Radar time series analysis over West Anatolia.

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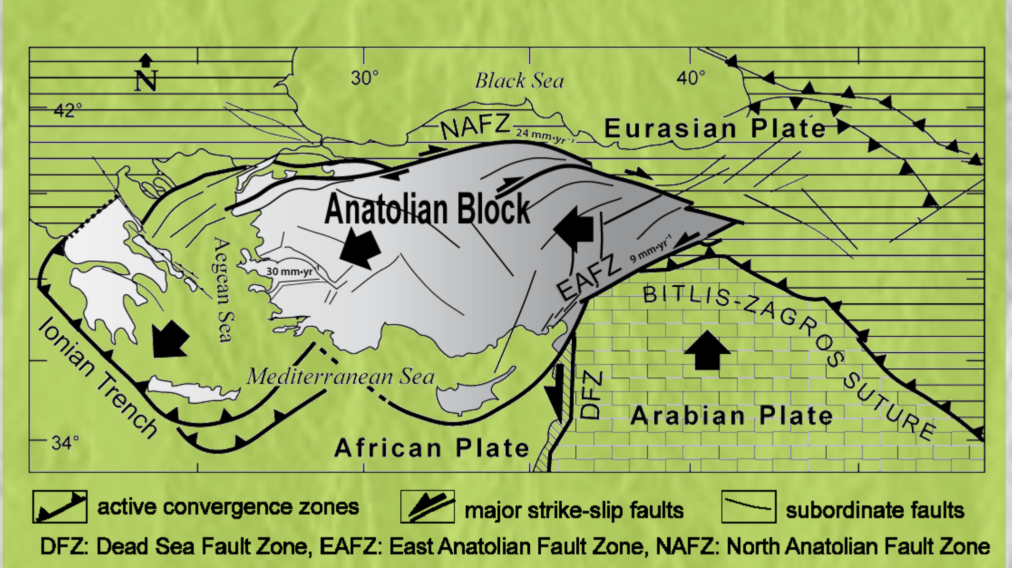
Interseismic tectonic motion manifests itself as a long (10's to 100's km) wavelength signal. The magnitude and the extent of the signal is crucial to understand kinematics of the crustal motion. For two decades, GPS measurements have been the main source of information for observing such a signal. In this study we use PS-InSAR observations to monitor tectonic signal over West Anatolia. The region is characterized by horst-graben morphology which is controlled by oblique-slip normal faults. The faults cause an extension with an amount of circa 25-30 mm/yr in NE-SW direction as observed by sparse GPS network measurements. In our analysis, we have used 42 ERS images acquired between 1992 and 2001 years. We have identified coherent interferograms which would reduce noise level in the rural areas leading to increased point density. Finally we compare our PS-InSAR results with two other GPS studies within the region.

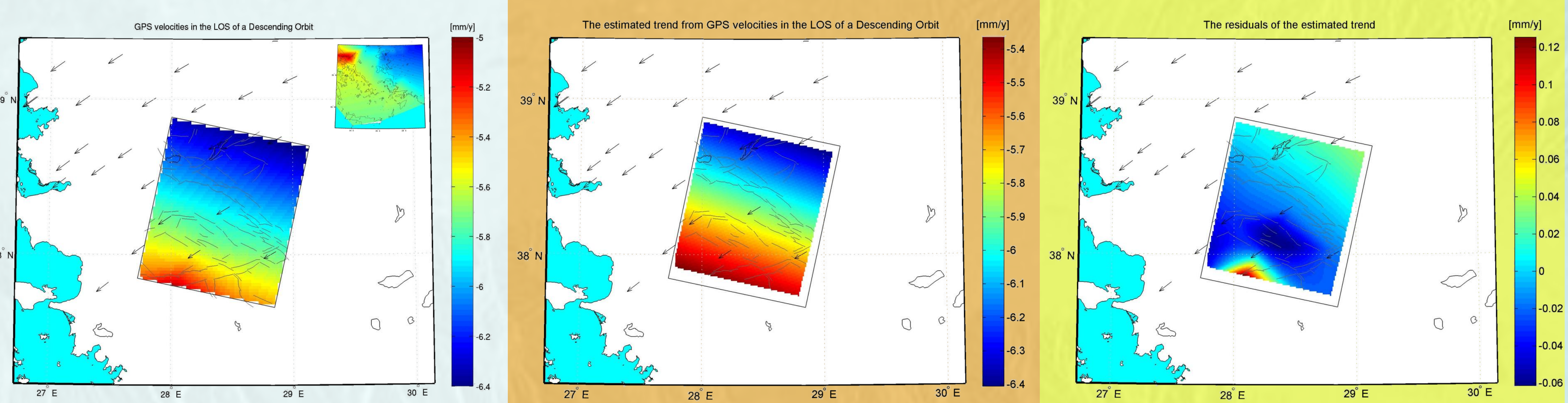


DFZ: Dead Sea Fault Zone, EAFZ: East Anatolian Fault Zone, NAFZ: North Anatolian Fault Zone
(modified from Kaymakçı 2000; Sengör et al. 1985; Barka, 1992; Bozkurt, 2001)

Neotectonic outline of Turkey and surroundings regions

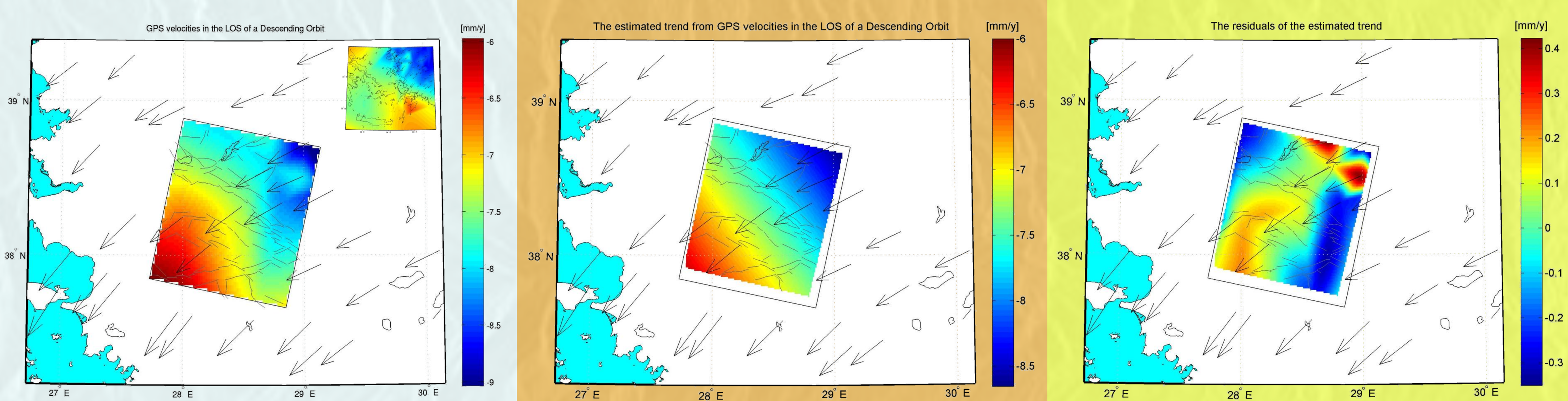
LOS Deformation	Estimated Trend	Residuals

GPS-1



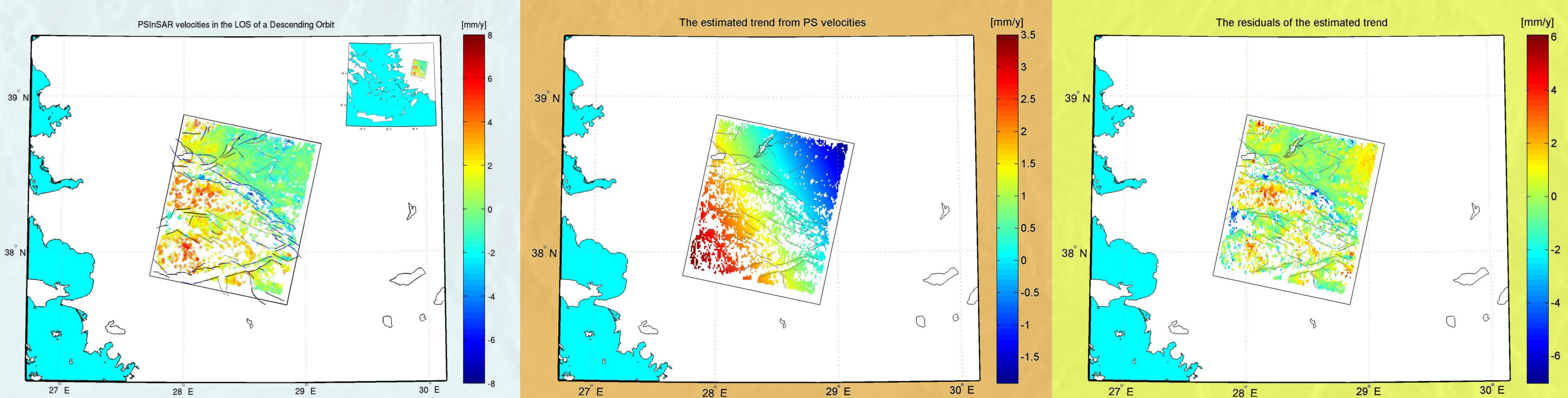
GPS-1: The arrows show the velocity field of GPS measurements with respect to the stable Eurasia, from *Nyst and Thatcher*, 2004. The black frame depicts the ERS coverage over the grabens. The grey lines represents the normal faults bounding horst-graben structures. The color images show the line of sight (LOS) velocity field produced from the GPS measurements for the Descending orbit.

GPS-2

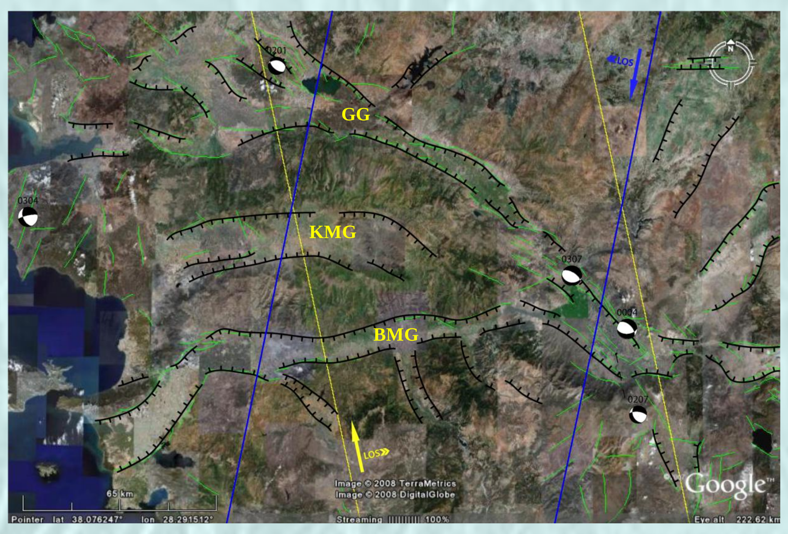


GPS-2: The arrows show the velocity field of GPS measurements with respect to the stable Eurasia, from Aktug et. al, 2009. The black frame depicts the ERS coverage over the grabens. The grey lines represents the normal faults bounding horst-graben structures. The color images show the line of sight (LOS) velocity field produced from the GPS measurements for the Descending orbit.

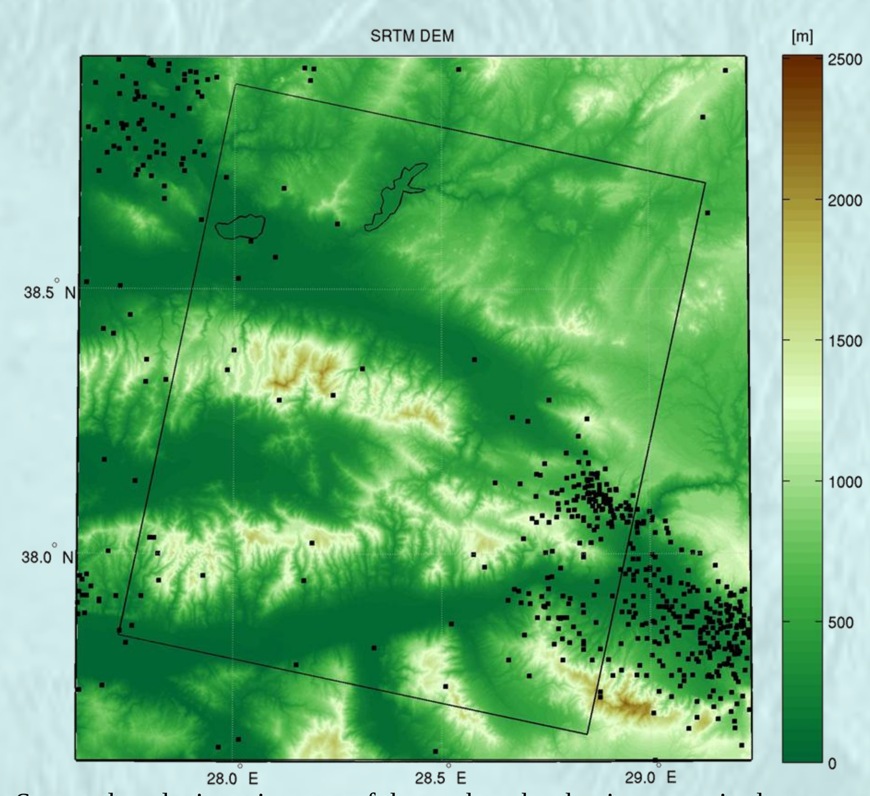
PS-InSAR



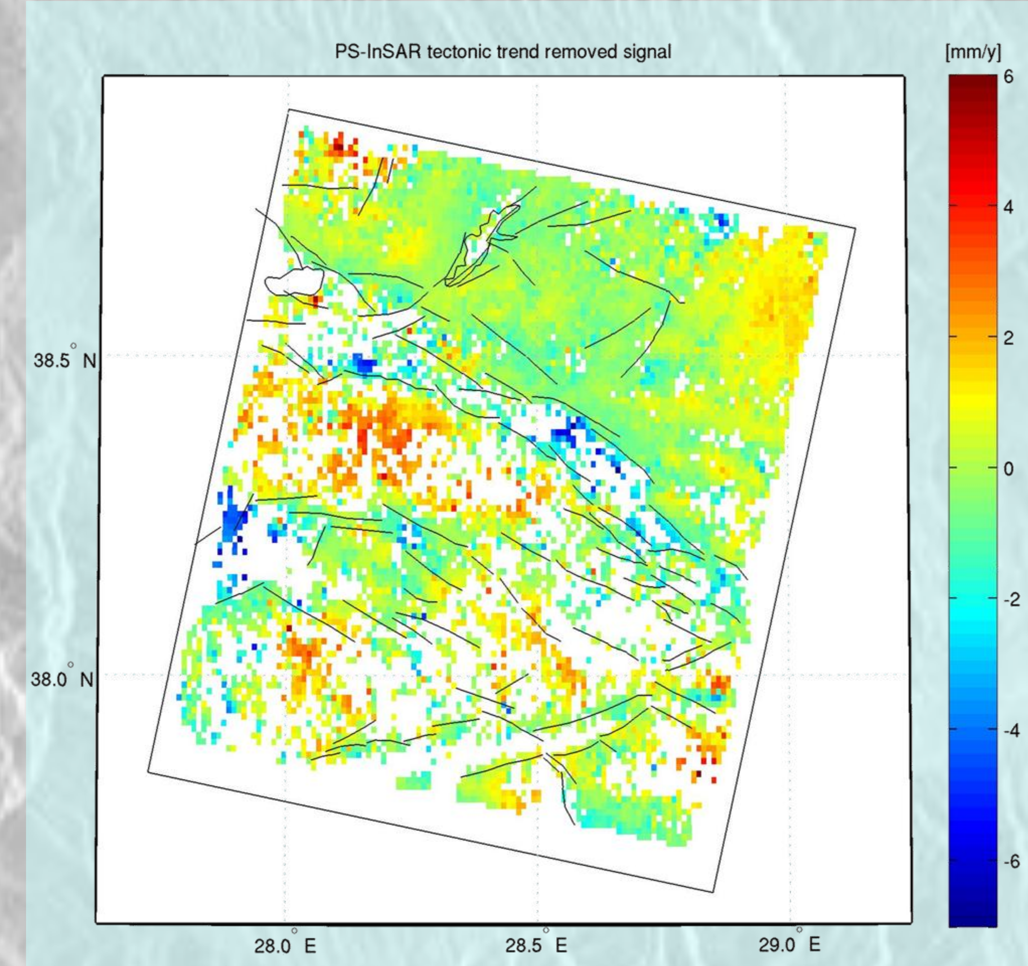
PS-InSAR: The color images show the line of sight (LOS) velocity field estimated using PS-InSAR. The black frame depicts the ERS coverage over the grabens. The grey lines represents the normal faults bounding horst-graben structures.



ERS satellite ascending and descending passes over the major horst-graben structures in western Anatolia. The focal mechanism solution of major earthquake within this decade.



Square dots depict epicenters of the earthquakes having magnitude Mw > 3 within the region for the period 1990-2009 (B.U. KOERI, 2009).



A close-up look: The velocities mostly depicts the vertical component of the deformation. Lines depict the fault locations.

- **Conclusions**:
  - PS-Insar observation has better spatial resolution than GPS measurements.That allows us to identify deformation along the grabens bounded by active faults.
  - In the region, interseismic tectonic signal can be represented as a trend which mostly composed of horizontal component. Both GPS-2 (Aktug et al, 2009) and our PS-InSAR results are in agreement with the trend of the signal.

References:

1. Aktug, B., J. M. Nocquet, A. Cingöz, B. Parsons,Y. Erkan,P. England,O. Lenk,M. A. Gürdal,A. Kilicoglu,H. Akdeniz, A. Tekgül, 2009. Deformation of western Turkey from a bombination of permanent and campaign GPS data: Limits to block-like behavior, JGR 114 (B10404).

2. Hooper, A., 2006. Persistent Scatterer Radar Interferometry for Crustal Deformation Studies and Modeling of Volcanic Deformation, PhD Thesis, Stanford University.

3. Nyst, M. and W. Thatcher, 2004. New constraints on the active tectonic deformation of the Aegean. JGR (Solid Earth) 109 (B18), 11406–+.

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