TOPS InSAR processing for Mexico city site

Dinh HO TONG MINH

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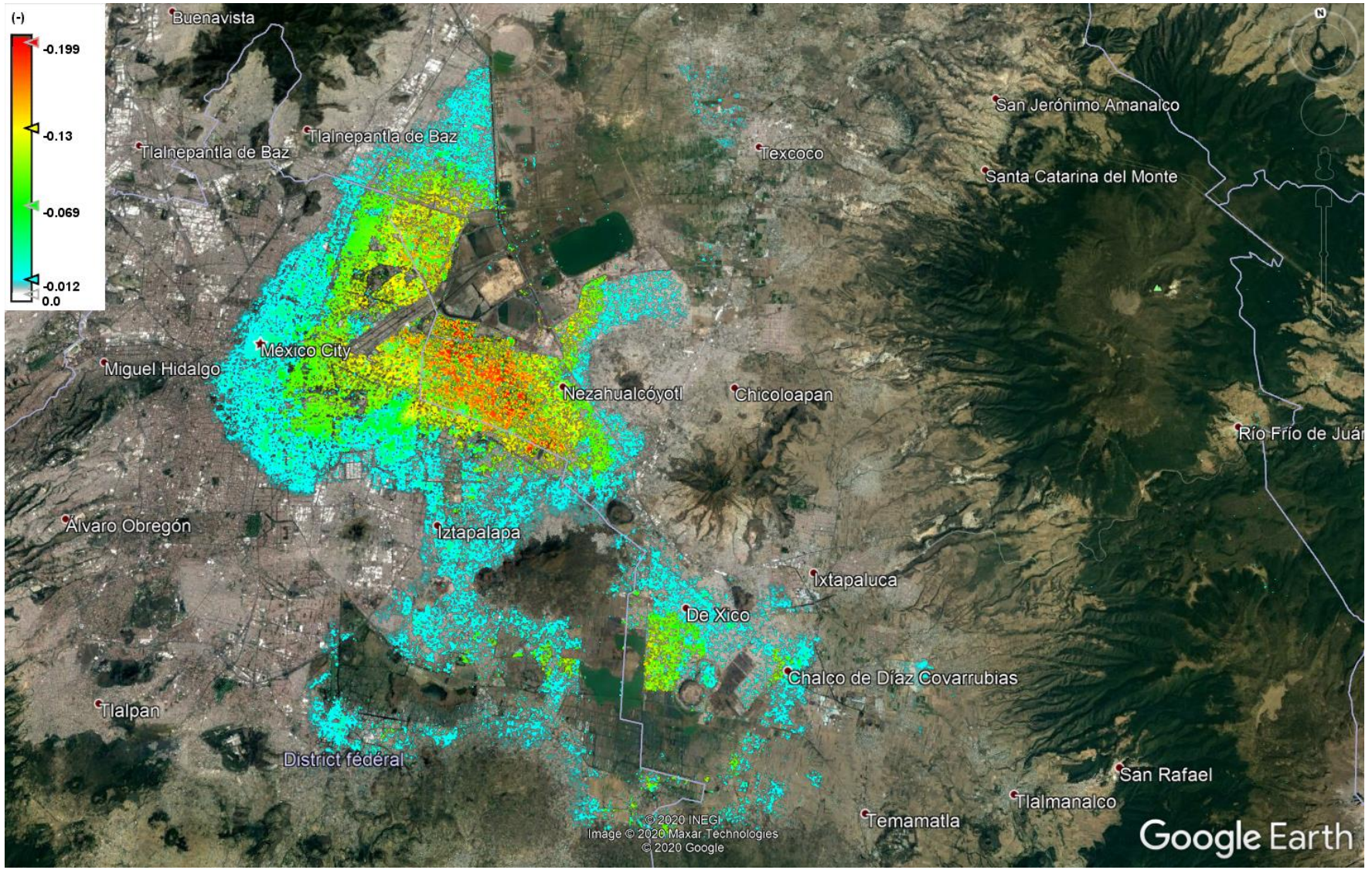
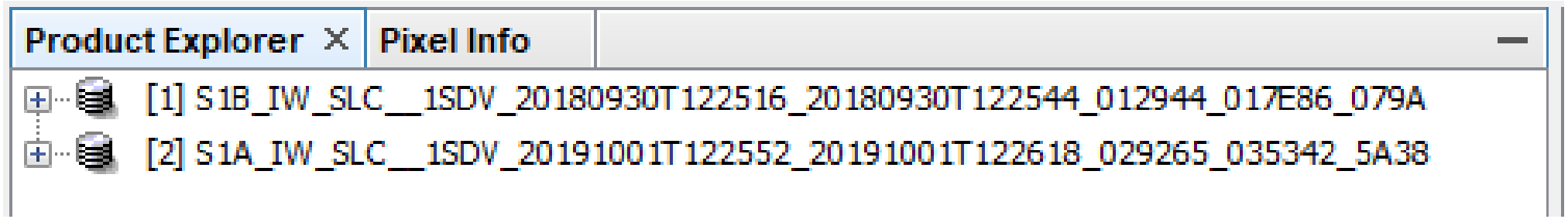
Montpellier, July 2021

Goal: able to generate this subsidence map

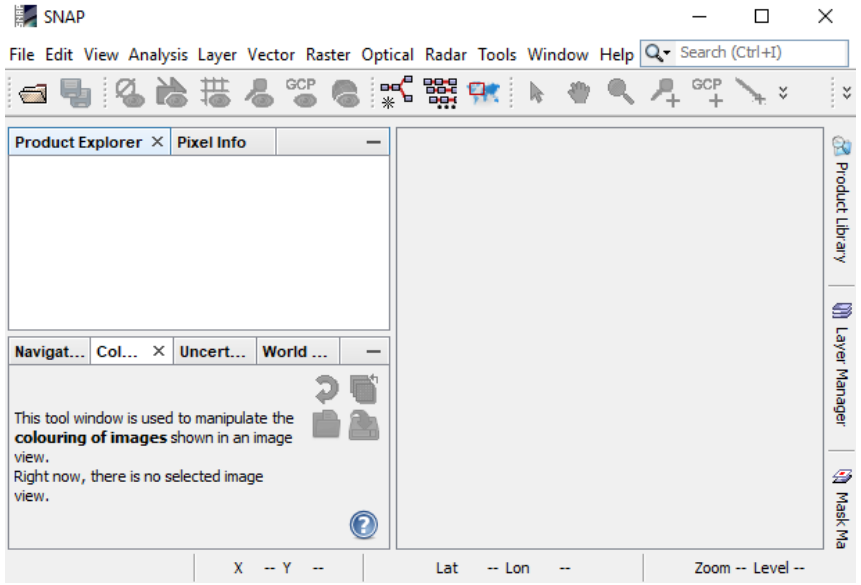
m/year



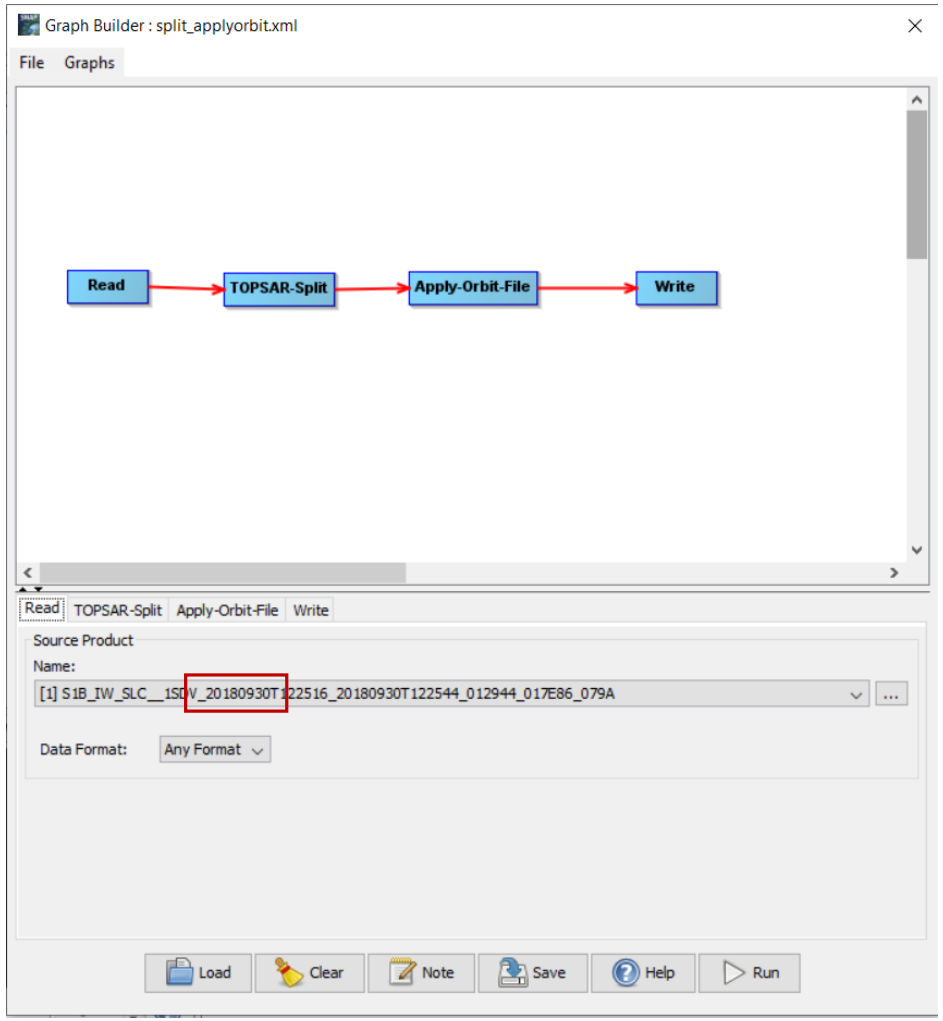
Data available

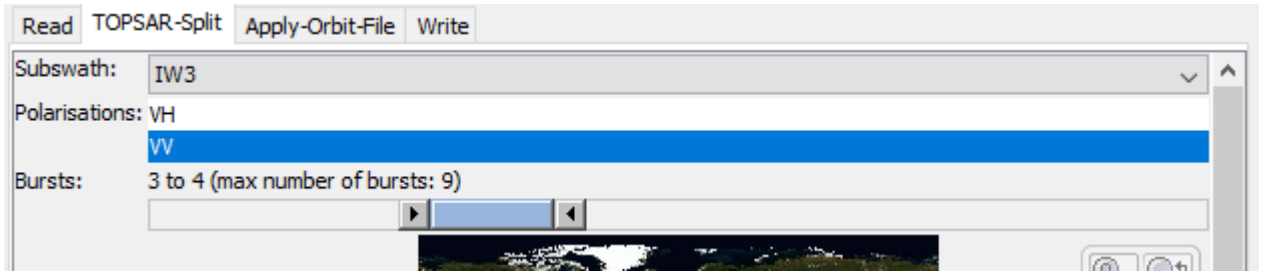


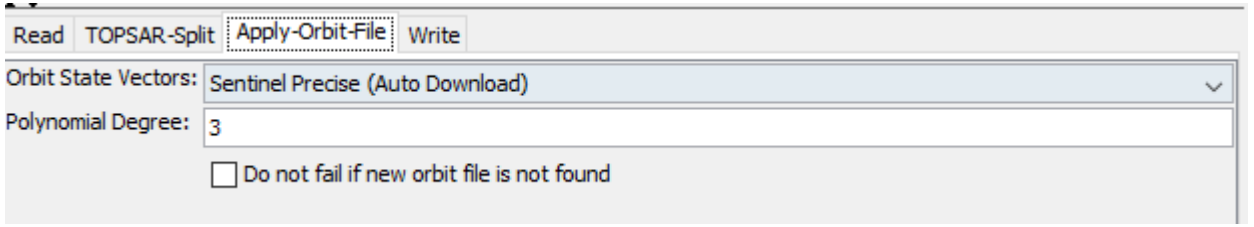
SNAP

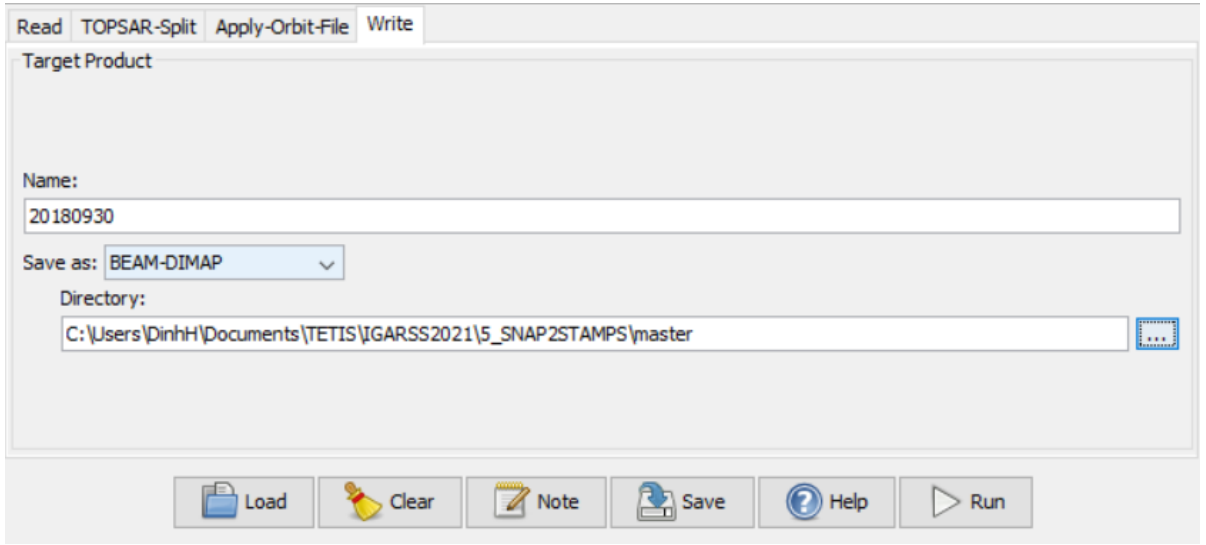


Preparation master file :
Select IW3 and burst 3-4 in SNAP









Preparation master file :
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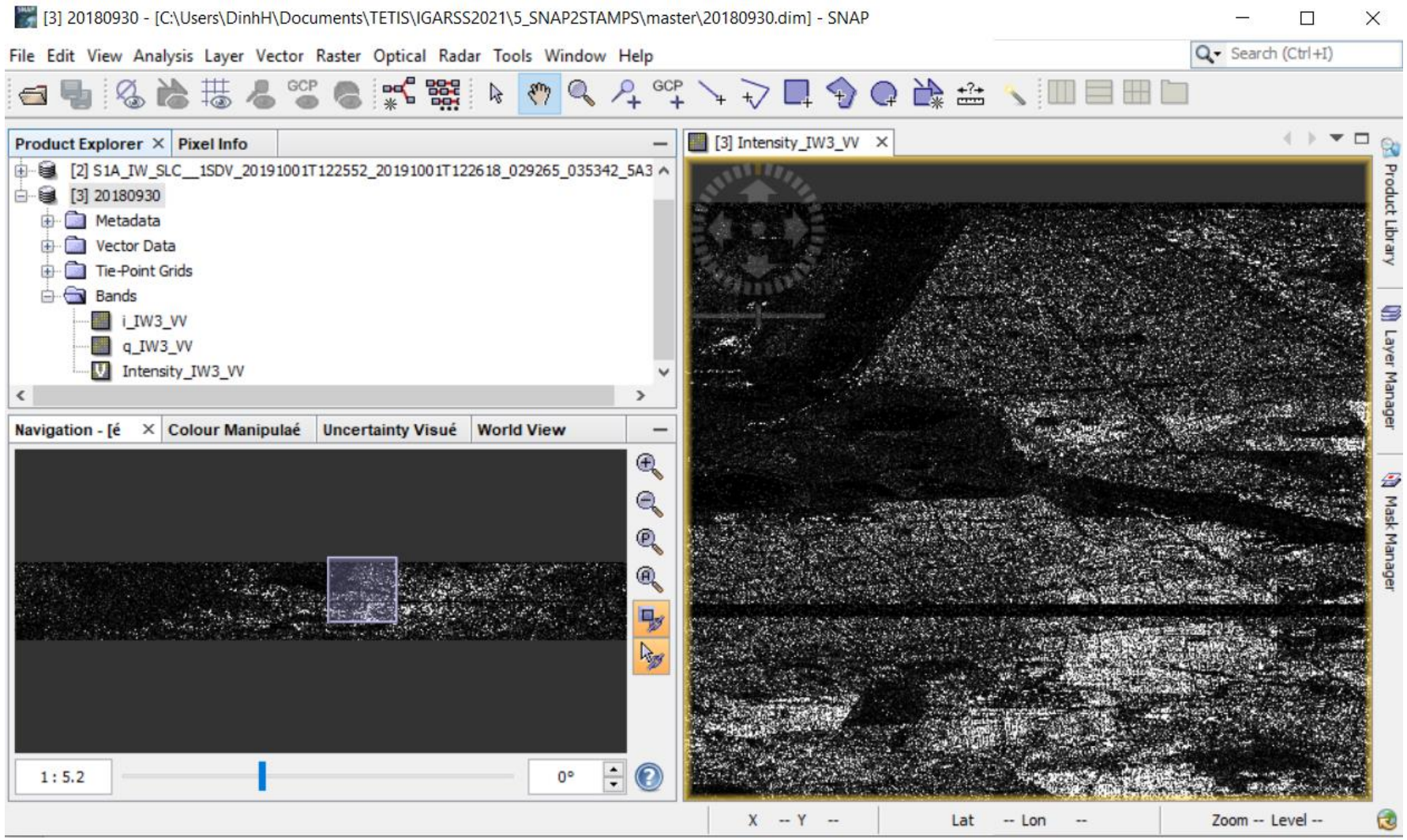
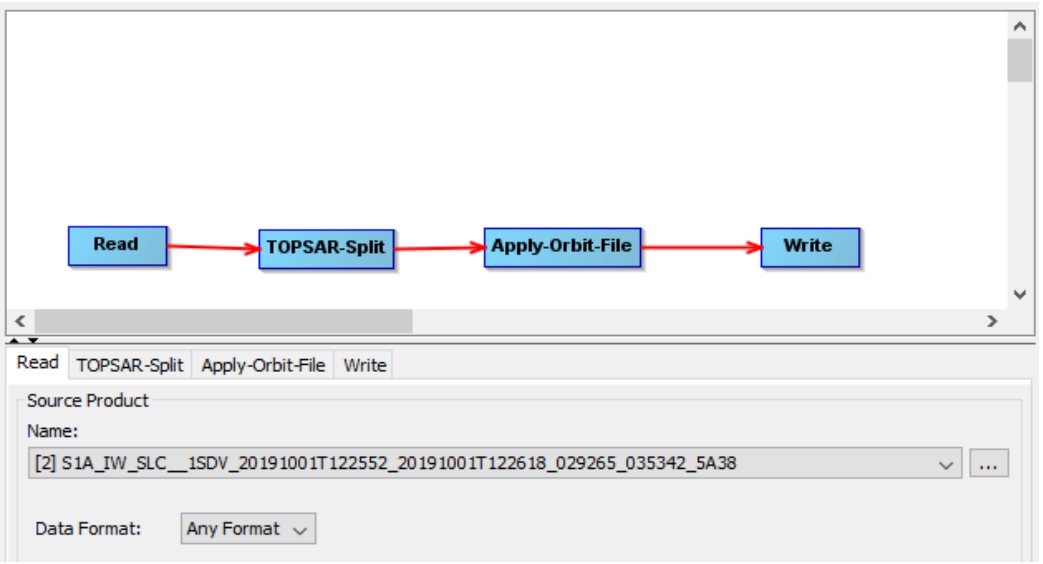
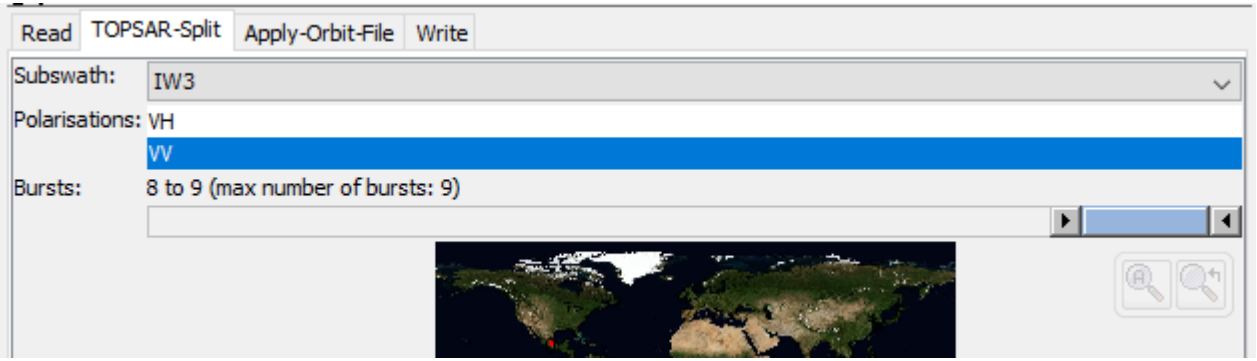
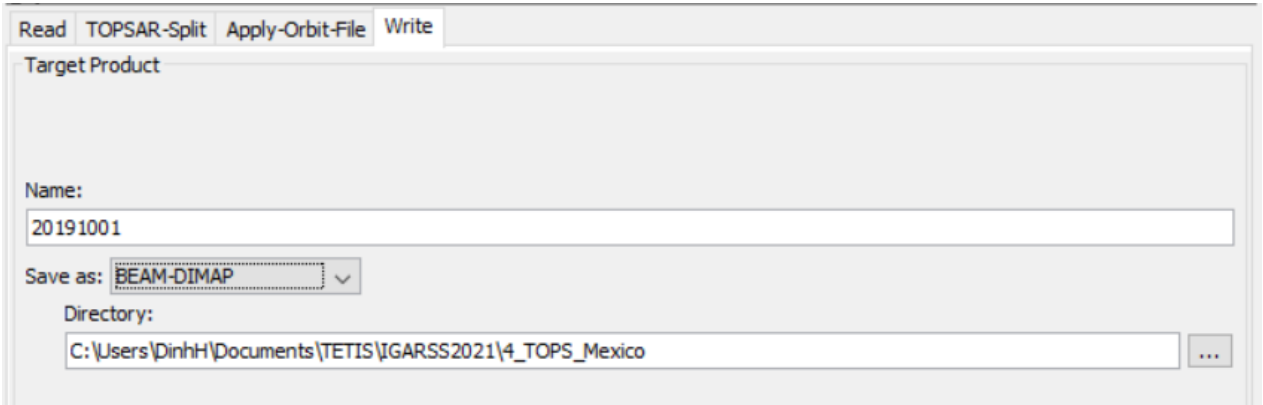
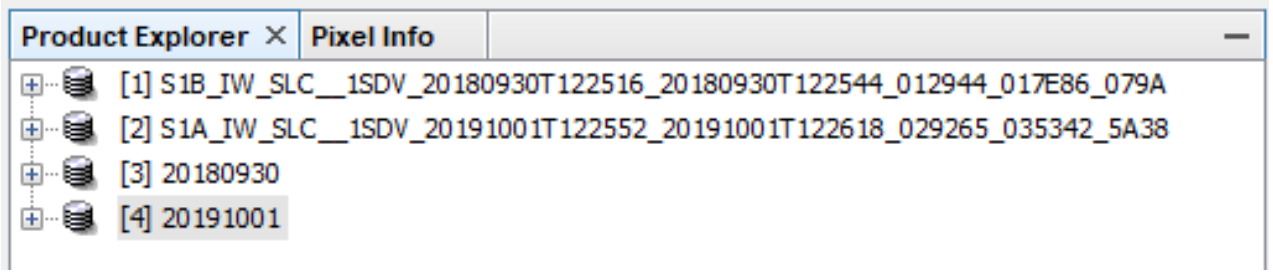


Preparation slave file :
Select IW3 and burst **8-9** in SNAP

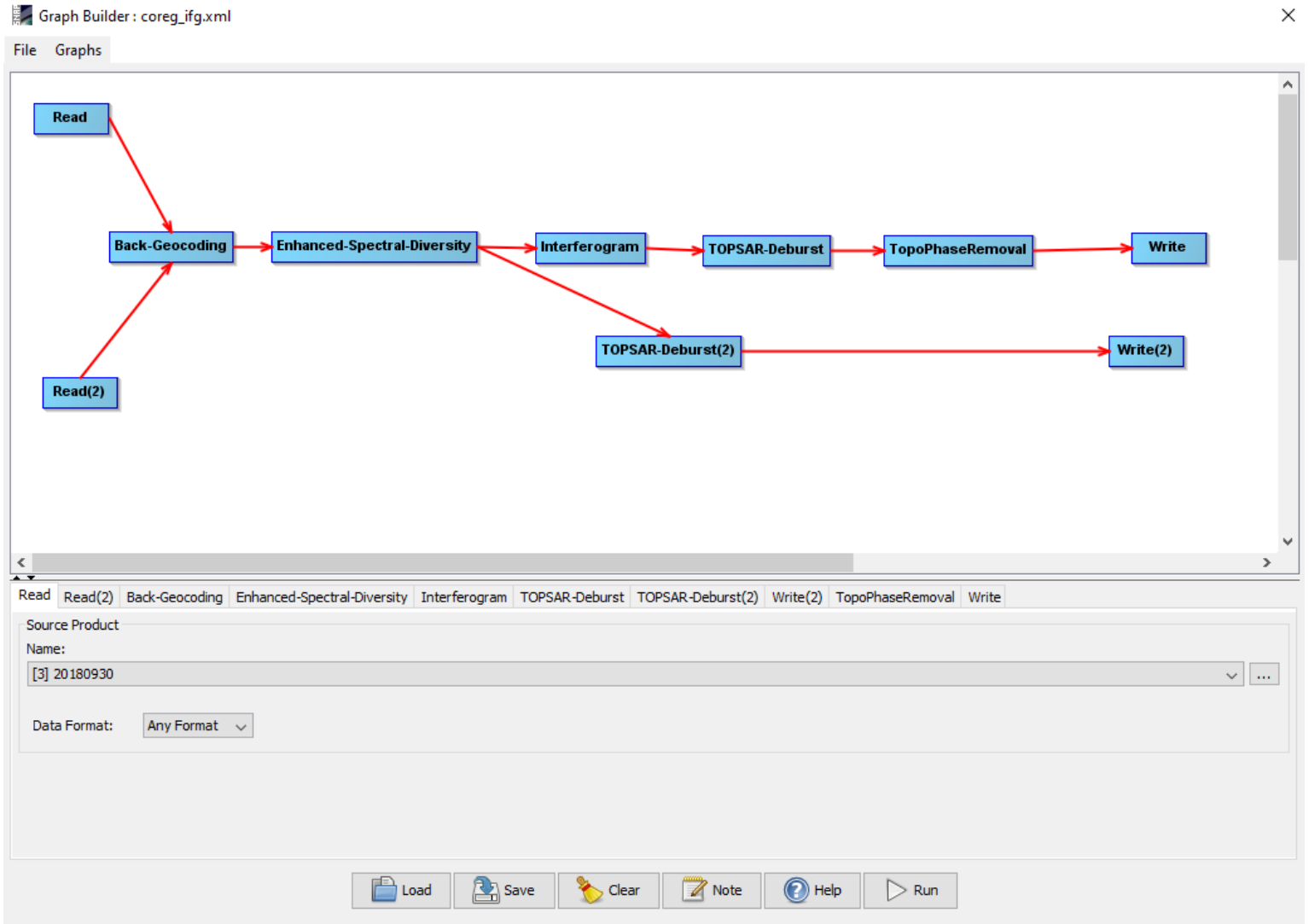


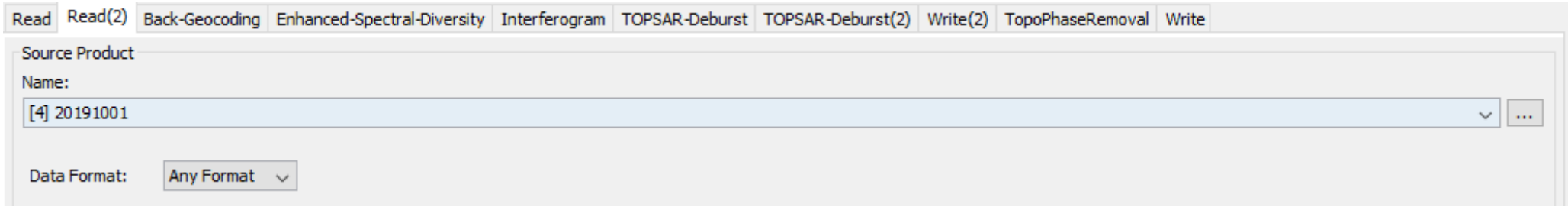


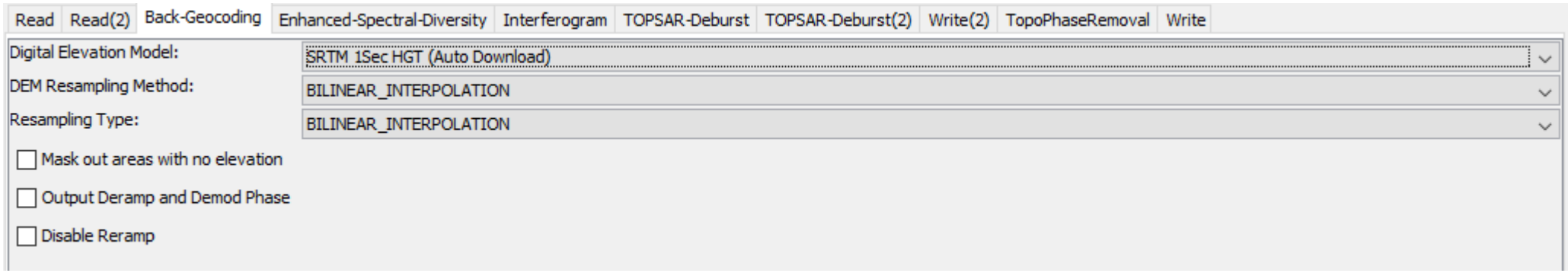


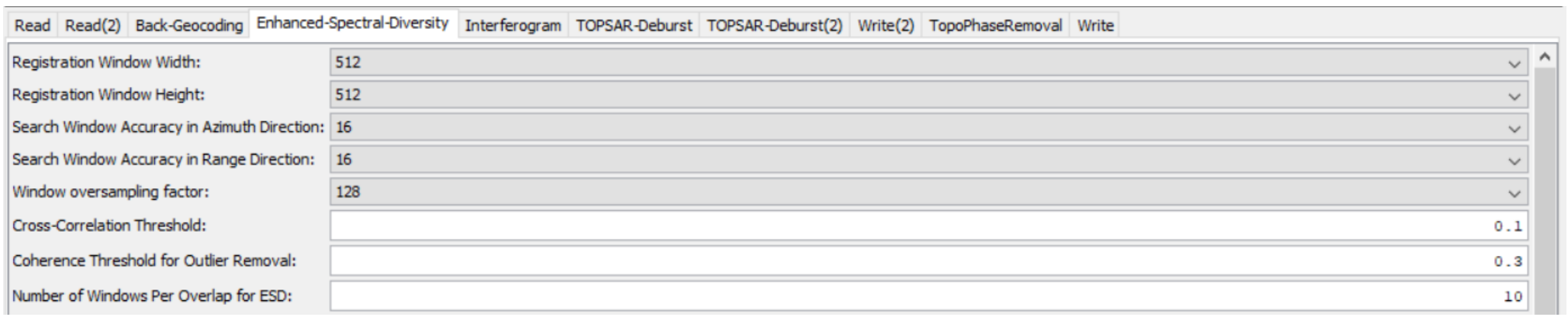


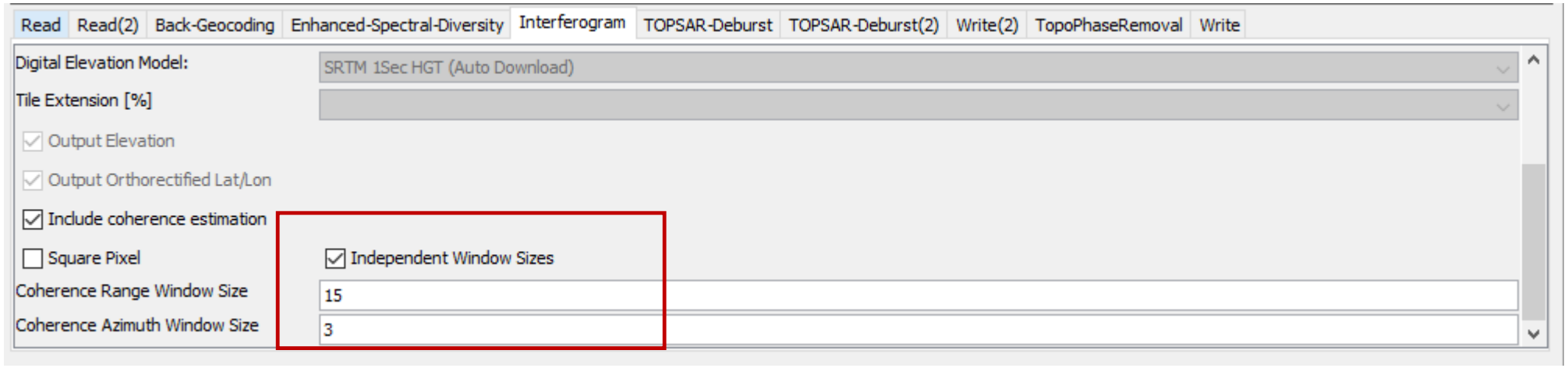
TOPS Coregistration and interferogram formation



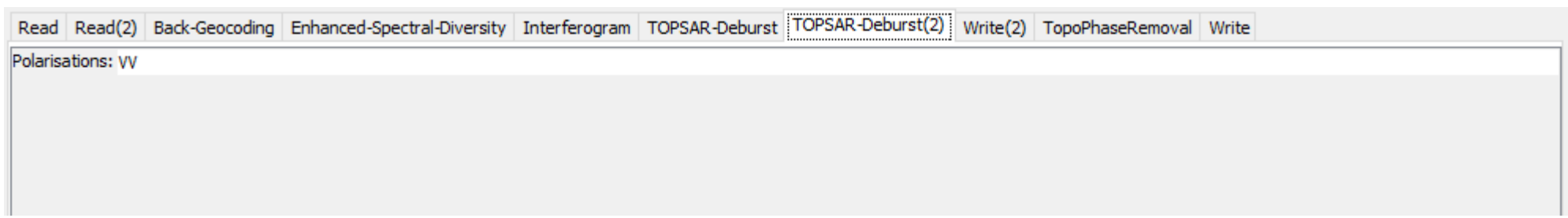

Read
Read(2)
Back-Geocoding
Enhanced-Spectral-Diversity
Interferogram
TOPSAR-Deburst
TOPSAR-Deburst(2)
Write(2)
TopoPhaseRemoval
Write
Source Product
Name:
[4] 20191001
...
Data Format:
Any Format

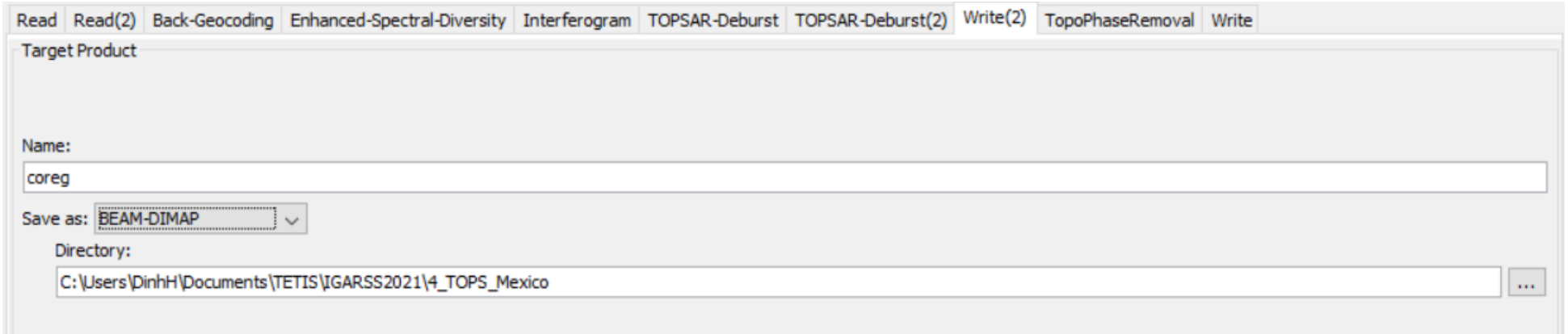

Read
Read(2)
Back-Geocoding
Enhanced-Spectral-Diversity
Interferogram
TOPSAR-Deburst
TOPSAR-Deburst(2)
Write(2)
TopoPhaseRemoval
Write
Digital Elevation Model:
SRTM 1Sec HGT (Auto Download)
DEM Resampling Method:
BILINEAR_INTERPOLATION
Resampling Type:
BILINEAR_INTERPOLATION
Mask out areas with no elevation
Output Deramp and Demod Phase
Disable Reramp

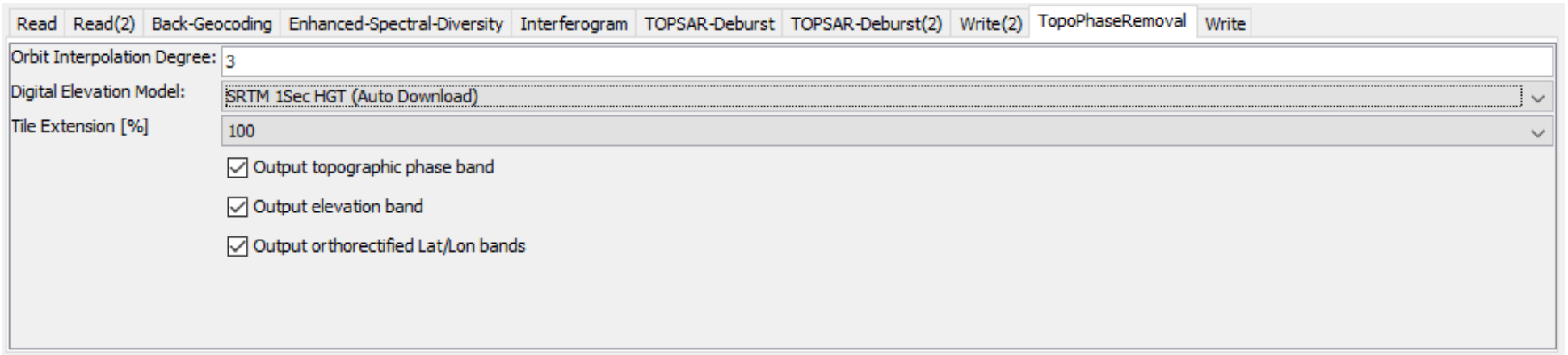

Read
Read(2)
Back-Geocoding
Enhanced-Spectral-Diversity
Interferogram
TOPSAR-Deburst
TOPSAR-Deburst(2)
Write(2)
TopoPhaseRemoval
Write
Registration Window Width:
512
Registration Window Height:
512
Search Window Accuracy in Azimuth Direction:
16
Search Window Accuracy in Range Direction:
16
Window oversampling factor:
128
Cross-Correlation Threshold:
0.1
Coherence Threshold for Outlier Removal:
0.3
Number of Windows Per Overlap for ESD:
10

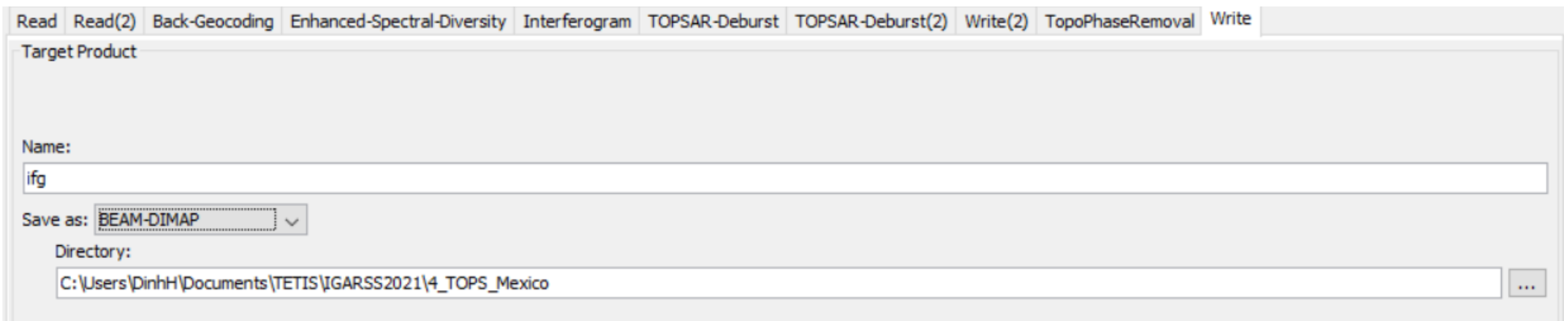

Read
Read(2)
Back-Geocoding
Enhanced-Spectral-Diversity
Interferogram
TOPSAR-Deburst
TOPSAR-Deburst(2)
Write(2)
TopoPhaseRemoval
Write
Digital Elevation Model:
SRTM 1Sec HGT (Auto Download)
Tile Extension [%]
Output Elevation
Output Orthorectified Lat/Lon
Include coherence estimation
Square Pixel
Independent Window Sizes
Coherence Range Window Size
15
Coherence Azimuth Window Size
3


Read
Read(2)
Back-Geocoding
Enhanced-Spectral-Diversity
Interferogram
TOPSAR-Deburst
TOPSAR-Deburst(2)
Write(2)
TopoPhaseRemoval
Write
Polarisations: VV

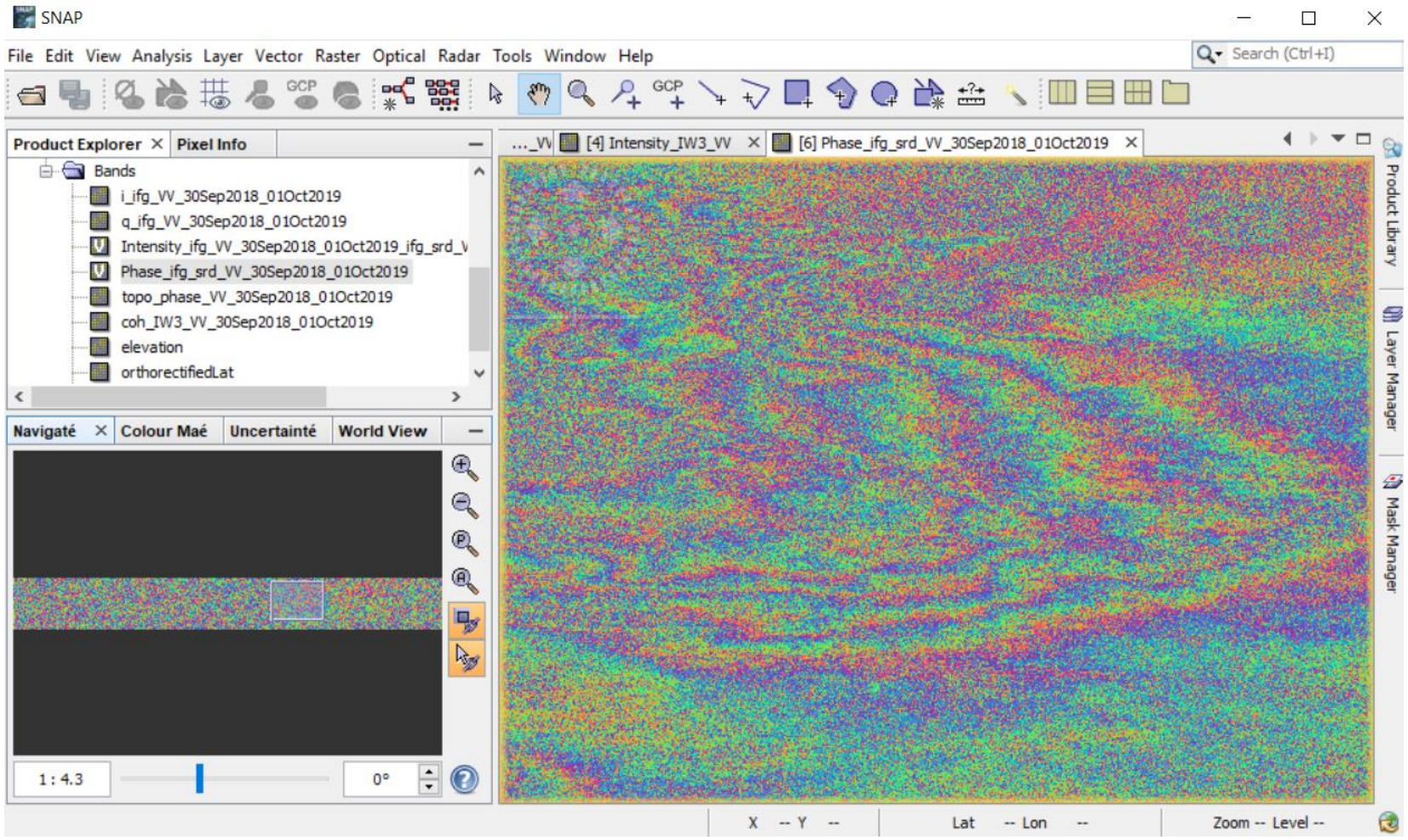

Read
Read(2)
Back-Geocoding
Enhanced-Spectral-Diversity
Interferogram
TOPSAR-Deburst
TOPSAR-Deburst(2)
Write(2)
TopoPhaseRemoval
Write
Polarisations: VV


Read
Read(2)
Back-Geocoding
Enhanced-Spectral-Diversity
Interferogram
TOPSAR-Deburst
TOPSAR-Deburst(2)
Write(2)
TopoPhaseRemoval
Write
Target Product
Name:
coreg
Save as:
BEAM-DIMAP
Directory:
C:\Users\DinhH\Documents\TETIS\IGARSS2021\4_TOPS_Mexico
...

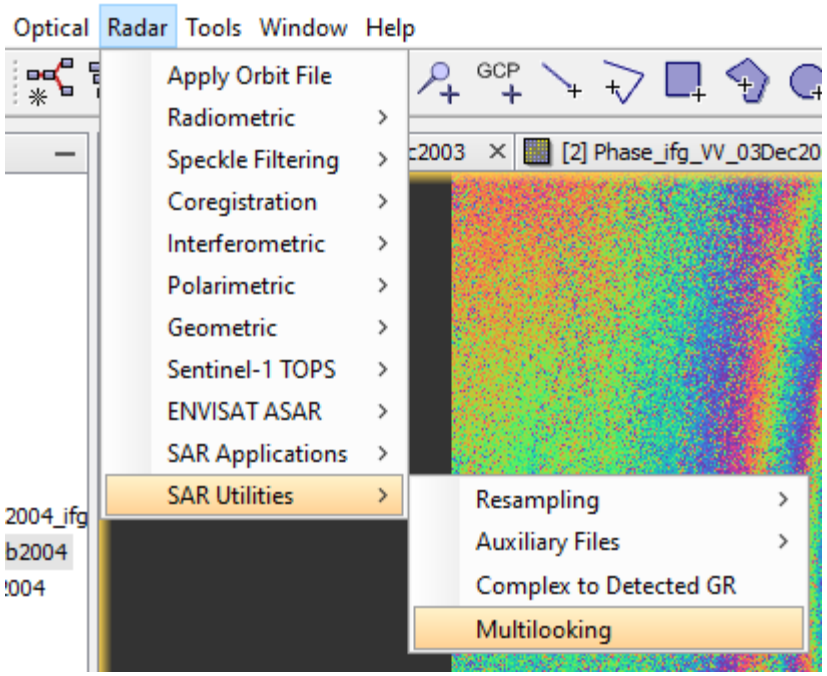

Read
Read(2)
Back-Geocoding
Enhanced-Spectral-Diversity
Interferogram
TOPSAR-Deburst
TOPSAR-Deburst(2)
Write(2)
TopoPhaseRemoval
Write
Orbit Interpolation Degree:
3
Digital Elevation Model:
SRTM 1Sec HGT (Auto Download)
Tile Extension [%]
100
Output topographic phase band
Output elevation band
Output orthorectified Lat/Lon bands


Read
Read(2)
Back-Geocoding
Enhanced-Spectral-Diversity
Interferogram
TOPSAR-Deburst
TOPSAR-Deburst(2)
Write(2)
TopoPhaseRemoval
Write
Target Product
Name:
ifg
Save as:
BEAM-DIMAP
Directory:
C:\Users\DinhH\Documents\TETIS\IGARSS2021\4_TOPS_Mexico
...

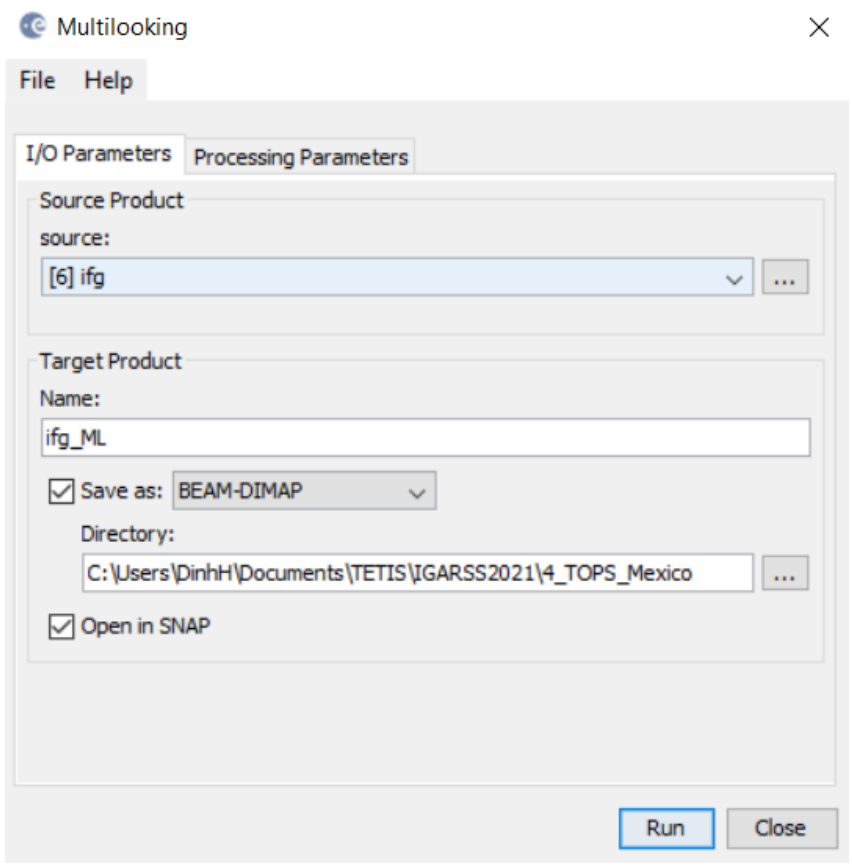
TOPS Coregistration and interferogram formation

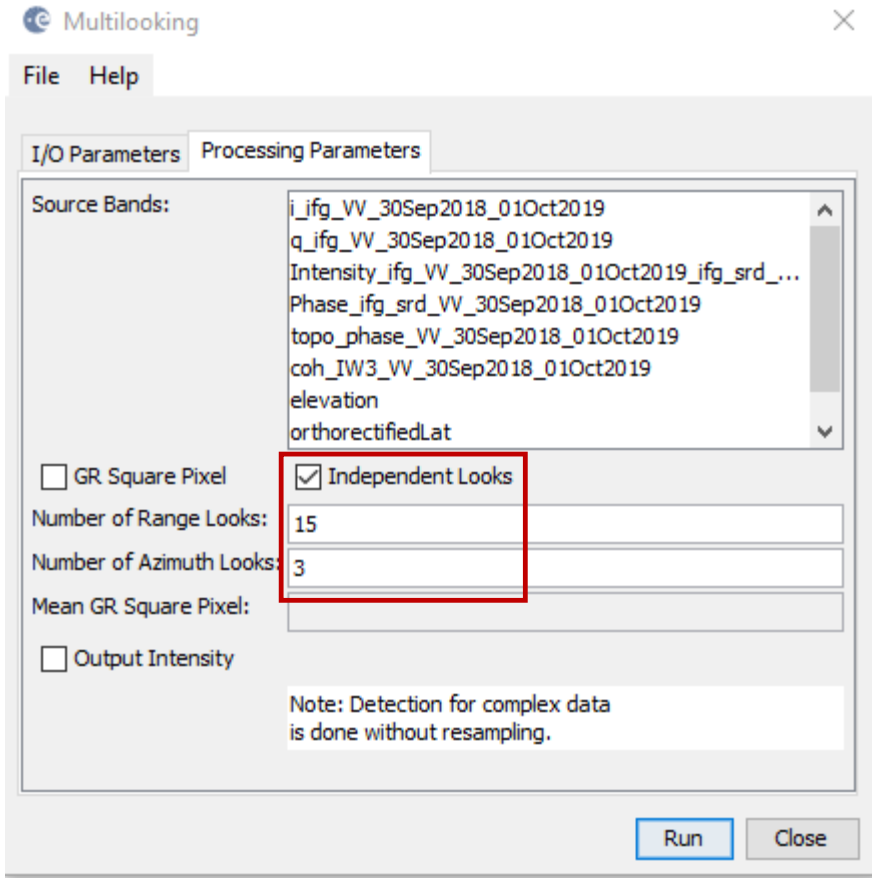


Reduce noise by multilooking

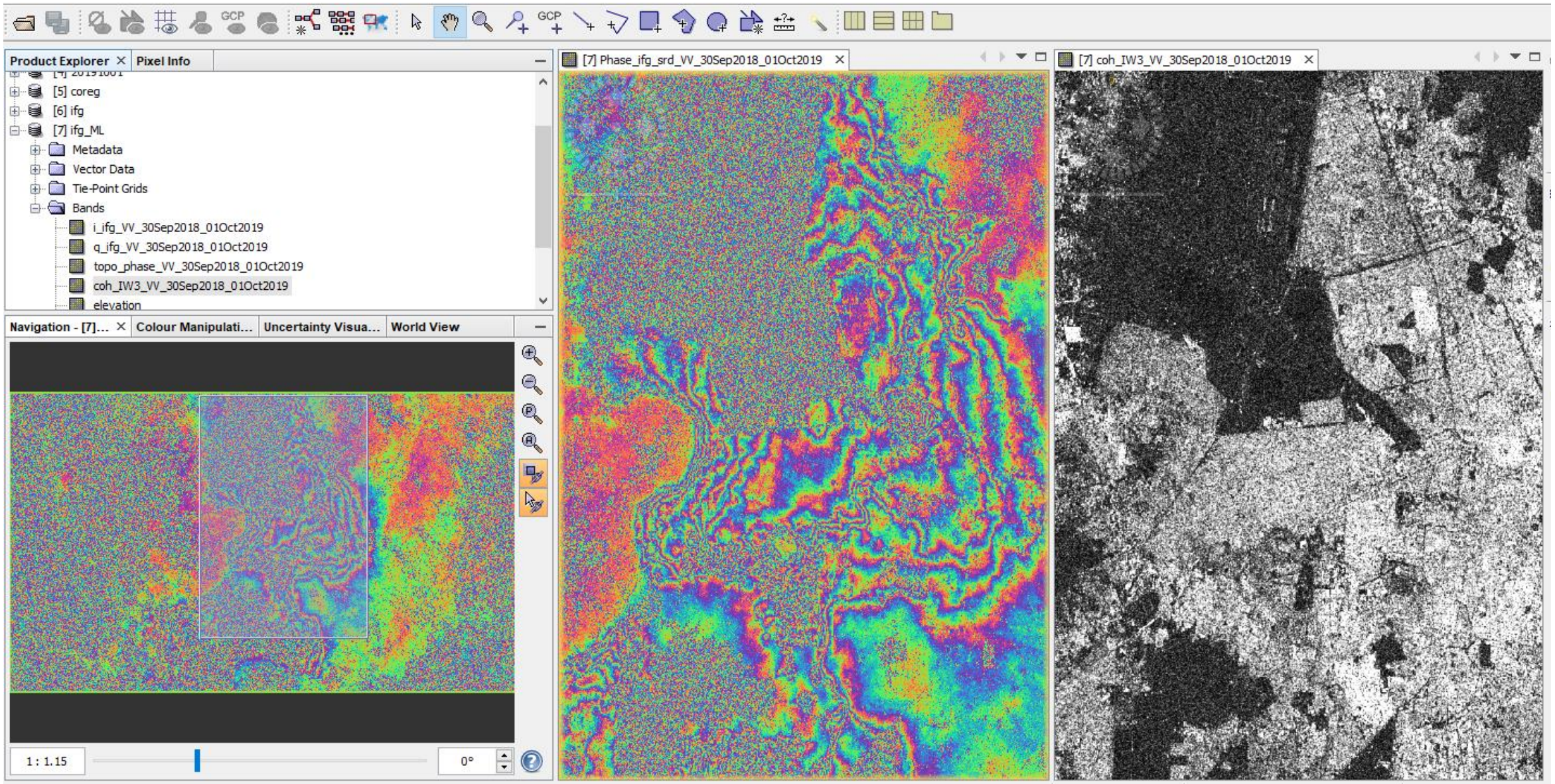


Reduce noise by multilooking

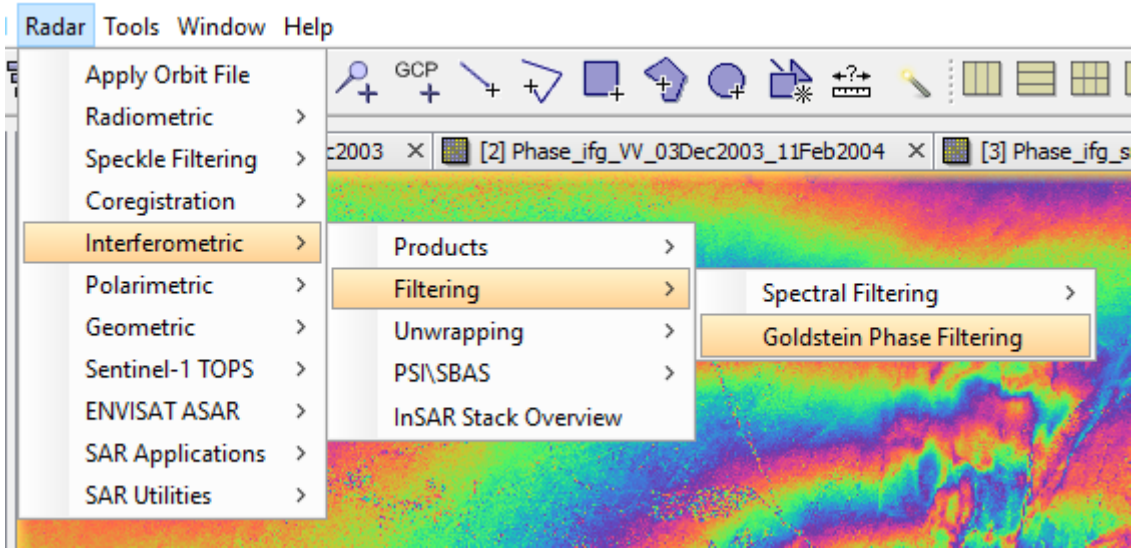




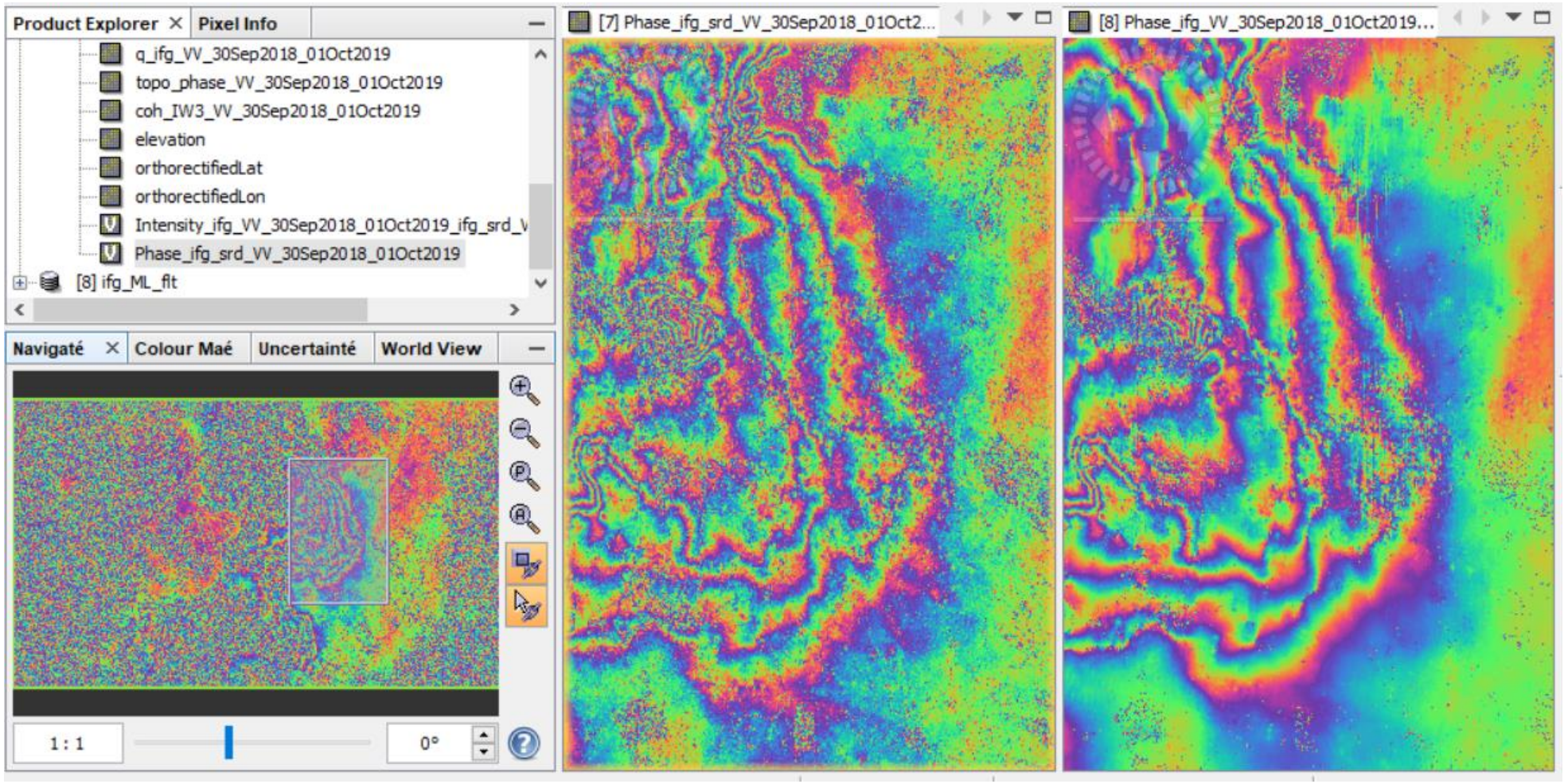
Reduce noise by multilooking



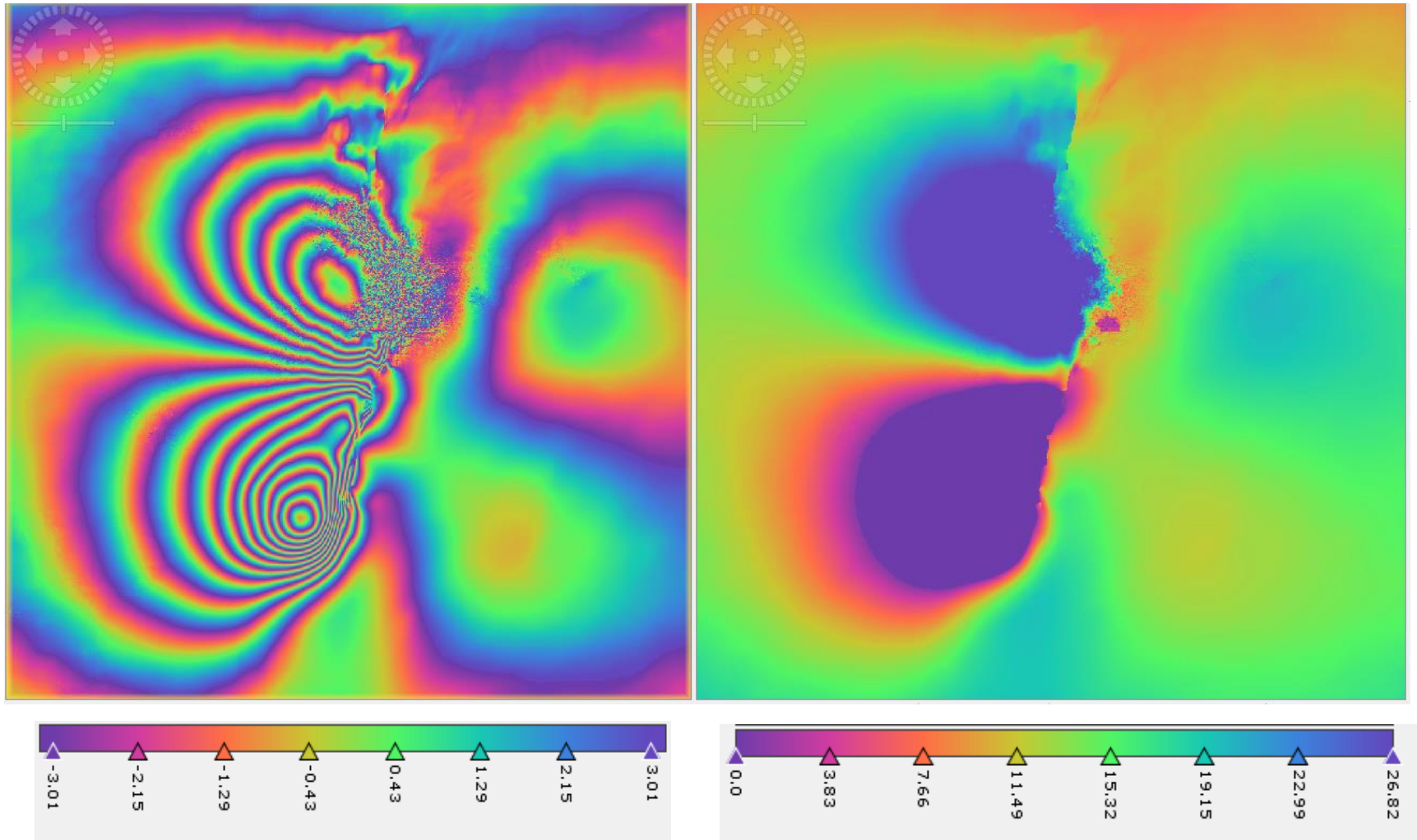
More reduce noise by filtering



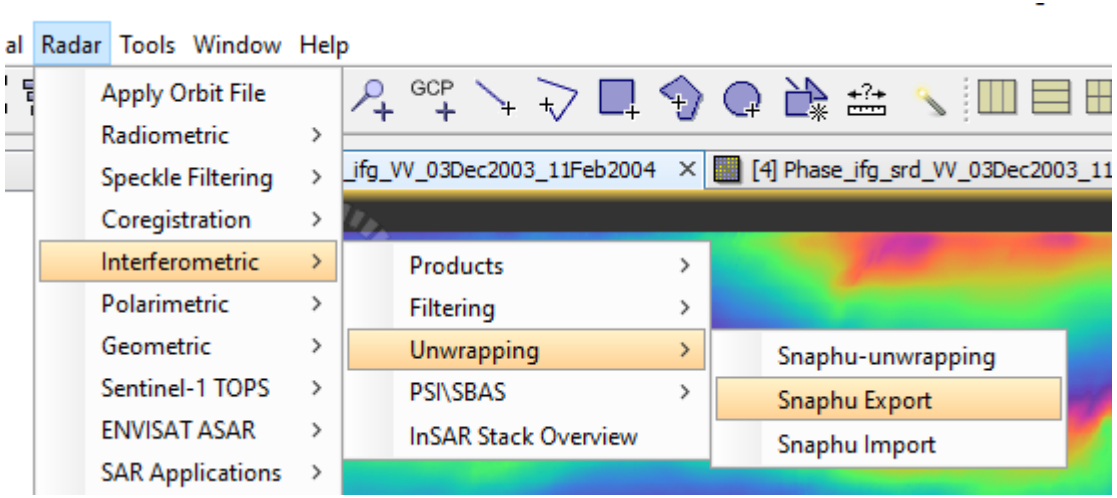
More reduce noise by filtering



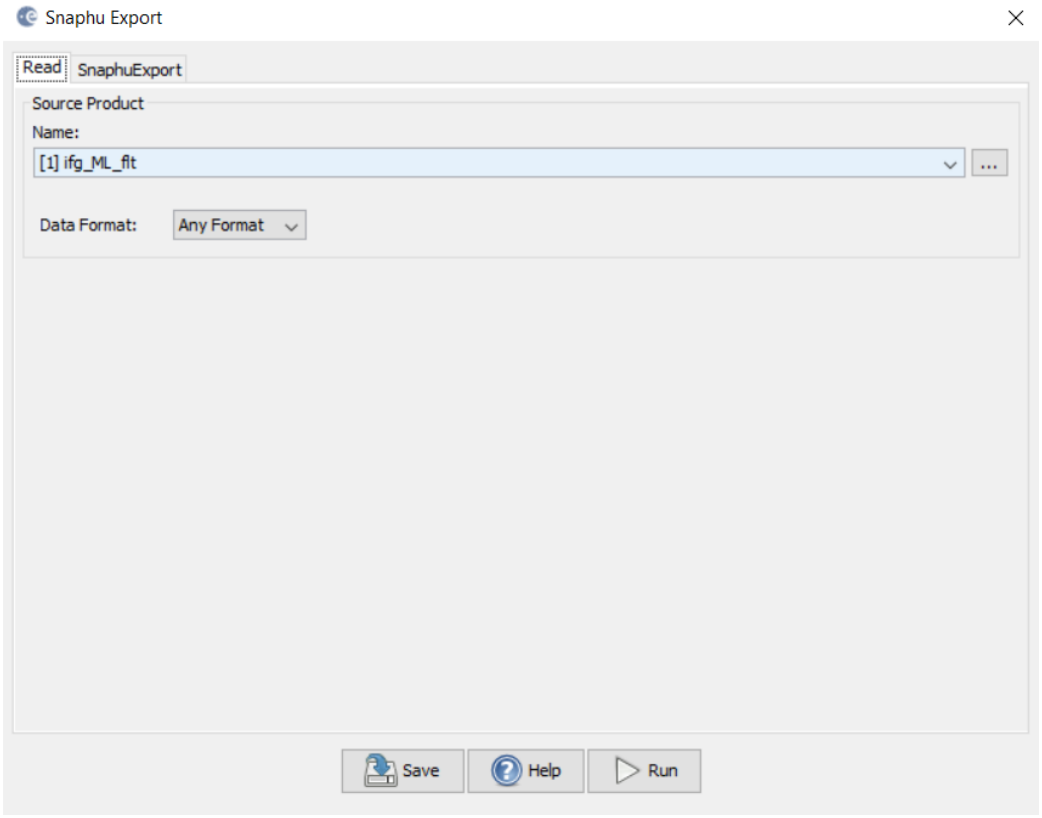
Phase unwrapping

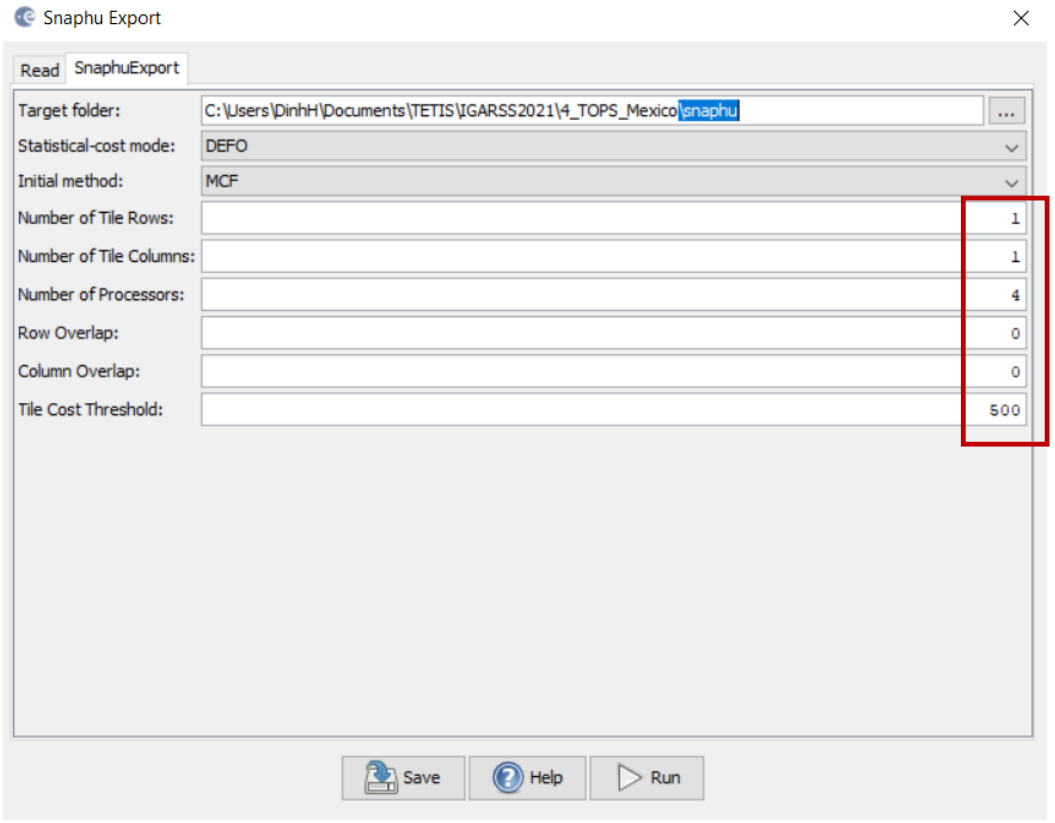


Phase unwrapping

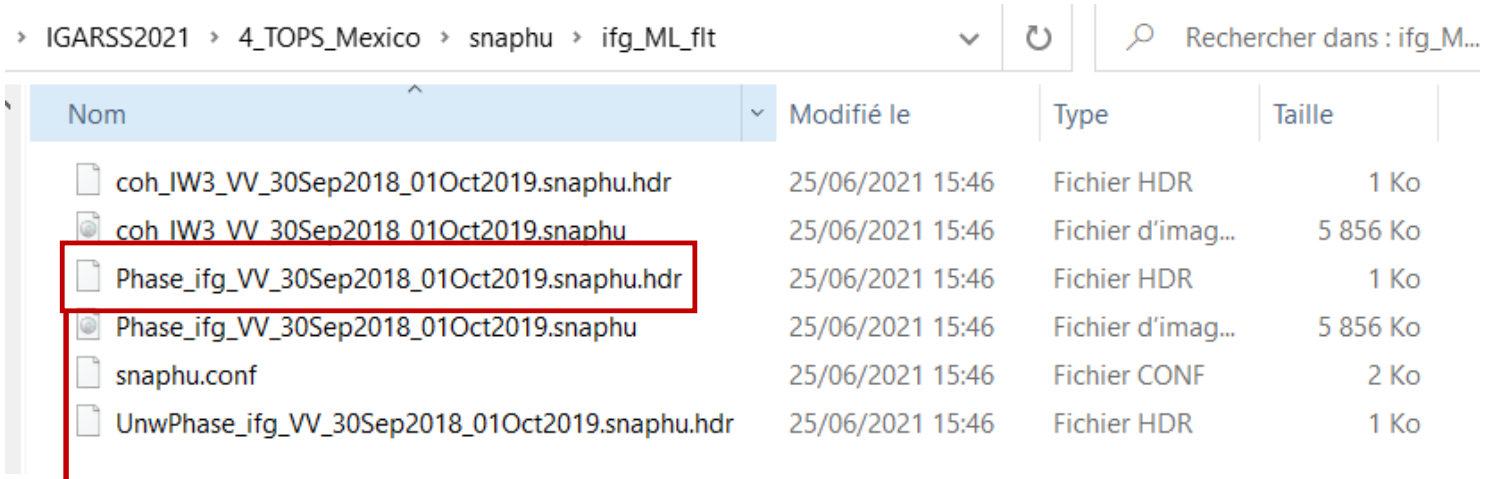


Phase unwrapping export

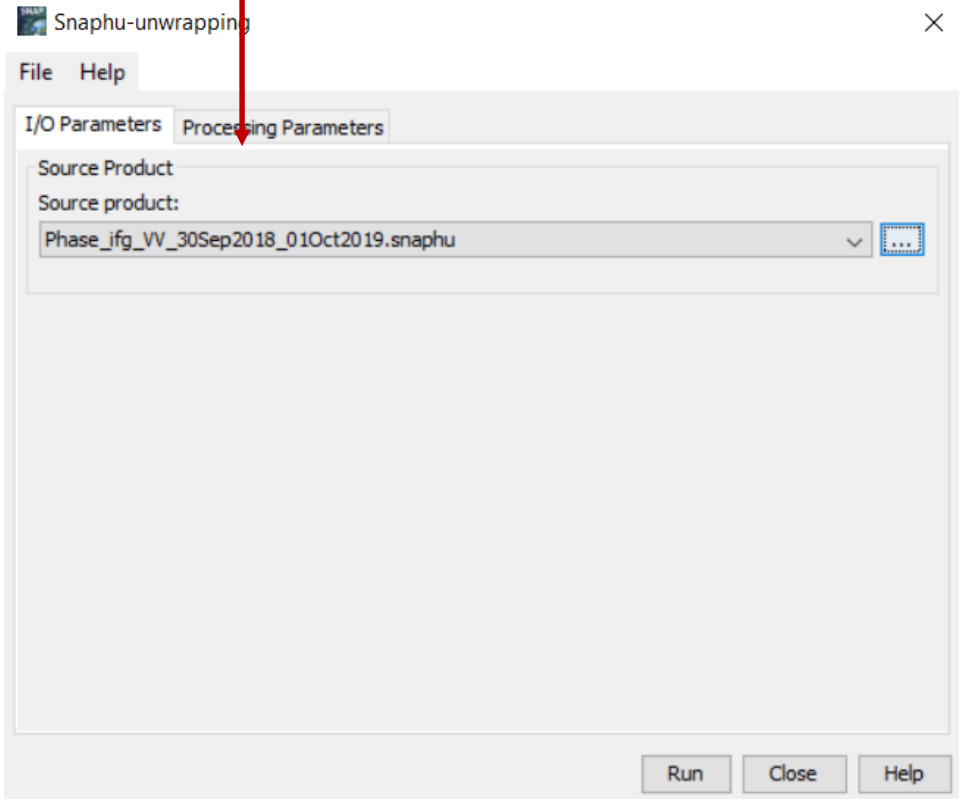


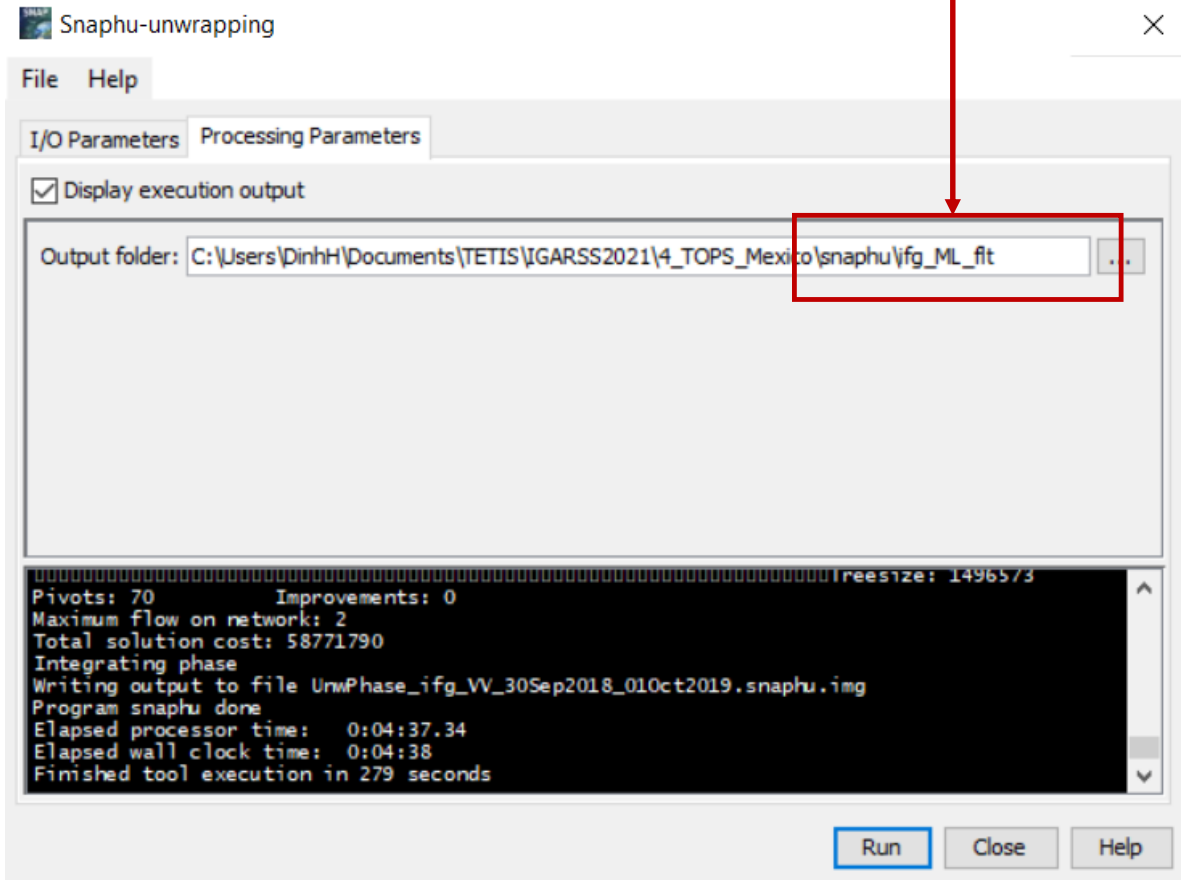


Phase unwrapping

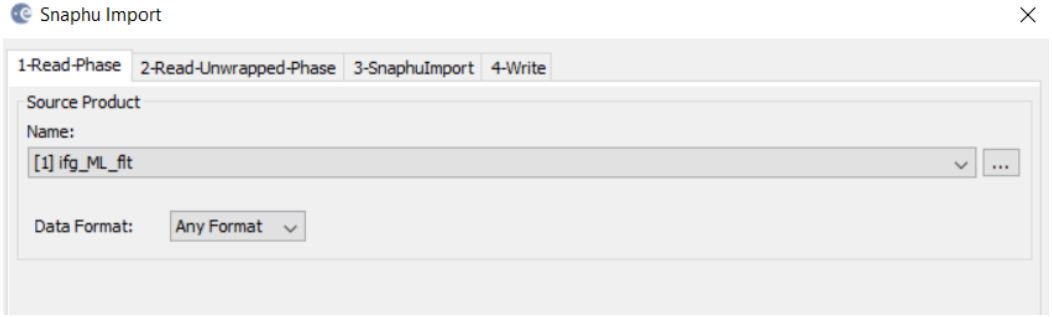


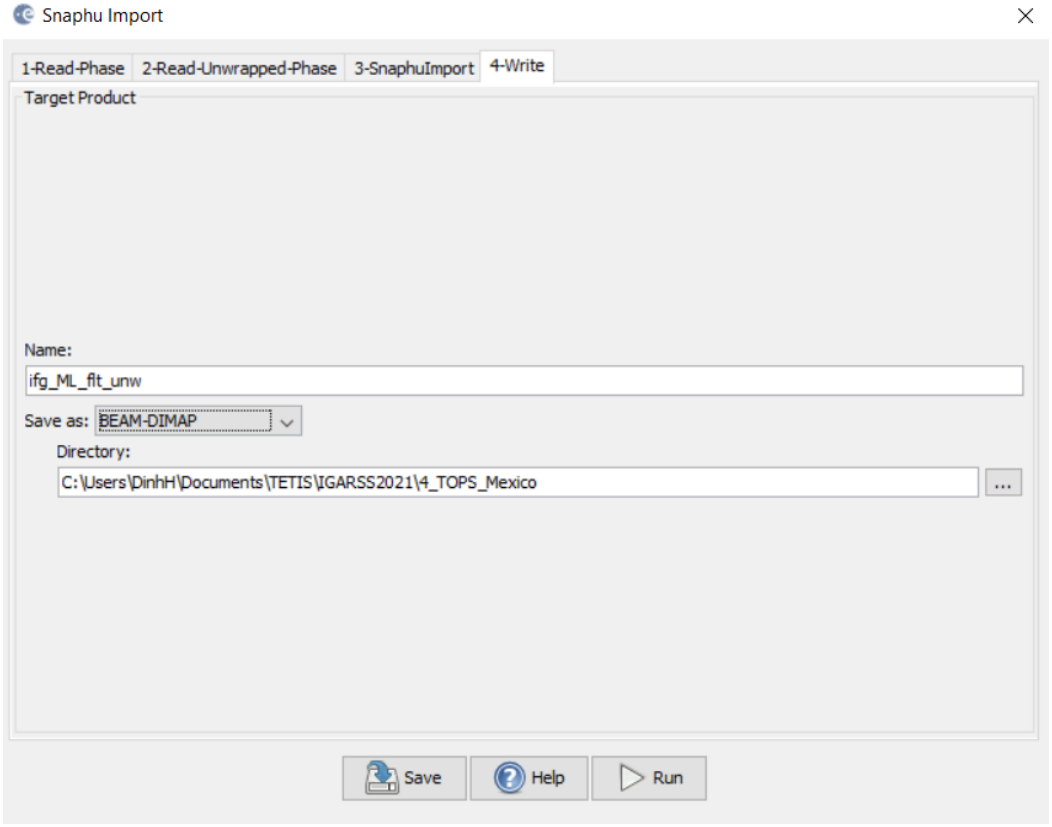
same folder with source product

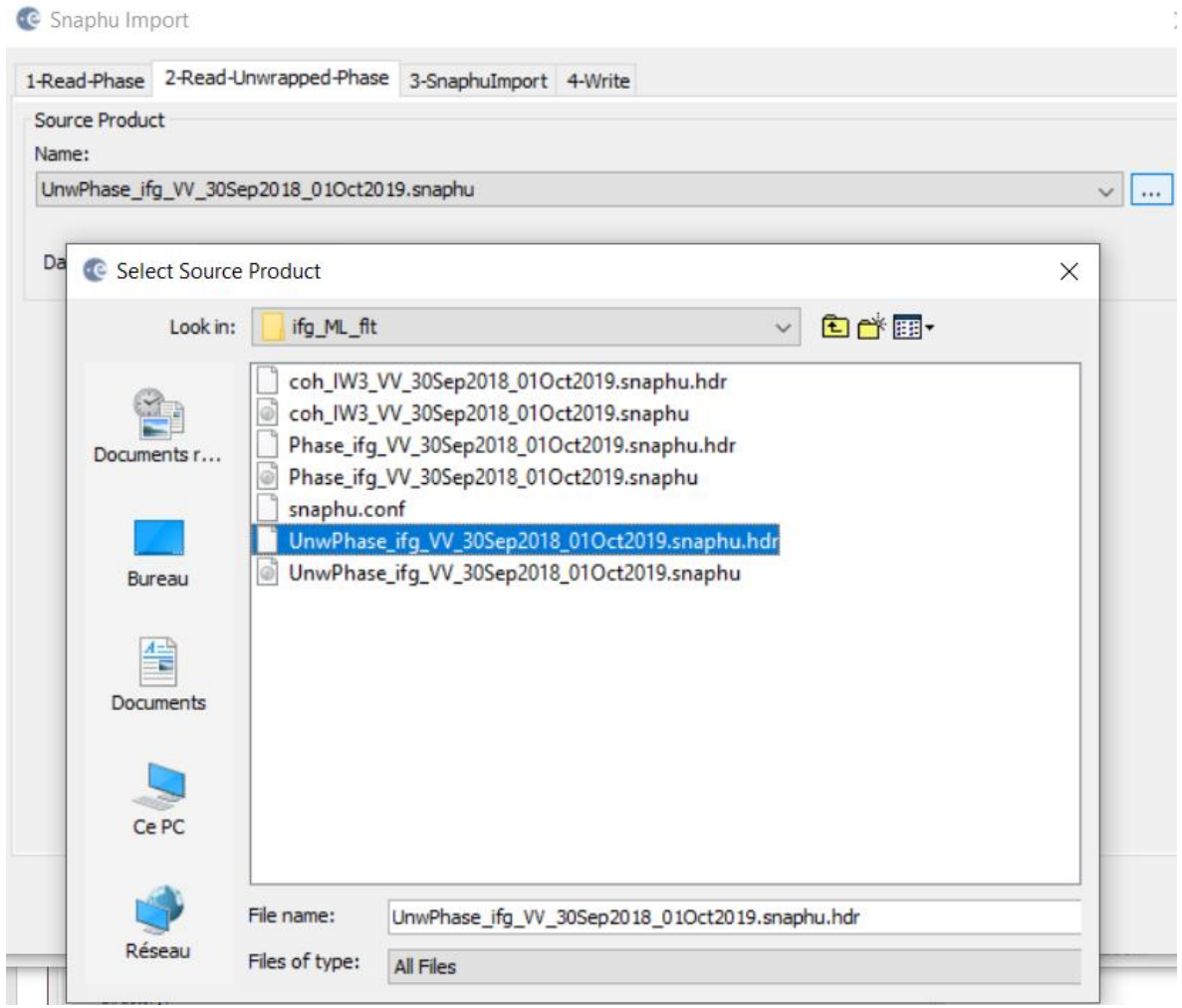




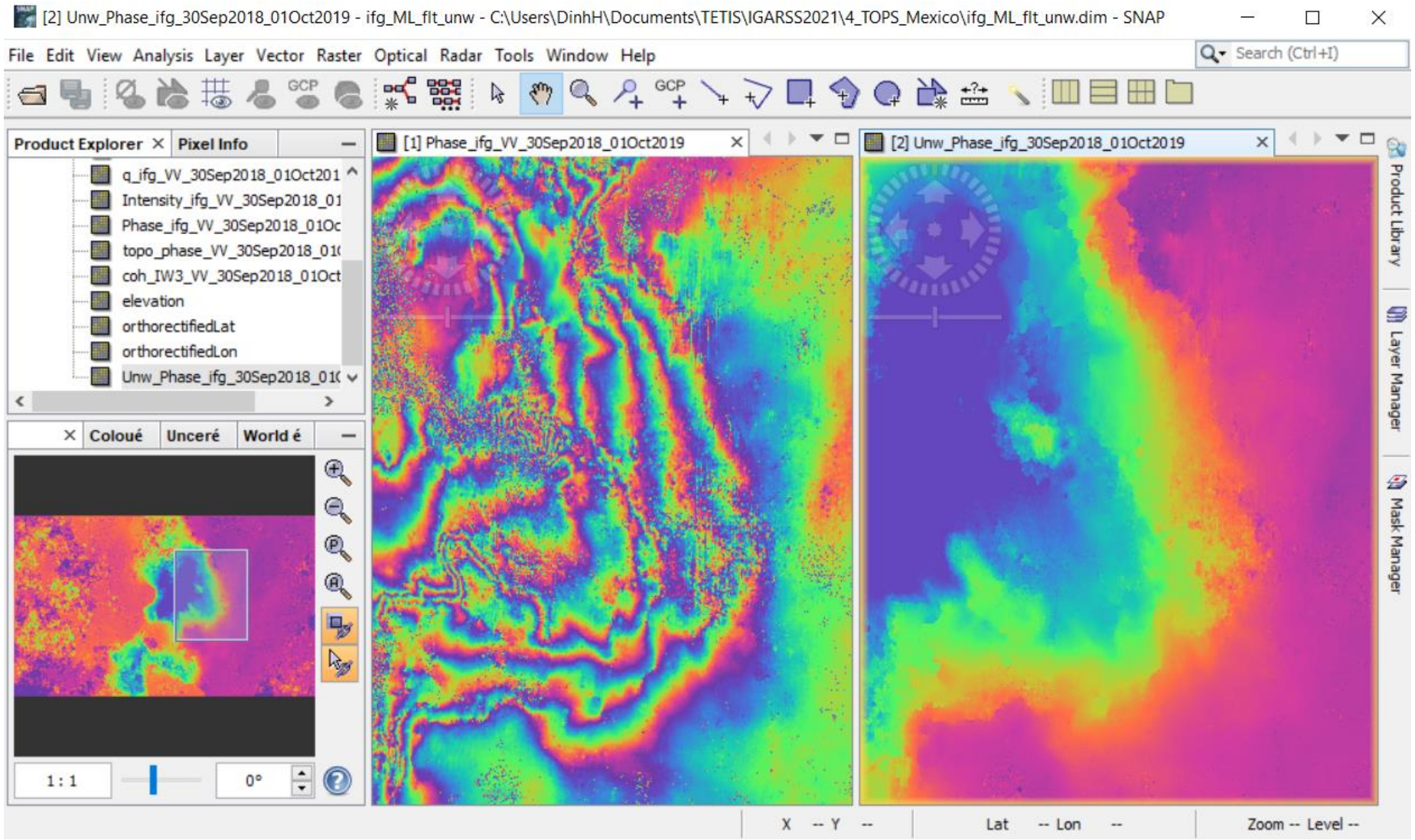
Phase unwrapping import



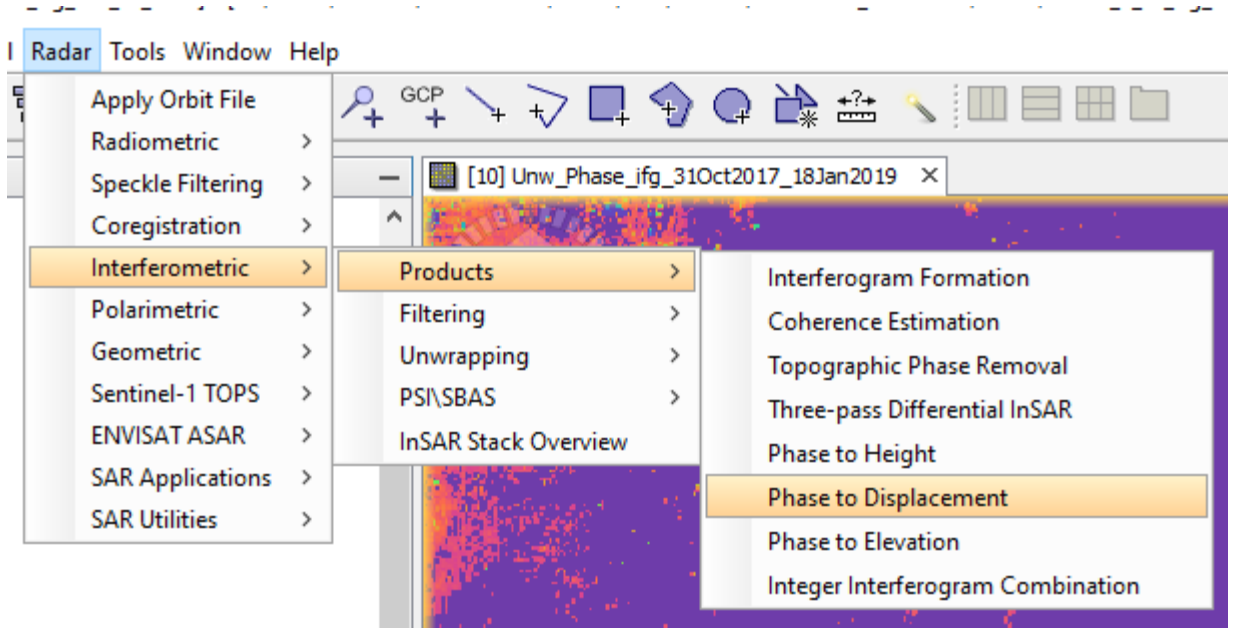




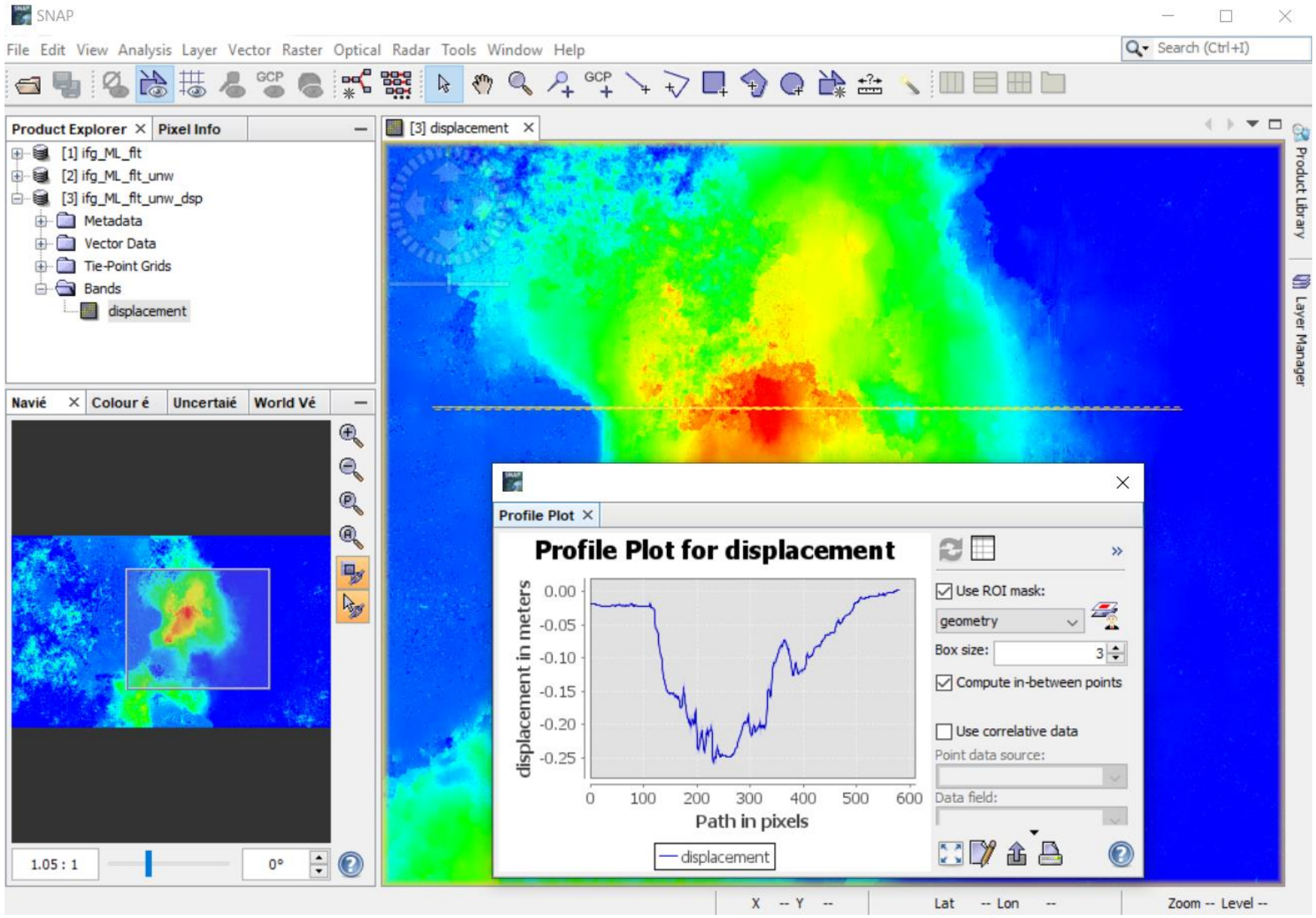
Phase unwrapping



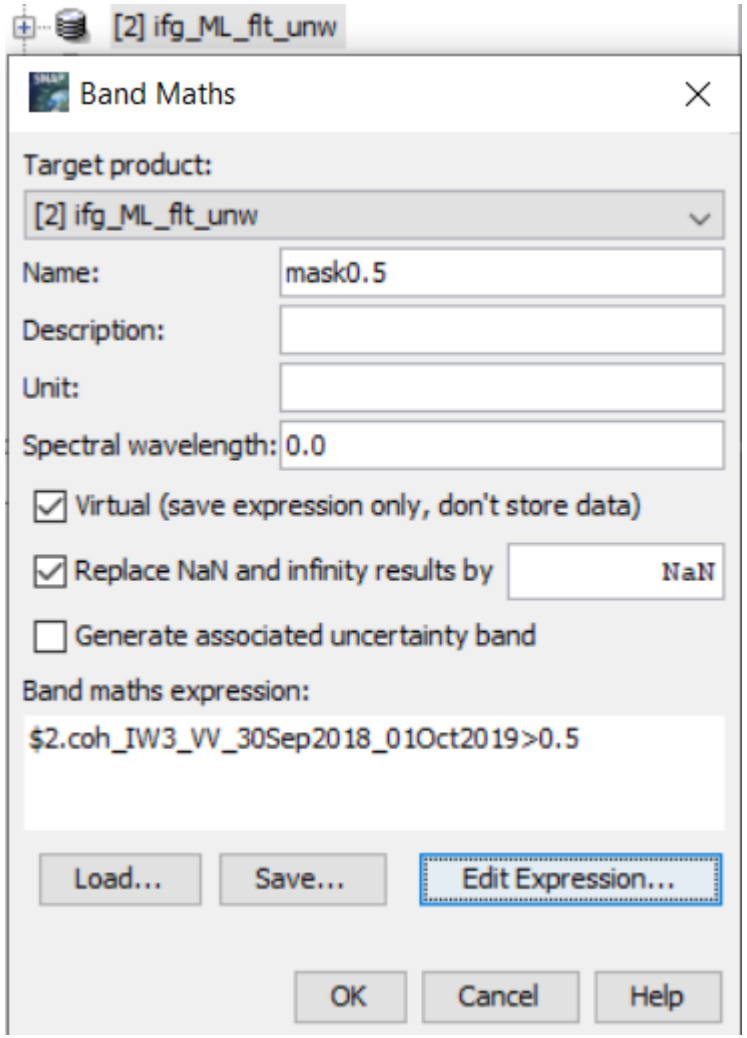
Phase conversion



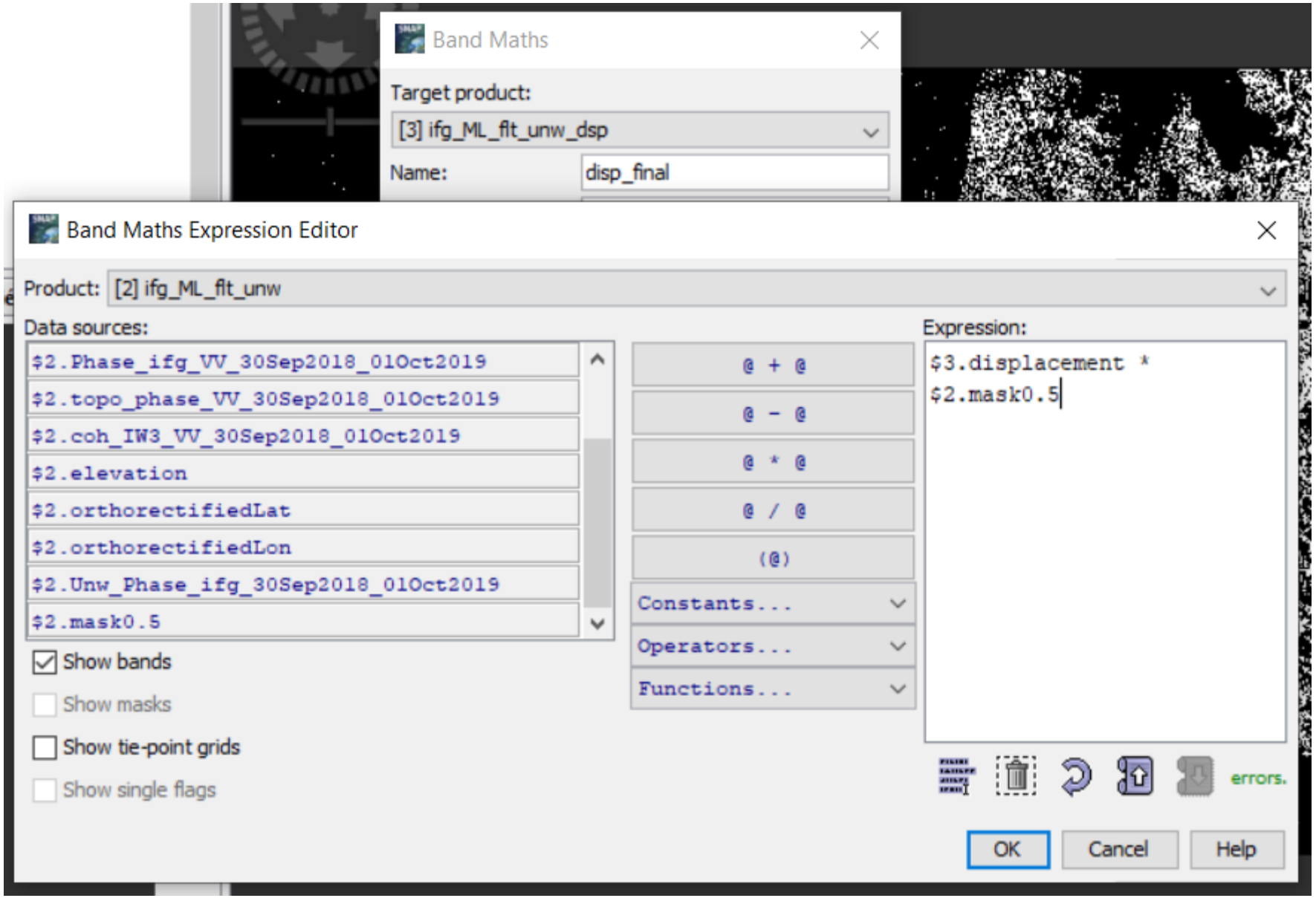
Displacement



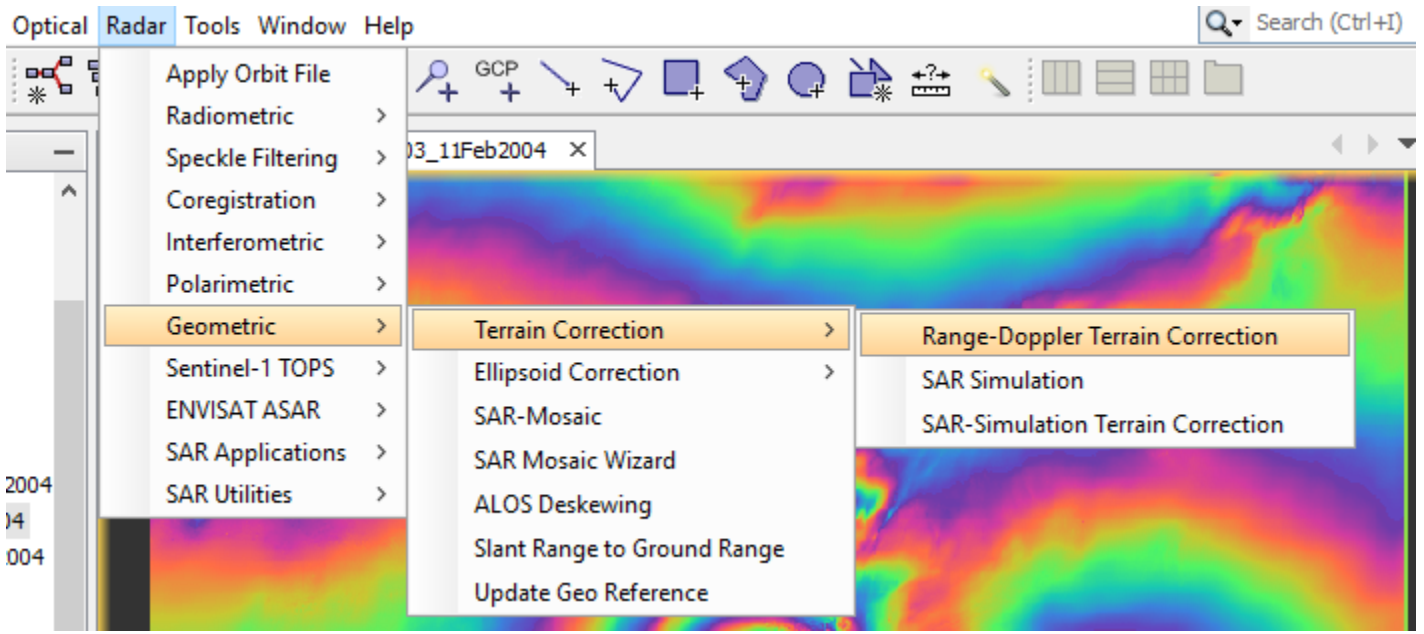
Improve by masking



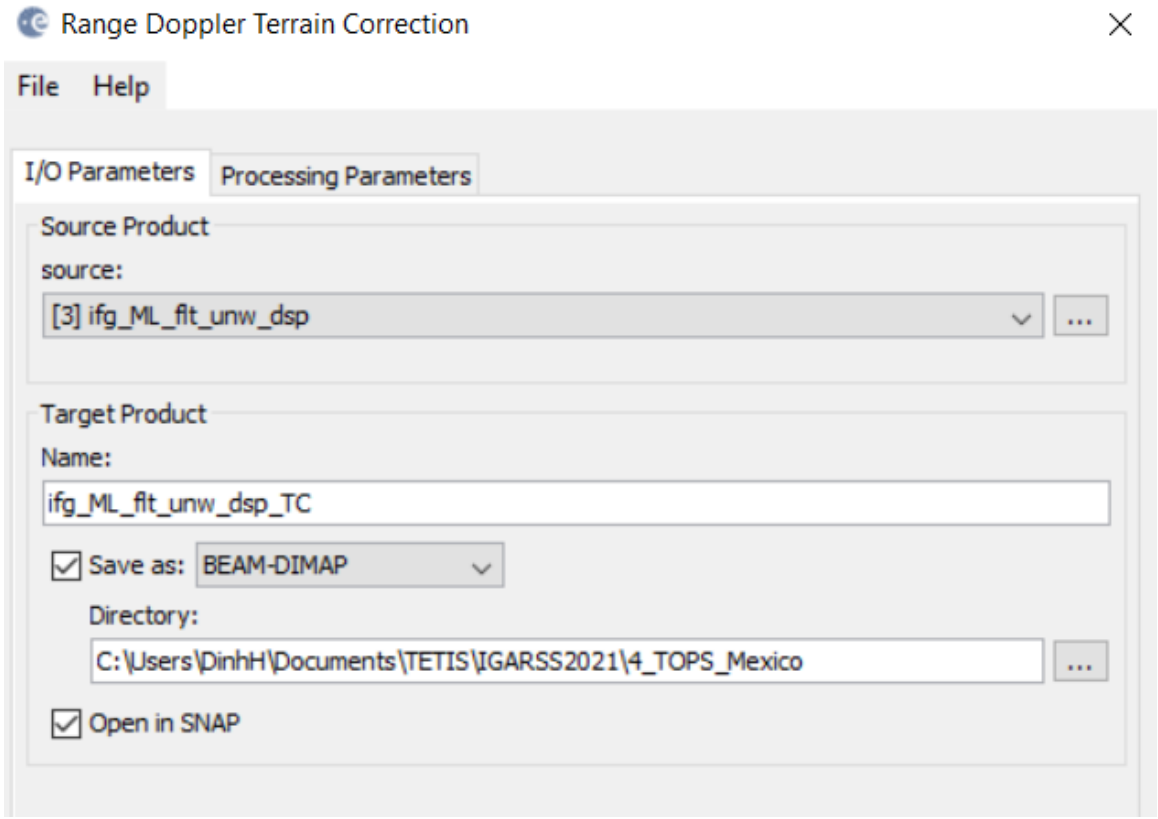
Improve by masking

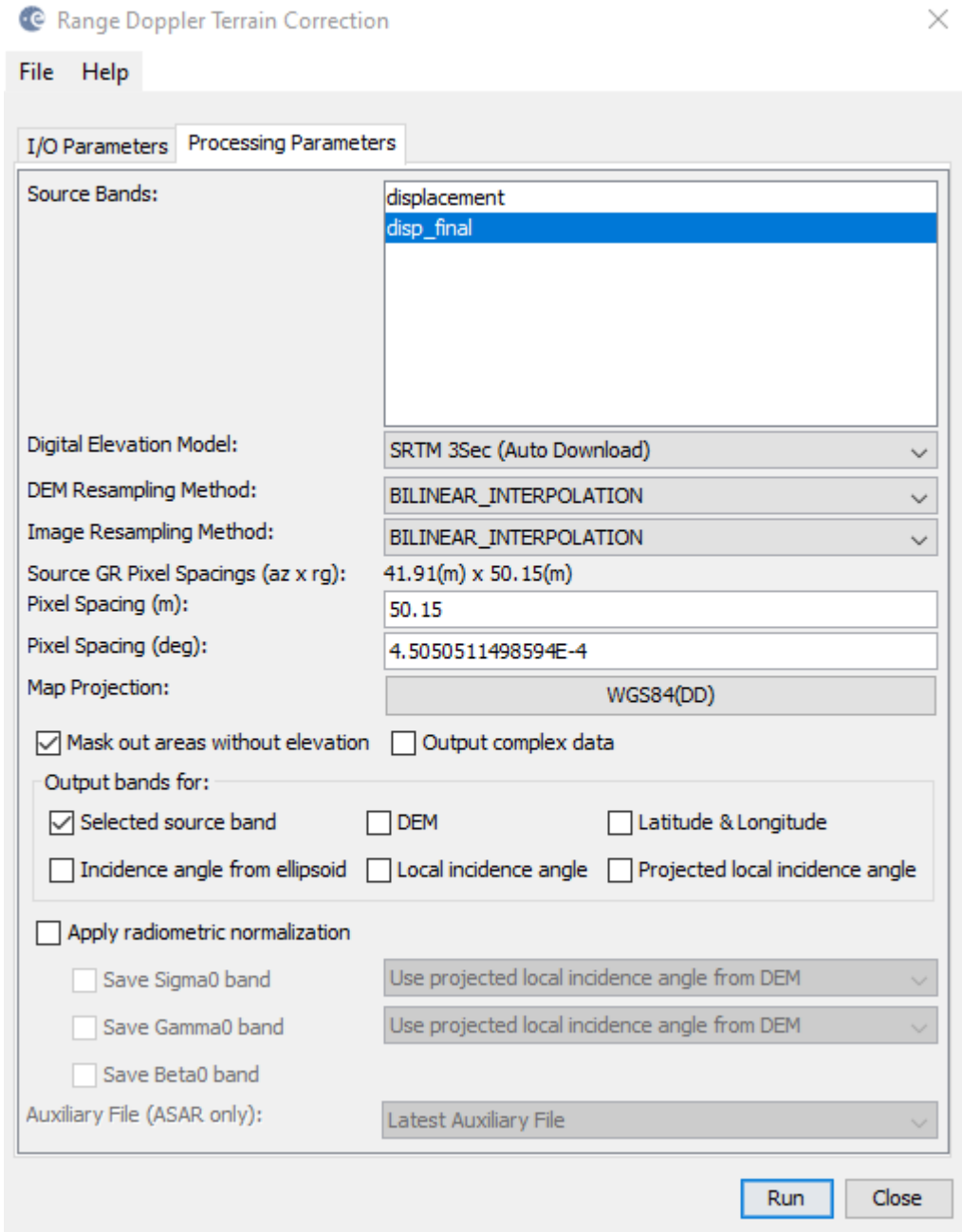


Geocode

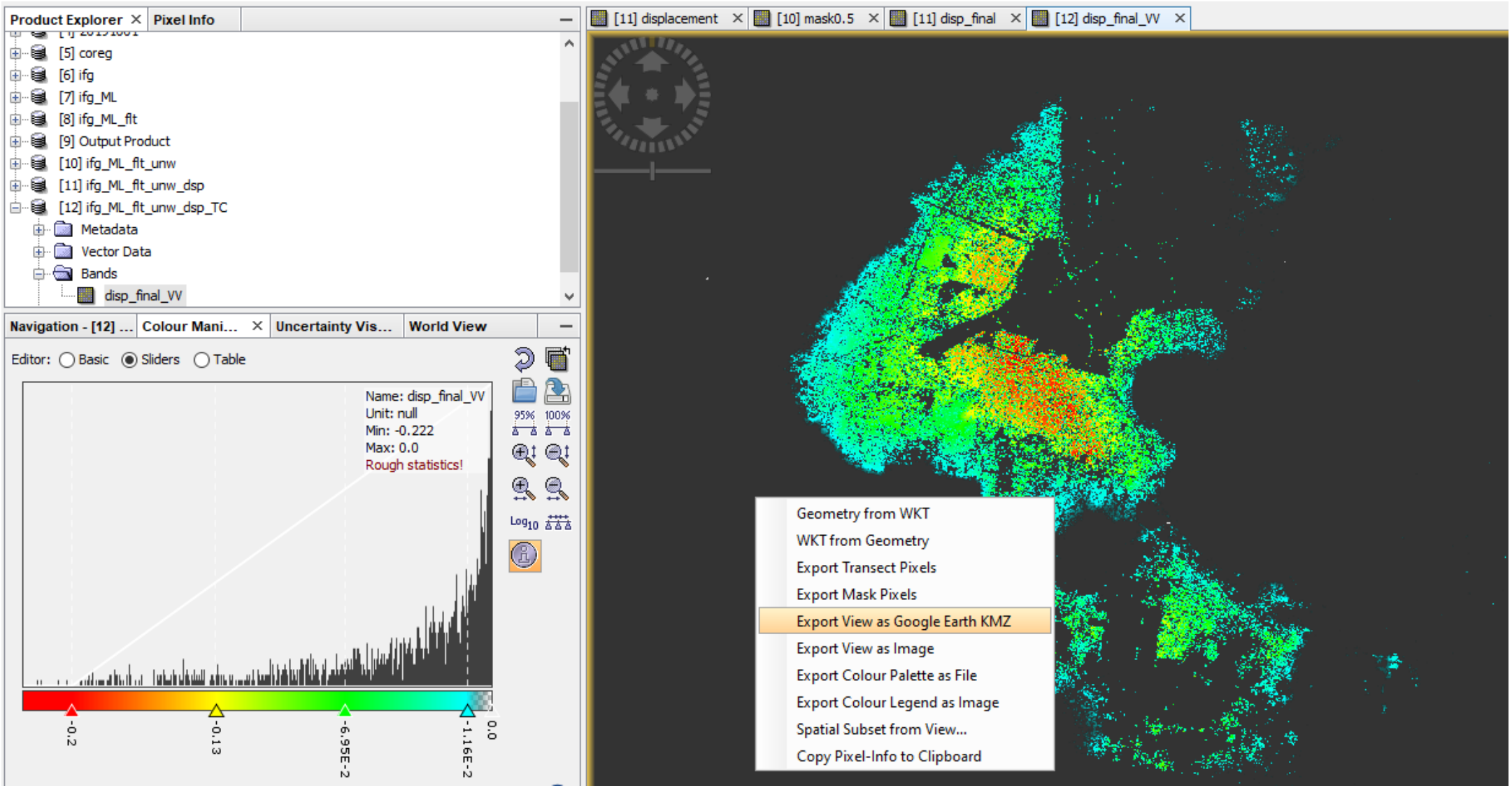

Optical
Radar
Tools
Window
Help
Search (Ctrl+I)
Apply Orbit File
Radiometric
Speckle Filtering
Coregistration
Interferometric
Polarimetric
Geometric
Sentinel-1 TOPS
ENVISAT ASAR
SAR Applications
SAR Utilities
GCP
03_11Feb2004
Terrain Correction
Ellipsoid Correction
SAR-Mosaic
SAR Mosaic Wizard
ALOS Deskewing
Slant Range to Ground Range
Update Geo Reference
Range-Doppler Terrain Correction
SAR Simulation
SAR-Simulation Terrain Correction
2004
04
004

Geocode


Range Doppler Terrain Correction
File
Help
I/O Parameters
Processing Parameters
Source Product
source:
[3] ifg_ML_flt_unw_dsp
...
Target Product
Name:
ifg_ML_flt_unw_dsp_TC
Save as:
BEAM-DIMAP
Directory:
C:\Users\DinhH\Documents\TETIS\IGARSS2021\4_TOPS_Mexico
...
Open in SNAP


Range Doppler Terrain Correction
File
Help
I/O Parameters
Processing Parameters
Source Bands:
displacement
disp_final
Digital Elevation Model:
SRTM 3Sec (Auto Download)
DEM Resampling Method:
BILINEAR_INTERPOLATION
Image Resampling Method:
BILINEAR_INTERPOLATION
Source GR Pixel Spacings (az x rg):
41.91(m) x 50.15(m)
Pixel Spacing (m):
50.15
Pixel Spacing (deg):
4.5050511498594E-4
Map Projection:
WGS84(DD)
Mask out areas without elevation
Output complex data
Output bands for:
Selected source band
DEM
Latitude & Longitude
Incidence angle from ellipsoid
Local incidence angle
Projected local incidence angle
Apply radiometric normalization
Save Sigma0 band
Use projected local incidence angle from DEM
Save Gamma0 band
Use projected local incidence angle from DEM
Save Beta0 band
Auxiliary File (ASAR only):
Latest Auxiliary File
Run
Close

Export to Google Earth



Export to Google Earth