

## How to use iGPS to generate velocity profiles?

Step 1). For InSAR LOS rate map (\$iGPS\example\sar\xyz\_profiles\xyz\meanvel\_01.txt) in XYZ format (Fig. 1):

```
91.474576  31.035791  0.505565
91.482076  31.030791  -1.081916
...
```

Each line of the XYZ file contains:

```
longitude latitude velocity [velocity_uncertainty]
```

The last column (velocity uncertainty) is optional.

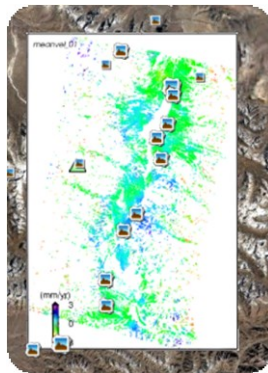


Fig. 1 InSAR LOS rate map for Gulu Graben, Dangxiong, Lhasa, Tibet, China. Viewed with Google Earth.

If the LOS rate map is in other formats (e.g. binary grid), one should first convert it to XYZ format. Currently, iGPS does not support other file formats.

2) Create a fault trace polyline for Yadong-Gulu rift and save it as GMT psxy format (\$iGPS\example\sar\xyz\_profiles\fault\_trace\fault\_ydgl2.psxy).

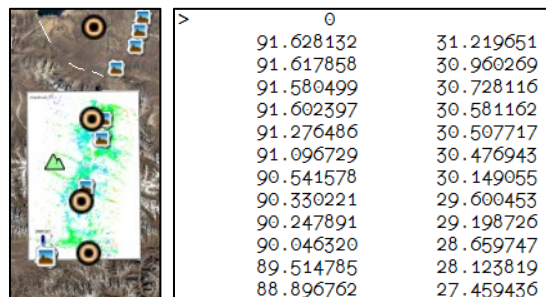


Fig. 2 Fault trace polyline for Yadong-Gulu fault zone.

3) Use iGPS program “SAR\_LOS\_PROFILES\_AUTO\_XYZ” to generate velocity profiles.

The iGPS main program should be first launched. If not, open the iGPS starter (\$iGPS\main\start\_igps.pro) and run it (e.g. by pressing the F8 key), which will set the

iGPS environment paths automatically. Then, open \$iGPS\sar\sar\_los\_profiles\_auto\_xyz.pro file with IDL Workbench (IDLDE) and set your parameters. Currently, iGPS does not provide a GUI for this program.

```

start_igps.pro sar_los_profiles_auto_xyz.pro
1
2=PRO SAR_LOS_PROFILES_AUTO_XYZ, vfile=vfile, $ ;velocity file (in va
3 pfile=pfile, $ ;profiles file (two-end-points lines)
4 opath=opath, $ ;output path
5 ffile=ffile, $ ;if exist) fault trace (only one polyline in GMT f
6 flon=flon, $ ;fault longitude (if ffile is not present && it is no
7 flat=flat, $ ;fault latitude (if ffile is not present && it is
8 out_plot=out_plot, $ ;whether output temporary plots
9 inputfmt=inputfmt, $ ;input velocity format (0- ; 1-psvelo)
10 ;0 (default): 1x site Lon lat vn sign ve size cne
11 ;1 (psvelo): 1x Lon lat ve vn size sign cne site
12 maxdist=maxdist ; the maximum distance away from the line to creat
13
14 PROG=(STRSPLIT(LAST(SCOPE_TRACEBACK()),/EXTRACT))[0]
15
16 ;readme first
17 ;this program needs files parameters: 3 inputs and 1 output
18 ;inputs:
19 ; vfile - the velocity file in XYZ format;
20 ; ffile - fault file (continuous polyline in GMT psxy format)
21 ; pfile - profiles file (two-points lines in GMT psxy format)
22 ;
23 ;output

```

Fig. 3 Open SAR\_LOS\_PROFILES\_AUTO\_XYZ source code in IDL Workbench.

With the default settings, SAR\_LOS\_PROFILES\_AUTO\_XYZ program will run with the supplied example located at \$iGPS\example\sar\xyz\_profiles\ directory. If the output path does not exist, iGPS will create it.

iGPS will create a preview plot for each profile (e.g. Fig. 4).

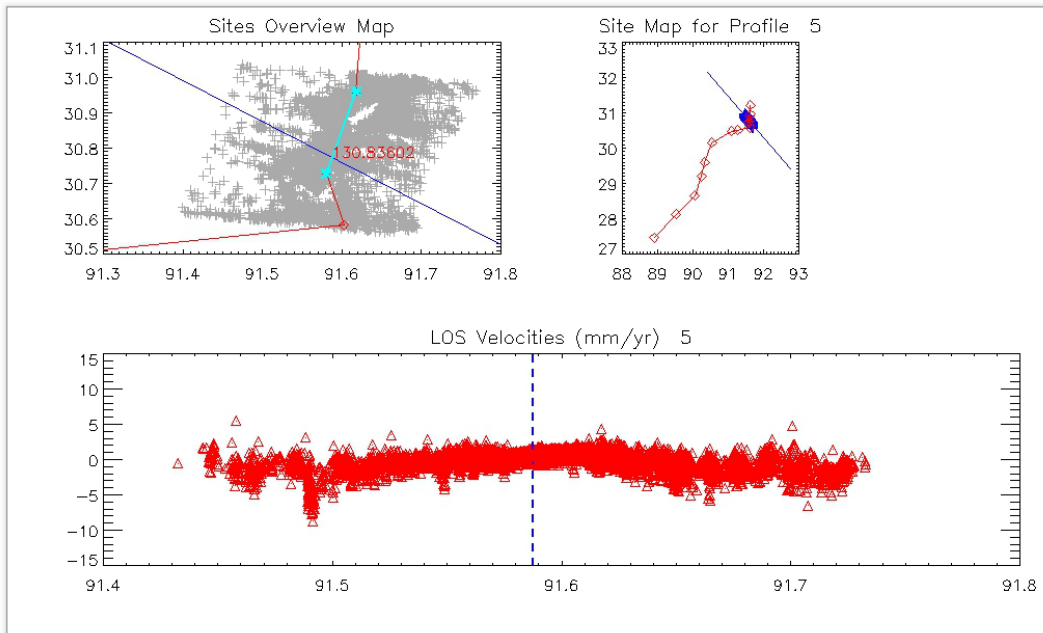


Fig. 4 Plot for velocity profile.

Content of the output velocity profile file looks like:

# PSXY\_PROFILE    90.440    32.500

# PSXY\_PROFILE    92.809    29.758

*These two lines are profile line.*

# PSXY\_FAULT\_PROFILE\_INTERSECT    91.625    31.129

*This is the intersection point between the profile and fault.*

# PSXY\_FAULT\_TRACE    91.628    31.220

*The below points represent the fault trace.*

# PSXY\_FAULT\_TRACE    91.618    30.960

# PSXY\_FAULT\_TRACE    91.580    30.728

# PSXY\_FAULT\_TRACE    91.602    30.581

# PSXY\_FAULT\_TRACE    91.276    30.508

# PSXY\_FAULT\_TRACE    91.097    30.477

# PSXY\_FAULT\_TRACE    90.542    30.149

# PSXY\_FAULT\_TRACE    90.330    29.600

# PSXY\_FAULT\_TRACE    90.248    29.199

# PSXY\_FAULT\_TRACE    90.046    28.660

# PSXY\_FAULT\_TRACE    89.515    28.124

# PSXY\_FAULT\_TRACE    88.897    27.459

*	site	p_long	p_lati	p_dist	v_along	ve_along	v_tang	ve_tang	long	lati	dist_to_fault	v_los	ve_los
	1165	91.709	31.031	-4.99	0.00	0.00	0.00	0.00	91.673	30.999	13.603498	-0.47	0.00
	1151	91.710	31.031	-4.92	0.00	0.00	0.00	0.00	91.673	30.999	13.619490	-0.51	0.00
	1166	91.710	31.030	-4.92	0.00	0.00	0.00	0.00	91.673	30.999	13.660586	-0.89	0.00
	1171	91.710	31.030	-4.94	0.00	0.00	0.00	0.00	91.673	30.999	13.682630	-0.43	0.00

The data section of the profile file is velocity along the profile. The columns are

- **site**: site name (each point in LOS map);
- **p\_long**: longitude of the point by projecting the site (LOS point) to the profile;
- **p\_lati**: latitude of the above point;
- **p\_dist**: distance from the LOS point to the profile;
- **v\_along**: velocity along the profile (not valid for InSAR LOS velocity);
- **ve\_along**: uncertainty for the above;
- **v\_tang**: velocity perpendicular to the profile (strike-slip component);
- **ve\_tang**: uncertainty for the above;
- **long**: longitude of the LOS point;
- **lati**: latitude of the LOS point;
- **dist\_to\_fault**: distance from the LOS point to the fault trace (vary between negative and positive from the left to the right)
- **v\_los**: LOS velocity
- **ve\_los**: LOS velocity uncertainty