Amplitude time series

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MasTer Toolbox

Sat. image Download

Interferometric processing (MasTer Engine)

Ampli.

Coh.

Defo.

20200101

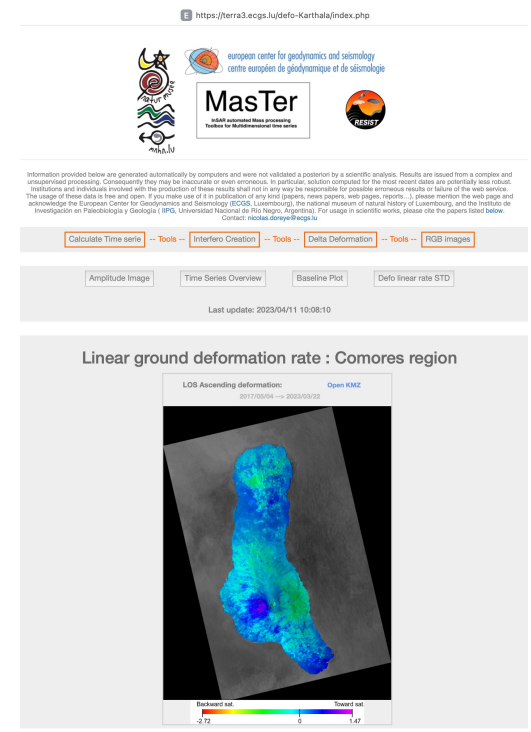
Time Series processing (MSBAS)

Cumul. defo.

Mean Veloc.

Time series

Web Page(s)



ALL2GIF.sh

MultiLunch_Ampli_Coh.sh

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Amplitude Time Series

Plan:

Why amplitude (coherence) time series ?

Only the amplitude in Slant Range + gif animation tagged with date :

- ALL2GIF.sh
- Corner offset
- Pixel shape
- Warning : hard coded lines
- How geocode results

Amplitude and Coherence maps in slant range and geographical coord:

- MultiLaunch_Ampli_Coh.sh

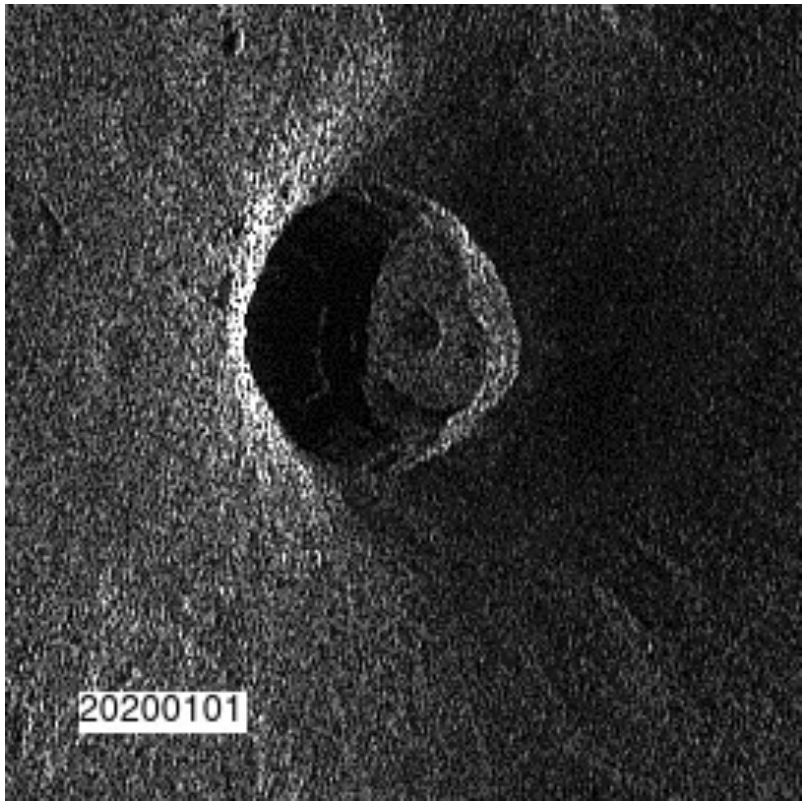
Other scripts:

- For only one amplitude image: *MakeAmpliPlotSingleImg.sh*
- For time series of other products: *AllProd2GIF.sh*
- RGB composition:

Amplitude Time Series

Why amplitude (and/or coherence) time series ?

- Geomorphological changes
- Wild fires or inundations
- Land cover changes
- Height measurements from shadows
- Pixel tracking

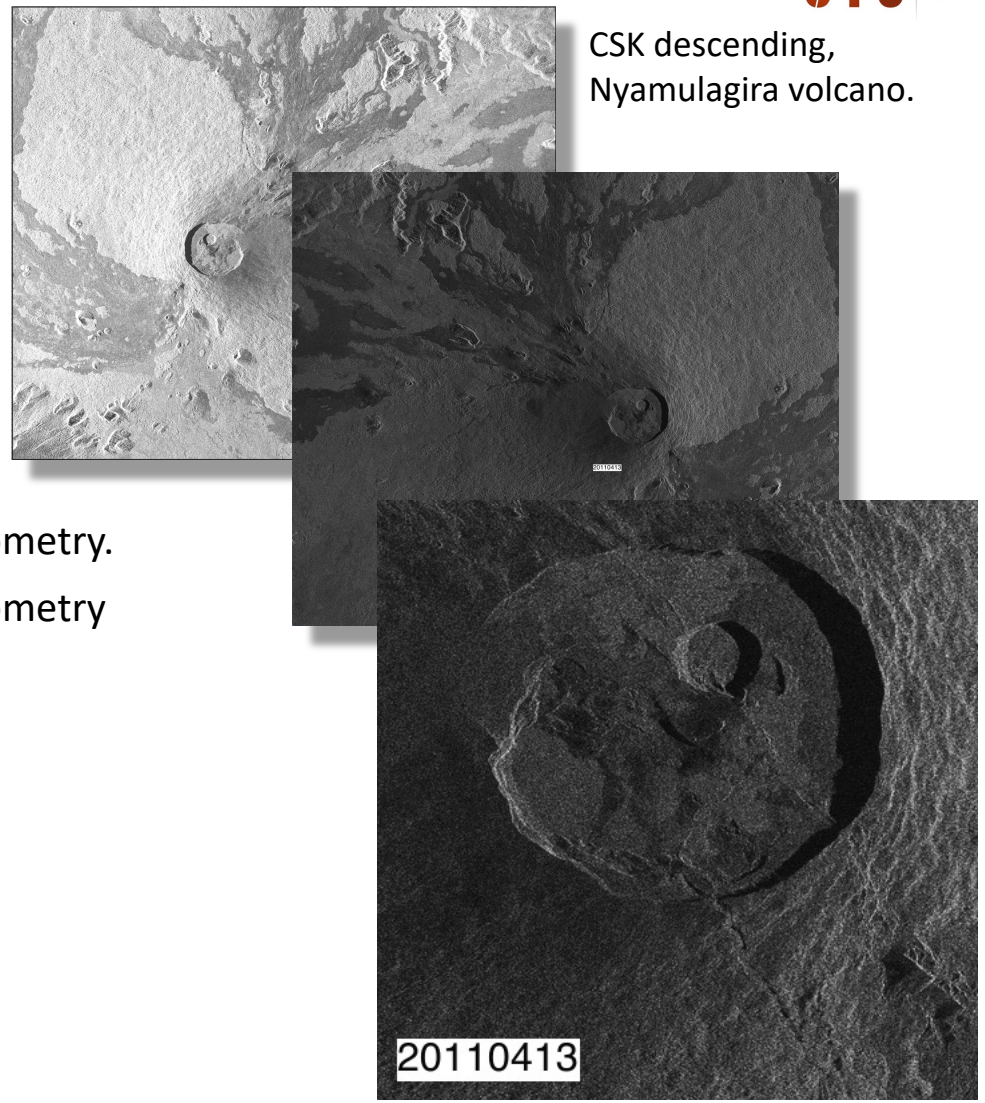


Amplitude Time Series

Why amplitude (coherence) time series ?

Only the amplitude in Slant Range + gif animation tagged with date:

- ***ALL2GIF.sh***



CSK descending,
Nyamulagira volcano.

- The script will run a series of ***SinglePairNoUnwrap.sh***
  (Combining the Super Master & each image from the data base).
- It will **only** focus on the **amplitude** images in **slant range**
  It will create
  - Amplitude images as Real32 binary matrix (+ ascii header) in radar geometry.
  - Amplitude images as Real32 binary matrix (+ ascii header) in radar geometry flipped or flopped to be as close as possible a natural orientation.
  - jpg files of these flipped/flopped images,
    with a date tag positionned wherever you need in the image
  - A gif animation with all the jpg images cropped to the size you need.
    Large crops were needed for coregistration.

Amplitude Time Series

Why amplitude (coherence) time series ?

Only the amplitude in Slant Range + gif animation tagged with date:

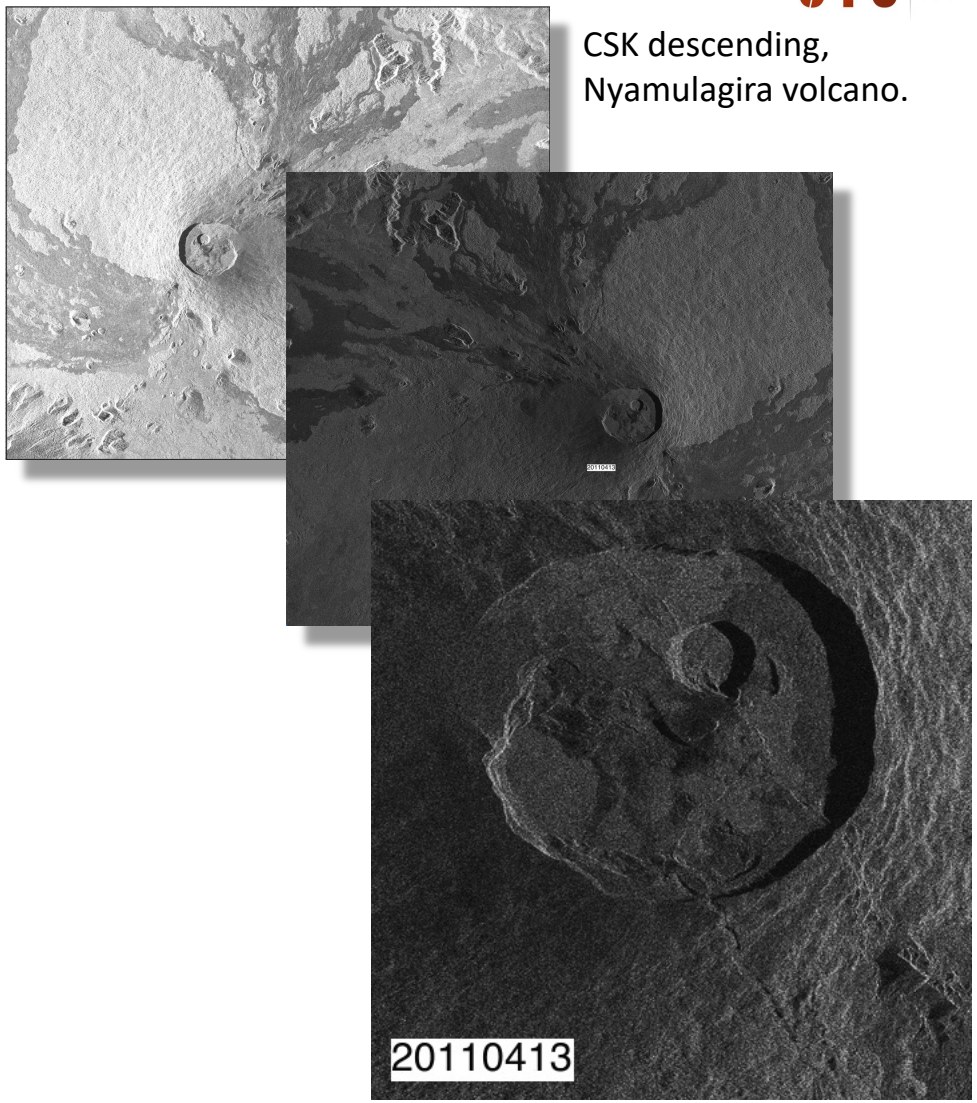
- ***ALL2GIF.sh***

  - Real32 binary matrix (+ ascii header) mimicks ENVI files,
    i.e. they can be open with QGIS, though without geographic reference, all aligned on the same grid.
    These are the products usually needed for analysis.

  - Note: S1 IW can be sigma nought calibrated

  - As usual, all scripts are incremental

  - Syntax: ***ALL2GIF.sh*** *SMDATE LaunchMTpParam.txt LabelX LabelY*
    where *SMDATE* is the date of the Super Master,
    LabelX LabelY are the position of the date label in jpg image



CSK descending,
Nyamulagira volcano.

Amplitude Time Series

Why amplitude (coherence) time series ?

Only the amplitude in Slant Range + gif animation tagged with date:

- *ALL2GIF.sh*
- **Corner offset**

➢ If some images cause problem, check _List_Az_Rg_UpperLeft_coord.txt for pairs whose Upper right range and azimuth coordinate are not as expected (that is not the same as in _SizeOfCroppedAreaOfInterest.txt).

Either discard these wrong images or try to adjust the parameters LLRGCO and LLAZCO in LaunchMTpParam.txt
(See manual § 3.2)


```
61
62  # INSAR
63  ########
64  DEFO        # PROCESSMODE, DEFO to produce DInSAR or TOPO to produce DEM (used only in SinglePair.sh)
65  VV          # INITPOL, For multi pol images; force polarisation at initInSAR for InSAR processing. If it does not exists it will find the first compatible MAS-SLV pol.
66  50          # LLRGCO, Lower Left Range coord offset for final interferometric products generation. Used in SinglePairNoUnwrap only for Shadow measurements
67  50          # LLAZCO, Lower Left Azimuth coord offset for final interferometric products generation. Used in SinglePairNoUnwrap only for Shadow measurements
```

Amplitude Time Series

Why amplitude (coherence) time series ?

Only the amplitude in Slant Range + gif animation tagged with date:

- ALL2GIF.sh
- Corner offset
- **Pixel shape**

➢ In LaunchMTpParam.txt, the parameter PIXSHAPE let you decide if you want

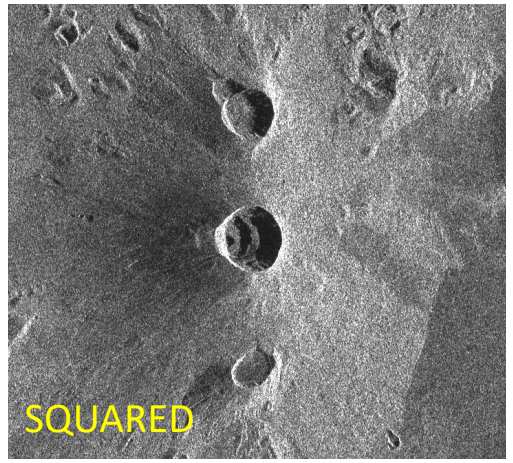
- to multilook your images in Range and Azimuth so that the final pixels look square, or
- to compute your image while keeping the original form.

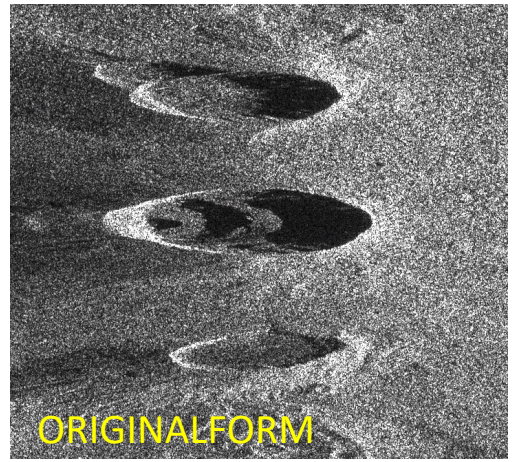
➢ SQUARE is easier to visualise

➢ ORIGINALFORM: pixel shape may allow to keep highest resolution e.g. for shadow length mesurements

```
42
43  # AMPLITUDE
44  ############
45  4           # MLAMPLI, Multilooking factor for amplitude images reduction (used for coregistration - 4-6 is appropriate).
46                      # If rectangular pixel, it will be multiplied by corresponding ratio.
47  SQUARE      # PIXSHAPE, pix shape for product : SQUARE, ORIGINALFORM, SQUAREUNITY or ORIGINALFORMUNITY
48  SIGMANO     # CALIBSIGMA, if SIGMAYES it will output sigma nought calibrated amplitude file (for S1 only)
49
50  # COARSE COREG
51  ##############
52  64          # CCOHWIN, Coarse coreg window size (64 by default but may want less for very small crop). Can be set to 0 to skip
```

S1 Desc 21 flopped image
Nyiragongo crater





Amplitude Time Series

Why amplitude (coherence) time series ?

Only the amplitude in Slant Range + gif animation tagged with date:

- ALL2GIF.sh
- Corner offset
- Pixel shape
- **Warning : hard coded lines**

ALL2GIF.sh contains hardcoded lines
thru a call of __HardCodedLines.sh to define :

- The destination of computed amplitude images
- The size and position of the gif crop

```
36  # New in Distro V 2.0: - Use hard coded lines definition from __HardCodedLines.sh
37  # New in Distro V 3.0 20230830: - Rename SCRIPTS_OK directory as SCRIPTS_MT
38  #                               - Replace CIS by MT in names
39  #                               - Renamed FUNCTIONS_FOR_MT.sh
40  #
41  # MasTer: InSAR Suite automated Mass processing Toolbox.
42  # NdO (c) 2017/12/29 - could make better... when time.
43  # ------------------------------------------------------------------------------------------
44  PRG=`basename "$0"`
45  VER="Distro V3.0 MasTer script utilities"
46  AUT="Nicolas d'Oreye, (c)2016-2019, Last modified on Aug 30, 2023"
47  echo " "
48  echo "${PRG} ${VER}, ${AUT}"
49  echo "Processing launched on $(date) "
50  echo " "
51
52  SUPERMASTERINPUT=$1          # Date of SuperMaster
53  PARAMFILE=$2                 # parmaters file
54  LABELX=$3                    # position of the date label in jpg fig of mod
55  LABELY=$4                    # position of the date label in jpg fig of mod
56
57  # vvv ----- Hard coded lines to check --- vvv
58  source $HOME/.bashrc
59
60  source ${PATH_SCRIPTS}/SCRIPTS_MT/__HardCodedLines.sh
61      # Setup disk paths for processing in Luxembourg. Adjust accordingly if you run several
62      ALL2GIFWhereAreAmpli
63      # See also below:
64      # - ALL2GIFCrop to define the crop region in amplitude images depending on the sat/trk/target
65  # ^^^ ----- Hard coded lines to check -- ^^^
66
67
```

Amplitude Time Series

Why amplitude (coherence) time series ?

Only the amplitude in Slant Range + gif animation tagged with date:

- ALL2GIF.sh
- Corner offset
- Pixel shape
- Warning : hard coded lines
- **How geocode results**

If you need to geocode your results, this can be performed using the script ***Geocode_from_ALL2GIF.sh***.

It must be launched in the …/SAR_SM/AMPLITUDES/SAT/TRK/REGION/ directory with a parameter file containing the desired details of the geocoding.

This parameter file has a structure slightly different from LaunchMTpParam.txt files.
See template in ___V20200812_LaunchParamReGeocAmpli.txt.

However, note that the script we will see next is doing it directly...

Amplitude Time Series

Why amplitude (coherence) time series ?
Only the amplitude in Slant Range + gif animation tagged with date

Amplitude and Coherence maps in slant range and geographical coord:

- **MultiLaunch_Ampli_Coh.sh**

➢ Unlike ***ALL2GIF.sh***, which computes all the images with the Super Master, the script will run a series of ***SinglePair.sh*** using a list of pairs (several list formats are possible – see manual §3.5)

➢ It will compute **amplitude** and (masked or unmasked) **coherence** images in **slant range** and in geographical coordinates
It will create

- Amplitude images as Real32 binary matrix (+ ascii header) in radar geometry, stored in
  _ALL_COH_SLANTRG
  _ALL_AMPLI_SLANTRG (and/or _ALL_AMPLI_SIGMA_SLANTRG for S1 IW)
- Amplitude images as Real32 binary matrix (+ ascii header) in radar geometry , stored in
  _ALL_COH_GEOC
  _ALL_AMPLI_GEOC (or _ALL_AMPLI_SIGMA_GEOC for S1 IW)

➢ See manual §3.5 for syntax etc…

Amplitude Time Series

Why amplitude (coherence) time series ?
Only the amplitude in Slant Range + gif animation tagged with date
Amplitude and Coherence maps in slant range and geographical coord

Other scripts:

- **For only one amplitude image: MakeAmpliPlotSingleImg.sh**

  - ***MakeAmpliPlotSingleImg.sh*** allows to create an amplitude images for only one image, e.g.
    - if only one image is available (no pair possible),
    - if no coregistration on a SuperMaster is required, or
    - if speed is important, as it skips all processes other than what is needed to just compute the amplitude.

  - It requires a slightly different LaunchParameter.txt. See template in ___V20220719_LaunchParamAmpli.txt

  - See manual § 3.6 for more information

Amplitude Time Series

Why amplitude (coherence) time series ?
Only the amplitude in Slant Range + gif animation tagged with date
Amplitude and Coherence maps in slant range and geographical coord

Other scripts:

- For only one amplitude image: *MakeAmpliPlotSingleImg.sh*
- **For time series of other products: *AllProd2GIF.sh***

➢ ***AllProd2GIF.sh*** allows to create a gif animation with the **geocoded** product:

- Coherence maps
- Residual interferograms
- Deformation maps
- Amplitude

from all the pairs in the current directory.

➢ See script for more information

Amplitude Time Series

Why amplitude (coherence) time series ?
Only the amplitude in Slant Range + gif animation tagged with date
Amplitude and Coherence maps in slant range and geographical coord

Other scripts:

- For only one amplitude image: *MakeAmpliPlotSingleImg.sh*
- For time series of other products: *AllProd2GIF.sh*
- **RGB composition:**

➢ ***AmpAmpAmp.sh*** allows to create a RGB composition by combining 2 amplitude maps (amp1 amp2 amp2) using Fiji.
It requires amplitude images in ENVI format.

➢ ***AmpAmpCoh.sh*** allows to create a RGB composition by combining 2 amplitude maps and a coherence image (amp1 amp2 coh) using Fiji.
It requires amplitude images in ENVI format.

➢ These are useful tools to track changes occuring between images such as flooding, lava flows emplacements etc...

Amplitude Time Series

Plan:

Why amplitude (coherence) time series ?

Only the amplitude in Slant Range + gif animation tagged with date :

- ALL2GIF.sh
- Corner offset
- Pixel shape
- Warning : hard coded lines
- How geocode results

- DONE ! -

Amplitude and Coherence maps in slant range and geographical coord:

- MultiLaunch_Ampli_Coh.sh

Other scripts:

- For only one amplitude image: *MakeAmpliPlotSingleImg.sh*
- For time series of other products: *AllProd2GIF.sh*
- RGB composition: