DIAPOTB

A NEW OPEN SOURCE TOOL FOR DIFFERENTIAL SAR INTERFEROMETRY

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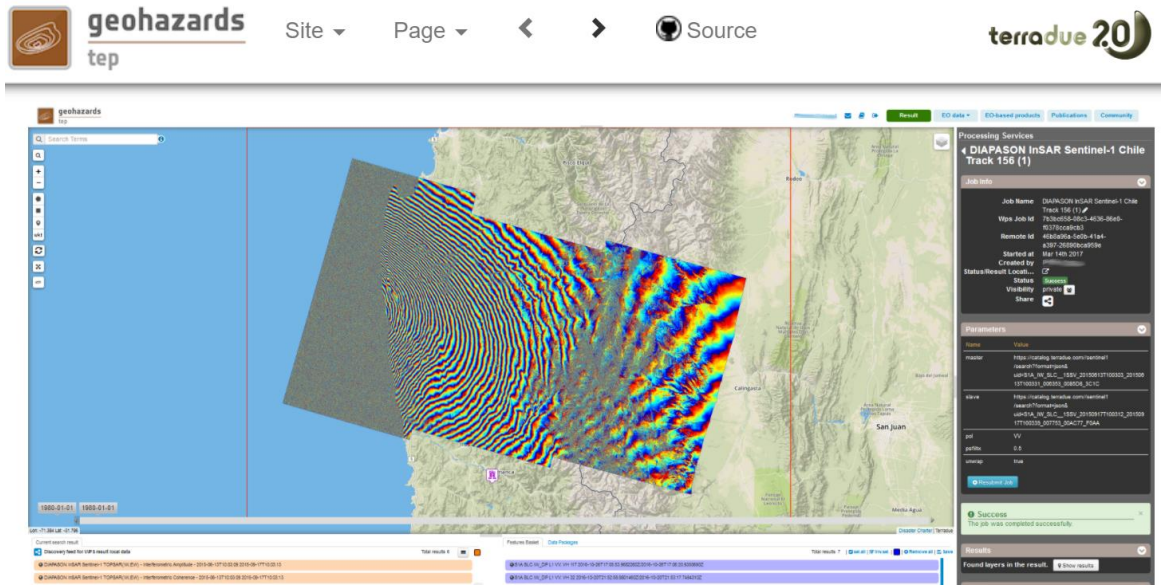
Massonnet et al. 1994

DiapOTB is based on the heritage of CNES DIAPASON s/w maintained by TRE/ALTAMIRA until 2016 and which is still running on GTEP ESA platform in a friendly interface.



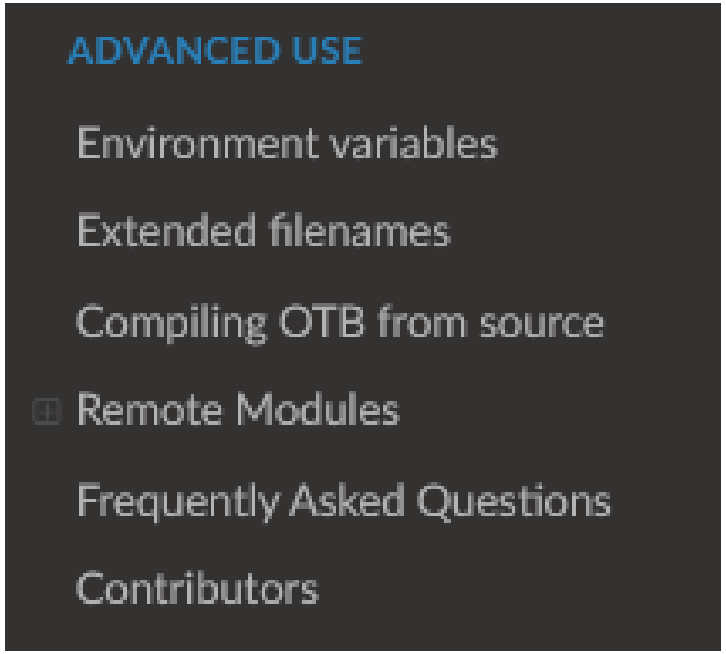
It has become an **open source** s/w in the framework of the **O**rfeo **T**ool**B**ox **(OTB)** offering new SAR modules in this open library

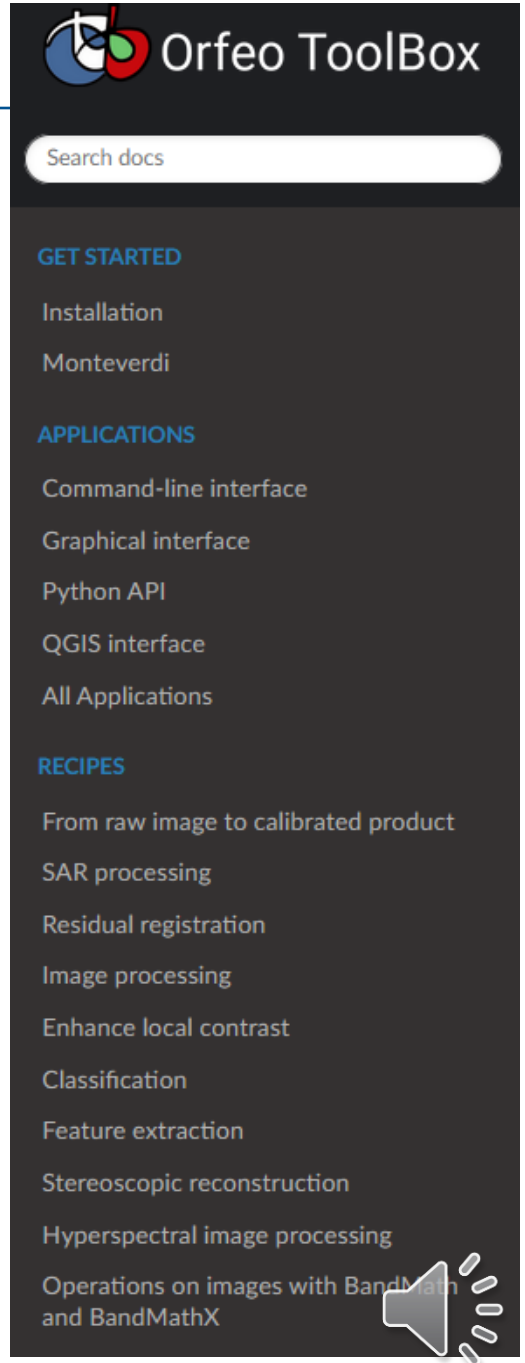
Orfeo ToolBox

DIAPOTB : a remote module in the ready to use binary packages of OTB available for Windows, Linux and Mac

License: Apache License 2.0

https://www.orfeo-toolbox.org/

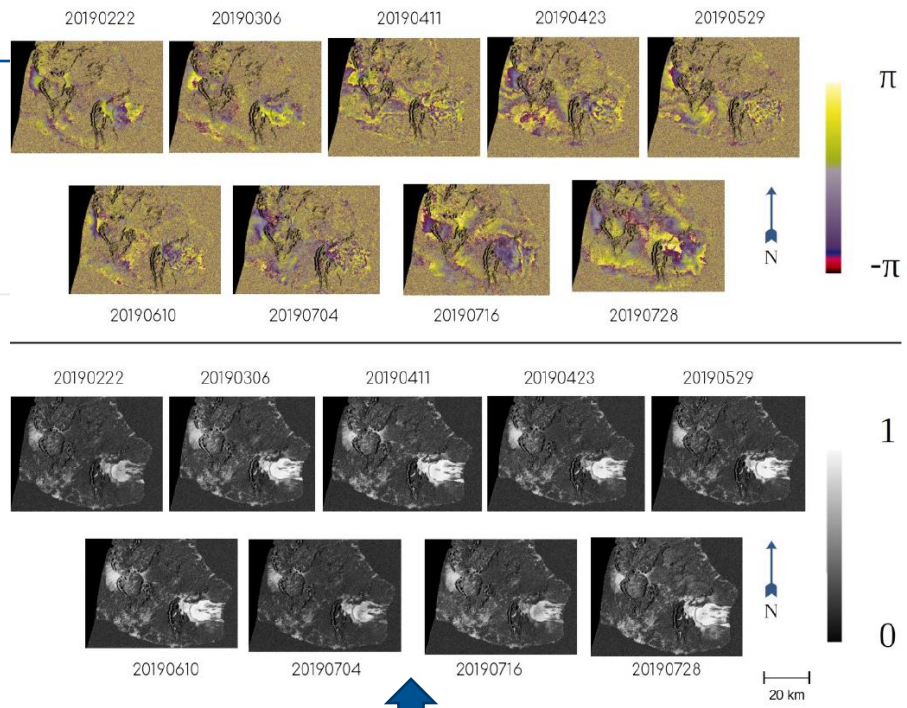




https://gitlab.orfeo-toolbox.org/remote_modules/diapotb/-/wikis/home

https://gitlab.orfeo-toolbox.org/remote_modules/diapotb/-/wikis/ProcessingChains

Available chains and execution

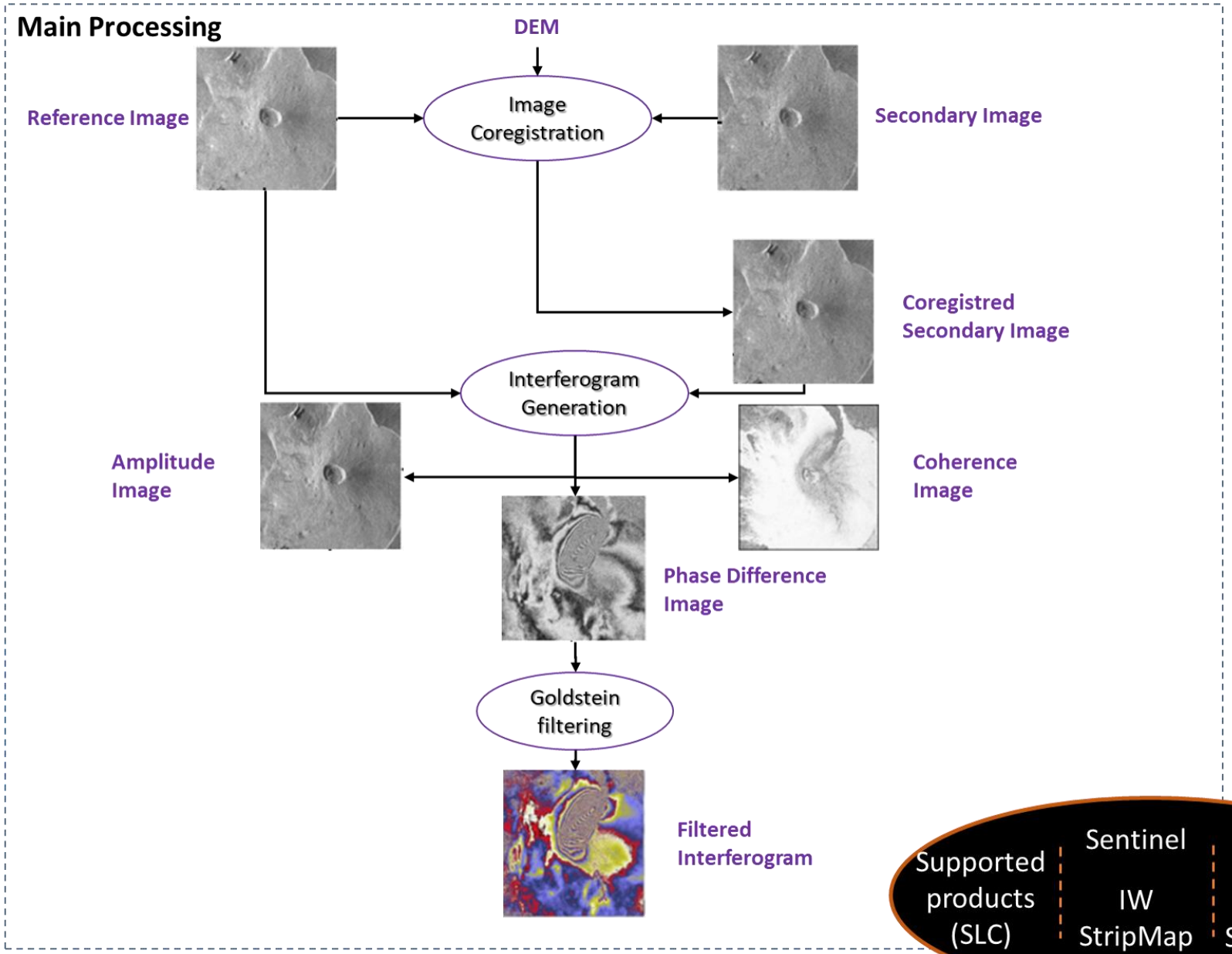


Four kinds of workflows are available according input products and modes :

- diapOTB.py : Single interferometry chain for S1 Stripmap mode and Cosmo
- diapOTB_S1IW.py : Single interferometry chain for S1 IW mode
- SAR_MultiSlc.py : Multitemporal interferometry chain for S1 Stripmap mode and Cosmo
- SAR_MultiSlc_IW.py : Multitemporal interferometry chain for S1 IW mode

All these chains can be executed by following the tutorial.

A Python API was designed to organize python scripts and to help new chain development. In case of existing workflows do not fullfill your needs, you can easily create your own workflow by calling DiapOTB applications.



Main inputs

- Reference Image
- Secondary Image
- DEM

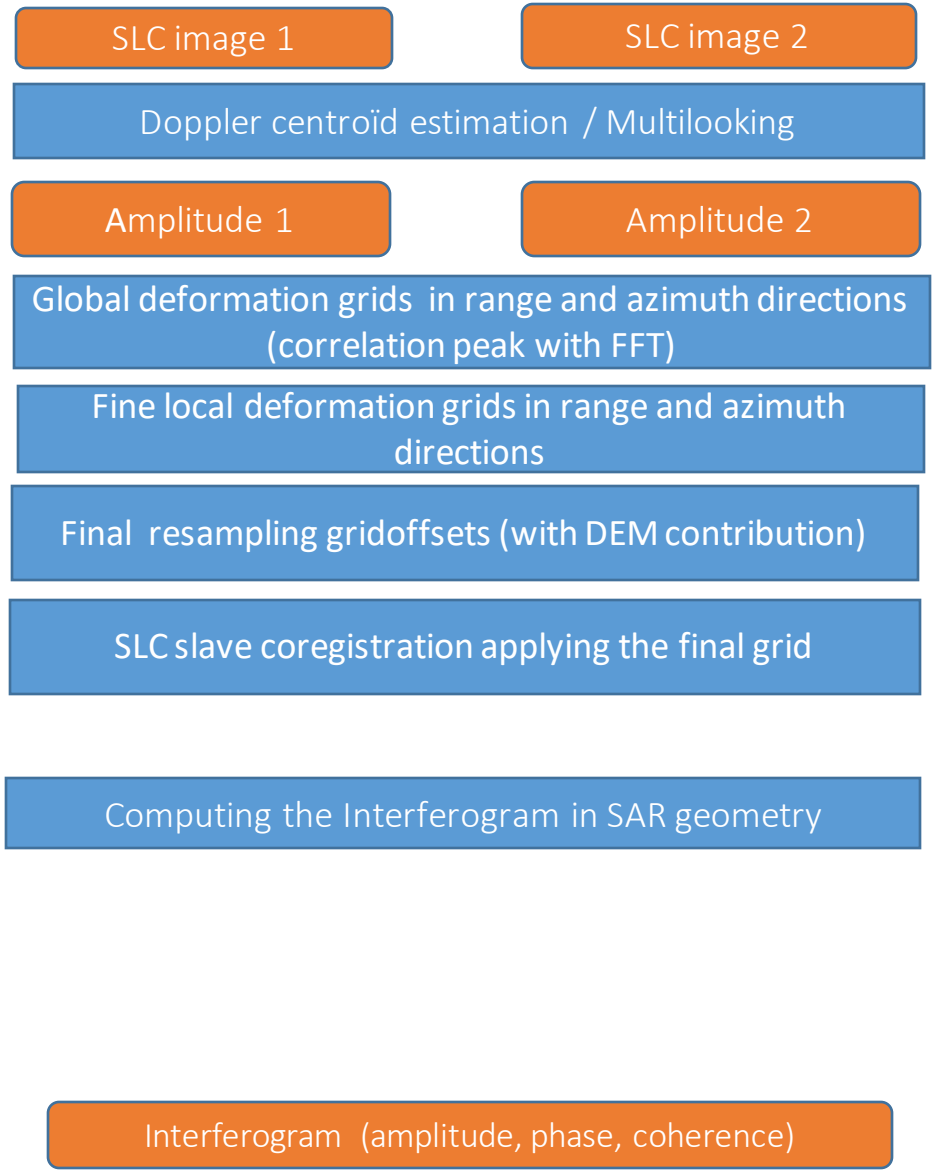
DiapOTB needs metadata to process images => inputs images must be stored into its native repositories (i.e : .SAFE for Sentinel 1) or have already been processed by OTB (with an associated geom file)

Main outputs

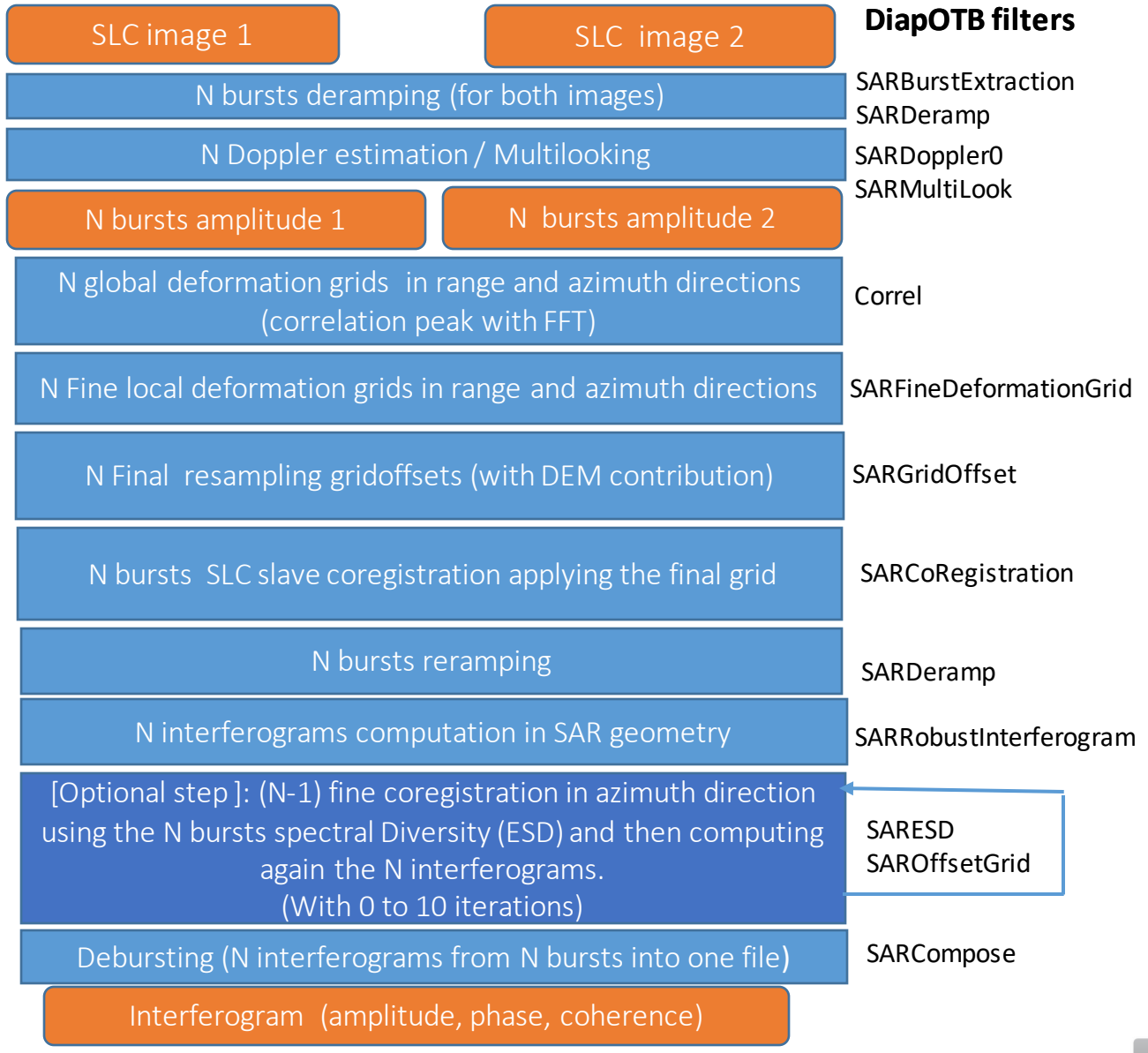
- Coregistred Secondary Image
- Interferogram (3 Bands) : amplitude, phase and coherence
- Filtered interferogram (3 Bands) : amplitude, phase and coherence

Supported products (SLC)

Sentinel	Cosmo
IW StripMap	HImage Spotligtht



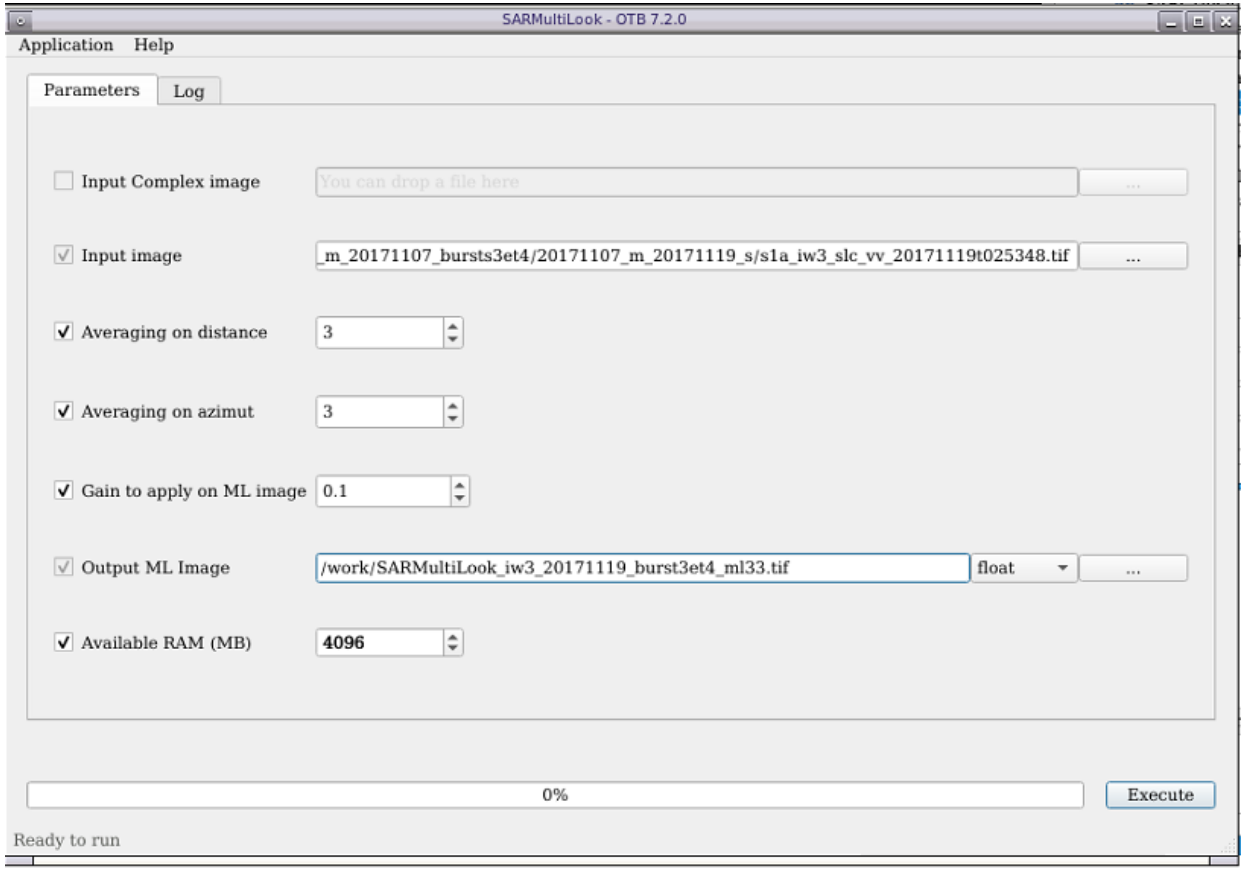
DiapOTB flowchart (Stripmap and Spotlight mode)

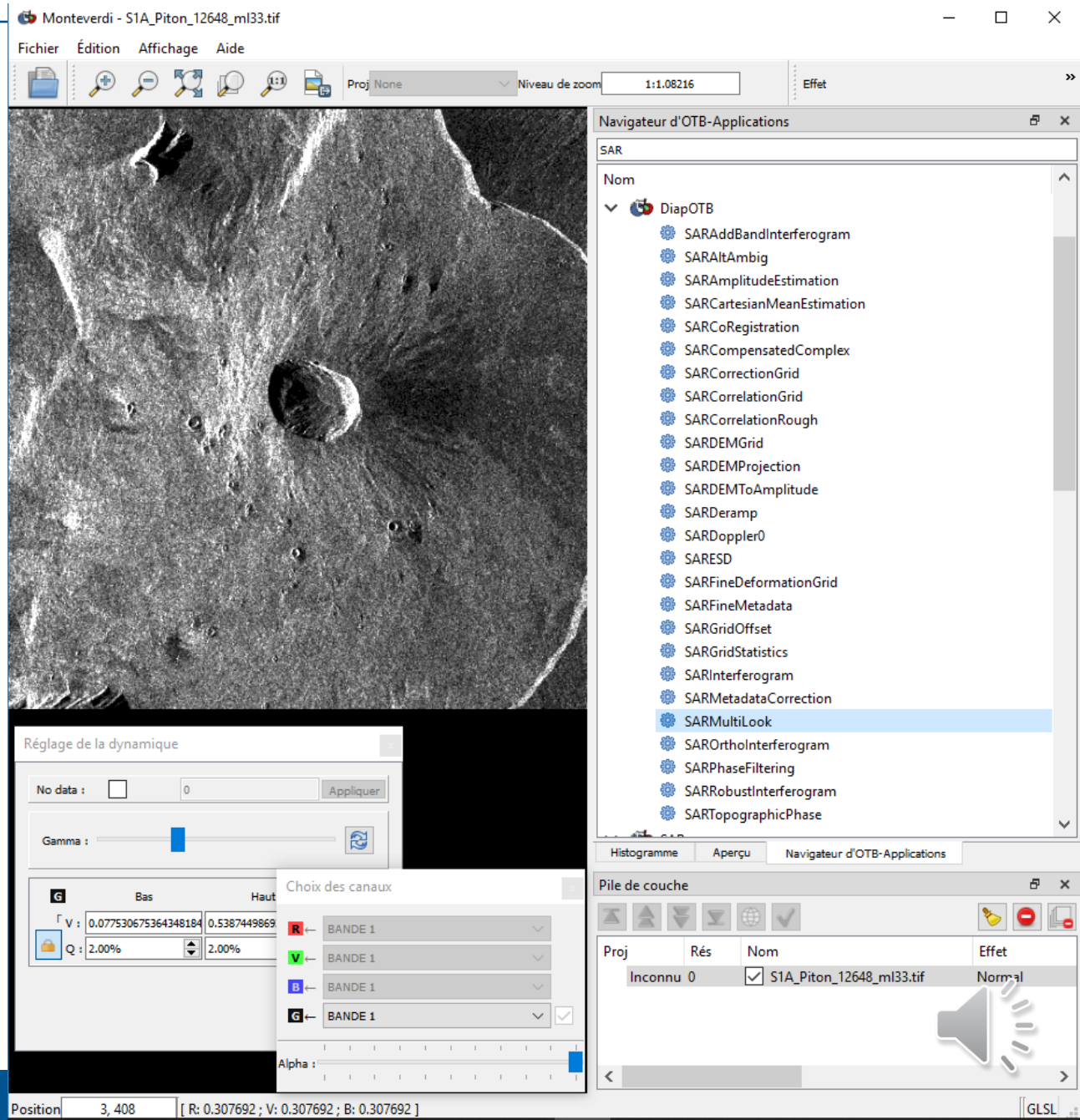


DiapOTB flowchart (TopSAR/IW mode)

Monteverdi **user friendly** graphical interface

with **OTB-Applications browser**





Pre-processing tools, an example: Orbital Stack Analysis and Pointing Vectors

>>> use **OTB command line** to execute filters or applications

> otbApplicationLauncherCommandLine SARAltAmbig

This is the SARAltAmbig application, version 7.1.0 *(or higher...)*

Evaluation of ambiguity height

Parameters:

```
MISSING  -inlist   <string list>   Input images list (for estimations)  (mandatory)
MISSING  -lat      <float>         Target lat (degree)  (mandatory)
MISSING  -lon      <float>         Target long (degree)  (mandatory)
MISSING  -height   <float>         Target height (m)  (mandatory)
MISSING  -outfile  <string>        Output file to store the results  (mandatory)
     -bistatic <boolean>        Activate bistatic Mode  (optional, off by default, default value is false)
     -ram      <int32>          Available RAM (MB)  (optional, off by default, default value is 256)
     -progress <boolean>        Report progress
     -help     <string list>    Display long help (empty list), or help for given parameters keys
```

Use -help param1 [... paramN] to see detailed documentation of those parameters.

Outputs

IMAGE	ORBIT
CSKS4_SCS_U_S2_24_HH_RA_SF_20190302045652_20190302045700	45002
CSKS4_SCS_U_S2_24_HH_RA_SF_20190318045657_20190318045705	45239
CSKS2_SCS_U_S2_24_HH_RA_SF_20181224045655_20181224045703	59740
CSKS2_SCS_U_S2_24_HH_RA_SF_20190210045655_20190210045703	60451
CSKS1_SCS_U_S2_24_HH_RA_FF_20190117045656_20190117045704	62821

MASTER	SLAVE ORBIT	Incidence	**ALT AMBIG(m)**	Radial	Lateral
59740	62821	51.573740	22.945	638.921	-508.054
59740	60451	51.557775	-505.847	100.894	22.975
59740	45002	51.527055	-11.148	-867.721	1044.819
59740	45239	51.558703	1488.144	195.437	-7.913
62821	60451	51.573047	-21.949	-538.312	531.385
62821	45002	51.542327	-7.503	-1507.481	1553.917
62821	45239	51.573975	-23.304	-443.751	500.477
60451	45002	51.526362	-11.400	-968.597	1021.953
60451	45239	51.558010	377.521	94.544	-30.891
45002	45239	51.527290	11.066	1062.003	-1051.770

Ground target --> Satellite Vectors :

Image Orbit	North Projection	East Projection	Vertical Projection
45002	-0.209066	-0.753631	0.623163
45239	-0.209359	-0.754264	0.622298
59740	-0.209265	-0.754285	0.622305
60451	-0.209330	-0.754251	0.622324
62821	-0.209444	-0.754579	0.621887

Conclusions and perspectives

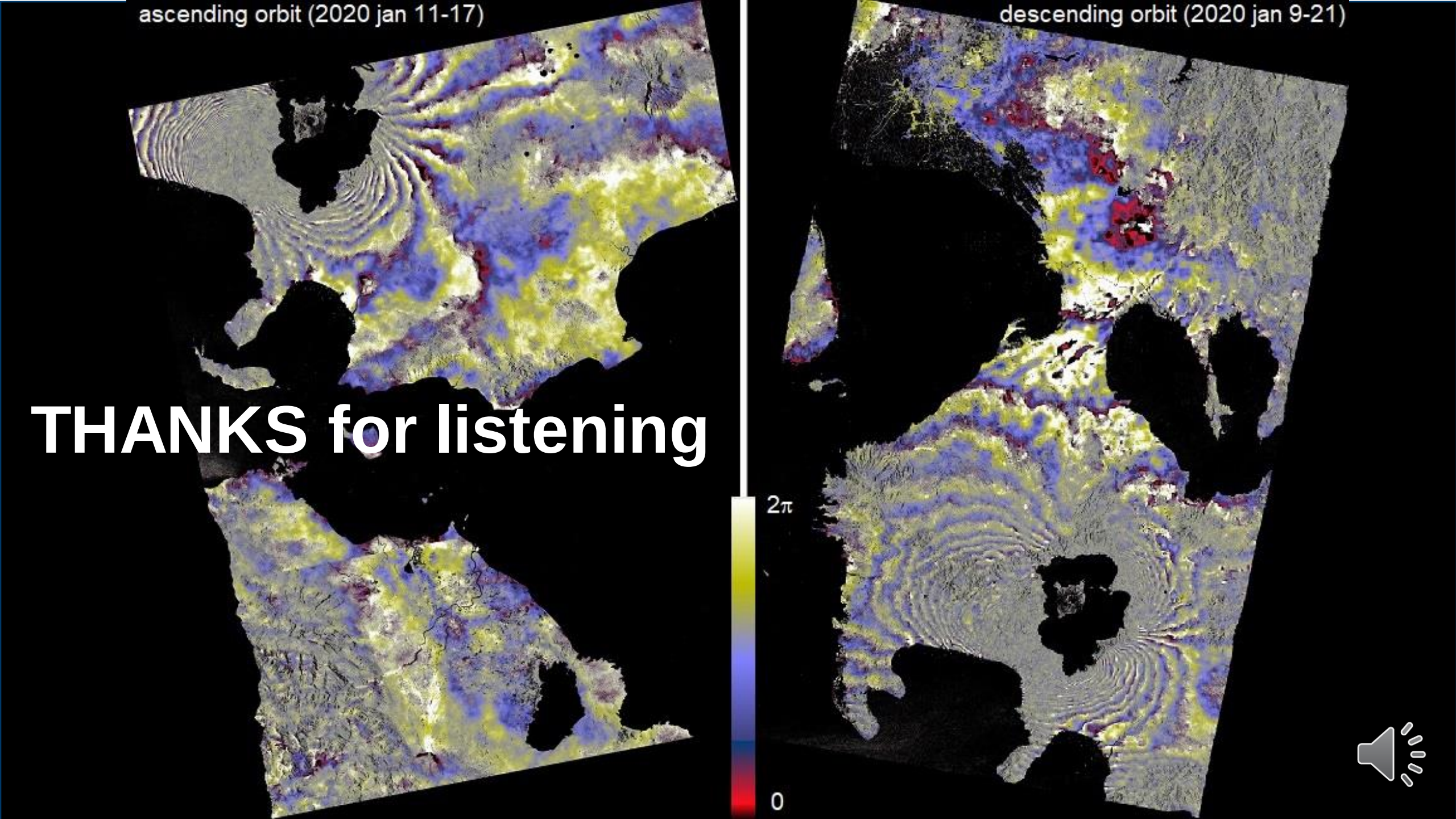
DiapOTB within open source Orfeo ToolBox is able to produce **interferograms** as well as **stacks of coregistered SLCs data** with an automated ingestion of external DEMs in a short time.

Effort has been put so far on 2 missions :

- Sentinel1: Stripmap and IW modes
- Cosmo: Stripmap and Spotlight modes

Next step in 2021 is to integrate TerraSAR-X/PAZ spotlight and stripmap modes (we will welcome data from PAZ to test our software).

DiapOTB is an open source software and
contributions from SAR community are welcome through OTB !!



THANKS for listening