

2011 SCEC Proposal Final Report

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Workshop proposal 11180

“Wrap-Up Workshop for Incorporating Geodetic Surface Deformation Data into the Uniform California Earthquake Rupture Forecast, Version 3 (UCERF3)”

A workshop was held on 4 June 2011 in Oxnard, California to present provisional plans for submission of geodetic estimates of slip rates on major California faults and strain rates in the surrounding blocks to UCERF3 and solicit comments and guidance from the space geodetic community. The forty-two attendees included geologists, geodesists and deformation modelers, of whom several had also attended the SCEC Planning Committee meeting at Oxnard. Co-convenors included Wayne Thatcher (USGS), Kaj Johnson (Indiana), Liz Hearn (UBC), David Sandwell (Scripps), Ned Field (USGS) and Yuehua Zeng (USGS). At the workshop, presentations and discussions were held on three focus areas:

- Strain Rate Map Methodologies and Issues
- Earthquake Cycle Deformation and Influence of Postseismic Transients
- Block Models and GPS Fault Slip Rate Estimation

Most of our meeting time was spent on the third bulleted item, with added material on geological estimates of California fault slip rates. Since our April 2010 workshop, UCERF3 geologists Tim Dawson and Ray Weldon have collaborated with geodesists and modelers to develop a block model for California that is geologically viable yet sufficiently simple to be well-constrained by geodetic observations. Several iterations between the GPS community and geologists have resulted in a reference block model geometry (Figure 1), which was distributed with standard GPS velocity field data to deformation modelers. A subset of modelers participating in this effort met on March 8 in Boulder, CO to compare and discuss preliminary slip rate estimates, to get a clearer understanding of specific products required for the UCERF3 effort, and provide UCERF3 personnel with a status report (see agenda below).

Final modeling results were presented at the June 4 wrap-up workshop (see agenda below). Participants discussed how block model results compare with slip rates from the preliminary UCERF3 geologic slip rate model and complementary southern CA deformation models by Yuehua Zeng and Peter Bird (UCLA). Sensitivity of inferred fault slip rates to different modeling approaches was discussed, as well as effects (for block models) of allowing block strain, shallow fault creep or variations in locking depth. For example, Figures 2a and 2b (which are from K. Johnson's presentation) show how allowing fault-bounded blocks to deform affects inferred slip rates. Slip rates from block models were subsequently incorporated into a single, consensus block model and, together with the complementary non-block models of Yuehua Zeng and Peter Bird, were submitted for inclusion in the UCERF3 report (<http://www.wgcep.org/UCERF3>).

GPS/UCERF3 Wrap-up Workshop Agenda: Saturday 04 June 2011
Embassy Suites, Oxnard CA

8:30 am	Overview & Goals	Wayne Thatcher
8:45 am	Overall UCERF3 Perspective	Ned Field

Update from Disciplinary Groups

9:00 am	Earthquake Cycle Effects	Liz Hearn
9:30 am	Discussion	All
9:45 am	Strain Rate Mapping	David Sandwell
10:15 am	Discussion	All
10:30 am	COFFEE BREAK	
11:00 am	UCERF3 Active Faults, Blocks & Slip Rates	Tim Dawson
11:30 am	Discussion	All
Noon	LUNCH BREAK	

Detailed Presentation of New Block Modeling Results

1:00 pm	Block Modeling & Slip Rate Estimation	Kaj Johnson
2:00 pm	Discussion	All
2:30 pm	Reconciliation of GPS and Geologic Slip Rates	Tim & Kaj
3:00 pm	Discussion	All
3:30 pm	COFFEE BREAK	
4:00 pm	Plan for GPS/UCERF3 Final Report	Wayne Thatcher
4:15 pm	Discussion	All
5:00 pm	ADJOURN	

Meeting Agenda: Tuesday 08 March

(GPS/UCERF3 Conveners + Rob + Ned and Tim, Morgan & Tom)

9:00 am	Introduction	Wayne
9:15 am	UCERF3 Perspective	Ned
9:30 am	Overview of Earthquake Cycle Effects	Liz
9:45 am	Overview of Strain Rate Mapping Activity	David
10:00 am	Block Modeling & Slip Rate Estimation	Kaj
10:30 am	Active Faults & "Geological Block Models"	Tim
11:00 am	Use of Fault Geometry & Slip Rates	Morgan
11:30 am	Recurrence Modeling	Tom
Noon	LUNCH BREAK	
1:00 pm	Discussion of Interrelations/Coordination Between Deformation Modeling Results and Work of Other UCERF3 Groups	All
~3:00 pm	ADJOURN	

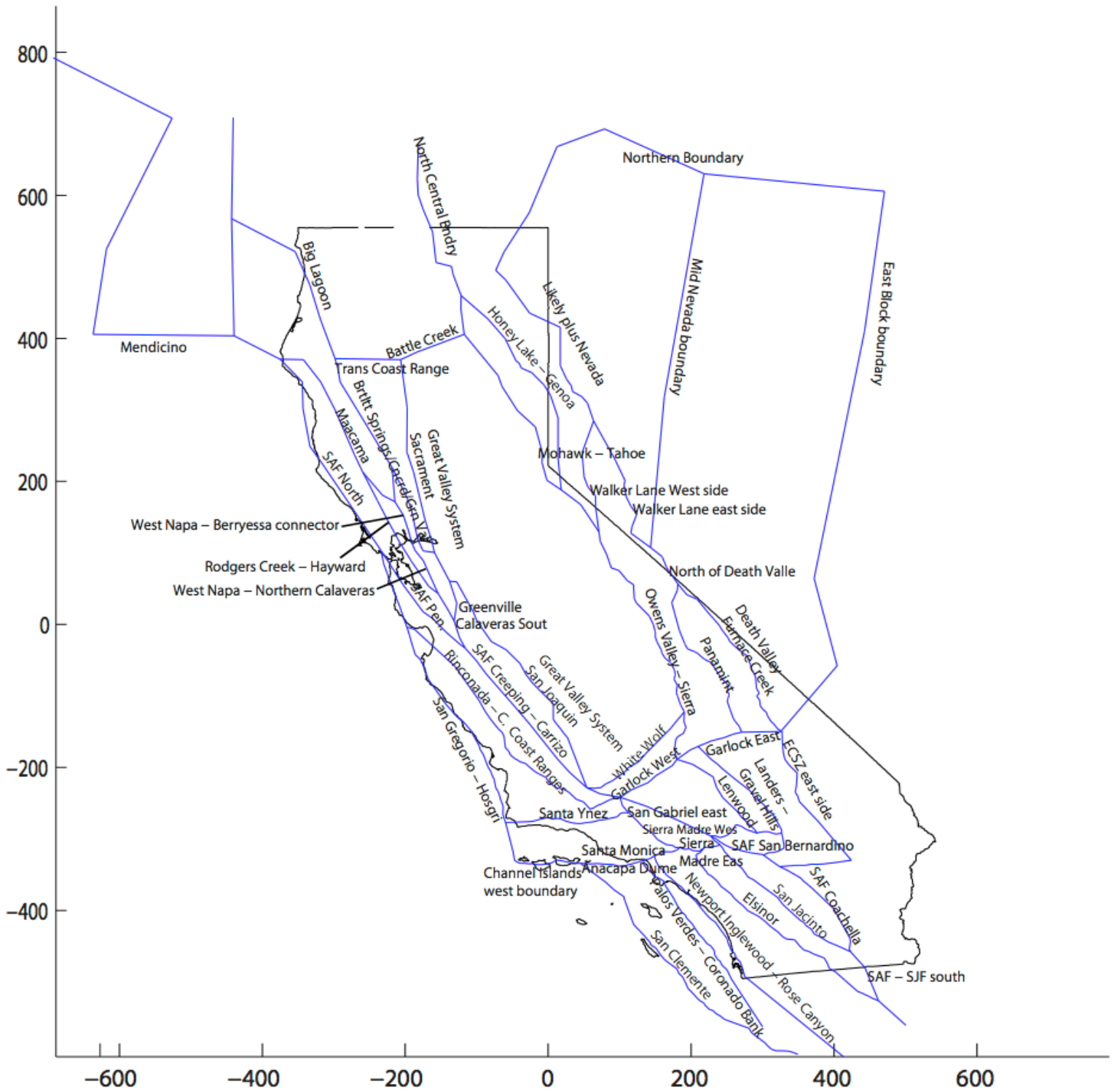


Figure 1. Reference block model derived from geologic model and used by deformation modelers to infer slip rates.

range strike-slip rates
models with no internal block strain
color denotes median

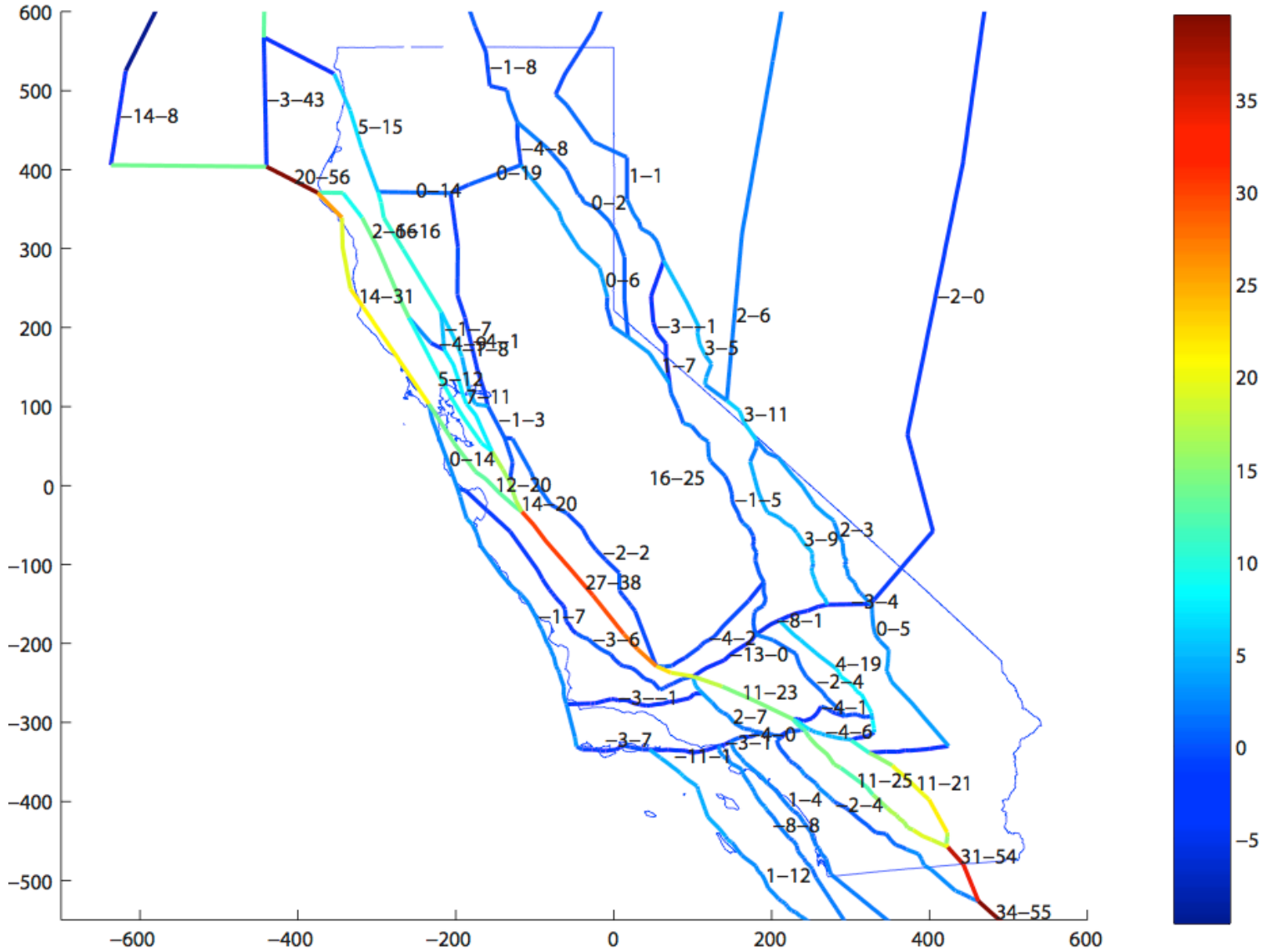


Figure 2a. Strike-slip fault slip rates, showing the range of values from traditional block models, in which block strain is not allowed.

range strike-slip rates
 models with internal block strain
 color denotes median

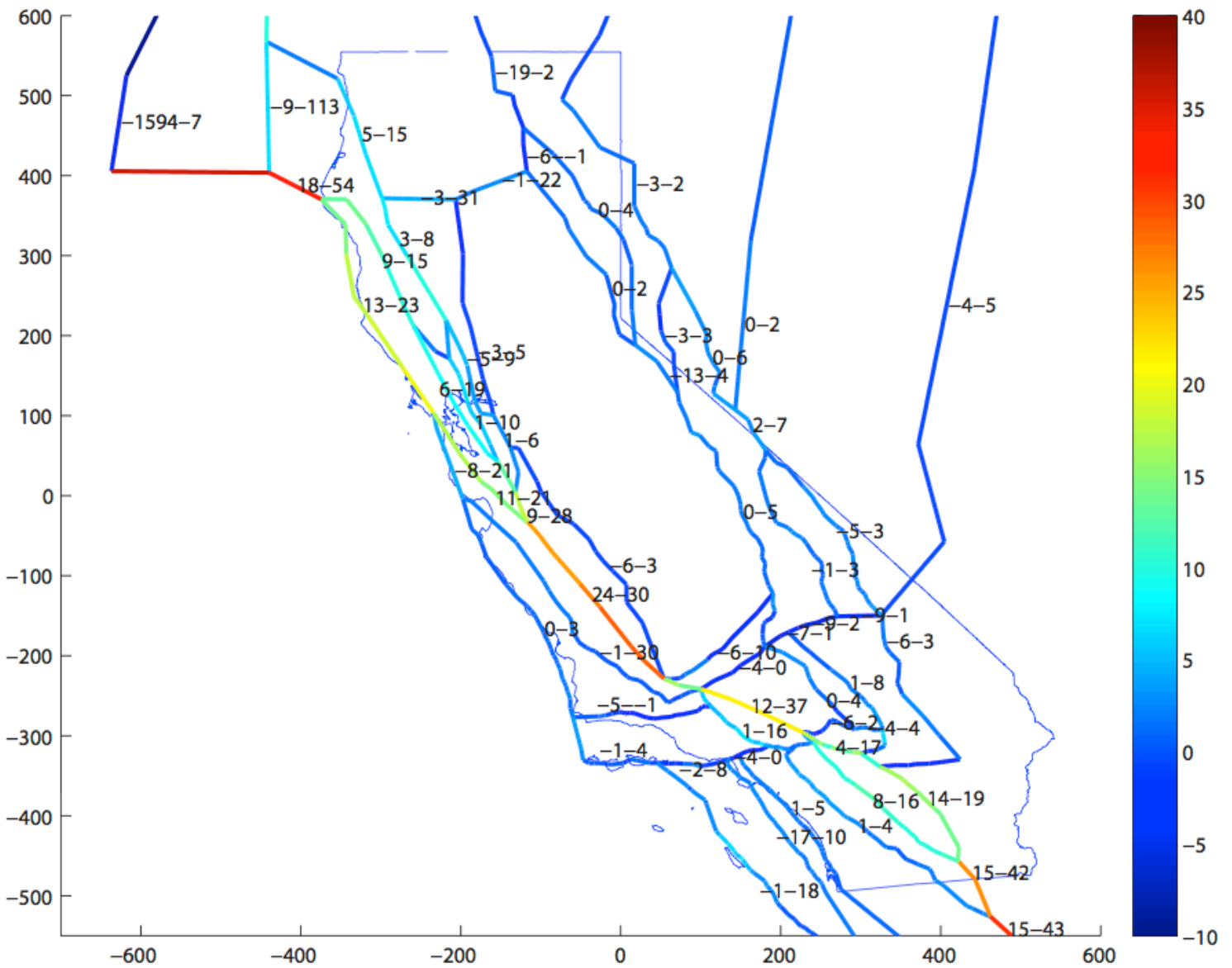


Figure 2b. Strike-slip fault slip rates, showing the range of values from models in which block strain is permitted. GPS velocities are fit with lower slip rates, and block strain may indicate potential for slip on minor faults.