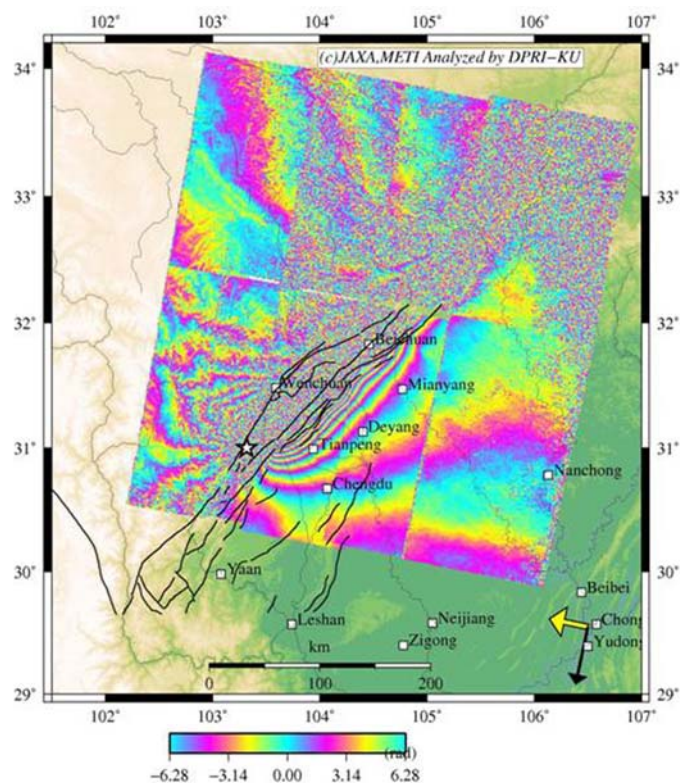


PALSAR ScanSAR Interferometry with GammaR

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We have been conducting the analysis of PALSAR ScanSAR mode (WB1) data using the software provided by Prof. David Sandwell from UCSD since last September. The program of UCSD divides a raw image data file into 5 files according to observation swath by finding the change of PRF. It also zero-pads in proportion to PRF in the data file for each swath during waiting time. In order to use these data with GammaR which we are using in DPRI, Kyoto University, we must tune up several parameters. The tune-up is roughly categorized into followings: (1) adjustment of state vectors, (2) edit of SAR and SLC parameter files, and (3) modification of setting of range compression and coregistration of images /DEM.



(1) Adjustment of state vectors

There is no information on state vectors in the parameter files output by UCSD program. Therefore we must use PALSAR_proc of GammaR to extract necessary information including state vectors from the LED file. However, PALSAR_proc outputs information that is consistent with only the first record of the raw file. For example, if the first record comes from the swath4, off-nadir angle (~34 deg), PRF (~2150Hz), and state vectors etc for swath4 are output in the SAR and SLC parameter files. Even if we edit parameters in the files according to other swaths, we cannot obtain focused images. In order to extract parameters consistent with other swaths, we must repeat the next procedure: first, we find the changes of PRF using PALSAR_proc. Then, we cut the records of the previous swath by using cp_data, again apply PALSAR_proc to new raw data file. We must repeat 4 times to obtain parameters consistent with all swaths.

(2) Edit of parameters in SAR and SLC parameter files

UCSD program outputs raw image data of record size of 11200 bytes without header. Therefore, we must edit these numbers and total process lines in corresponding parameter files to be input to GammaR. Furthermore, we must edit observation start time by copying from the output files of the UCSD program. This is important, because this information will be used with state vectors during the coregistration of images and DEM.

(3) Modification of setting of range compression and coregistration of images/DEM

When we process SLC, we should better input the number of valid records, which is written in the original SAR parameter files, to the range compression routine `pre_rc`. If not, resultant SLC has a black belt on its right side, which will cause a trouble in coregistration.

In the interferometric processing, we must be aware of the step size for the iteration for calculation of correlation to coregister images/DEM, since ScanSAR images have less resolution than strip mode images. So far, we are using the half step size than that for the analysis of strip mode images. When images contain ocean significantly, we should remove it.

We have analyzed ScanSAR images before and after the Wenchuan earthquake (Figure) and images of southwestern Japan acquired in summer 2007 and 2008. Since perpendicular baselines are as large as 700m, we could not obtain high coherence in mountains. However, we recognize as high coherence in urban/plane area as strip mode. Especially, interferograms of the Wenchuan earthquake, which are acquired from the descending orbit, gave us different information from those by the strip mode images acquired from ascending orbits, and posed a strong constraint on fault model. We do not know why the azimuth lines are less and there are gaps between consecutive frames. This point must be elaborated further.

PALSAR ScanSAR images give us not only information from a wide area but have a big merit from the fact that ScanSAR observations are being mainly made from descending orbits. For the purpose of crustal deformations in a wide area which may arise from interplate earthquakes, we expect accumulation of ScanSAR images, and would like to establish the procedure to analyze ScanSAR data.

Keywords: ScanSAR, InSAR, PALSAR, crustal deformation