Current status and future plans for the Community Geodetic Model (InSAR) products

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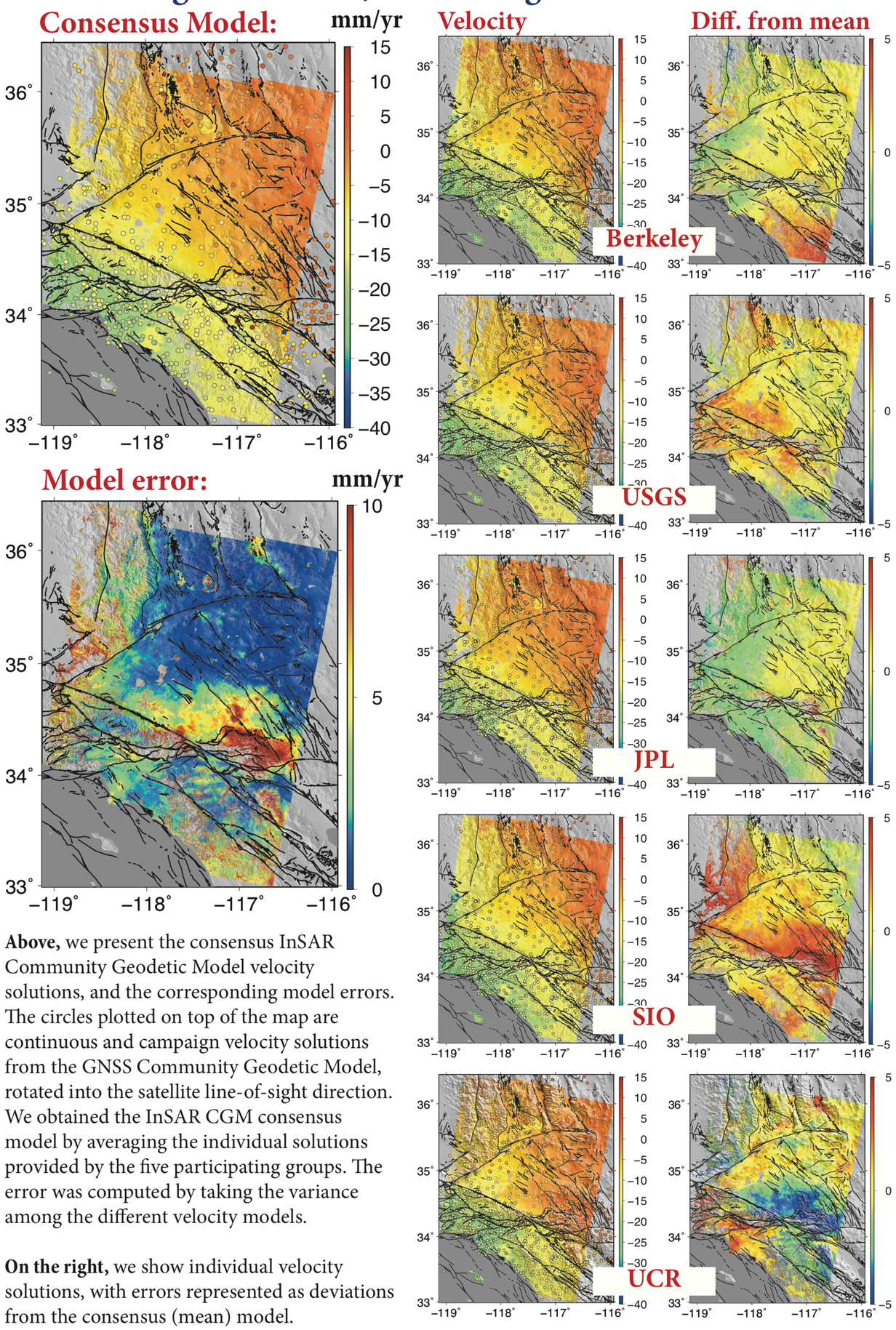
Why CGM?

The motivation of the SCEC Community Geodetic Model (CGM) is to provide a set of self-consistent and well documented products (time series and velocities) over southern California. Collation, correction and averaging of InSAR solutions processed by the SCEC CGM (InSAR) Working Group help to reduce systematic biases, missing data or other inaccuracies due to any single strategy.

Ongoing research and future plans:

Next steps: expanding the study area with additional Sentinel-1 data; making the data available to the public via the SCEC web interface. **Ongoing reseach highlights:** establishing best practices for InSAR time series estimation; finding the best strategy for integration with GNSS Community Geodetic Model velocities and time series.

Line-Of-Sight velocities, descending Sentinel-1 track 71:



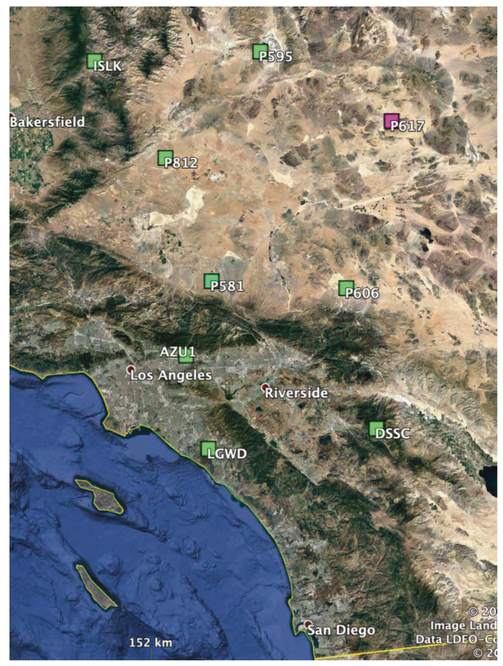
Above, we present the consensus InSAR Community Geodetic Model velocity solutions, and the corresponding model errors. The circles plotted on top of the map are continuous and campaign velocity solutions from the GNSS Community Geodetic Model, rotated into the satellite line-of-sight direction. We obtained the InSAR CGM consensus model by averaging the individual solutions provided by the five participating groups. The error was computed by taking the variance among the different velocity models.

On the right, we show individual velocity solutions, with errors represented as deviations from the consensus (mean) model.

Methods and models:

	BKLY	USGS	JPL1	SIOX	UCRV
Coregistered stack	●	●	●	●	●
GMTSAR	●	●		●	●
ISCE			●		
ESD correction			●		
DEM error correction			●	●	
Topo-correlated atm. removed			●	●	
Weather model removed (ERA5)	●				
CANDIS correction	●			●	
Coherence-based SBAS				●	
GPS correction				●	
Spatiotemporal smoothing		●	●	●	
Phase closure masking			●	●	●

- **Topo-correlated atmosphere removal**
  pros: can remove time-correlated atmosphere
  cons: can sometimes remove deformation signals
- **Weather model corrections**
  pros: corrects for seasonal tropospheric contribution using auxiliary data
  cons: models may lack coverage or resolution
- **CANDIS correction**
  pros: reduces turbulent tropospheric contribution
  cons: may smooth some time-dependent signals.



- **GPS correction**
  pros: helps correct InSAR errors at long spatial wavelengths
  cons: solution is poorly constrained in areas of poor GNSS coverage and at image edges
- **Spatiotemporal filtering**
  pros: removes turbulent atmospheric noise
  cons: requires prior knowledge of noise characteristics

InSAR time series, comparison with GNSS: