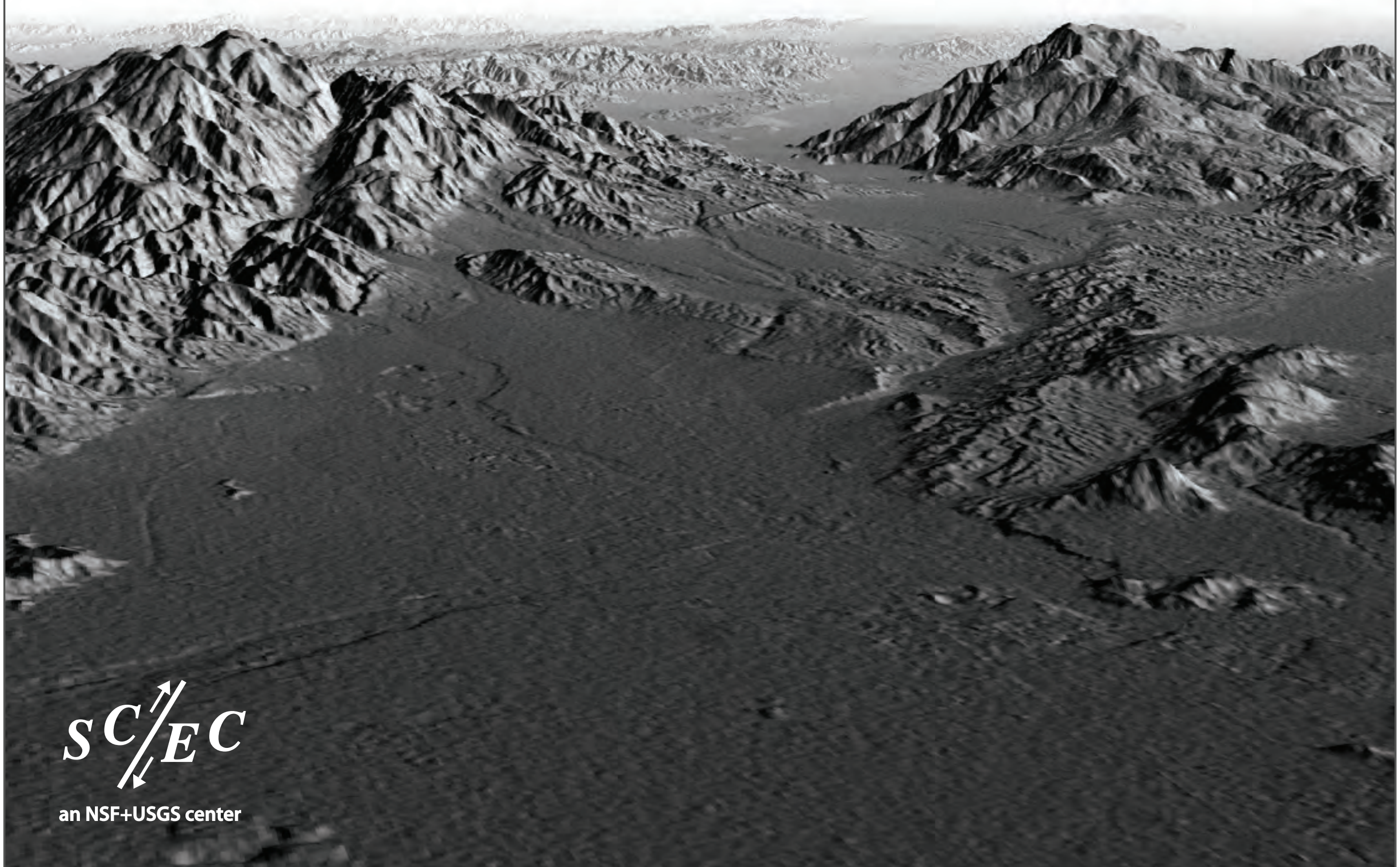
2009 Southern California Earthquake Center Annual Meeting



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degree of precision. Slip rates and flexural parameters for each fault were determined by finding the best fit to the velocity profile of a simple arctan function for the velocity distribution. Our estimated slip rates are then compared with current geologic estimates. Fit is generally good, although our estimates are significantly lower than geologic estimates for some sections of the SAF, and the cumulative slip rate across the Mojave Desert is about twice current geologic estimates. We suggest that the present-day velocity field is reasonably representative of the long-term field, and that it provides an image of the long-term response of the continental lithosphere to relative plate motion. This leads to the following conclusions.

1. The lithospheric transform is a zone of high strain-rate up to 80 km wide that is not everywhere centred on the surface trace of the San Andreas Fault. It is straighter than the SAF, and has an overall trend closer to the plate motion vector than the SAF.

2. Most sections of the SAF take up less than 50% of the total slip rate, and slip is transferred from one part of the system to another in a way that suggests the SAF should not be considered as a unique locator of the plate boundary.

3. 35-50% of the total plate boundary displacement takes place outside the high strain-rate zone, and is distributed over a region several hundred km on either side, including the Eastern California Shear Zone.

2-060
CONTEMPORARY BLOCK TECTONICS AND KINEMATICS OF SOUTHERN CALIFORNIA DERIVED FROM GPS-DATA *Gaydalenok O (Moscow State), and Simonov D (Moscow State)*

Southern California attracts great interest from scientists all over the world due to its complicated tectonics. Because it has one of the best GPS networks it allowed us to apply our original methods for the analysis of the velocity data. We classified GPS-vectors according to the similarity of their Euler poles, and calculated the relative motions of the resulting clusters. Thus we obtained statistical clusters (Model of GPS-derived Clusters) that could be interpreted as belonging to different rigid blocks where confirmed with geologic data. We matched our Model of Clusters with Quaternary faults and found that not all boundaries coincide with faults. For this reason we mapped lineaments using Shuttle Radar Topography Mission data. Thus we made a general Block Tectonic Model that shows (a) boundaries based on Quaternary faults, (b) boundaries based on lineaments, and (c) inferred boundaries without topographic expression. We suggest that some boundaries do not express in topography because the displacements are so recent and topography has not developed yet, or it they may be caused by creep or by localized stress accumulation.

The main conclusions from our Block Tectonic Model are as follows:

1. The model suggest that there is the kinematically stable zone along the San Andreas fault between its interaction with the Garlock and San Jacinto faults. The fault is locked and a strong earthquake can be expected in this area, but the model shows that stress on this segment is significantly decreased due to nearby block interactions, where reverse motions are expressed widely.

2. Block boundaries which display transpressional kinematics mostly coincide with Quaternary faults (Santa Susana reverse fault), while boundaries with strike-slip character do not coincide with faults (Elsinore, San Gabriel faults).

3. Block kinematics suggested by the model correlate well with seismicity, which that could provide a test of the validity of our Model and our methods.

Additionally, we compared our Block Tectonic Model with previous block models. The main difference between the models is in approaches. Other authors first derive the block boundaries based on previously identified faults, and then they calculate GPS velocities of the blocks. We do the opposite – first we divide the area into blocks using statistical methods and then we try to confirm the resulting block boundaries geologically.

2-061

DECORRELATION OF ALOS AND ERS INTERFEROMETRY OVER VEGETATED AREAS IN CALIFORNIA *Wei M (SIO / IGPP), and Sandwell DT (UCSD)*

Temporal decorrelation over vegetated areas is the main limitation for recovering interseismic deformation along the San Andreas Fault system. To assess the improved correlation properties of L-band with respect to C-band, we analyzed ALOS PALSAR interferograms over three vegetated areas in California and compared them with corresponding C-band interferograms from Remote Sensing Satellite (ERS) of European Space Agency. Both ALOS and ERS interferograms have various temporal baselines with a maximum of two-year and various spatial baselines. (1) In the highly vegetated Northern California forests in the Coast Range area, ALOS remained remarkably well correlated over a two-year winter-to-winter interferogram (~0.27), while an ERS interferogram with a similar temporal and spatial baseline lost coherence (<0.13). (2) In central California near Parkfield, we found similar pattern. Four ALOS interferograms with a two-year temporal baseline all had adequate correlation (0.16-0.25) over vegetated mountain areas, while the ERS interferogram had much lower inadequate correlation (0.13-0.16). This improvement in correlation at L-band revealed creep along the San Andreas Fault that was not apparent at C-band. (3) In the Imperial Valley of Southern California, ALOS had higher correlation in the urban area (0.4 versus 0.3) and lightly irrigated area (0.18 versus 0.16). However, it had lower correlation over some sandy surfaces (0.2 versus 0.4). Interferograms with similar season acquisitions has higher correlation compared to that with dissimilar season even the time interval of the similar season is much longer. For both ALOS and ERS have lower correlation over vegetated areas and the correlation decreases with time when the time interval is less than 1 year on all types of areas. After that, the correlation stays the same level or even higher. In the vegetated areas, ALOS has higher correlation while they both decorrelated on farmlands in the Imperial Valley. We also found in some cases that the correlation of FBS-FBS interferograms was slightly better than that of mix-mode interferograms, i.e. FBD-FBS. These results suggested that ALOS remains correlated much longer than ERS in vegetated areas in California. New L-band observation including ALOS and future US mission DESDynl will be especially valuable for study the long-term slow motion, such as interseismic slip and fault creep, over vegetated areas in California.

2-062

TESTING DEM-BASED ATMOSPHERIC CORRECTIONS TO SAR INTERFEROGRAMS OVER THE LOS ANGELES BASIN *Jin L (UCR), and Funning GJ (UCR)*

Atmospheric water vapor delay is the major source of noise in SAR interferograms. Without the atmospheric delay being corrected, it is hard to see any slow surface movements of the ground; and it is impossible to validate PS-InSAR method either. If the water vapor delay is quantified, not only can we solve the previous two problems, but also reduce the errors in geodetic measurements, and improve the accuracy in generating Digital Elevation Models (DEMs).