SNAP_INSTALLATION_FOLDER = C:/Program Files/snap
SNAP_HOME_DIR = C:/Program Files/.snap
#####################################################################
[COMPUTING_RESOURCES]
CPU = 8
CACHE = 30G
#####################################################################
```

SNAP2StaMPS installation

- Simple steps, for example in Ubuntu:

```
sudo apt update
sudo apt install git libfftw3 libgfortran
git clone https://github.com/mdelgadoblasco/snap2stamps.git
conda env create -f snap2stamps_environment.yml  (includes installation of S1TBX v9.0.2)
```

Test sites:
end to end processing



SNAP2StaMPS–StaMPS PSI Test sites:

- Valencia:
  - ascending track 30
    - 2017/01 until 2018/12
    - 181 SLCs
  - descending track 8
    - 2017/01 until 2018/12
    - 217 SLCs
- Abu Dabi:
  - descending track 166
    - 2018/05 until 2019/04
    - 25 SLCs

TSX2StaMPS PSI Test sites:

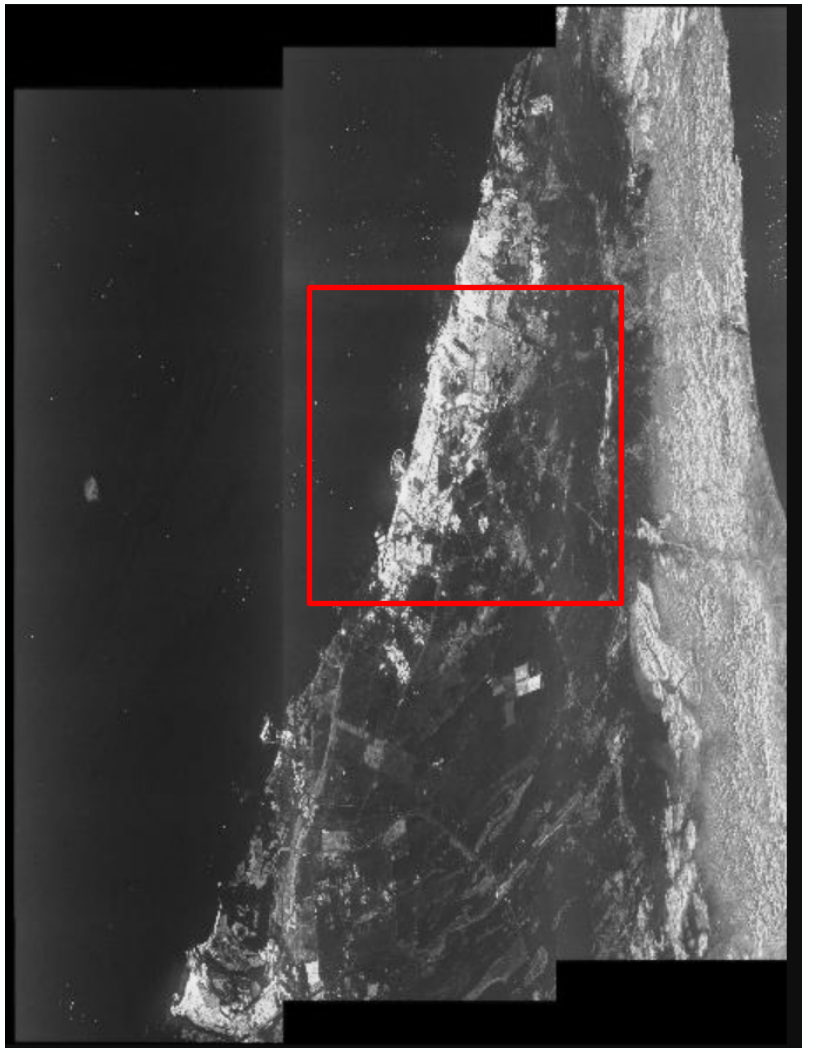
- Various gravity dams in North Rhine-Westphalia, Germany

- 151 SLCs covering a period of almost five years (2017/11-2022/08)

- Ascending track 40

- **TSX2Stamps** used for preprocessing and later PSI processing in StaMPS

SNAP2StaMPS – Example Plots



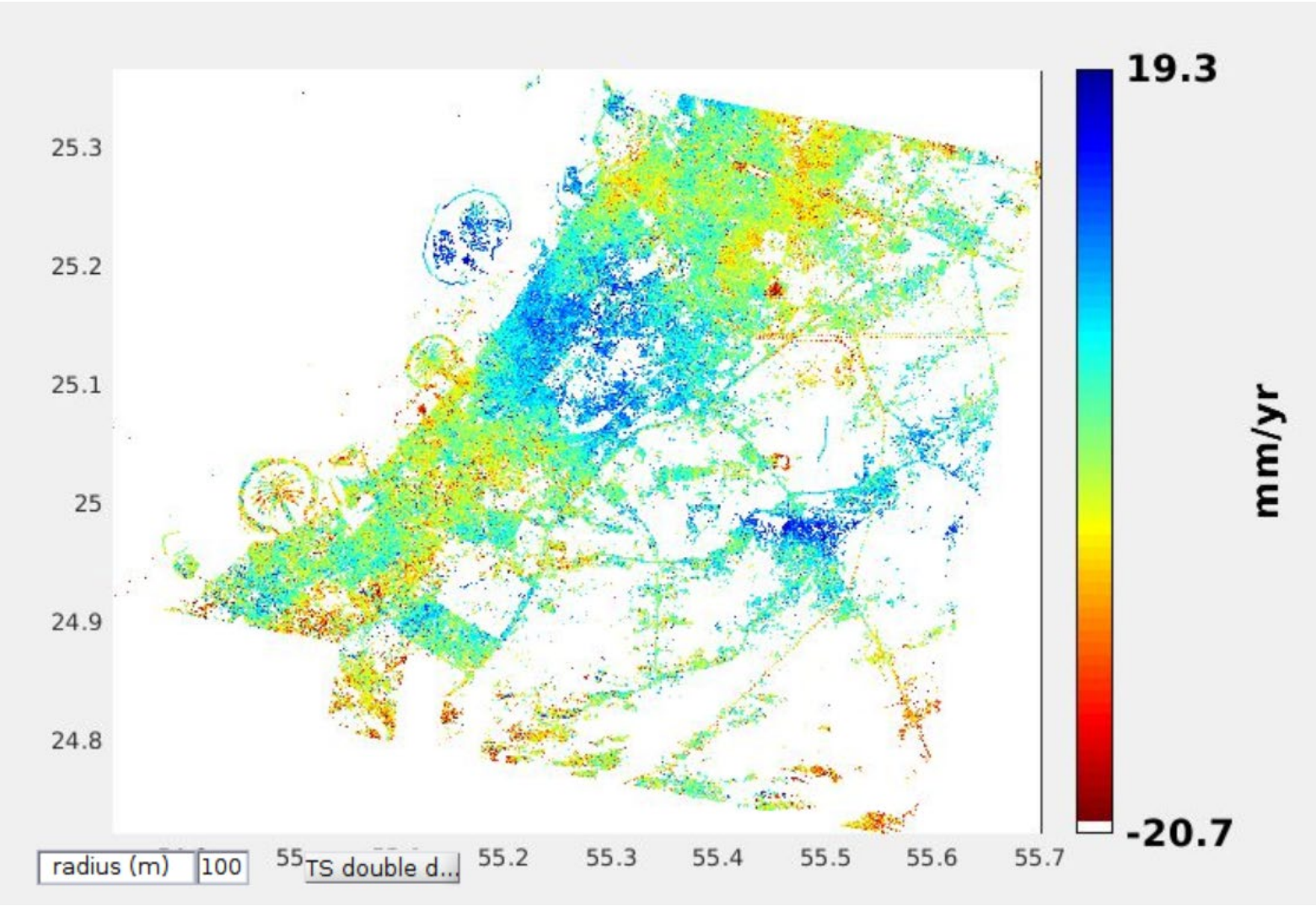


Fig.4: Sentinel-1 IW SLC over Abu Dabi and Dubai(Source: Copernicus Sentinel-1 [2018])

SNAP2StaMPS – Example Plots

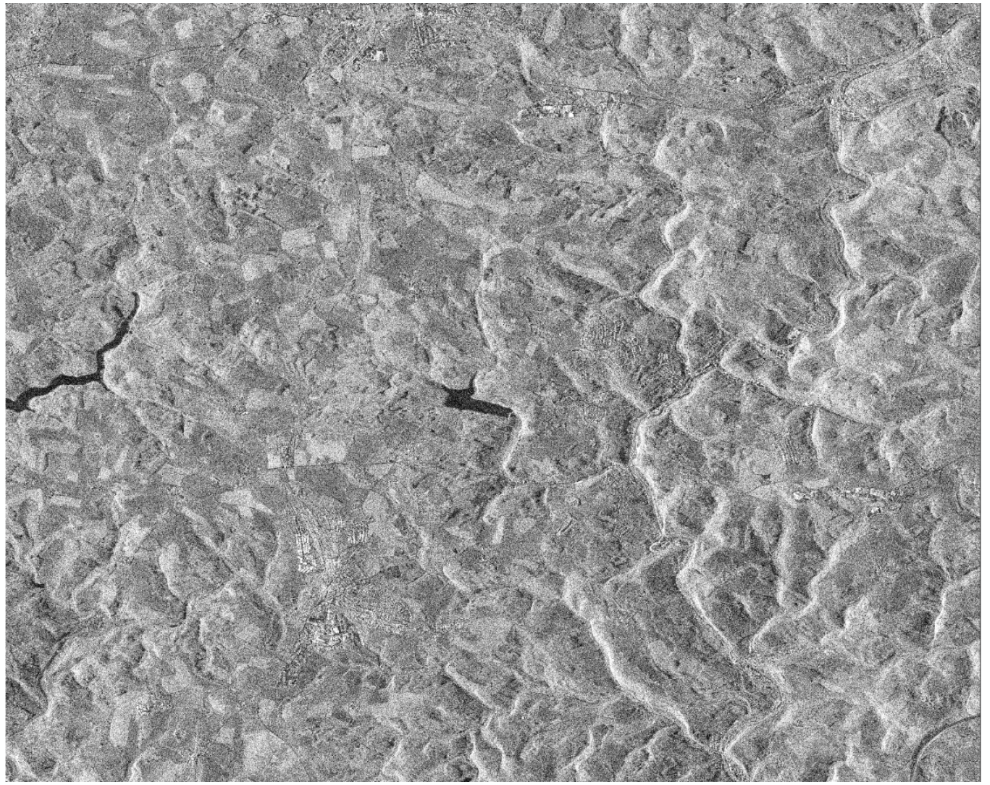


Fig.5: Coregistered TSX SLC image (Datasource: DLR 2022)

End PSI results under publication

Snap2StaMPS – New release

Package is available:

- https://github.com/mdelgadoblasco/snap2stamps

Contributions and feedback are welcome!

snap2stamps Github

Thank you for your attention

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