PSI USING StaMPS

For Sentinel-1A/B,

How to prepare Sentinel-1 images stack for PSI/SBAS in SNAP

NOTE: (8) images is a very small stack for PS identification, usually 20+ scenes are used/recommended.

1. For S1, apply TOPS split and then apply precise orbit.
2. Add all products to the Backgeocoding.
3. Create Stack of Backgeocoded images (master\_Stack).

NOTE: This point refers to the Backgeocoded Stack of all the products taking in account the selection of Master Image.

1. Create a stack of Interferograms (Follow the step one of Prepare for STACK AVERAGING) on the resulting stack. {**STEP 1**: **master (SAME MASTER)+ (Different Slaves)first slave** -> TOPS Corregistration, if necessary Deburst (and possibly subset), Interferogram, topographic phase removal, } master\_Stack\_ifg­\_dinsar .
2. Deburst both the Backgeocoded stack (master\_Stack\_Deb), and the Interferogram stack (master\_Stack\_Deb\_ifg­\_dinsar .).

NOTE: Deburst of the (master\_Stack\_Deb) is after the step of stacking, However, for the (master\_Stack\_Deb\_ifg­\_dinsar .) is already debursted because it is impossible to implement topo-phase removal before deburst according to SNAP 5.

1. Add an elevation band to the Interferogram stack (by right-click > add elevation raster.).
2. Add the Debursted stack and Debursted Interferogram stack to the stamps export.

Below is a description of for a case when a study area is within one IW swath OR within one burst.

NOTE: 12-13 images are OK for each Stack. If more images in the Stack - it is better to split it into several Stacks each having the same master. Master can be chosen by Radar-Interferometric-InSAR Stack Overview.

NOTE: StaMPS works with wrapped Interferograms as input. Unwrapping is done in PS at the last stage. So Goldstein Phase filtering or Multilooking before export to StaMPS should not be done.

Note: Multilooking could be done just to examine the Interferograms - this sometimes helps to determine a signal.) -multilooking reduces the chance for getting suitable persistent scatterers: As the pixel size increases, the chance that there is one dominant scatterer which exceeds all others in this pixel is reduced. So mutilooking is not prohibited but not necessarily contributing to good results. -Now multilooking is not necessary, StaMPS will resample images throughout the process before phase unwrapping.

Andy Hooper StaMPS PS exercise: [http://seom.esa.int/landtraining2015/files/Day\_4/D4P2a\_LTC2015\_Hooper.pdf4](http://seom.esa.int/landtraining2015/files/Day_4/D4P2a_LTC2015_Hooper.pdf)

 **Prepare data for StaMPS: Radar-Interferometric-PSI/SBAS-StaMPS EXPORT**

Exported to StaMPS the two files:

1. master\_Stack\_Deb\_ifg\_dinsar AND master\_Stack\_Deb
2. After the Exportation to StaMPS four directories are gotten (/diff0, /geo,/dem,/rslc)
3. Replace the former directories to the directory name (INSAR\_master\_data)

NOTE: In case of several Stacks export each Stack and then copy results to the directories directories /diff0, /geo,/dem,/rslc.

NOTE: It is possible to only copy **/diff0** and **/rslc**, and doesn’t need to copy **/geo** and **/dem**

1. To have PS geocoded add (Lon & Lat) bands to the result of 5 (master\_Stack\_Deb)
NOTE: (Right click -band maths-edit expressions-constants-lon (then lat) (UNCHECK "virtual" to save expression).
2. Export results to (ENVI or GAMMA format), Save result, for example, to /geo directory. Rename files with lon and lat to master\_data.lon and master\_data.lat. These are binary files with latitudes and longitudes.

NOTE: For all pixels of the master crop. (One file contains values of lat for all pixels and the other - of lon) All the other files (results of export of the other bands) can be deleted. The files master\_data.lon and master\_data.lat should be placed into /geo directory.

NOTE: Use **master\_data.lon** and **master\_data.lat** could have PS geocoded, **TC** is also workable.

1. Place the new scripts mt\_prep\_gamma to the /bin directory of StaMPS.
2. Place ps\_load\_initial\_gamma.m to the StaMPS matlab directory.
3. Run mt\_prep\_gamma from the INSAR\_masterdata directory.

NOTE 1 : Should use **mt\_prep\_gamma\_snap (changed)** provided by [FeiLiu](http://forum.step.esa.int/users/FeiLiu),

If the script **ps\_load\_initial\_gamma\_snap.m** provided by Katherine, workable then everything is OK, **else**: use the file **ps\_load\_initial\_gamma\_snap (changed).m** provided by [FeiLiu](http://forum.step.esa.int/users/FeiLiu), In any case, to rename the file to **ps\_load\_initial\_gamma.m** and replace the original one.

NOTE 2: ps\_load\_initial\_gamma\_snap.m and mt\_prep\_gamma\_snap must be in StaMPS installation directory not in your working directory. By [annamaria](http://forum.step.esa.int/users/annamaria)
In particular:
**mt\_prep\_gamma\_snap** must be in **/bin**,
**ps\_load\_initial\_gamma\_snap.m** must be in **/matlab**.

1. Run matlab and launch StaMPS.



There is a tutorial on command line processing on the tutorials page <http://step.esa.int/main/doc/tutorials/>

How did you get StaMP installed under cygwin?

Download the rar-file (<https://homepages.see.leeds.ac.uk/~earahoo/stamps/>)

* Unpack it to C:\Temp\StaMPS
* cd /cygdrive/c/temp/StaMPS
* make
* make install

This compiles the files which can be executed by the cygwin shell. You can run them with csh.
Some are also converted to exe-formats.
Same applies for the other packages.



Prepare for STACK AVERGING

STEP 1: master+first slave -> TOPS Corregistration, if necessary Deburst (and possibly subset), interferogram, topographic phase removal,

STEP 2: master+second slave -> coregistration, if necessary deburst (and possibly subset), interferogram, topographic phase removal.
STEP 3: master+third slave -> coregistration, if necessary deburst (and possibly subset), interferogram, topographic phase removal.
STEP 4: master+fourth slave -> coregistration, if necessary deburst (and possibly subset), interferogram, topographic phase removal.

STEP 5: Create a stack with results of step1,step2, step3, step4. STEP……

STEP 6 Create stacking averaging

STEP 7 SNAPHU EXPORT

STEP 8 UNWRAPPING

STEP 9 SNAPHU IMPORT

STEP 10 PHASE TO DISPLACEMENT