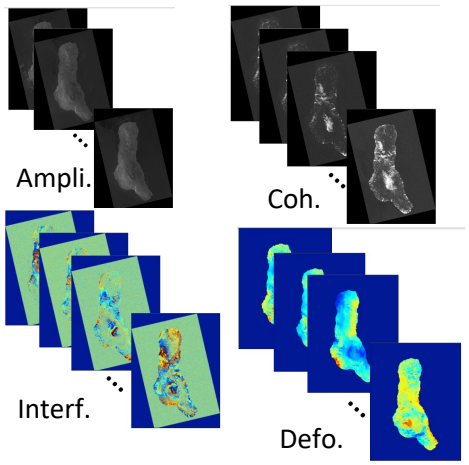
Automatization using cron jobs

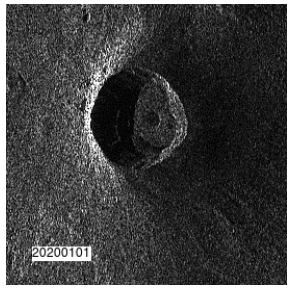
Nicolas d'Oreye

MasTer Toolbox

Sat. image Download

Interferometric processing (MasTer Engine)

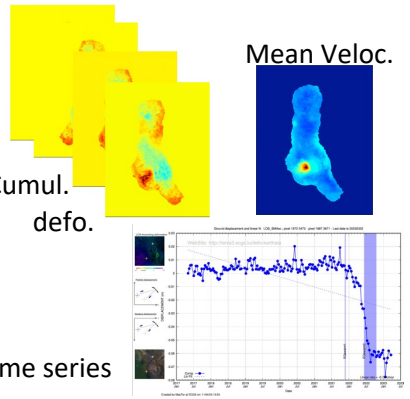




Ampli.

Defo.

Time Series processing (MSBAS)



Web Page(s)

G. Celli — D. Derauw — S. Samsonov — M. Jaspard

N. d'Oreye & D. Smittarello

Automatization using cron jobs

Plan:

What is a cron job ?

Step 0: download the data

Step 1: Read, coregister on Super Master and compute baseline plots

Step 2: Process all the DInSAR pairs

Step 3: Run the MSBAS inversion

SAR shadow processing

Automatization using cron jobs

What is a cron job ?

- **Cron** is a Linux-based program (daemon) allowing **scheduling tasks at a specific time**.
- The **cron jobs** are the tasks launched by the cron
- The **crontab** is the list of scheduled tasks and their execution time/repetition rate
- You can see the planned tasks by launching in $HOME (with administrator rights)
  crontab -l ("l" stands for "list")
- You can edit (using your default editor) the crontab by launching in $HOME (with administrator rights)
  crontab -e ("e" stands for "edit")
- Syntax of the cron:
  - Line starting by # are comments
  - Scheduller:
    mm hh DoM MM DoW path/***Task.sh***
    where mm, hh, DoM, MM and DoW are resp. the minutes, hours, day of Month, Month, Day of Week (Sunday=0)
  - It might be wise to end the line with "*> /dev/null 2>&1*" to avoid overloading the mailbox with possible messages generated by the task

Automatization using cron jobs

What is a cron job ?

- In $HOME/SAR/MasTerToolbox/SCRIPTS_MT/_cron_scripts[_NEW]/
  you can find examples of cron scripts used to run MasTer in a fully automatic mode for different targets:
  - VVP
  - Argentina
  - Comores
  - Guadeloupe
  - Reunion Island
  - Luxembourg
  - Hawaii
  - Etc…
- All the scripts were tuned to our needs at ECGS and may differ depending on the targets.
- They are all split in the following steps
  - Download
  - Reading, coregistering and computing baseline plots
  - Mass processing of the interferograms and deformation maps
  - MSBAS inversion and time series plots for some sets of pre-defined point of interest
- They are provided for inspiration and need to be strongly adapted to your own needs. We will illustrate it with Domuyo area.

Automatization using cron jobs

What is a cron job ?

Step 0: download the data

- Procedure depends on the satellite and the provider
- There is an example of script by Gilles Celli for downloading S1 data from SciHub in $HOME/SAR/MasTerToolbox/SCRIPTS_MT/_cron_scripts/_Download_Sentinel/***sentinel1_download_all.sh*** which launch ***sentinel1_downloader_ingestiondate.sh***.

  Both scripts must be adapted to your needs (set your password and login, change the e-mail addresses, adapt to your targets...).
- Must be set in your crontab as e.g. (for being launched every day at 2h18 am):
  18 02 * * * $HOME/SAR/MasTerToolbox/SCRIPTS_MT/_cron_scripts/_Download_Sentinel/sentinel1_download_all.sh > /dev/null 2>&1
- Other scripts to download S1 images can be found from the Internet
- See also e.g. ***ONDA_S1DataDownloader*** from MasTer Engine

Automatization using cron jobs

What is a cron job ?

Step 0: download the data

Step 1: Read, coregister on Super Master and compute baseline plots

- See examples of crons step 1 in $HOME/SAR/MasTerToolbox/SCRIPTS_MT/_cron_scripts/***Domuyo_S1_Step1_Read_SMCoreg_Pairs.sh***
- It will process successively :
  - ***Read_All_Img.sh***
  - [***_Check_ALL_S1_SizeAndCoord_InDir.sh***. Explanation of that step:
    if an image has not the expected nr of bursts and corner's coordinates (tolerance is hard coded in script)
    ➔ stores it in _TMP_QUARANTINE and it will try next time.]
  - ***SuperMasterCoreg.sh*** (Asc and Desc at the same time in background - see "&" at the end of line till "wait")
  - ***Ins_All_Img.sh*** (Asc and Desc at the same time in background)
  - ***Prepa_MSBAS.sh*** (Asc and Desc at the same time in background)
  - [Plot a common baseline plot for Asc and Desc modes with ***plot_Multi_BaselinePlot.sh***]
- Note that it start the ***SuperMasterCoreg.sh*** before the ***Prepa_MSBAS.sh*** because it knows already the date of the Super Master
- Let's see the script…

Automatization using cron jobs

What is a cron job ?

Step 0: download the data

Step 1: Read, coregister on Super Master and compute baseline plots

Step 2: Process all the DInSAR pairs

- See examples of crons step 1 in $HOME/SAR/MasTerToolbox/SCRIPTS_MT/_cron_scripts/***Domuyo_S1_Step2_MassProc.sh***
- It will process successively :
  - Check that no step 1 nor other step 2 processings are running for the same target
  - ***SuperMaster_MassProc.sh*** (Asc and Desc at the same time in background)
- Let's see the script…

Automatization using cron jobs

What is a cron job ?
Step 0: download the data
Step 1: Read, coregister on Super Master and compute baseline plots
Step 2: Process all the DInSAR pairs
Step 3: Run the MSBAS inversion

- See examples of crons step 1 in $HOME/SAR/MasTerToolbox/SCRIPTS_MT/_cron_scripts/***Domuyo_S1_Step3_MSBAS.sh***
- It will process successively:
  - Prepare the required directories (if not done yet)
  - Prepare the list of points for which it will plot the time series
  - Check that no step 3 nor Mass Processing are running for the same target
  - ***Remove_Duplicate_Pairs_File_All_Modes_But_Ampl.sh***: if a S1 orbit is updated, products are re-computed and may have a slighly different Bp or Ha or Incidence angle and hence another name. It remove the oldest.
  - Computes the date of the last Asc and Desc processed pair
  - Checks in a log file what was the date of the last processed pairs (Asc and Desc)

  } If same: STOP

  - Remove Broken Links and Clean txt file in existing ${MSBASDIR}/DefoInterpolx2Detren1 & 2 with ***Remove_BrokenLinks_and_Clean_txt_file.sh***. Do the same in _Full 1 & 2_Full (cfr coherence threshold).

Automatization using cron jobs

What is a cron job ?
Step 0: download the data
Step 1: Read, coregister on Super Master and compute baseline plots
Step 2: Process all the DInSAR pairs
Step 3: Run the MSBAS inversion

- It will process successively (continued):
  - Checks that each DefoInterpolx2Detrend*i*.txt has 4 columns (for files with and without coherence threshold).
  - ***_Check_bad_DefoInterpolx2Detrend.sh***: Again remove lines in MODEi.txt files associated to possible broken links or duplicated lines
  - ***build_header_msbas_criteria.sh*** for preparing the MSBAS files
  - Update header.txt to our needs:
    R_FLAG (inversion order and lambda factor) and C_FLAG (no calib because defo is already detrended)
  - Check again MODEi.txt files (4 columns, no broken links, no duplicated lines…)

START the **EW-UD** processing **without** coherence threshold:

  - If not the first run, merge newly created DefoInterpolx2Detrend*i*.txt with DefoInterpolx2Detrend*i*_Full.txt and /DefoInterpolx2Detrend*i* with /DefoInterpolx2Detrend*i*_Full
  - Update header.txt to our needs: takes the DefoInterpolx2Detrend*i*_Full.txt data sets

Automatization using cron jobs

What is a cron job ?
Step 0: download the data
Step 1: Read, coregister on Super Master and compute baseline plots
Step 2: Process all the DInSAR pairs
Step 3: Run the MSBAS inversion

- It will process successively (continued):
  - Run the MSBAS.sh for the Full data sets (i.e. without coherence threshold) with a list of points of interest for which it will compute the time series (pdf format, with error bars)
  - Make the baseline plots with exactly the pairs used: ***PlotBaselineGeocMSBASmodeTXT.sh***
  - Copy the list of points of interest and the time series (plots and values as .txt; both named with description) in the directory where times series are stored for the _Full processing, that is /zz_UD_EW_TS_Auto_${ORDER}_${LAMBDA}_${LABEL}_NoCohThresh/
  - Plot additional times series, though as double difference bewteen points of interest using ***PlotTS_all_comp.sh*** (see next talk)
  - Move these additional double difference time series (plots and values as .txt; both named with description) in the directory where times series are stored for the _Full processing, that is ${MSBASDIR}/zz_UD_EW_TS_Auto_${ORDER}_${LAMBDA}_${LABEL}_NoCohThresh/__Combi/ for figs, and ${MSBASDIR}/zz_UD_EW_TS_Auto_${ORDER}_${LAMBDA}_${LABEL}_NoCohThresh/_Time_series/ for values where ${MSBASDIR}/ is e.g. */3602*/MSBAS/*YourRegion_and_Some_Info/*

Automatization using cron jobs

What is a cron job ?

Step 0: download the data

Step 1: Read, coregister on Super Master and compute baseline plots

Step 2: Process all the DInSAR pairs

Step 3: Run the MSBAS inversion

- It will process successively (continued):

  START the **EW-UD** processing **with** coherence threshold:

  - Get back to header without DefoInterpolx2Detrend*i*_Full.txt data sets, that is DefoInterpolx2Detrend*i*.txt
  - Compute the coherence restriction: ***restrict_msbas_to_Coh.sh***
  - If there are pairs to exclude: ***Exclude_Pairs_From_Mode.txt.sh***
  - Run the MSBAS.sh with coherence threshold and with a list of points of interest for which it will compute the time series (pdf format, with error bars)
  - Make the baseline plots with exactly the pairs used: ***PlotBaselineGeocMSBASmodeTXT.sh***
  - Copy the list of points of interest and the time series (plots and values as .txt; both named with description) in the directory where times series are stored for the processing with coh threshold, that is /zz_UD_EW_TS_Auto_${ORDER}_${LAMBDA}_${LABEL}/
  - Plot additional times series, though as double difference bewteen points of interest using ***PlotTS_all_comp.sh*** (see ppt/pdf n° 8)

Automatization using cron jobs

What is a cron job ?
Step 0: download the data
Step 1: Read, coregister on Super Master and compute baseline plots
Step 2: Process all the DInSAR pairs
Step 3: Run the MSBAS inversion

- It will process successively (continued):
  - Move these additional double difference time series (plots and values as .txt; both named with description) in the directory where times series are stored for the _Full processing, that is ${MSBASDIR}/zz_UD_EW_TS_Auto_${ORDER}_${LAMBDA}_${LABEL}/__Combi/ for figs, and ${MSBASDIR}/zz_UD_EW_TS_Auto_${ORDER}_${LAMBDA}_${LABEL}/_Time_series/ for values

START the **ASC** processing **with** coherence threshold:

  - Set header.txt by commenting the line with DefoInterpolx2Detrend2.txt
  - Run the MSBAS.sh with coherence threshold and with a list of points of interest for which it will compute the time series (pdf format, with error bars)
  - Copy the list of points of interest and the time series (plots and values as .txt; both named with description) in the directory where times series are stored for the processing with coh threshold, that is /${MSBASDIR}/zz_LOS_TS_Asc_Auto_${ORDER}_${LAMBDA}_${LABEL}/
  - Plot additional times series, though as double difference bewteen points of interest using ***PlotTS.sh*** (see ppt/pdf n° 8)

Automatization using cron jobs

What is a cron job ?
Step 0: download the data
Step 1: Read, coregister on Super Master and compute baseline plots
Step 2: Process all the DInSAR pairs
Step 3: Run the MSBAS inversion

- It will process successively (continued):
  - Move these additional double difference time series (plots and values as .txt; both named with description) in the directory where times series are stored for the _Full processing, that is ${MSBASDIR}/zz_LOS_TS_Asc_Auto_${ORDER}_${LAMBDA}_${LABEL}/__Combi/ for figs, and ${MSBASDIR}/zz_LOS_TS_Asc_Auto_${ORDER}_${LAMBDA}_${LABEL}/_Time_series/ for values

START the **DESC** processing **with** coherence threshold:

  - Set header.txt by commenting the line with DefoInterpolx2Detrend1.txt
  - Run the MSBAS.sh with coherence threshold and with a list of points of interest for which it will compute the time series (pdf format, with error bars)
  - Copy the list of points of interest and the time series (plots and values as .txt; both named with description) in the directory where times series are stored for the processing with coh threshold, that is /${MSBASDIR}/zz_LOS_TS_Desc_Auto_${ORDER}_${LAMBDA}_${LABEL}/
  - Plot additional times series, though as double difference bewteen points of interest using ***PlotTS.sh*** (see ppt/pdf n° 8)

Automatization using cron jobs

What is a cron job ?

Step 0: download the data

Step 1: Read, coregister on Super Master and compute baseline plots

Step 2: Process all the DInSAR pairs

Step 3: Run the MSBAS inversion

- It will process successively (continued):
  - Move these additional double difference time series (plots and values as .txt; both named with description) in the directory where times series are stored for the _Full processing, that is ${MSBASDIR}/zz_LOS_TS_Desc_Auto_${ORDER}_${LAMBDA}_${LABEL}/__Combi/ for figs, and ${MSBASDIR}/zz_LOS_TS_Desc_Auto_${ORDER}_${LAMBDA}_${LABEL}/_Time_series/ for values

  Nearly there…

  - Get back to original header.txt in preparation of next run
  - Store the date and time of end or processing in ${MSBASDIR}/_last_MSBAS_process.txt for check at next run
  - Store date of last Asc and last Desc pair computed in ${MSBASDIR}/_Last_MassProcessed_Pairs_Time.txt for check at next run

  All done !

- Let's see the script…

Automatization using cron jobs

What is a cron job ?
Step 0: download the data
Step 1: Read, coregister on Super Master and compute baseline plots
Step 2: Process all the DInSAR pairs
Step 3: Run the MSBAS inversion
SAR shadow processing

- See examples of crons for automatic amplitude time series of the Nyiragongo and Nyamulagira regions in $HOME/SAR/MasTerToolbox/SCRIPTS_MT/_cron_scripts/***Nyigo_Nyam_Crater_S1_Read_AMPLI.sh***
- It will process successively :
  - ***Read_All_Img.sh***
  - Run a ***ALL2GIF.sh*** for the Nyiragongo region in Asc and Desc and for the Nyamulagira region in Asc.
    The Nyamulagira is on the same frame of the Desc scenes used for the Nyiragongo. Hence no need to run that one twice.
  - Because both volcanoes are on the same Desc frame, a special script is launched to extract the required info: ***Shadows_S1_Nyam_Desc.sh***
- Let's see the script…

Automatization using cron jobs

Plan:

What is a cron job ?

Step 0: download the data

Step 1: Read, coregister on Super Master and compute baseline plots

Step 2: Process all the DInSAR pairs

Step 3: Run the MSBAS inversion

SAR shadow processing

- DONE ! -