InSARDEMGeneration SARscape Modeler

Version 1.0

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Index

General Information

Examples of SARscape Modeler workflows can be find in the installation folder of SARscape (C:\Program Files\SARMAP SA\SARscape\examples\modeler_examples). We suggest keeping the already set parameters to obtain the results shown in this tutorial.

The main steps of this tutorial are described by a number. Steps that are not characterized by a number are not mandatory.

This symbol  specify a practical step that the user should perform in order to proceed with the tutorial.

Steps that are not identified by this symbol must not be modified. If parameters will be modified results obtained in this tutorial are not guarantee.

InSARDEMGeneration

This model generates a DEM using Interferometric SAR data. The model steps are: Interferogram generation, Adaptive Filter and Coherence Generation; Phase Unwrapping; Refinement and Reflattening; Phase to Height Conversion and Geocoding.

Data used in this tutorial are available in our FTP site, please, contact us at support@sarmap.ch to get login credentials.

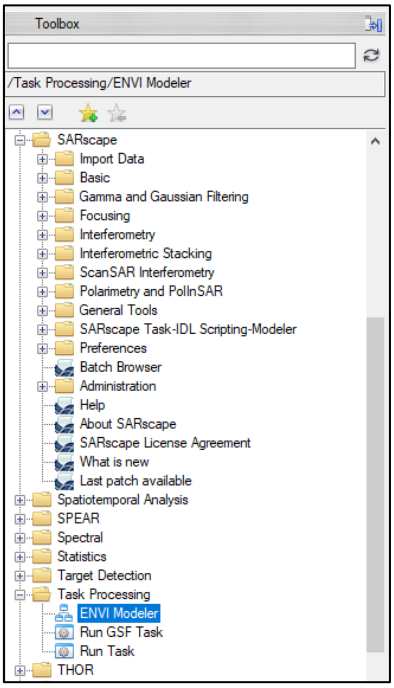

Figure 1 ENVI Modeler in ENVI Toolbox.

Start ENVI Modeler (Figure 1). Click the Open button in the ENVI menu bar, navigate to the examples folder in your SARscape installation path (i.e.: C:\Program Files\SARMAP SA\SARscape\examples\modeler_examples) and select the "InSARDEMGeneration.model". The sample model opens in an ENVI Modeler window, the model will appear as in Figure 2.

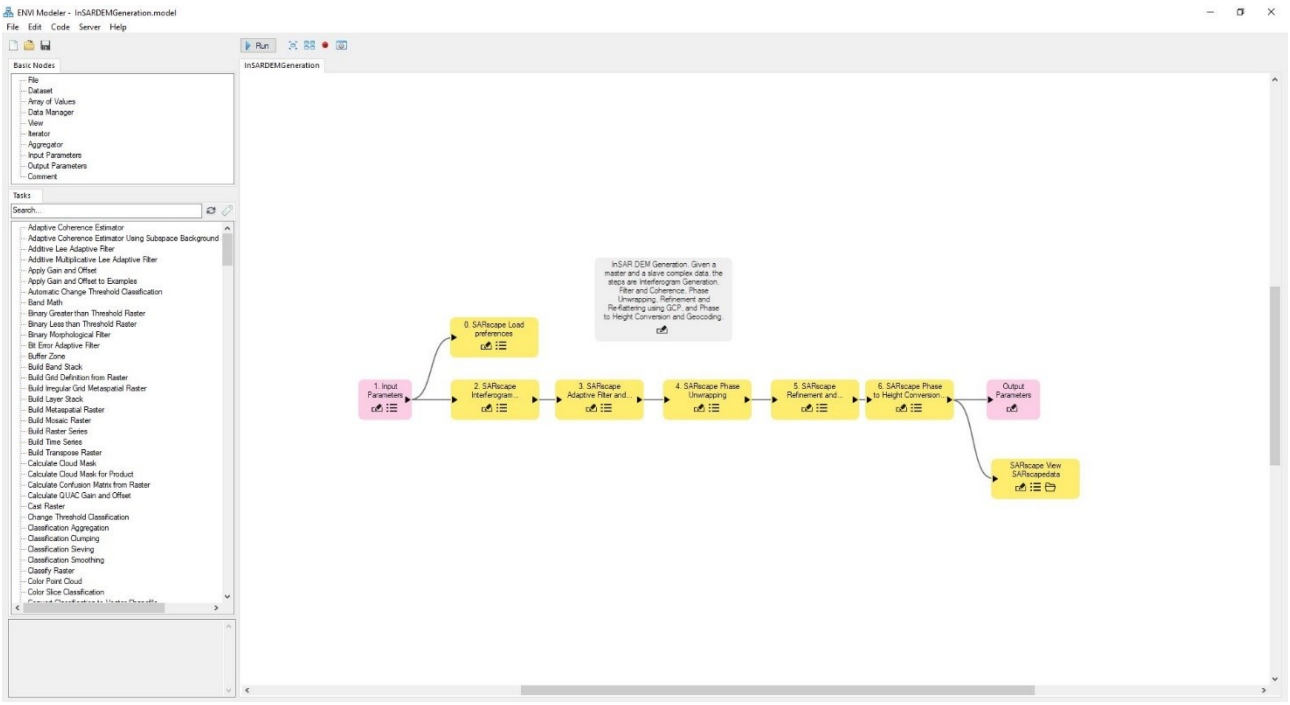

Figure 2 DEM generation model.

This model can be run as it is, each parameter is set to properly work.

✍ Click the Run button in ENVI Modeler window to run the model.

Step 0: SARscape Preferences

It loads SARscape Preferences. General preferences are set. This step is not mandatory.

The processing will stop since any data has been added. It will open the Input Parameter tasks that requires data (Step 1).

Step 1 Input Parameters

✍ Fill out the fields including:

- SARscape Preferences: make sure Preferences are set to General.
- Master: add the file name of the master data (_slc). This file is mandatory.
- Slave: add the file name of the slave data (_slc). This file is mandatory.
- DEM: add the DEM.
- Refinement GCP file: Ground Control Point are available for this dataset (.xml).
- Common URI for output: set the filename to create the output, which is not mandatory. In this case it means that output files will be saved in the ENVI temporary folder.

Once the model is set the completed task will appear in green color and a progress bar will describe the running processing step and view the progression of that step.

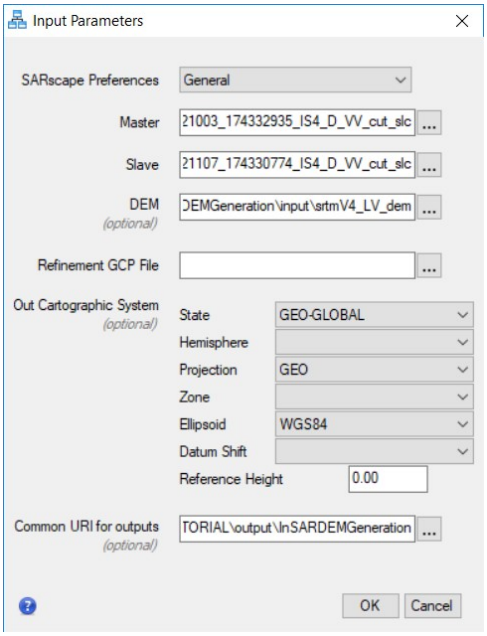

Figure 3 Input Parameters task Panel to be completed to start the processing.

Step 2 SARscape Interferogram Generation

The interferogram generation task computes the phase difference (ϕ) between the master and the slave images. Moreover, the interferogram generation requires master and slave files, the SRTM3 V4 DEM file in the Input Parameters, (see Interferometry - Phase processing - 1 - Interferogram Generation tool help).

Note: This task output will not be saved in the output folder since the common URI for outputs is not set.

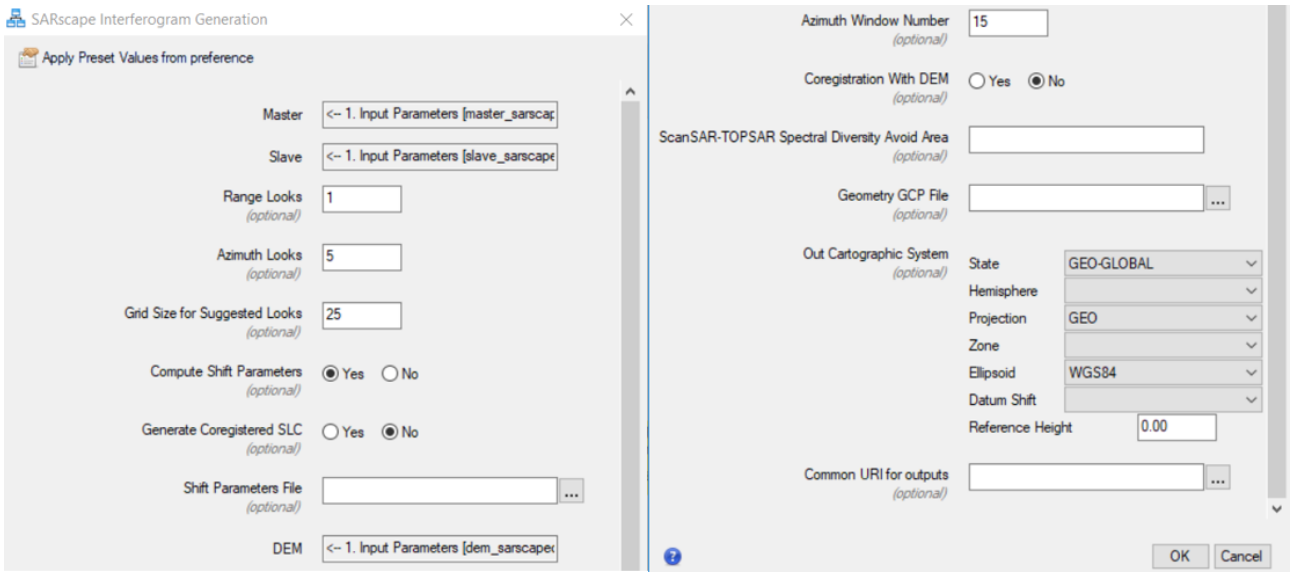

Figure 4 Interferogram Generation task panel.

Step 3 SARscape Adaptive Filter and Coherence Generation

The flattened interferogram (_dint) and the master and slave images allow to generate a filtered interferogram (_fint) with phase noise reduction. The Goldstein filter is applied. The Interferometric Coherence (_cc) is computed using the filtered image (see Interferometry - Phase processing - 2 - Adaptive Filter and Coherence Generation tool help).

Note: This task output will not be saved in the output folder since the common URI for outputs is not set.

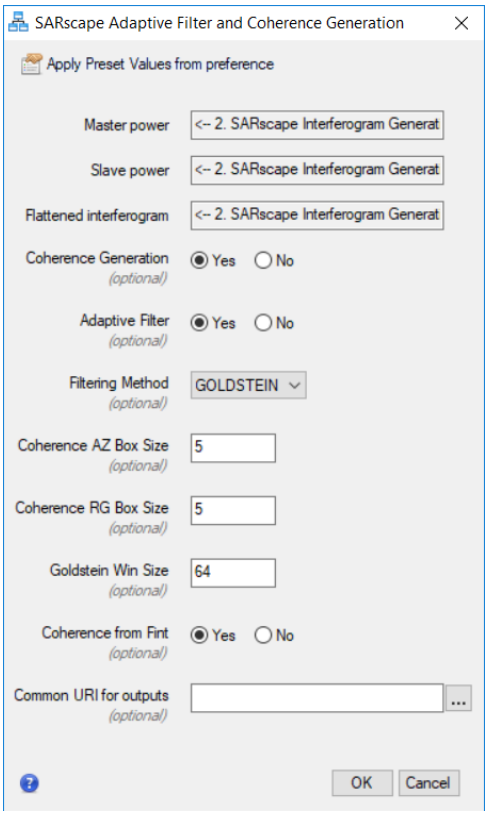

Figure 5 SARscape Adaptive Filter and Coherence Generation.

Step 4 SARscape Phase Unwrapping

The Minimum Cost Flow method is adopted for the unwrapping process. The filtered flattened interferogram and the coherence file produced in the previous step are used to create the unwrapped phase, using the minimum decomposition level (1) and an unwrapping coherence threshold of 0.2 (see Interferometry - Phase processing - 3 - Phase Unwrapping).

Note: This task output will not be saved in the output folder since the common URI for outputs is not set.

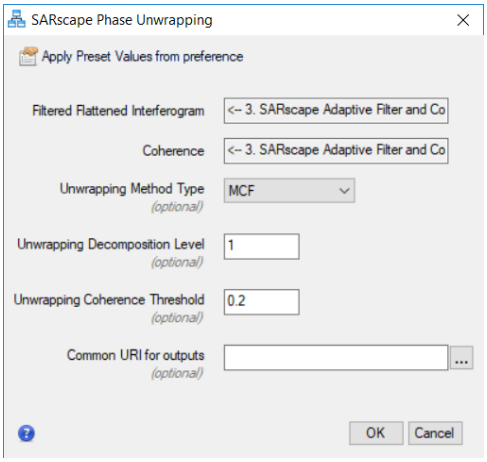

Figure 6 SARscape Phase Unwrapping task panel.

Step 5 SARscape Refinement and Reflattening

This step is crucial for a correct transformation of the unwrapped phase information into height values. It allows both to refine the orbits (i.e. correcting possible inaccuracies) and to calculate the phase offset (i.e. getting the absolute phase values), or remove possible phase ramps. The unwrapped interferogram, the multilooked master and slave intensity files, the coherence file, the synthetic phase the Digital Elevation Model in slant range, the geocoded reference DEM, the Ground Control Point files are mandatory (see Interferometry - Phase processing - 4- Refinement and Re-flattening).

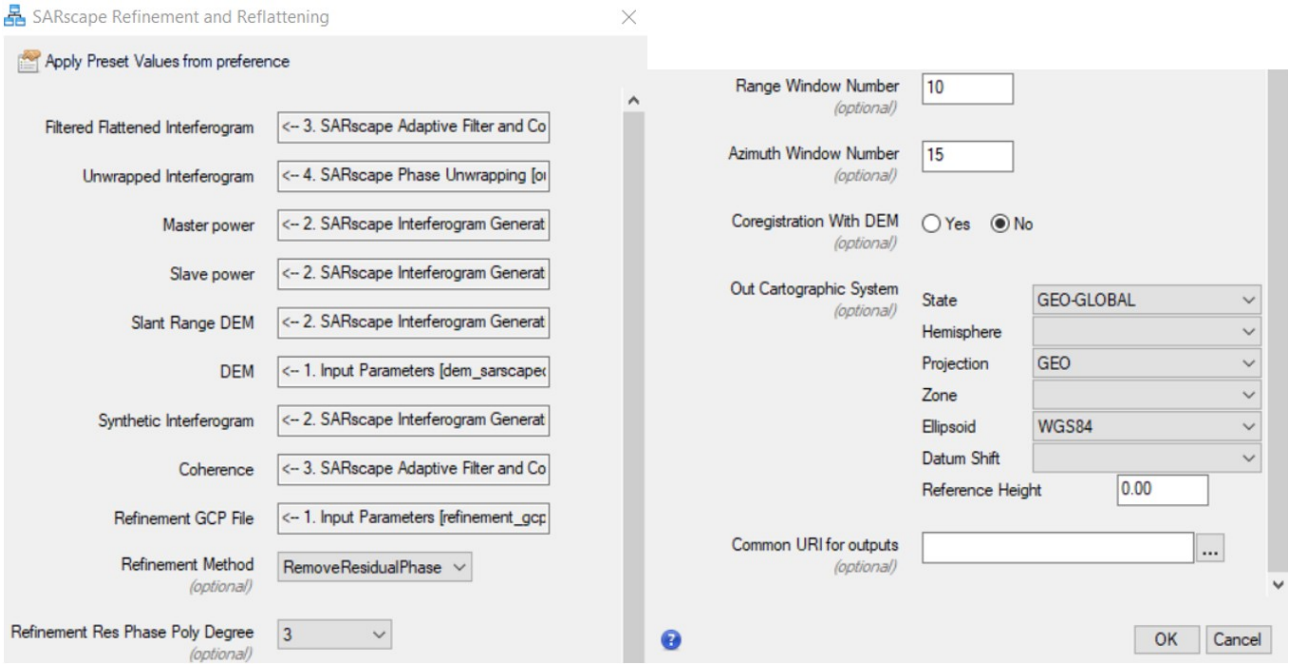

Figure 7 SARscape Refinement and Reflattening task panel.

Note: This task output will not be saved in the output folder since the common URI for outputs is not set.

Step 6 SARscape Phase to Height Conversion and Geocoding

Master and slave intensity files, the unwrapped interferogram, the synthetic interferogram, the coherence file, are mandatory to convert the unwrapped phase to height and geocoded into a map projection.

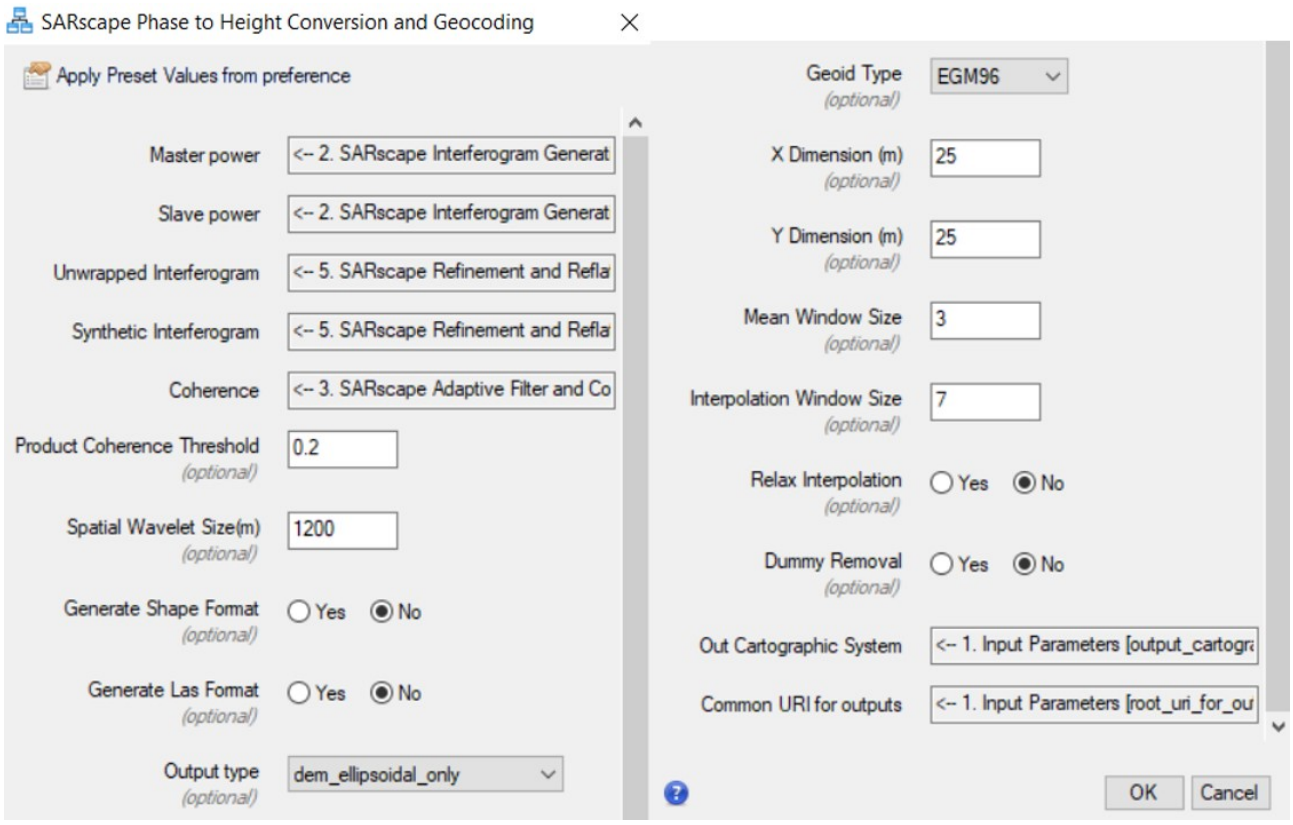

Figure 8 SARscape Phase to Height Conversion and Geocoding task panel.

SARscape View SARscapedata

The geocoded data are connected to SARscape View SARscapedata metatask for visualization purposes. (see the General Modeler Tutorial for further details).

Output Parameters

The SARscape Output Parameters allows defining the outputs in order to collect them for a potential Metatask.

Once the process is created the model can be saved and used as a function for further processing using Edit> Create task from model.

The model can be used also as MetaTask and saved on disk to be recall in the future from the Task Panel every time users will need it in ENVI Modeler. To save it use Code> Genarate Metatask. It has be saved in ENVI installation folder as .task.

Both the model and task can be shared with other users. Metatasks have to be saved in the disk.

Models can be saved as IDL script in Code > Generate IDL Program.