AMSTer : SAR & InSAR Automated Mass processing Software for Multidimensional Time series

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Time Series plotting

Nicolas d'Oreye

MasTer Toolbox

Sat. image Download

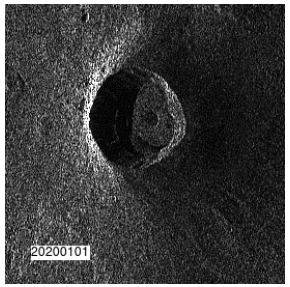
Interferometric processing (AMSTer Engine)

Ampli.

Coh.

Interf.

Defo.



Ampli.

Defo.

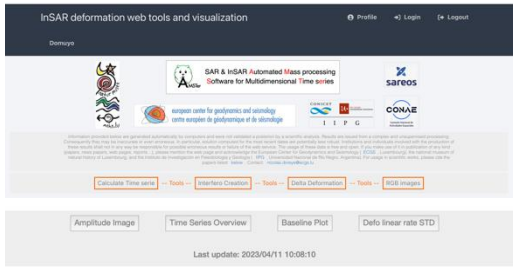
Time Series processing (MSBAS)

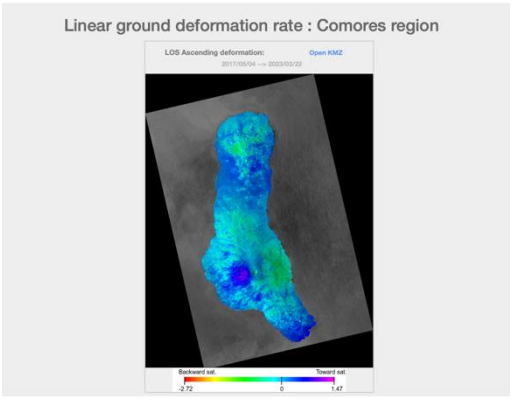
Cumul. defo.

Mean Veloc.

Time series

Web Page(s)





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Time Series plotting

Plan:

Time Series of single component: *PlotTS.sh*

Time Series in UD-EW component *PlotTS_AllComp.sh*

Insets

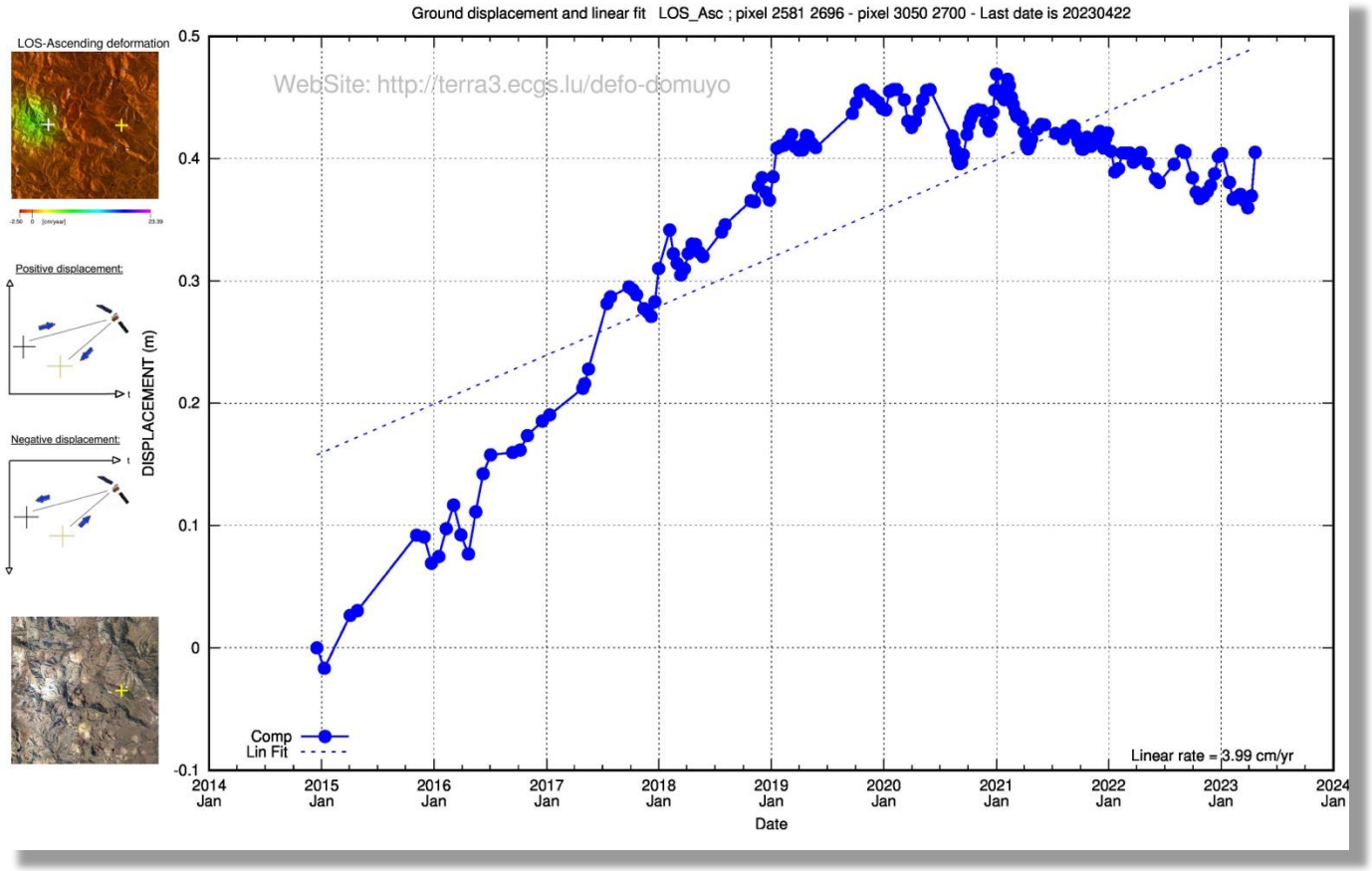
Error bars

Other options

Time Series plotting

Time Series of single component: *PlotTS.sh*

- Must be run in directory where MSBAS data of the component are, that is e.g. .../*3602*/MSBAS/*YourRegion_and_Some_Info*/zz_LOS_Asc….
- Templates required:
  plotTS_template.gnu or
  plotTS_template_fit.gnu
- Syntax: Needs the following parameters:
  - Coord. (*lines* and *cols*) of pixel(s)
  - Optional :
    - -f and –r (to display linear fit and rate)
    - -t (to add tag with direction of displacment)
    - -g, -d or –D (to clean gnu and txt files)
    - -EVENTS=/PathToEventsDir
      (see options here after)
    - start=*YYYYMMDD* -stop=*YYYYMMD*
- Note:
  See hard coded lines in need to be launched from QGIS



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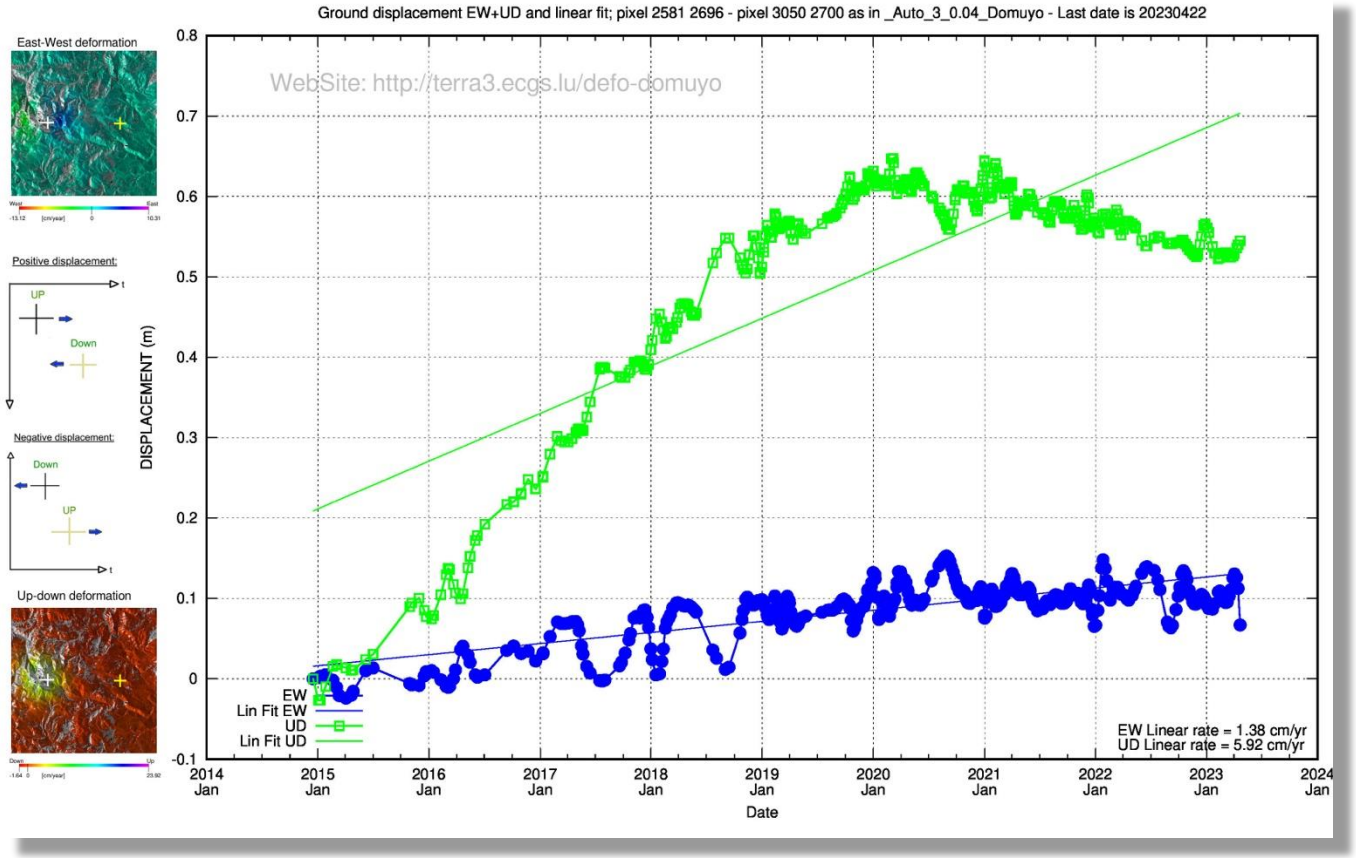
Time Series plotting

Time Series of single component: *PlotTS.sh*

Time Series in UD-EW component *PlotTS_AllComp.sh*

- Must be run in directory where MSBAS data are in sub directories, that is e.g. .../*3602*/MSBAS/*YourRegion_and_Some_Info/*
- Templates required:
  plotTS_template_multi.gnu or
  plotTS_template_multi_fit.gnu
- Syntax: Needs the following parameters:
  - Remak used in dir naming of the components
    e.g. zz_EW_*REMARKDIR*
  - Coord. (*lines* and *cols*) of pixel(s)
  - Optional :
    - -f and –r (to display linear fit and rate)
    - -t (to add tag with direction of displacment)
    - -g, -d or –D (to clean gnu and txt files)
    - -EVENTS=/PathToEventsDir
      (see options here after)
    - start=*YYYYMMDD* -stop=*YYYYMMD*
    - Coh=*Option to display error bars* (see here after)



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Time Series plotting

Time Series of single component: *PlotTS.sh*

Time Series in UD-EW component *PlotTS_AllComp.sh*

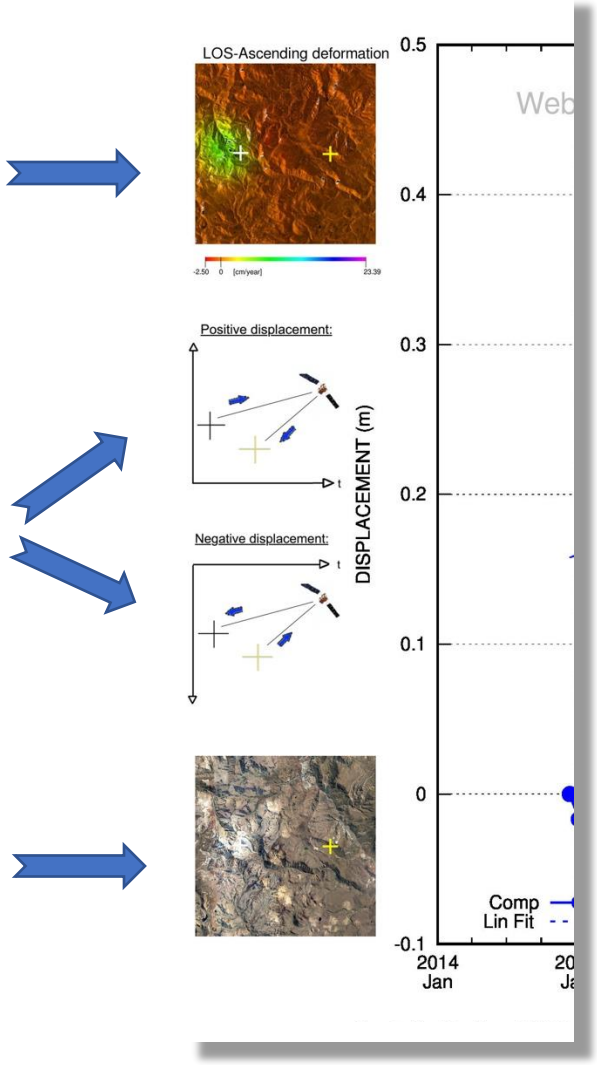
Insets

3 types of insets are displayed automatically, that is

- Inset to display the pixel localisation on velocity map
- Insets to display the direction of displacement
- Inset to display the location on Google Earth (Single component only)

providing that the correct info are present where needed:

- TS_Displ_*comp*.png
  These figs are located in /SCRIPTS_MT/TSCombiFiles
  They will be copied automatically in
  .../*3602*/MSBAS/*YourRegion_and_Some_Info*/
- TS_parameters.txt located in /SCRIPTS_MT/TSCombiFiles
  which contains the following parameters (to be adjsued to your needs – see after)
- Satview.jpg in .../*3602*/MSBAS/*YourRegion_and_Some_Info*/CombiFiles
  which contains the Google Earth map (see after how to prepare it).
  Note that its tif version might be needed for the web page (Satview.tif)



Time Series and maps plotting

Time Series of single component: *PlotTS.sh*

Time Series in UD-EW component *PlotTS_AllComp.sh*

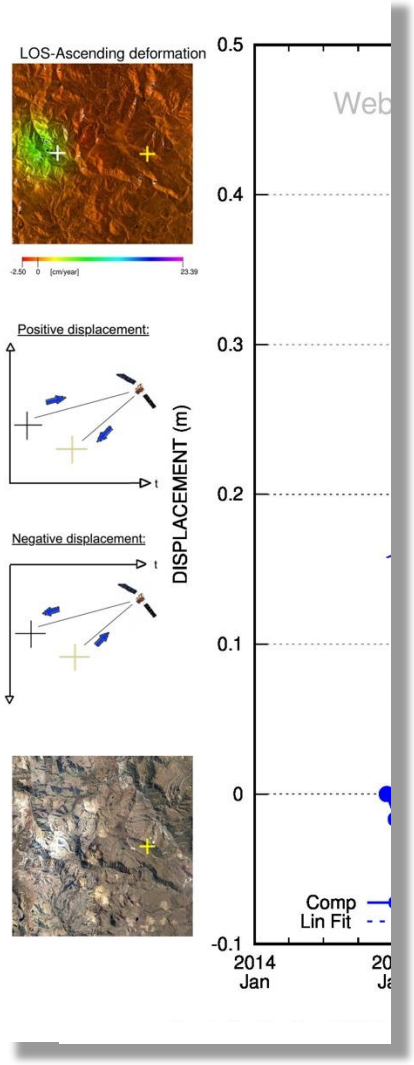
Insets

TS_parameters.txt:

```
# Data related to HP server path
defo-domuyo                    # WebPage

# Fiji_Amp_Defo_Coh script and ImageCreator.sh
# Value used to build the legend of the deformation maps
1.3             # IJAmpMin              (Minimum value for brightness to build amplitude image using ImageJ)
2.7             # IJAmpMax              (Maximum value for brightness to build amplitude image using ImageJ)
40              # MarkUp                (Legend vertical bar position Up)
90              # MarkDown              (Legend vertical bar position Down)
125             # LegValPosH            (Vertical Position of the value in the legend)
125             # LegUnitPosH           (Vertical Position of the unity in the legend)
35              # LegTxtPosH            (Vertical Position of the text info in the legend)
8               # LegAdjZero            (Fine adjustment of the horizontal positionnement of Zero)
60              # LegAdjMin             (Fine adjustment of the horizontal positionnement of Min Val)
10              # LegAdjMax             (Fine adjustment of the horizontal positionnement of Max Val)
70              # LegAdjLOS             (Fine adjustment of the horizontal positionnement of Max Val for LOS maps)
200             # LegAdjUnit            (Fine adjustment of the horizontal positionnement of Unity related to the left)
```

[...]

This first part of TS_parameters.txt usually doesn't need to be changed



Time Series plotting

Time Series of single component: *PlotTS.sh*

Time Series in UD-EW component *PlotTS_AllComp.sh*

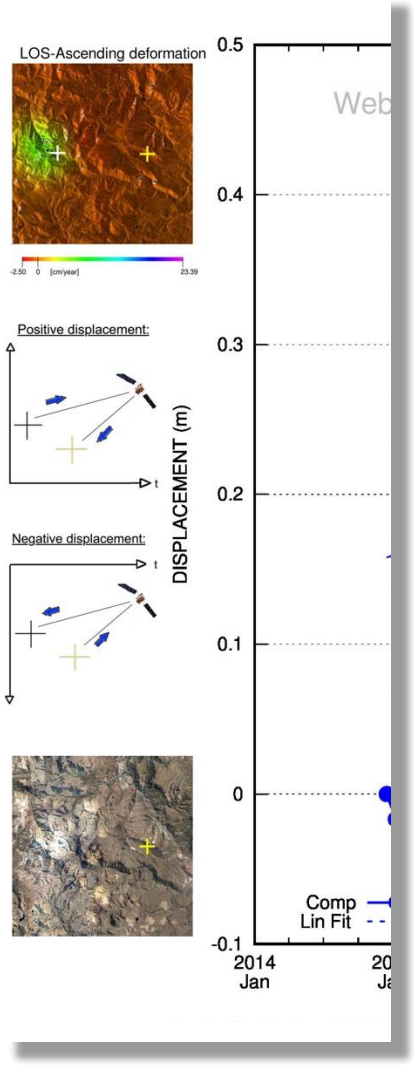
Insets

TS_parameters.txt: review the parameters in red:

```
# CreateColorFrame script + Fiji_Amp_Defo_Coh script
100             # Margin
800             # LegendWidth
0.6             # ColorBackgrdLegnd (0 = white --> 1 = grey)
35              # LegendTxtSize (Size of the text in the legend)
140             # LegendHeight (Height of the legend in pixels margin include)
40              # FrameTop (distance between top of color frame and top of the legend)
60              # FrameBott (distance between bottom of color frame and top of the legend)

# ImageCreator.sh and TimeSeriesInfo.sh
1000            # Crop_X (Top left X coordinate of the cropped zone)
1000            # Crop_Y (Top left Y coordinate of the cropped zone)
3361            # Crop_L (Horizontal size of the cropped zone)
2800            # Crop_H (Vertical size of the cropped zone)

# TimeSeriesInfo.sh
100             # CrossTresh (Distance between 2 points (Vert or Horiz) which determine the size of the cross)
15              # CrossBig Size of the cross in defo map as thumbnail if spacement between 2 pts are > treshold)
15              # CrossSmall Size of the cross in defo map as thumbnail if spacement between 2 pts are < treshold)

2.5             # RateResoSatView (Rate of pixels number compare with envi files)
```

← Depends on the size of your full image

← Needs explanation !



Time Series plotting

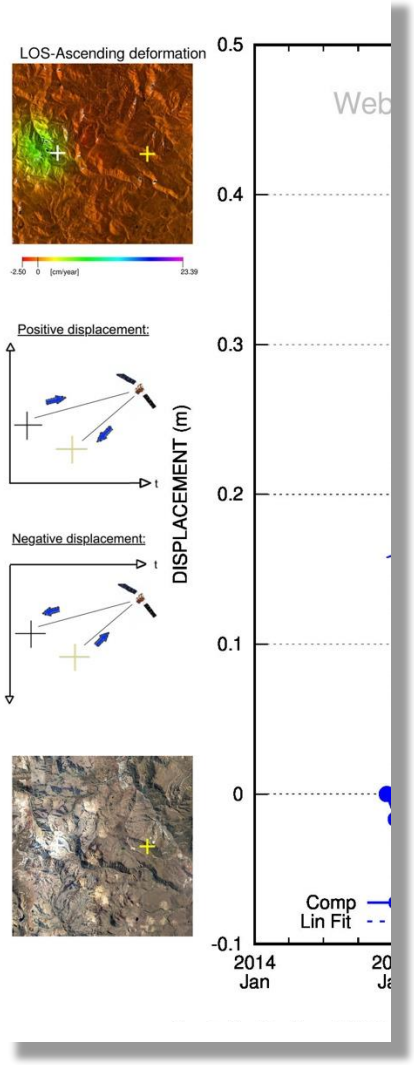
Time Series of single component: *PlotTS.sh*

Time Series in UD-EW component *PlotTS_AllComp.sh*

Insets

How set the RateResoSatView param for TS_parameters.txt ?
How create the Satview.tiff (and terrain.tif – for web page)
(See also manual Web_tool_Vx.x.docx)

1. Open a Google Earth background in QGIS as layer 1
2. Import a product map (defo, coh….) with the size of the msbas products as layer 2
3. Right-click on layer1 and select 'Export – >save as' with following option:
   - Output mode = Raw data
   - Format = Geotiff
   - Disable 'Create VRT' (untick the box to the right of "Format" box)
   - Change the CRS manually as the one of layer2 (You can find it in hdr file of layer2)
   - In extend, click on "Layer" and select layer2 (envi file).
   - in the "Horizontal" and "Vertical" boxes, enter the layer resolution factor to get image size of layer 1 (in lines/col) e.g. 5 time larger than of layer 2. Try e.g. entering a factor 10 or 50 and see the lines and col sizes in boxes "Columns" and "Rows".



Time Series plotting

Time Series of single component: *PlotTS.sh*

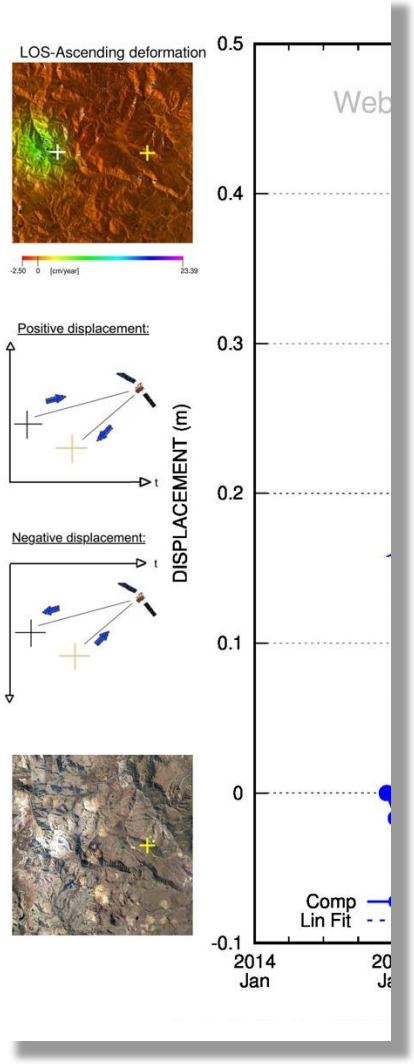
Time Series in UD-EW component *PlotTS_AllComp.sh*

Insets

How set the RateResoSatView param for TS_parameters.txt ?
How create the Satview.tiff (and terrain.tif – for web page)
(See also manual Web_tool_Vx.x.docx)

4. Save your file in .../*3602*/MSBAS/*YourRegion_and_Some_Info*/CombiFiles as satview.tif
   (for the web page, you may want to do the same with Google terrain and save it as terrain.tif)
5. Convert it as jpg using convert: ***convert satview.tif satview.jpg***
6. Edit the TS_parameters.txt to set:
   - The "RateResolutionFactor" (The RateResolutionFactor to write in TS_parameters.txt , is the size (either the number of lines or columns) of the layer 1 jpg image divided by the size of the MSBAS products)
   - The size/crop of the msbas products

```
# ImageCreator.sh and TimeSeriesInfo.sh
1000          # Crop_X (Top left X coordinate of the cropped zone)
1000          # Crop_Y (Top left Y coordinate of the cropped zone)
3361          # Crop_L (Horizontal size of the cropped zone)
2800          # Crop_H (Vertical size of the cropped zone)
[...]
2.5           # RateResoSatView (Rate of pixels number compare with envi files)
```



Time Series plotting

Time Series of single component: *PlotTS.sh*

Time Series in UD-EW component *PlotTS_AllComp.sh*

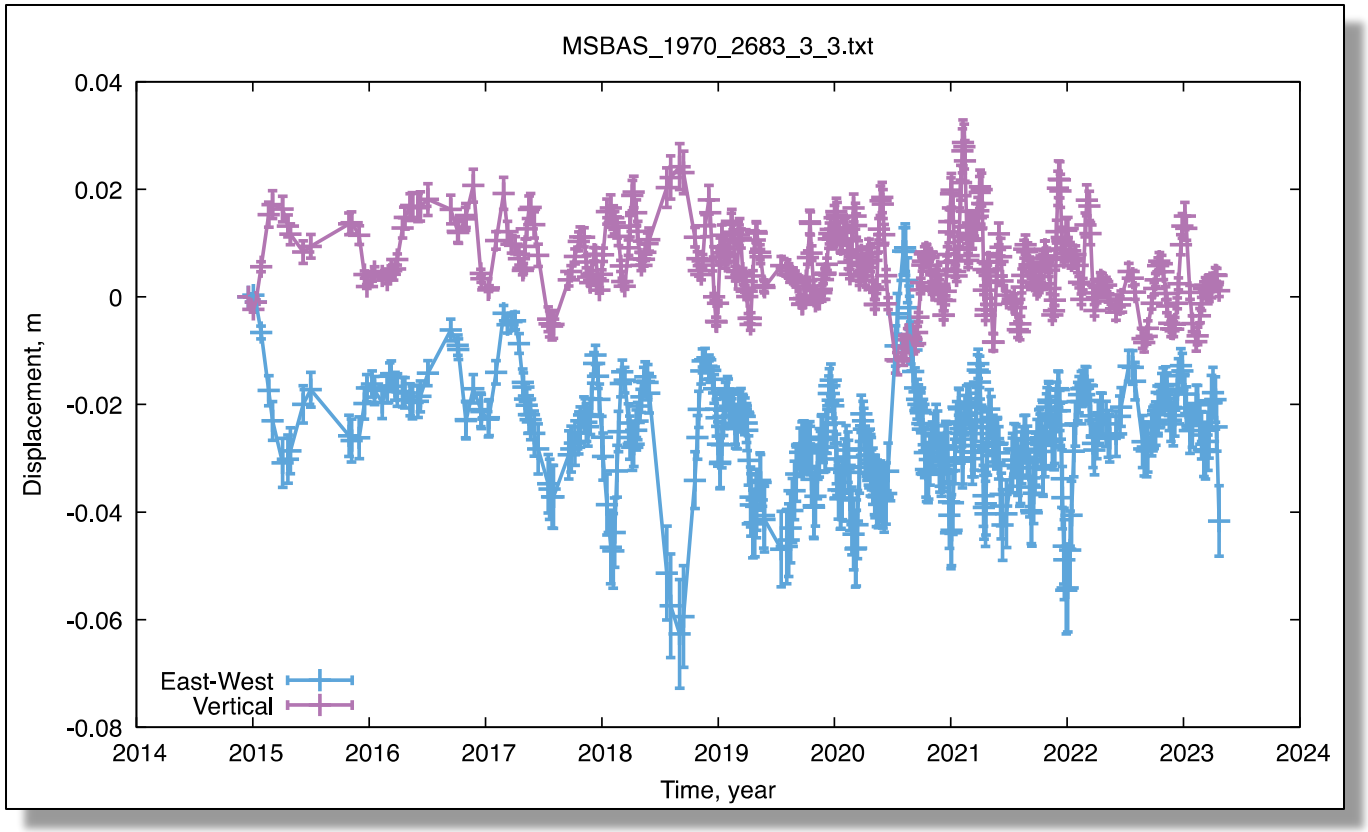
Insets

Error bars

2 types of error bars plots are possible:

- During operation of msbas: cfr list of points, e.g. Points_TS_Domuyo.txt

```
name   x    y    radiusX raduisY
LagunaMaule_Summit 2357 1443 0 0
LagunaMaule_W 1653 1443 3 3
LagunaMaule_S 2357 2146 3 3
LagunaFea_1 2494 1698 0 0
LagunaFea_2 2515 1685 3 3
```



Figures are stored in pdf format
in .../*3602*/MSBAS/*YourRegion_and_Some_Info*/zz_UD_EW_TS_...

Error bars = stdv among values of pixels in a box of ± *radiusX* and ± *radiusY* around the pixel.

Time Series plotting

Time Series of single component: *PlotTS.sh*

Time Series in UD-EW component *PlotTS_AllComp.sh*

Insets

Error bars

2 types of error bars plots are possible:

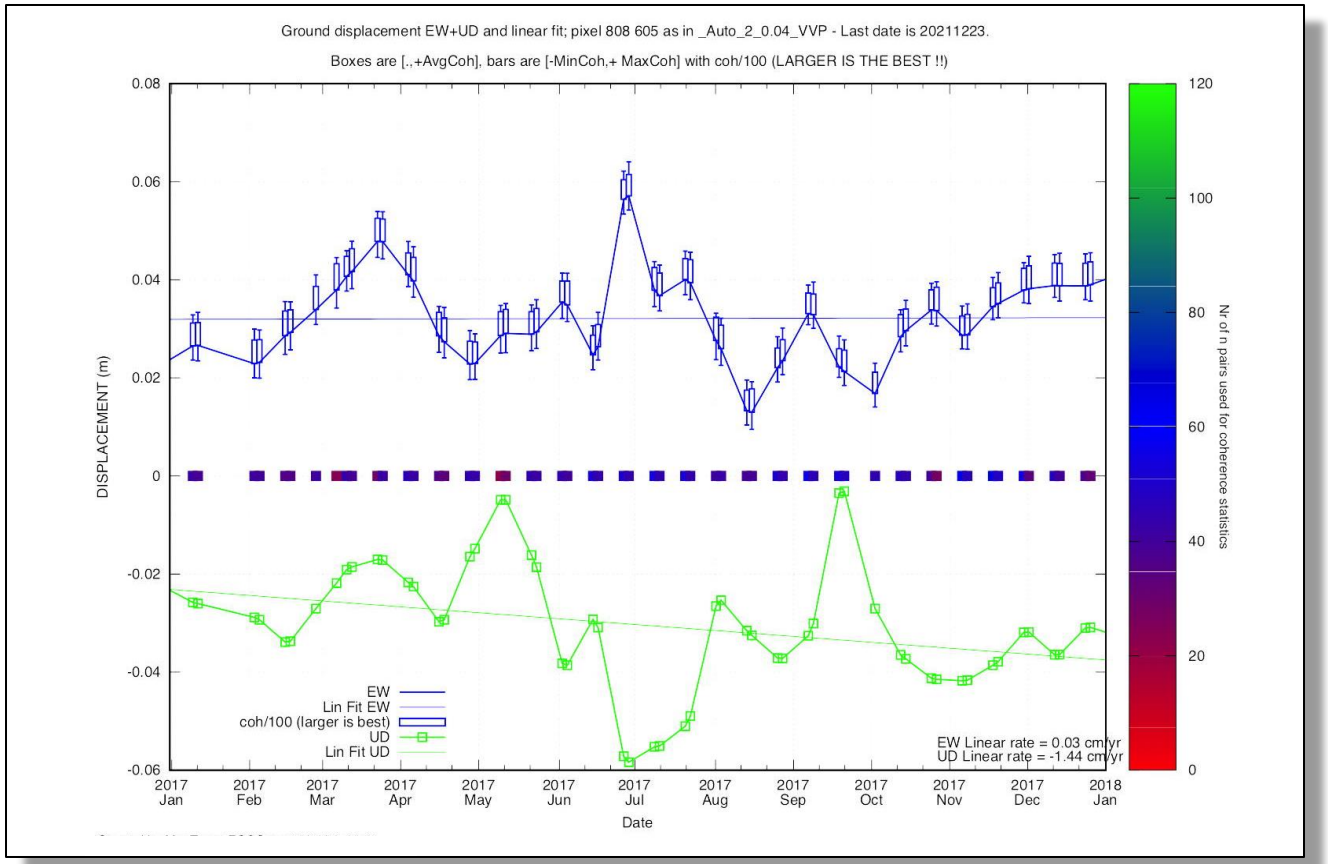
- After msbas processing, with ***PlotTS_AllComp.sh*** with option (See manual § 6.4b)
  -coh=*avgavg*, *avgmin*, *avgminmax* or *avgavgminmax*

The script computes the mean coherence (avg), min and max coherence (/100 !).

Note that because these boxes and bars are coherence related info and not “error bars”, the **larger is the best!**.

Color-coded symbols are added along the y=0 axis corresponding to the number of pairs used to compute the coherence statistics.

Figures are stored in eps format on single pixel plots in
.../3602/MSBAS/*YourRegion_and_Some_Info*/zz_UD_EW_TS_...



Example of plot with option -coh=avgminmax.
Bottom of the box is displacement, top of the box is the average coherence (/100).
Lower and upper bars are min and max coherence (/100) respectively.

Time Series plotting

Time Series of single component: *PlotTS.sh*
Time Series in UD-EW component *PlotTS_AllComp.sh*
Insets
Error bars
Other options

By providing the path to a directory (-EVENTS=/PathTo/EVENTS_TABLES) that contains some formatted files, one can plots additional features:

- EQ_*YourPlace*.txt: (vertical blue dashed line) e.g.

```
EQplace  yyyymmdd
```

- EQ_Swarms_*YourPlace*.txt: (vertical blue rectangle) e.g.

```
EQplace   yyyymmdd   yyyymmdd
```

- Eruptions_*YourPlace*.txt: (vertical red rectangle) e.g.

```
ErVolc   yyyymmdd   yyyymmdd
```

- Sat_Cover_*YourPlace*.txt: (horiz. blue and/or red rectangles) e.g.

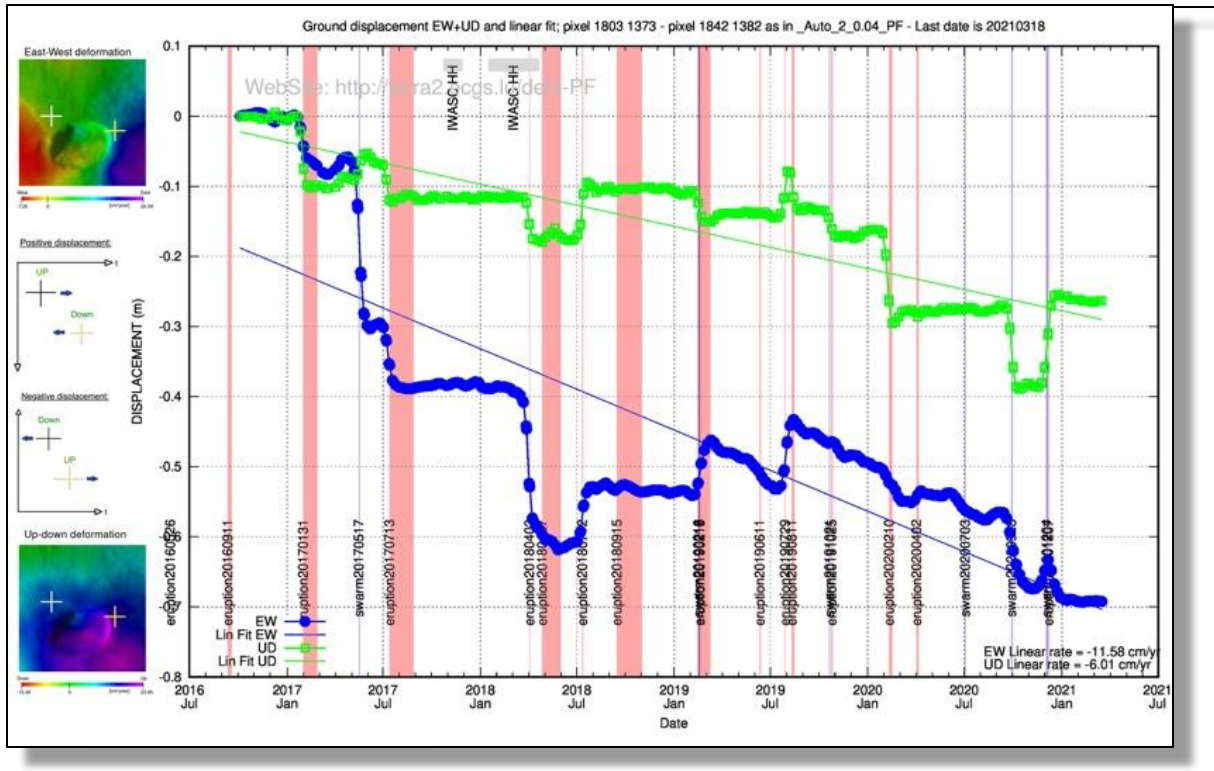
```
Sat_Mode   yyyymmdd   yyyymmdd
```

- Asymetric_Acquisition_*YourPlace*.txt: (horiz. grey rectangles) e.g.

```
Desc-Only  yyyymmdd   yyyymmdd
```

- Other_events_*YourPlace*.txt: (vertical blue dashed line) e.g.

```
Name     yyyymmdd
```



May need to change gnu scripts to adjust position of tags etc…

Events tables must contain names and dates in columns separated by a single tab. No empty lines in the files or at the bottom.

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Time Series plotting

Plan:

Time Series of single component: *PlotTS.sh*

Time Series in UD-EW component *PlotTS_AllComp.sh*

Insets

Error bars

Other options

- DONE ! -