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

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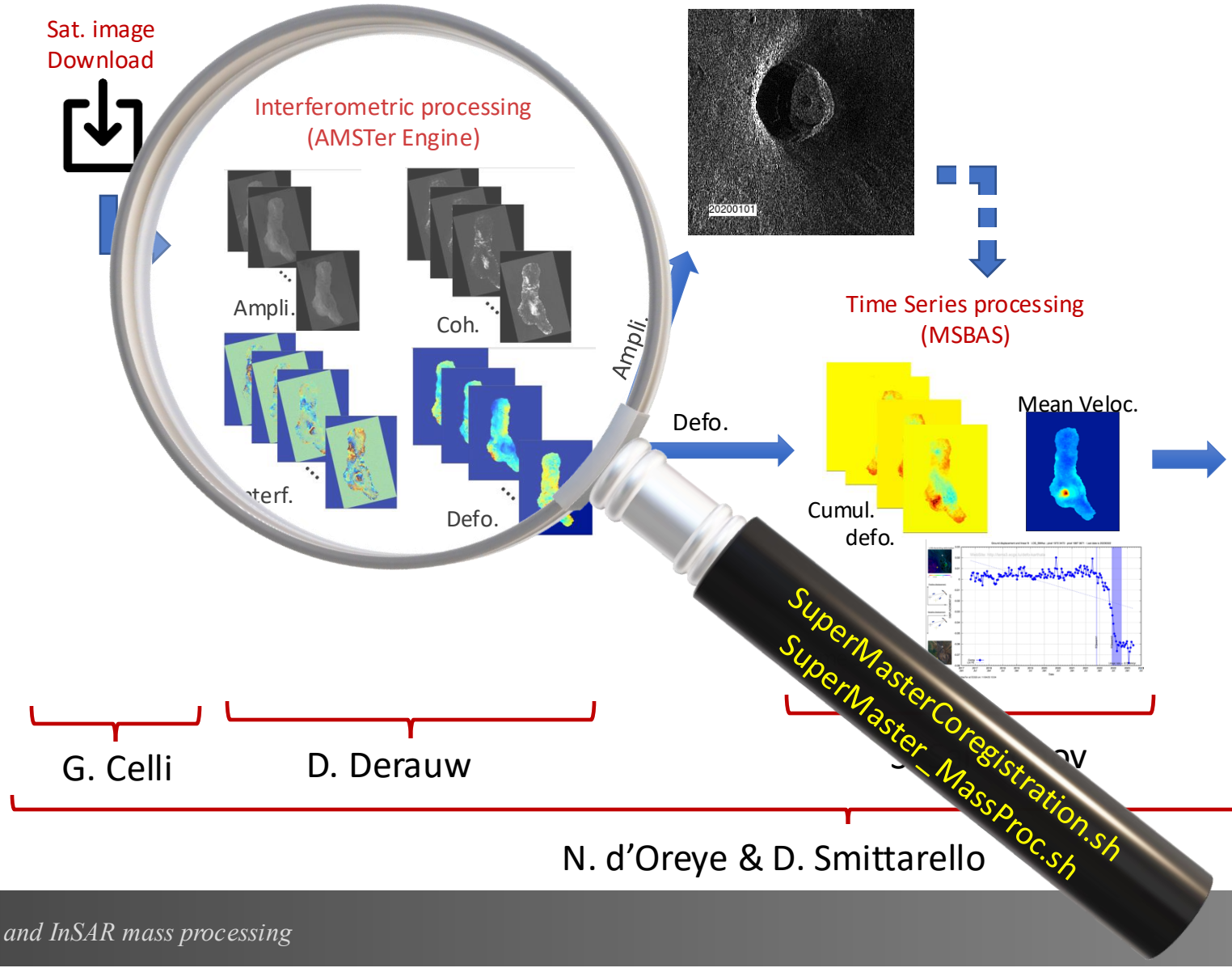
Mass Processing:

Baseline plot, Coregistration on a super master and DInSAR computation of all pairs.

Nicolas d'Oreye

AMSTer Toolbox



Mass Processing & Exercise 2

Plan:

Building the baseline plot and selecting the Super Master:

- Ins_All_Img.sh
- Prepa_MSBAS.sh
- Dual criteria selection
- Manually add or remove pairs from automated list
- Note about old baseline plot tools

Coregistration on the Super Master:

- SuperMasterCoreg.sh
- __SplitCoreg.sh

Mass Processing:

- SuperMaster_MassProc.sh
- __SplitSession.sh

Additional information:

- Note about updated S1 orbits
- Verify_Mass_Process_Results.sh
- Re-geocode or re-unwrap

Hands-on exercice 2 with data on Domuyo - Laguna del Maule

Exercise 2

Building the baseline plot and selecting the Super Master:

- **lns_All_Img.sh** (must be run for each mode !):
  - Create a directory where to link all the images from the given mode to process, e.g. in …/1650/SAR_SM/MSBAS/*YourRegion*/seti where *i* is an index for each mode/sat of available data.
    In our case, *YourRegion* = ARGENTINE and *i* = 1-2
  - Although not mandatory, keep a note with all the modes for your convenience, e.g. in a file …/1650/SAR_SM/MSBAS/*YourRegion*/ _Sets_description.txt that contains e.g.:

```
Description for Argentine processings:

set1 = S1 Domuyo & Laguna del Maule Asc 18
set2 = S1 Domuyo & Laguna del Maule Desc 83
set3 = SAOCOM Asc
set4 = …
```

  - Syntax : in /set1 dir
    lns_All_Img.sh *WhereDataAre*/NoCrop *WhereDataSet* *SAT*
    where *WhereDataSet*/NoCrop is e.g. $PATH_1650/SAR_CSL/S1/ARG_DOMU_LAGUNA_A_18/NoCrop
    WhereDataSet is e.g. $PATH_1650/SAR_SM/MSBAS/ARGENTINE/set1
    SAT is S1
  - Do the same for Descending in /set2dir :
    where *WhereDataAre*/NoCrop is e.g. $PATH_1650/SAR_CSL/S1/ARG_DOMU_LAGUNA_D_83/NoCrop
    WhereDataSet is e.g. $PATH_1650/SAR_SM/MSBAS/ARGENTINE/set2
    SAT is S1
  - Note: for the sake of efficiency for the exercice, the provided CSL data only contains images.csl/Info + dir names

Exercise 2

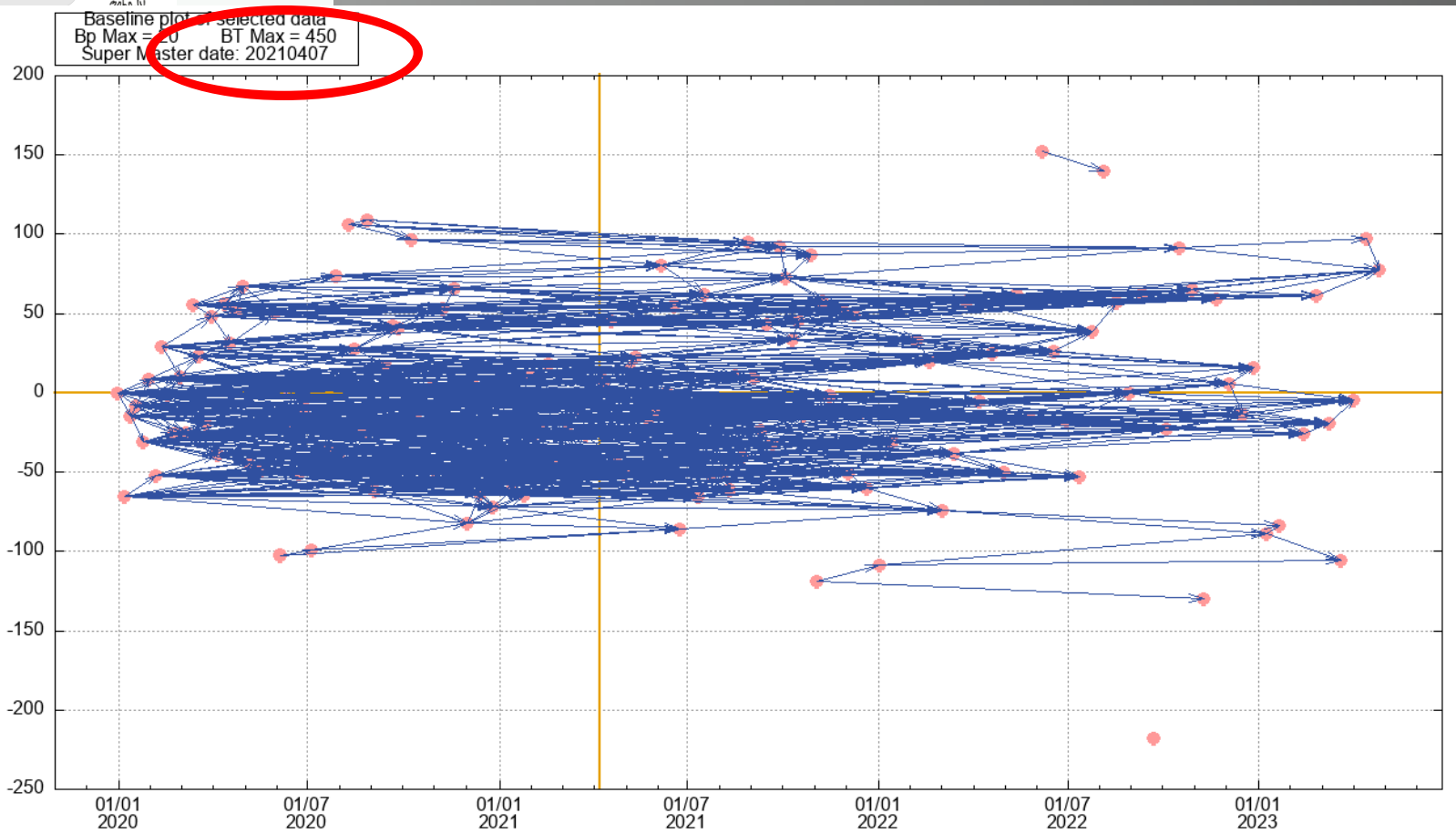
Building the baseline plot and selecting the Super Master:

- lns_All_Img.sh
- **Prepa_MSBAS.sh** (must be run for each mode !):
  - Because it is the first run, you do not have a Super Master yet. Hence run
    Prepa_MSBAS.sh *WhereDataSet BP BT*
    where *WhereDataSet* is $PATH_1650/SAR_SM/MSBAS/ARGENTINE/set1 and [same]/set2
    BP is e.g. 20
    BT is e.g. 450
    and answer y when it asks you if you want to compute a new Super Master
  - At second run, you do not want to recompute a Super Master,
    (because you would have to re-coregister all the images on the new SM then compute again all the Mass Processed pairs !).
    Hence, at next runs add a 4th parameter with the date of the former Super Master
    and answer n when it asks you if you want to compute a new Super Master…
  - In any case, you should end up with the following files:
    - A table with the list of pairs satisfying your criteria: table_0_20_0_450.txt

Master	Slave	Bperp	Delay
20200101	20200113	-14	12
20200101	20200119	-8	18
20200101	20200131	9	30
20200101	20200218	-1	48
20200101	20200301	11	60
20200101	20200325	-19	84
20200101	20200512	9	132
20200101	20200524	10	144
20200101	20200611	3	162
20200101	20200629	-9	180
20200101	20200711	-18	192
20200101	20200915	17	258
20200101	20201015	-18	288
20200101	20201027	3	300
20200101	20201208	5	342
20200101	20201220	-2	354
20200101	20210119	-6	384
20200101	20210131	11	396
20200101	20210212	-19	408
20200101	20210218	18	414
20200101	20210302	-3	426
20200101	20210320	-9	444
20200107	20200206	13	30
20200107	20200518	16	132
20200107	20200623	15	168
20200107	20200903	4	240
20200107	20201021	19	288
20200107	20201102	10	300
20200107	20201126	10	324
20200107	20201202	-16	330
20200107	20201214	1	342
20200107	20201226	-7	354
20200107	20210107	15	366
20200107	20210113	4	372
20200107	20210125	1	384
20200107	20210401	18	450
20200113	20200119	7	6
20200113	20200125	-16	12

Exercise 2

Bui



]/set2

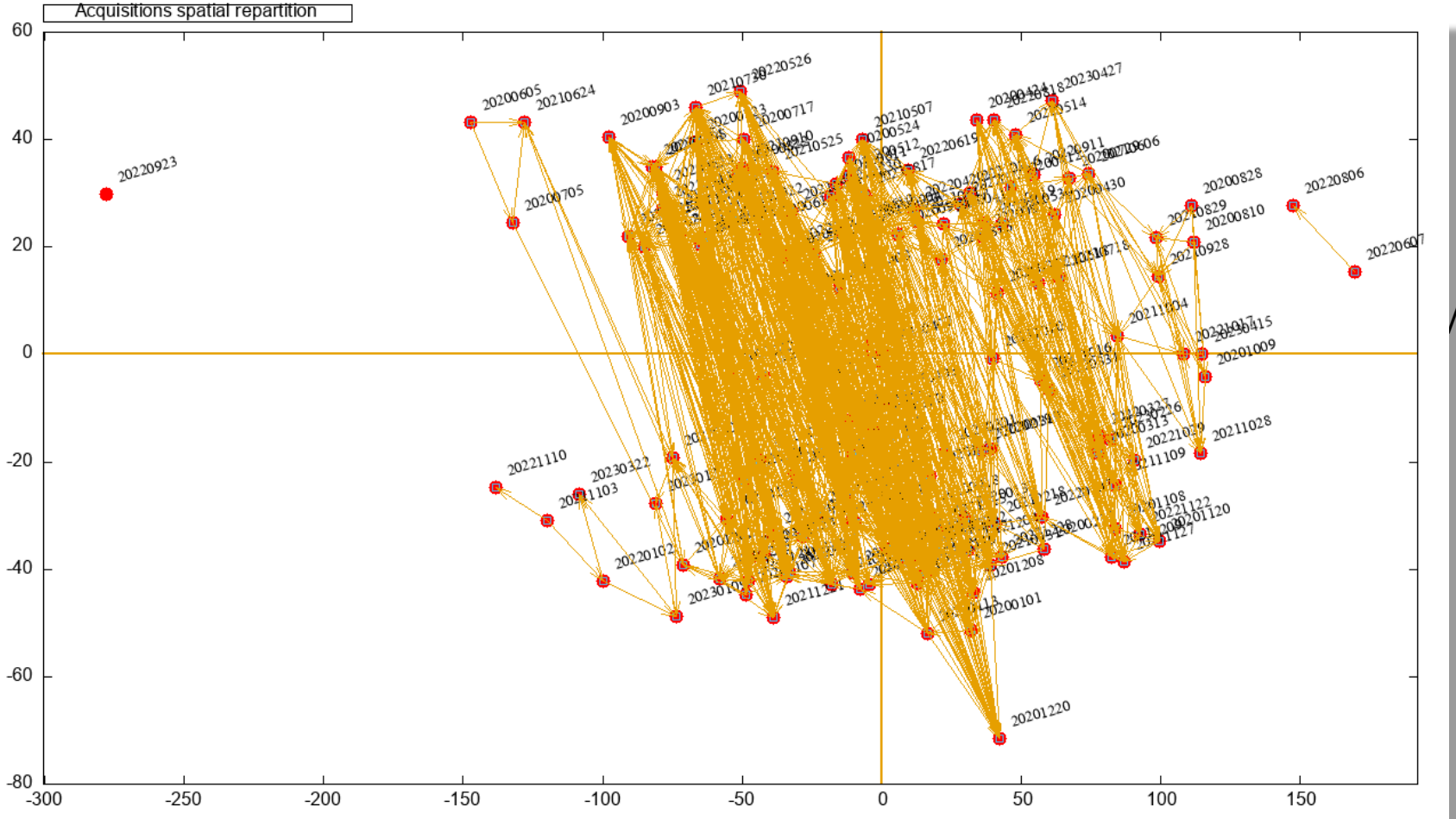
- A table with the list of pairs satisfying your criteria: table_0_20_0_450.txt
- A baseline plot: baselinePlot_BpMax=20_BTMax=450.txt.png

See in that plot the selected (or forced) SM for the subset of images satisfying the baselines criteria.

Note that the SM indicated in allPairsListing.txt is the one for the whole data set, not the selected pairs.

Exercise 2

B



/set2

- A baseline plot: baselinePlot_BpMax=20_BTMax=450.txt.png
- A orbital plot: imageSatialLocalisation_BpMax=20_BTMax=450.txt.png

Exercise 2

Build

```
# List of all potential InSAR pairs in directory:
#   /Volumes/1650/SAR_SM/MSBAS/ARGENTINE/set2
#
#
# Identified Super Master: 20210407
#
#  Master date   .   Slave date  .       xm     .       ym     .       xs     .       ys     .       Bp0     .       Bp     .       Dt     .       Ha
    20200101          20200107          32.04          -51.39          -48.55          -44.75          -0.16          -65.26              6          215.67
    20200101          20200113          32.04          -51.39           16.42          -52.01          -0.16          -14.49             12          971.51
    20200101          20200119          32.04          -51.39           15.50          -40.41          -0.16           -7.82             18         1799.51
    20200101          20200125          32.04          -51.39           -7.73          -43.75          -0.16          -30.76             24          457.61
    20200101          20200131          32.04          -51.39           29.91          -30.53          -0.16            9.13             30        -1541.15
    20200101          20200206          32.04          -51.39          -39.23          -33.72          -0.16          -51.82             36          271.59
    20200101          20200212          32.04          -51.39           58.04          -36.15          -0.16           29.46             42         -477.78
    20200101          20200218          32.04          -51.39           16.71          -29.48          -0.16           -1.07             48        13206.22
    20200101          20200224          32.04          -51.39           -9.47          -31.31          -0.16          -25.21             54          558.24
    20200101          20200301          32.04          -51.39           23.09          -18.23          -0.16           10.63             60        -1324.61
    20200101          20200307          32.04          -51.39          -14.90          -21.65          -0.16          -24.71             66          569.55
    20200101          20200313          32.04          -51.39           77.38          -18.29          -0.16           55.93             72         -251.64
    20200101          20200319          32.04          -51.39           38.93          -17.60          -0.16           23.81             78         -591.01
    20200101          20200325          32.04          -51.39          -10.52          -18.55          -0.16          -19.31             84          728.76
    20200101          20200331          32.04          -51.39           59.87           -6.53          -0.16           48.14             90         -292.34
    20200101          20200406          32.04          -51.39          -42.55           -4.04          -0.16          -38.81             96          362.63
    20200101          20200412          32.04          -51.39           46.44           31.20          -0.16           56.78            102         -247.87
    20200101          20200418          32.04          -51.39           22.26           24.24          -0.16           31.79            108         -442.76
    20200101          20200424          32.04          -51.39           34.14           43.69          -0.16           51.99            114         -270.72
    20200101          20200430          32.04          -51.39           62.05           26.03          -0.16           67.45            120         -208.66
    20200101          20200506          32.04          -51.39          -63.50           20.52          -0.16          -43.60            126          322.80
    20200101          20200512          32.04          -51.39          -11.66           33.28          -0.16            9.04            132        -1556.48
    20200101          20200518          32.04          -51.39          -72.30           22.00          -0.16          -49.12            138          286.50
    20200101          20200524          32.04          -51.39          -11.80           36.63          -0.16            9.61            144        -1463.89
    20200101          20200530          32.04          -51.39           43.26           24.22          -0.16           50.49            150         -278.76
    20200101          20200605          32.04          -51.39         -147.48           43.15          -0.16         -102.17            156          137.75
    20200101          20200611          32.04          -51.39          -16.26           31.75          -0.16            3.47            162        -4059.13
    20200101          20200617          32.04          -51.39          -42.17           23.13          -0.16          -23.90            168          588.82
    20200101          20200623          32.04          -51.39          -78.65           30.35          -0.16          -50.58            174          278.23
```

- A orbital plot: imageSatialLocalisation_BpMax=20_BTMax=450.txt.png
- A file with all the pairs and their characteristics: allPairsListing.txt

Exercise 2

Building the baseline plot and selecting the Super Master:

- lns_All_Img.sh
- **Prepa_MSBAS.sh** (must be run for each mode !):
  - Because it is the first run, you do not have a Super Master yet. Hence run
    Prepa_MSBAS.sh *WhereDataSet BP BT*
    where *WhereDataSet* is $PATH_1650/SAR_SM/MSBAS/ARGENTINE/set1 and [same]/set2
    BP is e.g. 20
    BT is e.g. 450
    and answer y when it ask you if you want to compute a new Super Master
  - At second run, you do not want to recompute a Super Master,
    (because you would have to re-coregister all the images on the new SM then compute again all the Mass Processed pairs !).
    Hence, at next runs add a 4th parameter with the date of the former Super Master
    and answer n when it ask you if you want to compute a new Super Master…
  - In any case, you should end up with the following files:
    - A table with the list of pairs satifying your criterias: table_0_20_0_450.txt
    - A baseline plot: baselinePlot_BpMax=20_BTMax=450.txt.png
    - A orbital plot: imageSatialLocalisation_BpMax=20_BTMax=450.txt.png
    - A file with all the pairs and their characteristics: allPairsListing.txt
    - Plus some intermediate files & files to be compatible with old version of the tools to build the plot.

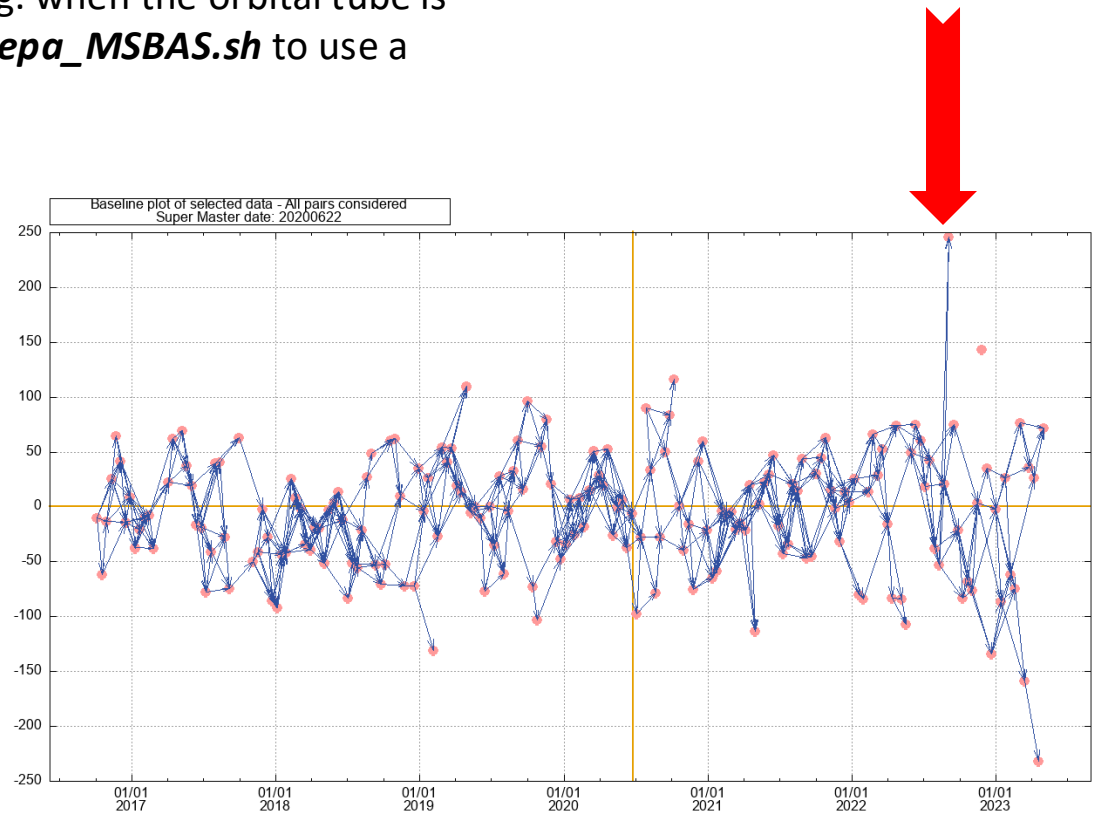
Exercise 2

Building the baseline plot and selecting the Super Master:

- lns_All_Img.sh
- Prepa_MSBAS.sh
- **Dual criteria selection**
  - If you need to increase the baseline criteria from a given date, e.g. when the orbital tube is suddenly degraded such as after the loss of S1-B, you may ask ***Prepa_MSBAS.sh*** to use a second set of criteria from a given date as follow:

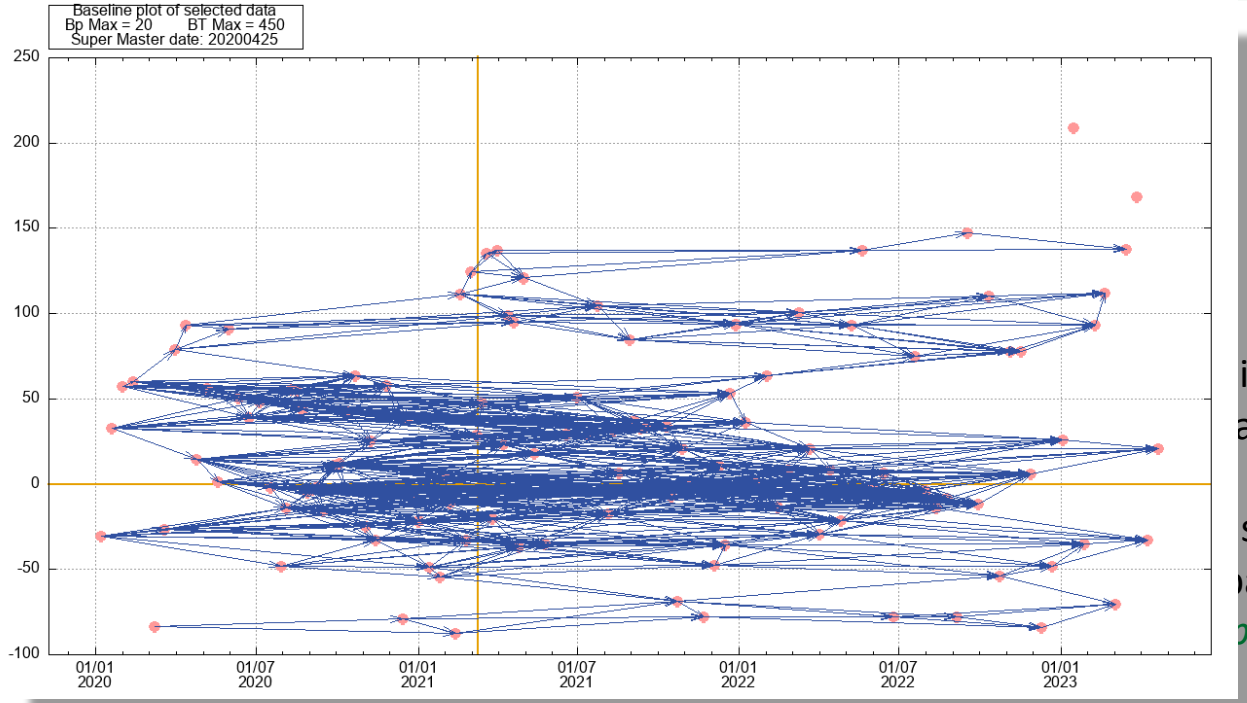
Prepa_MSBAS.sh *WhereDataSet BP1 BT1 DATESM BP2 BT2 DATECHANGE*

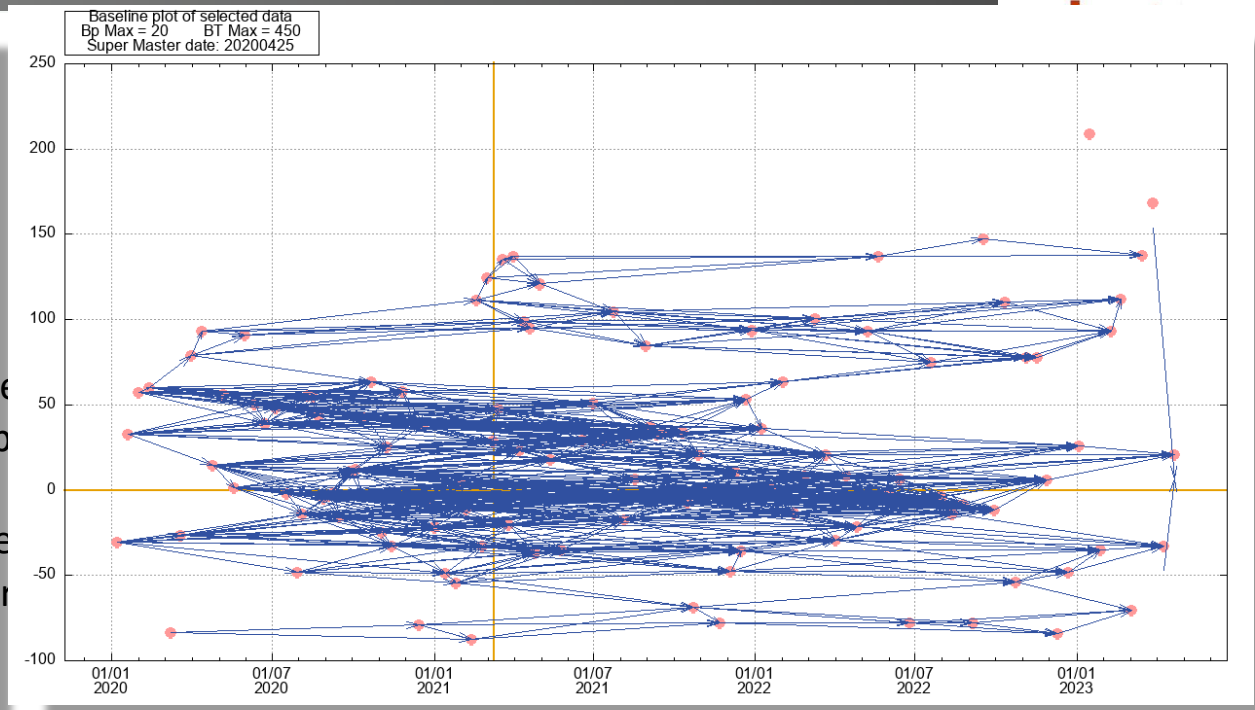
where *BP1* and *BT1* are the baseline criteria for the first part of the time series
DATESM is the date of the Super Master
BP2 and *BT2* are the baseline criteria for the second part of the time series
DATECHANGE is the date from which it shoud use
BP2 and *BT2* to select the pairs



Illustrative example from Réunion Island:
baseline Plot with BpMax=70 Before 20220501 then BpMax=90 After_20220501

Exercise 2





These pairs will be added automatically to the baseline plot when running ***Prepa_MSBAS.sh***.
Test it e.g. by adding to set 1, the two pairs in *table_0_20_0_450_AdditionalPairs.txt* as follow:

```
20230329        20230422        147     24
20230410        20230422        53      12
```

(See also manual § 4.3)

Note a little bug (small offset to new pairs… see gnuplot file to sort it out)

Exercise 2

Building the baseline plot and selecting the Super Master:

- lns_All_Img.sh
- Prepa_MSBAS.sh
- Dual criteria selection
- **Manually add or remove pairs from automated list**
  - To add pairs to the baseline plot
  - To remove pairs from the baseline plot although they do fit the criteria, either:
    - Remove them from the desired list of pairs file.
      Ensure that the link selectedPairsListing.txt points toward that file, then re-run the gnuplot scripts:
      gnuplot baselinePlot.gnuplot (must be launched in in set*i* directory of course)
    - Or remove lines in the Table_Bmin_Bmax_Tmin_Tmax.txt file, Launch the script ***plotBaselines.sh***.
      The plot will however be in another format and named span_FlatArrow _*0_MaxBp_0_MaxBt*.eps
      (see manual § 4.3, page 84)
    - Or do it when building time series data sets (see manual § 6.1a page 104): add a file named _EXCLUDE_PAIRS_ALTHOUGH_CRITERIA_OK.txt in the directroy of the mode to invert using msbas (DefoInterpolx2Detrend*i*; see exercice 3), then run ***Exclude_Pairs_From_Mode.txt.sh***, then ***PlotBaselineGeocMSBASmodeTXT.sh*** (see manual § 6.5).

Building the baseline plot and selecting the Super Master:

- Ins_All_Img.sh
- Prepa_MSBAS.sh
- Dual criteria selection
- Manually add or remove pairs from automated list
- **Note about old baseline plot tools**

For the sake of compatibility with former versions of MasTer, there are some old tools used to build baseline plots (***build_bperp_file.sh*** and ***plotBaselines.sh*** - see manual §4.3).

These require files that are still prepared by ***Prepa_MSBAS.sh*** although they are not used by usual MasTer features. These files (stored in …/SAR_SM/MSBAS/*YourRegion*/*seti*) are e.g. :

- span_0_*MaxBp*_0_*MaxBt*.txt
- Span1_0_*MaxBp*_0_*MaxBt*.txt
- Bperp_file.txt

They can be ignored most of the time except if for any reason you want to create baseline plots with these older tools (***plotBaselines.sh***)

Exercise 2

Building the baseline plot and selecting the Super Master:

- Ins_All_Img.sh
- Prepa_MSBAS.sh
- Dual criteria selection
- Manually add or remove pairs from automated list
- Note about old baseline plot tools
- **Extract_x_Shortest_Connections.sh**

  This script prepares a table named table_0_0_MaxShortest_x.txt with all the pairs with the x shortest connections in the baseline plot. It computes this from the file allPairsListing.txt (created with ***Prepa_MSBAS.sh***) from the current directory. See manual § 4.3, page 85

Building the baseline plot and selecting the Super Master:

- lns_All_Img.sh
- Prepa_MSBAS.sh
- Dual criteria selection
- Manually add or remove pairs from automated list
- Note about old baseline plot tools
- Extract_x_Shortest_Connections.sh
- **DelaunayTable.sh**

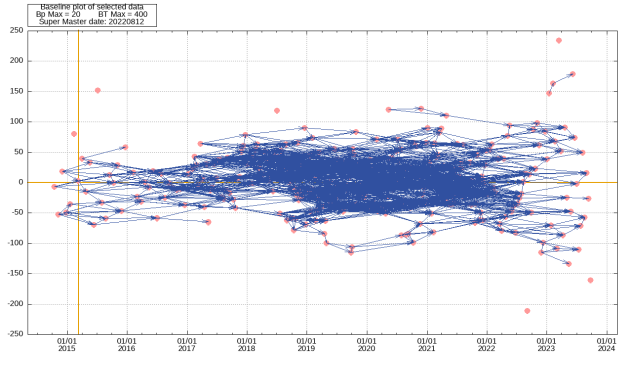
This script prepares a table named table_0_0_Delaunay*PARAM*_0.txt (where *PARAM* is Ratio*xxx*MaxBt*xxx*MaxBp*xxx* ; see below) with all the pairs in the baseline plot satisfying a Delaunay triangulation, and a possible filtering of the baselines larger than a maximum temporal and/or spatial baseline provided as parameters. The script computes this selection thanks to the file allPairsListing.txt (created with ***Prepa_MSBAS.sh***) from the current directory. It takes 3 optional parameters (in any order):

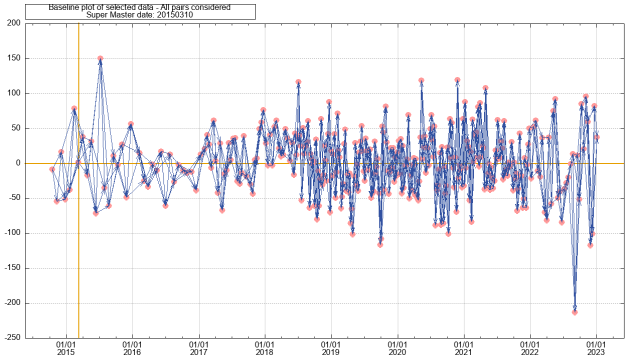
- -Ratio=*float*: where *float* is a number (as float format) representing the ratio between X axis (time; in years) and Y axis (Bp in meters) in the Delaunay plot. For instance, a ratio of *x* will make the 1m baseline orthogonal to 1 day/*x*. Adjusting that ration allows avoiding elongated triangles;
- -BpMax=*integer*: the Max Bp (as integer format) allowed for the segments of the triangles in y direction;
- -BtMax=*integer*: the Max Bt (as integer format) allowed for the segments of the triangles in x direction.

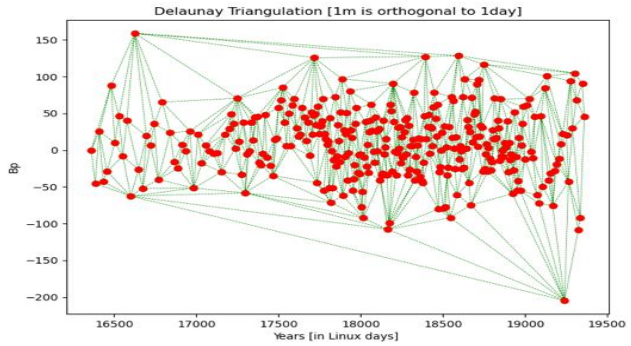
Exercise 2

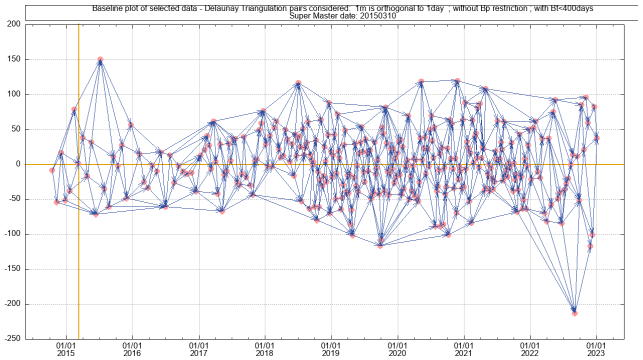
Building the baseline plot and selecting the Super Master:

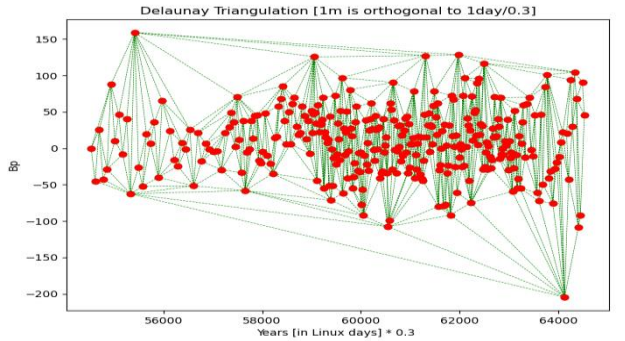
- lns_All_Img.sh
- Prepa_MSBAS.sh
- Dual criteria selection
- Manually add or remove pairs from automated list
- Note about old baseline plot tools
- Extract_x_Shortest_Connections.sh
- **DelaunayTable.sh**

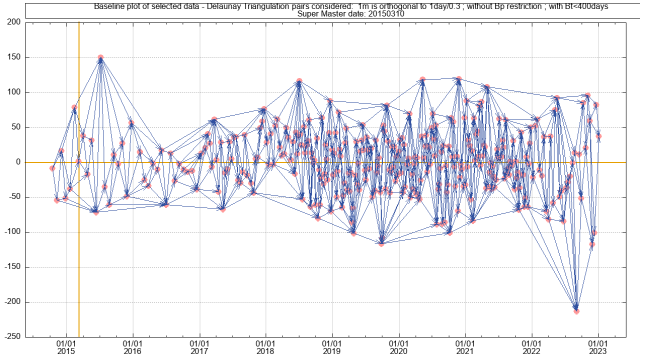












Example of baseline plot for Sentinel 1 images acquired in the Virunga (DRC) computed with several techniques:

Top Left: All pairs with Bp <20m and Bt < 400 days (obtained with **prepa_MSBAS.sh**).
Top Right: Max 3 shortest connection (obtained with **Extract_x_Shortest_Connections.sh**).

Middle Left: Delaunay Triangulation without Ratio (i.e. 1m is orthogonal to 1 day) and without maximum baseline filtering.
Middle right: Same as above with spatial baseline restricted to Max 400 days (both obtained with **DelaunaTable.sh**).

Bottom Left: Delaunay Triangulation with Ratio 0.3 (i.e. 1m is orthogonal to 1/.3 day) and without maximum baseline filtering.
Bottom right: Same as above with spatial baseline restricted to Max 400 days (both obtained with **DelaunaTable.sh**).

(Note: The top left baseline plot covers a slightly longer time span)

Building the baseline plot and selecting the Super Master

Coregistration on the Super Master:

- **SuperMasterCoreg.sh:**

  That step must always be run, though it will do different things depending on the satellite/mode:

  - **<u>For all satellites/modes but S1 in IW</u>**, it coregisters (i.e. aligns) each image on the Super Master. Hence the script will:
    - First compute the DEM (and maybe the mask) - if required - in the slant range geometry of the Super Master,
    - Compute the affine transformation to coregister and resample each image in the slant range geometry of the Super Master.

  - **<u>For Sentinel 1 in Wide Swath mode (IW)</u>**, because of the TOPSAR acquisition principle, all the images of a given mode are already aligned. There is no need to coregister each image in the geometry of the Super Master and any image can be used as a master in its own slant range geometry. Hence the script will:
    - compute the DEM (and maybe the mask) - if required - in the slant range geometry for each image.

Building the baseline plot and selecting the Super Master

Coregistration on the Super Master:

- **SuperMasterCoreg.sh:**
  - Syntax (see manual § 5.1)

    SuperMasterCoreg.sh *LaunchMasTerParam.txt* *[*FORCE*]*
  - It will create a directory for each set where it will store the coregistration and resampling of each image to the SuperMaster. Its naming is as follow:
    …/SAR_SM/SAR_RESAMPLED/*SAT*/*REGION_TRACK*/SMCrop_SM_*DATESM_CROPNAME_*
  - Notes:
    - The script is incremental: it processes only the images that are not coregistered yet.
    - It computes the DEM only if it does not exist yet.
      (For S1 IW, you can force to recompute the DEM for each image by adding FORCE as 2nd parameter).
    - It computes the mask only if required and if it does not exist yet.
    - Because for the sake of efficiency and security, ***SuperMasterCoreg.sh*** runs in a processing directory that is not the final one (cfr *LaunchMTparam.txt*), the script also runs ***RenamePathAfterMove.sh*** (and maybe ***RenamePath_Volumes.sh***) after in order to set the final destination directory path in parameters files of each processed pairs (see manual § 5.1 - notes).

Building the baseline plot and selecting the Super Master

Coregistration on the Super Master:

- SuperMasterCoreg.sh
- **__SplitCoreg.sh**

  To speed up the coregistration processing, launch several ***SuperMasterCoreg.sh*** sessions in parallel in separate terminals using ***__SplitCoreg.sh***.

  The script must be provided with (see manual § 5.2):
  - A list of images to coregister and to be split
  - The *LaunchMTparameters.txt* file (with its full path) to be used
  - The number of parallel sessions to process the coregistration
  - If FORCE is provided as 4th parameter (for S1 images IW), it will recompute the DEM for each image

  Beware: hard coded lines must be tuned in the script for locating the discs where one can compute the different sessions.

Building the baseline plot and selecting the Super Master

Coregistration on the Super Master:

To practice, let's coregister few S1 –IW images for the region of Domuyo – Laguna del Maule

- Prepare a *LaunchMTparam_S1_Arg_Domu_Laguna_D_83_Z1_ML8_MassProcess_Coreg.txt :*
  - TRKDIR = ARG_DOMU_LAGUNA_D83_Tst_Coreg (because that is where the data are in …/SAR_CSL/S1)
  - SUPERMASTER = 20210407 (because that is what was discovered by ***Prepa_MSBAS.sh***)
  - DEMNAME = NQNyMas (because that its name in DataSAR/SAR_AUX_FILES/DEM/SRTM30/ALL/)
  - CROP = CROPno & REGION = Domuyo_Laguna (or any other that makes sense to you)
  - INTERFML = 8
  - POWSPECSMOOTHFACT = 0 (because we are not interested in filtered interf. and it will spare time)
  - APPLYMASK = APPLYMASKno

  And/or compare with provided DataSAR/SAR_AUX_FILES/Param_files/S1/ARG_DOMU…/ *LaunchMTparam_S1_Arg_Domu_Laguna_D_83_Z1_ML8_MassProcess_Coreg.txt*
- run

  SuperMasterCoreg.sh *LaunchMTparam.txt* FORCE

  (FORCE = in case wrong DEM already exist in SAR_CSL/S1/ARG_DOMU_LAGUNA_D83_Tst_Coreg/NoCrop/*img*.csl/Data)

Exercise 2

Building the baseline plot and selecting the Super Master

Coregistration on the Super Master:

To practice, let's coregister few S1 –IW images for the region of Domuyo – Laguna del Maule

- Prepare a *LaunchMTparam_S1_Arg_Domu_Laguna_D_83_Z1_ML8_MassProcess_Coreg.txt :*
- Run
- Check your results in
  …/1650/SAR_SM/RESAMPLED/S1/ARG_DOMU_LAGUNA_D83_Tst_Coreg/SMNoCrop_SM20210427/*pairs*

  and

  …/1650/SAR_CSL/S1/ARG_DOMU_LAGUNA_D83_Tst_Coreg/NoCrop/*images*.csl/Data/externalSlantRangeDEM
  …/1650/SAR_CSL/S1/ARG_DOMU_LAGUNA_D83_Tst_Coreg/NoCrop/*images*.csl/Info/externalSlantRangeDEM.txt

Building the baseline plot and selecting the Super Master
Coregistration on the Super Master
Mass Processing:

- **SuperMaster_MassProc.sh**

  - It will compute each interferometric pairs from a provided list in a directory …/PROCESS/AS/*SAT*/*MAS_SLV*
  - It will then move them in the final destination directory, that is
    …/SAR_MASSPROCESS/*SAT*/*REGION_TRACK*/SMCrop_SM_*DATESM_CROPNAME/*
  - As soon as a pair is processed, it will also move the geocoded products in a Geocoded directory located in the final destination directory, in subdirectories named by their type:
    …/SAR_MASSPROCESS/*SAT*/*REGION_TRACK*/SMCrop_SM_*DATESM_CROPNAME*/Geocoded/Ampli
    /Coh
    /Defo
    /DefoInterpol
    /DefoInterpolDetrend
    /DefoInterpolx2Detrend
    /InterfFilt
    /InterfResid
    /UnwrapPhase

Exercise 2

Building the baseline plot and selecting the Super Master
Coregistration on the Super Master

Mass Processing:

- **SuperMaster_MassProc.sh**

  - Note that if the PROCESS directory is not on the same hard disc as the Geocoded directory, it will copy instead of move the pair directories and only erase them from PROCESS when all the pairs are processed and when it has confirmed that everything was copied to the final directory.
    This prevents losing results in case of connection loss between discs.

  - In a similar way, it will copy the rasters (quicklook .ras) of the geocoded products in a GeocodedRasters directory located in the final destination directory, in subdirectories named by their type. These quicklooks also remain in the pair directories.

  - Syntax (see manual § 5.3)

    SuperMaster_ **MassProc*.sh*** *ListOfPairs* *LaunchMTparam.txt* *[*-f or -list=*filename]*
    where *ListOfPairs* is *a* list of pairs to process (see e.g. table_0_*BP*_0_*BT*.txt computed by ***Prepa_MSBAS.sh***)
    -f or -list=*filename* are optional to force a different type of list of pairs (see manual § 5.)

Exercise 2

Building the baseline plot and selecting the Super Master
Coregistration on the Super Master
Mass Processing:

- SuperMaster_MassProc.sh
- **__SplitSession.sh**

To speed up the mass processing, launch several ***SuperMaster_MassProc.sh*** sessions in parallel in separate terminals using ***__SplitSession.sh***.

The script must be provided with (see manual § 5.4):

- A list of pairs to process and to be split (see table_0_*BP*_0_*BT*.txt computed by ***Prepa_MSBAS.sh***)
- The *LaunchMTparameters.txt* file (with its full path) to be used
- The number of parallel sessions to process the DInSAR
- A 4th parameter can be offered for undocumented option – see script for explanations

Beware: hard coded lines must be tuned in the script for locating the discs where one can compute the different sessions.

Exercise 2

Building the baseline plot and selecting the Super Master
Coregistration on the Super Master
Mass Processing:

To practice, let's process few S1 – IW pairs for the region of Laguna del Maule

- Prepare a *LaunchMTparam_S1_Arg_Domu_Laguna_D_83_Z1_ML8_MassProcess.txt :*
  - TRKDIR = ARG_DOMU_LAGUNA_D83_Tst_Coreg (because that is where the data are in …/SAR_CSL/S1)
  - SUPERMASTER = 20210407 (because that is what was discovered by ***Prepa_MSBAS.sh***)
  - DEMNAME = NQNyMas (because that its name in DataSAR/SAR_AUX_FILES/DEM/SRTM30/ALL/)
  - CROP = $PATH_1650/kml/ARGENTINA/Lagunal_Maule.kml
    Remember: cropping a S1 IW needs a kml; any other needs coordinates. See manual §3.1, note 2) page 69 !
  - REGION = Laguna_del_Maule (or any other that makes sense to you – no white space nor fancy characters!)
  - INTERFML = 8
  - POWSPECSMOOTHFACT = 1 (because we are not interested in filtered interf. and it will spare time)
  - APPLYMASK = APPLYMASKno
  - SKIPUW = SKIPyes (Tio spare time…)

  And/or compare with provided DataSAR/SAR_AUX_FILES/Param_files/S1/ARG_DOMU…/
  LaunchMTparam_S1_Arg_Domu_Laguna_D_83_Z1_ML8_MassProcess.txt

Exercise 2

Building the baseline plot and selecting the Super Master
Coregistration on the Super Master

Mass Processing:

To practice, let's process few S1 – IW pairs for the region of Laguna del Maule

- Prepare a *LaunchMTparam_S1_Arg_Domu_Laguna_D_83_Z1_ML8_MassProcess.txt :*
- run

SuperMaster_MassProc.sh with the following parameters :

…/SAR_SM/MSBAS/*ARGENTINE*/set2/table_0_20_0_450_SAMPLE_FOR_TST.txt

LaunchMTparam_S1_Arg_Domu_Laguna_D_83_Z1_ML8_MassProcess.txt

➔ OK? ✅ (~ 1 min for DEM + 25 min or with unwrapping)
See in …/SAR_MASSPROCESS/S1/…

Exercise 2

Building the baseline plot and selecting the Super Master
Coregistration on the Super Master
Mass Processing:

To practice, let's process few S1 – IW pairs for the region of Laguna del Maule

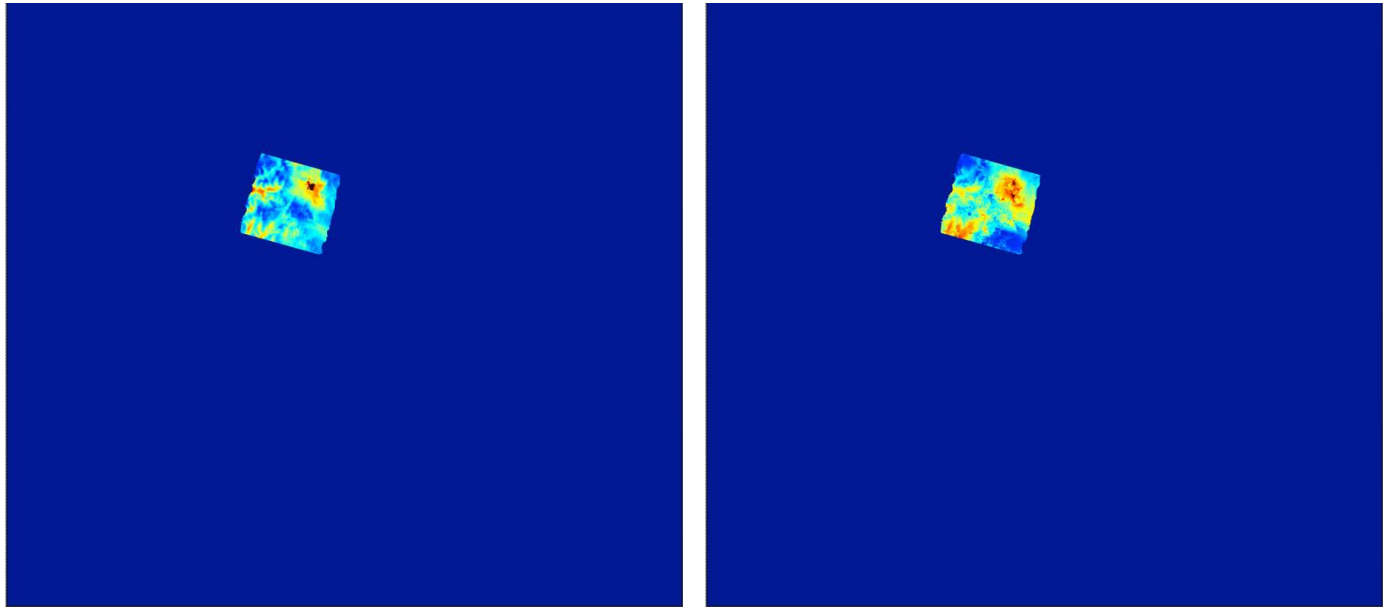
- What do you see at the Terminal ?
  - Ask you to be sure…
  - Suggest to process 3 pairs
  - Process (at least on the first run) to the DEM projection in Slant Range
  - Crash on first pair, as expected 😇. Why ?
    (also look in your PROCESS directory: what is wrong and why ?)
  - See if it successfully moved everything to /SAR_MASSPROCESS/
  - Tells you everything is done…

Exercise 2

Building the baseline plot and selecting the Super Master
Coregistration on the Super Master
Mass Processing:

To practice, let's process few S1 – IW pairs for the region of Laguna del Maule

Results: e.g. in
…/3601/SAR_MASSPROCESS/S1/ARG_DOMU_LAGUNA_D_83_Tst_Coreg/SMNoCrop_SM_20210407_Zoom1_ML8/GeocodedRasters/DefoInterpolx2Detrend



deformationMap.interpolated.flattened.UTM.50x50.bil.interpolated_S1_ARG_DOMU_LAGUNA_D_83_Tst_Coreg-36.2deg_20210407_20210413_Bp8.903m_HA-1720m_BT6days_Head253.6deg.ras

deformationMap.interpolated.flattened.UTM.50x50.bil.interpolated_S1_ARG_DOMU_LAGUNA_D_83_Tst_Coreg-36.2deg_20210407_20210507_Bp16.77m_HA-897.m_BT30days_Head253.6deg.ras

Exercise 2

Building the baseline plot and selecting the Super Master
Coregistration on the Super Master
Mass Processing

Additional information:

- **Note about updated S1 orbits (**See manual § 2**)**
  - When perform the reading of the data with ***Read_All_Img.sh***, it will search of course if new images were made available
  - It also check if updated orbits were made available.
    (Note that it only checks for the most recent ones unless you added the parameter ForceAllYears.
    Also, it does not attempt to update the orbits at all if you added the parameter –n).
  - If orbits were updated, and if you have launched ***Read_All_Img.sh*** with the parameters
    /SAR_SM/RESAMPLED/
    /SAR_MASSPROCESS/
    it will move all products computed with the preliminary orbits into dedicated directories:
    /SAR_SM/RESAMPLED/S1_CLN
    /SAR_MASSPROCESS/S1_CLN
    Hence, next time you run a ***SuperMasterCoreg.sh*** and/or ***SuperMaster_MassProc.sh***, it will recompute these products with the updated orbits.
  - These S1_CLN directories are flushed after 30 days to avoid overloading your hard disks.

Exercise 2

Building the baseline plot and selecting the Super Master
Coregistration on the Super Master
Mass Processing

Additional information:

- ***Verify_Mass_Process_Results*.sh** (see manual § 5.6**):**

When you are done with a mass processing, you may wonder if everything is OK. Or you may face problem at the time series inversion because some deformation data are missing or corrupted.

To assist you to identify where it could have been going wrong , you can run the script ***Verify_Mass_Process_Results*.sh** with the following 2 parameters:

PairsFile.txt	(path to file with the list of compatible pairs, i.e. …/SAR_SM/MSBAS/REGION/set*i*/table_0_MaxBp_0_MaxBt.txt)
MASSPROCESSINGPATH	(path to where geocoded products are stored, i.e. …/SAR_MASSPROCESS/*SAT*/*TRACK*/CROP_*SM_DATE_ZOOM_ML*/Geocoded)

It will check if all pairs are processed and each geocoded product is stored as expected in /Geocoded….
Missing products will be listed in files.
It will also offer to clean incoherent occurrence of files and pair directories (beware…).

Exercise 2

Building the baseline plot and selecting the Super Master
Coregistration on the Super Master
Mass Processing

Additional information:

- **Re-geocode or re-unwrap a list of pairs in SAR_MASSPROCESS** (see manual § 8.5)
  - If results were moved from PROCESS to SAR_MASSPROCESS, first run in …/SAR_MASSPROCESS/*SAT*/*TRACK*/CROP_*SM_DATE_ZOOM_ML* the script ***RenamePathAfterMove_in_SAR_MASSPROC.sh*** *SAT*
  - In the same directory, run ***ReUnwrap_fromList.sh*** with a list of pairs to reprocess in one column, as *MAS_SLV* dates (or S1 names) and the parameters file for that re-run.
    Test it for instance by changing the parameter ZONEMAP as ZoneMapYes.
  - In the same directory, run ***ReGeocode_fromList.sh*** with a list of pairs to reprocess in one column, as *MAS_SLV* dates (or S1 names) and a parameters file for that re-run. Note that the list of products to re-geocode is hard coded in the script, as well as the option to recompute the raster figures. You can change all that…

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Exercise 2

Building the baseline plot and selecting the Super Master:

- Ins_All_Img.sh
- Prepa_MSBAS.sh
- Dual criteria selection
- Manually add or remove pairs from automated list
- Note about old baseline plot tools
- Extract_x_Shortest_Connections.sh
- DelaunayTable.sh

Coregistration on the Super Master:

- SuperMasterCoreg.sh
- __SplitCoreg.sh

- DONE ! -

Mass Processing:

- SuperMaster_MassProc.sh
- __SplitSession.sh

Additional information:

- Note about updated S1 orbits
- Verify_Mass_Process_Results.sh
- Re-geocode or re-unwrap

Data samples for exercise 3

Provide samples to participants

- ✓ **Directory with mass processed DInSAR pairs:**
  3601/SAR_MASSPROCESS/S1/ARG_DOMU_LAGUNA_A_18_SAMPLE 144.19 Gb – 16.204 items
  3601/SAR_MASSPROCESS/S1/ARG_DOMU_LAGUNA_D_83_SAMPLE 132.75 Gb – 14.603 items
- ✓ **A kml for coherence threshold estimation**
  1650/kml/ARGENTINA/LagunaDelMaule_TestPhaseCLosure.kml 1.4 Kb – 1 item

MasTer Toolbox