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

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Exercises with your own data

or

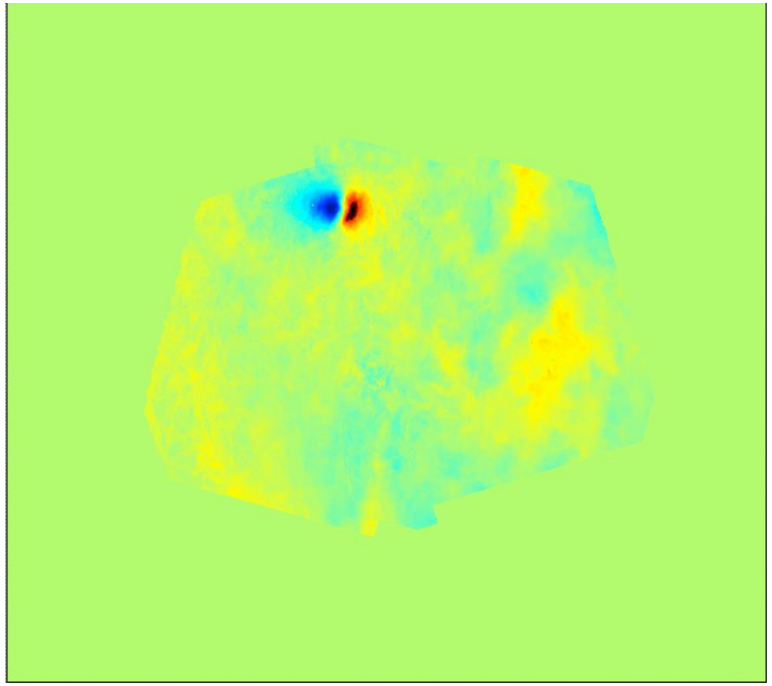
Coherence threshold, phase closure…

Nicolas d'Oreye

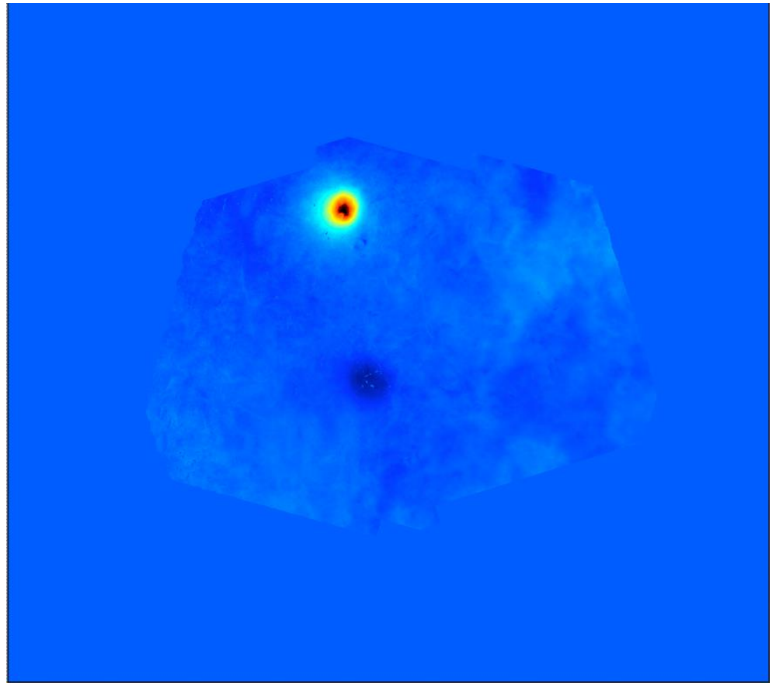
Exercise 4

Get back to MSBAS results for Domuyo and Laguna del Maule region in
…/3602/MSBAS/_Argentina_S1_20m_450days_NoOptim

Remember :



EW linear rate



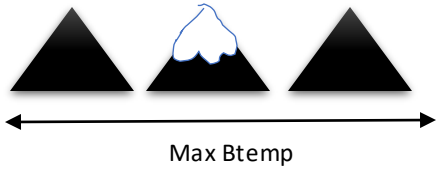
UD linear rate

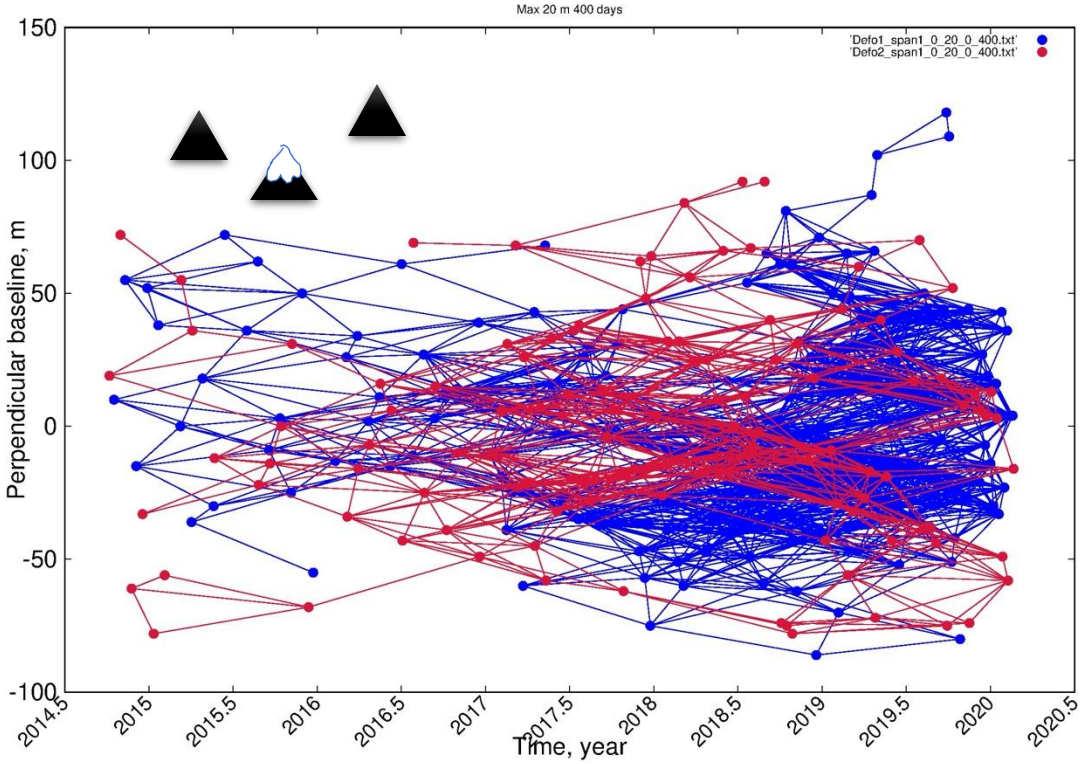
…/3602/MSBAS/_Argentina_S1_20m_450days_NoOptim/zz_*Comp*_2_0.04_NoCrop

Exercise 4

➔ **Coherence threshold**

If the selectedd temporal baseline is long enough to keep coherent pairs from summer to summer, it may happen that, in the mean time, the winter would cause decorrelation between summer and winter time:

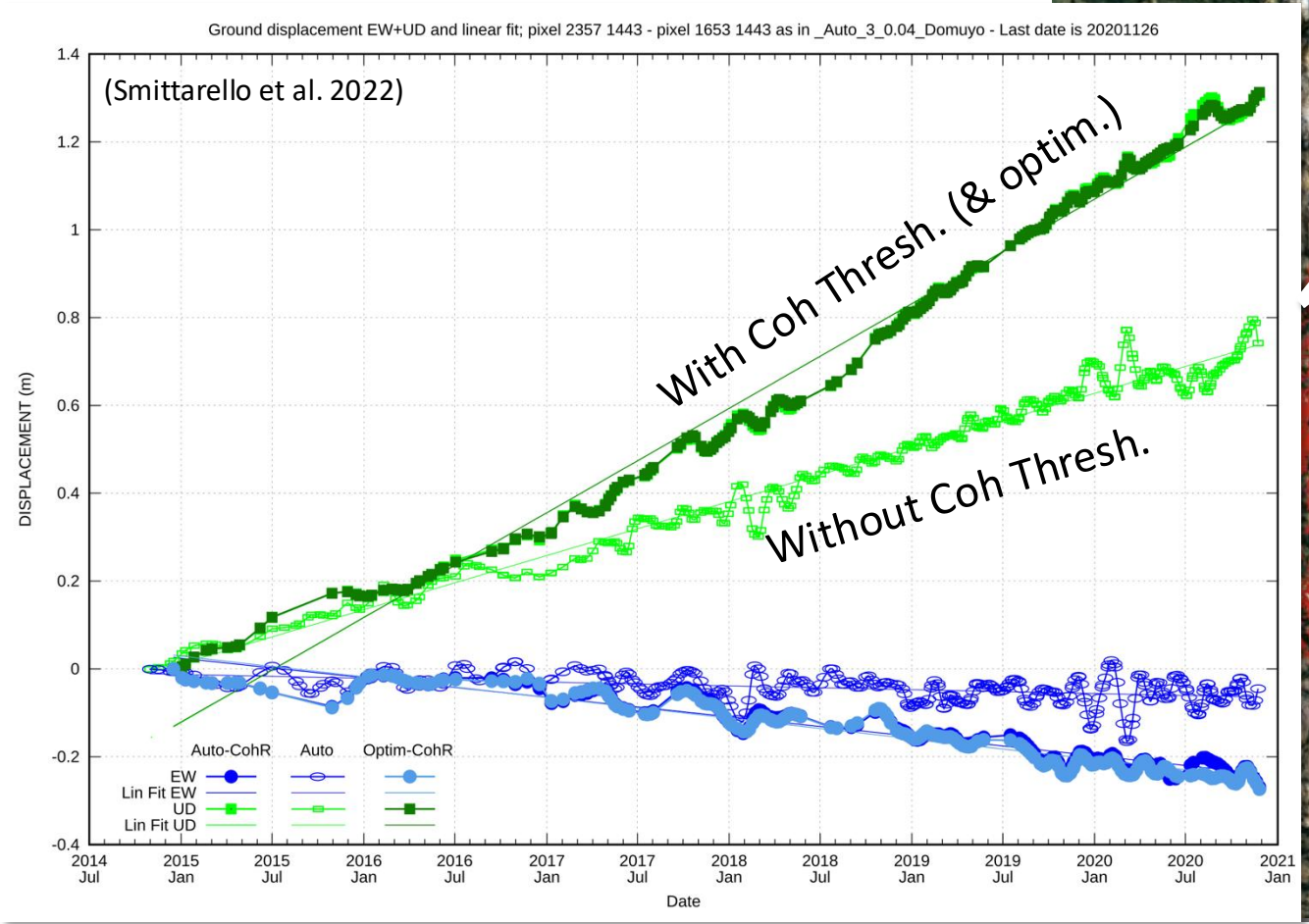


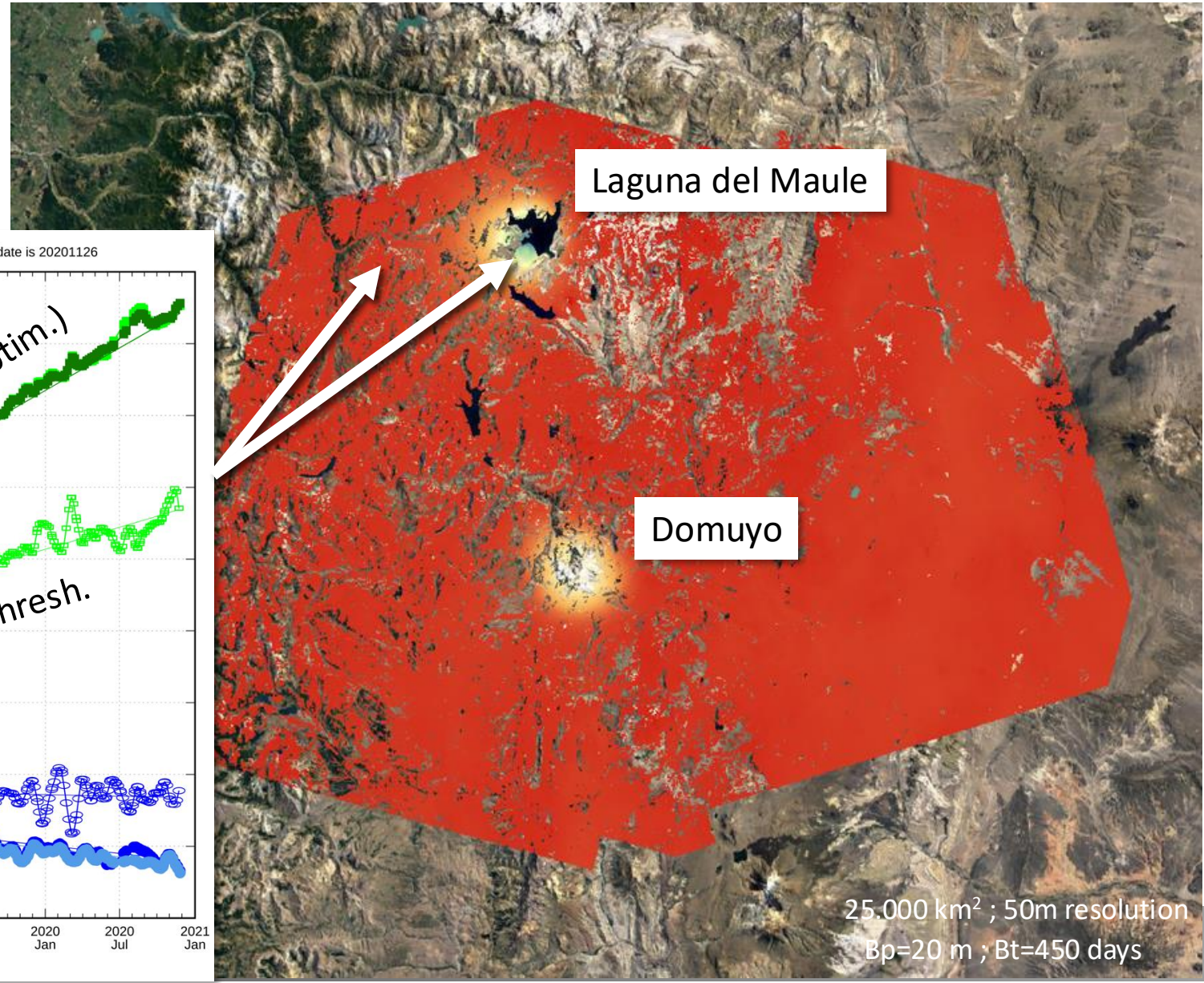


Studies have shown that it could lead to severe signal underestimation (Smittarello et al. 2022) !

Exercise 4

2014-2020: Sentinel 1:
- Full: 2666 interferograms
- With Coh Threshold: 1013
- Optimized => -75 %





Exercise 4

- Use the script ***restrict_msbas_to_Coh.sh*** with the following parameters:
  - Mode to clean, eg. DefoInterpolx2Detrend*i*
  - a coherence threshold
  - the path to a kml where mean coherence must be computed
  - the path to the directory where the geocoded coherence maps are stored, e.g SAR_MASSPROCESS/*SAT*/*TRK*/*REGION_ML*/Geocoded/Coh

  => it creates the necessary files in …/MSBAS_RESULTS/LOCATION/MODE*i*
- Use the script ***Exclude_Pairs_From_Mode.txt.sh*** with the following parameter:
  $3602/MSBAS/*YourRegion_and_Some_Info*/DefoInterpolx2Detrend*i*
- Execute ***MSBAS.sh*** as before (provides a meaningful text string for directory naming)

- Note: Coherence threshold selection is incremental ➔ slower the first time, faster the next ones…

What do you observe (compared to 2014-2021 time series) ?

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Phase closure

To search for possible interferograms affected by unwrapping error by checking phase closure consistency between triangles of pairs, run the following scripts:

- ***Extract_Triangles.sh*** to list all the triangles from the list of pairs (eg $PATH_1650/SAR_SM/MSBAS/*Region*/set*i*/table_*0_MaxBp_0_MaxBt*.txt) saved in a file _Triangles/*List_Triangels.txt*.
- ***Check_Closure_All_Triangles.sh*** to check unwrapping error in all triangles. It computes the mean phase based on a kml provided as parameter and consider that there is or there is no phase closure error based on an offset provided also as a parameter. It outputs 3 files in …/SAR_MASSPROCESS/*SAT*/*TRK*/*REGION_ML*/Geocoded/_CheckTriangles.txt/: _Good_Closure.txt, _Wrong_Closure.txt and _Pairs_To_Clean_From_WrongClosure_NotIn_GoodClosure.txt
- Wrong pairs in _Pairs_To_Clean_From_WrongClosure_NotIn_GoodClosure.txt can be rejected from MSBAS by running ***Remove_Pairs_From_BaselineOptimisation.sh***

Exercise 4

To test phase closure with Argentine dataset (beware: need ***Check_Closure_All_Triangles.sh*** > V1.4):

- ***Extract_Triangles.sh*** $PATH_1650/SAR_SM/MSBAS/ARGENTINE/set1/table_0_20_0_450.tx

  lists all triangles in $PATH_1650/SAR_SM/MSBAS/ARGENTINE/set1/_Triangles/*List_Triangles.txt* i.e. including those for which you do not have pair directories in SAR_MASSPROCESS ➔ make artificial list with only 2022 and 2023 pairs, eg.

  grep 2022 *List_Triangles.txt* > *List_Triangles_2022-2023.txt*
  grep 2023 *List_Triangles.txt* >> *List_Triangles_2022-2023.txt*
  grep –v 2021 *List_Triangles_2022-2023.txt* > *List_Triangles_2022-2023-no2020.txt* (maybe also without 2020..)

- ***Check_Closure_All_Triangles.sh*** $PATH_1650/SAR_SM/MSBAS/ARGENTINE/set1/_Triangles/*List_Triangles_2022-2023-no2020.txt* $PATH_3601/SAR_MASSPROCESS/S1/ARG_DOMU_LAGUNA_A_18_SAMPLE/SMNoCrop_SM20180512_Zoom1_ML4/Geocoded/DefoInterpolx2Detrend $PATH_1650/kml/ARGENTINA/LagunaDelMaule_TestPhaseClosure.kml 0.9

  lists $PATH_3601/SAR_MASSPROCESS/*SAT*/*TRK*/*REGION_ML*/Geocoded/_CheckTriangles.txt/*_Good_Closure.txt*
  and $PATH_3601/SAR_MASSPROCESS/*SAT*/*TRK*/*REGION_ML*/Geocoded/_CheckTriangles.txt/*_Wrong_Closure.txt*
  and $PATH_3601/SAR_MASSPROCESS/*SAT*/*TRK*/*REGION_ML*/Geocoded/_CheckTriangles.txt/_Pairs_To_Clean_From_WrongClosure_NotIn_GoodClosure.txt
  (and ignore the triangles for which there is no pair directories in SAR_MASSPROCESS)

- Wrong pairs in _Pairs_To_Clean_From_WrongClosure_NotIn_GoodClosure.txt can be rejected from MSBAS by running ***Remove_Pairs_From_BaselineOptimisation.sh*** $PATH_3602/MSBAS/_Argentina_S1_20m_450days/DefoInterpolx2Detrend1 $PATH_3601/SAR_MASSPROCESS/*SAT*/*TRK*/*REGION_ML*/Geocoded/_CheckTriangles.txt/_Pairs_To_Clean_From_WrongClosure_NotIn_GoodClosure.txt

- Do the same for DefoInterpolx2Detrend2 if required

- Run again ***MSBAS.sh*** after having renamed the DefoInterpolx2Detrend*i*_Optimized__Pairs_To_*CleanPFrom*…..txt as DefoInterpolx2Derend*i*.txt

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Exercise 4

Simply restrict pair selection to Max 3 times

- To restrict the computation of MSBAS to images taken max 3 times as Master and 3 times as Slave, run these scripts (see manual or scripts):
  - ***Extract_Baselines_3.sh***
  - ***Keep_Pairs_From_Extract_Baseline_3.sh***