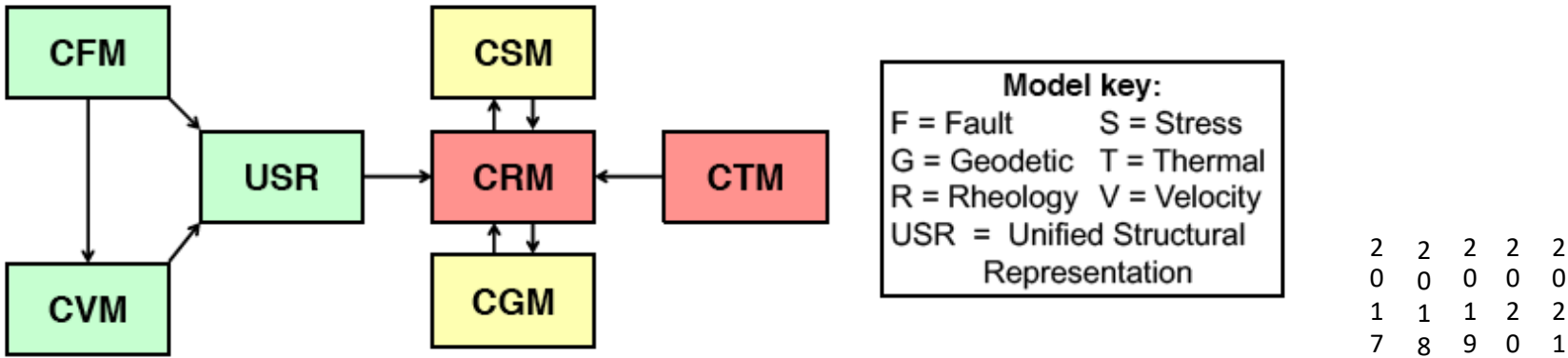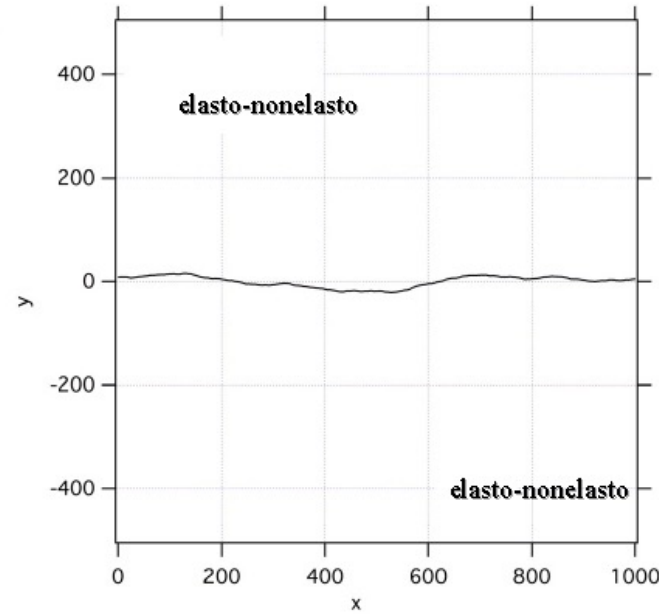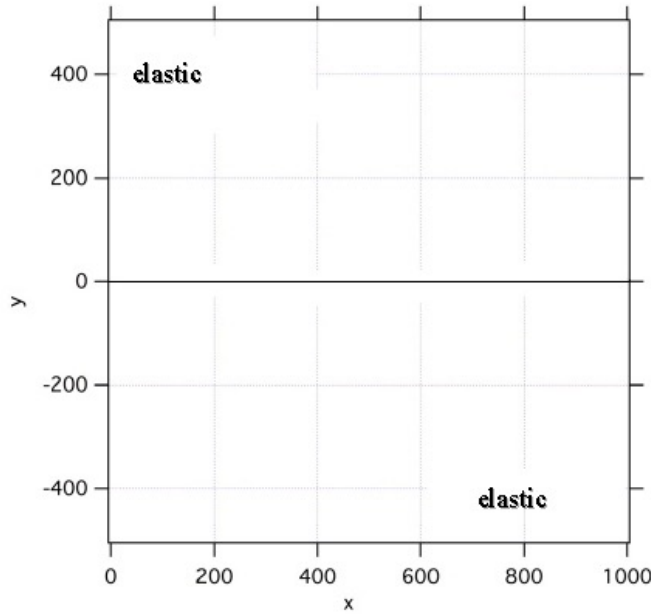**Figure 3.5.** Schema of the SCEC Community Models, showing the main directions of information flow among the models. The colors indicate the development status: mature (green), youthful (yellow), in utero (red).

Model key:
F = Fault   S = Stress
G = Geodetic   T = Thermal
R = Rheology   V = Velocity
USR = Unified Structural
          Representation

2017 2018 2019 2020 2021

synoptic of the crm circa SCEC 5 year 1 (2017)
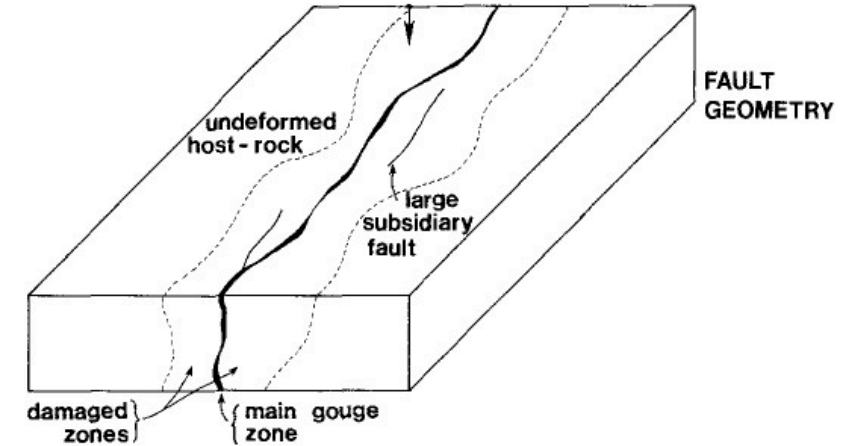
	Milestone	Y1	Y2	Y3	Y4	Y5
b	Organize TAGs for community models, as appropriate, including a TAG to develop a geologic framework for the Community Rheology Model (CRM).	x				
n	Construct a provisional 3D geologic framework of southern California, as a first step towards developing a CRM. Convene a workshop on how to characterize the brittle, ductile, plastic, and viscoelastic rheologies of the southern California lithosphere, including shear zones.		x			
p	Unify representation of SCEC community models, including refined CFM and CVM structures and prototypes of the CTM and CRM, and enhance their interoperability. Release a CRM that incorporates the rheologies of shear zones.					x
i	Identify key material parameters that will be necessary to characterize inelastic behavior of geomaterials in the upper crust and near-surface deposits, and define strategies to add these data to community models (e.g., CVM, CRM) for use in forward and inverse modeling.		x	x	x	
f	Populate the CRM with rheology models (velocity, anelastic attenuation, nonlinear properties) of the rock and soil layers of the crust to capture nonlinear phenomena such as off-fault plasticity, permanent ground deformation and earthquake triggered ground failure phenomena in physics-based simulation.			x		
o	Implement mixing laws for polymineralic rocks of the CRM. Release CRM version 1.0 that includes 3D geologic framework and constitutive models consistent with the CTM.				x	

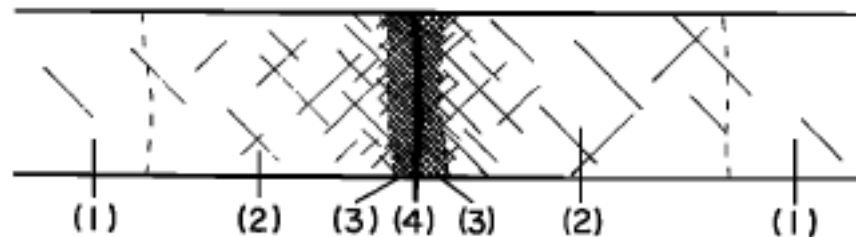**a brittle rheology model? shear zone thickness/degree of localization**

elastic

elastic

elasto-nonelasto

elasto-nonelasto

F. M. Chester and J. M. Logan   1986

FAULT GEOMETRY

undeformed host-rock

large subsidiary fault

damaged zones

main gouge zone

Internal Structure of Principal Faults of the North Branch San Gabriel Fault

(1)   (2)   (3) (4) (3)   (2)   (1)

1) Undeformed Host Rock

Fault Zone { 2) Damaged Host Rock
           3) Foliated Zone
           4) Central ultracataclasite layer } Fault Core

Chester et al (1993)
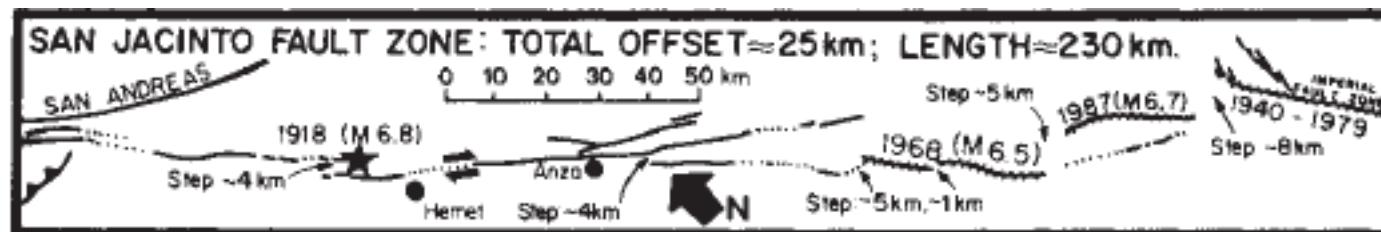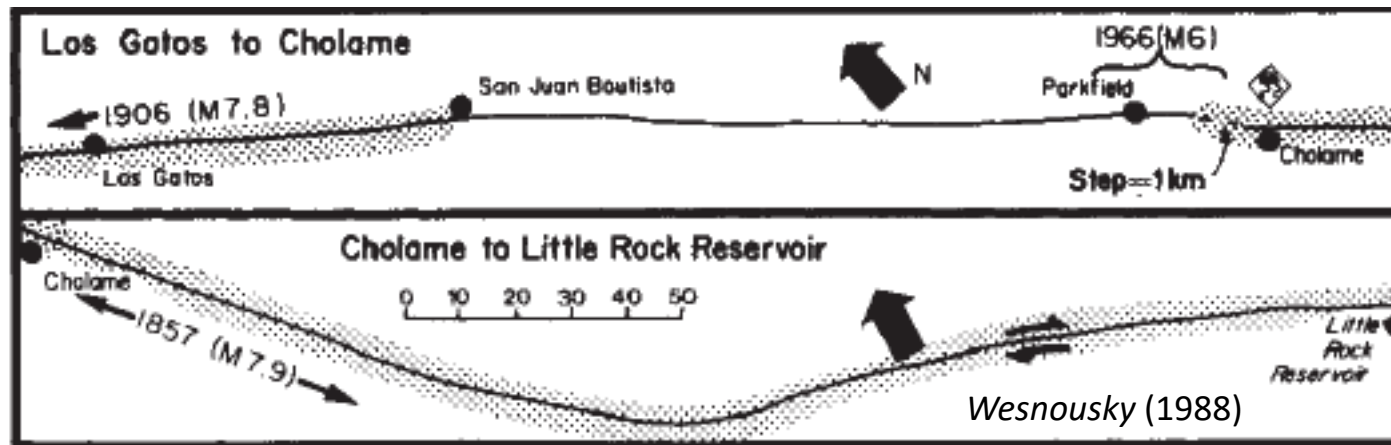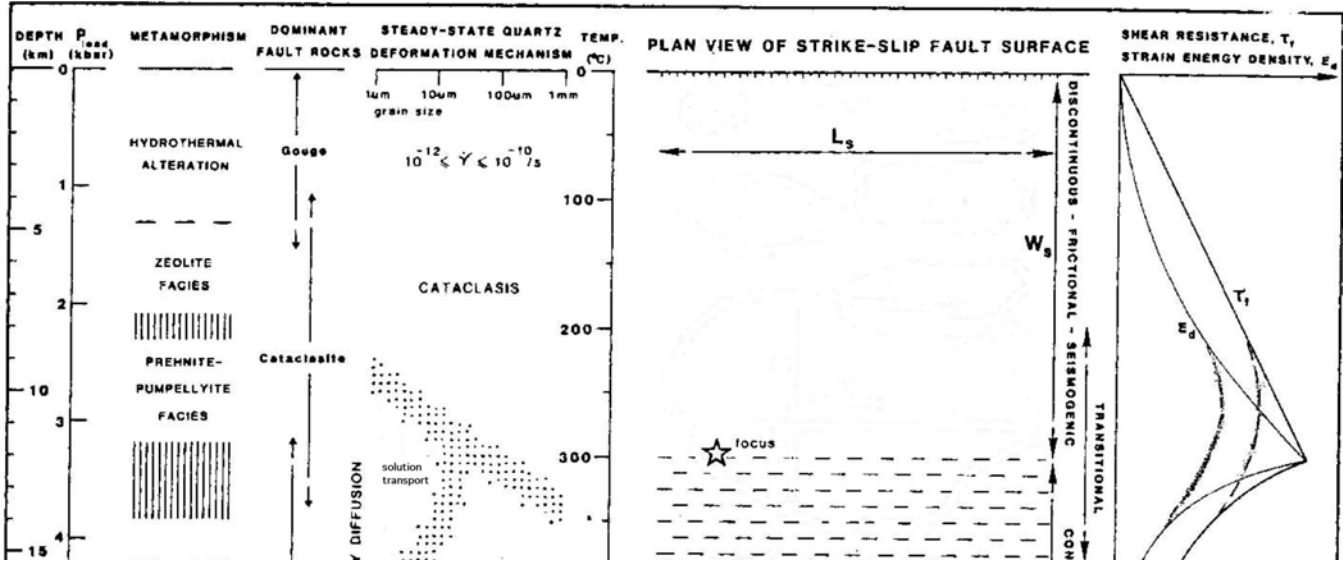
WR

1000:1

10:1

$\log D$ (m)

$\log T$ (m)
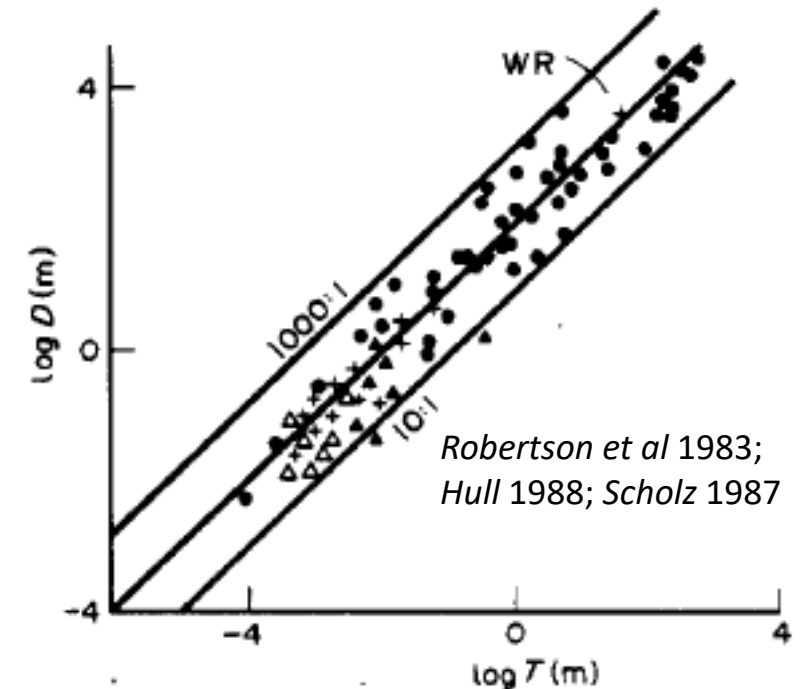
Robertson et al 1983; *Hull* 1988; *Scholz* 1987
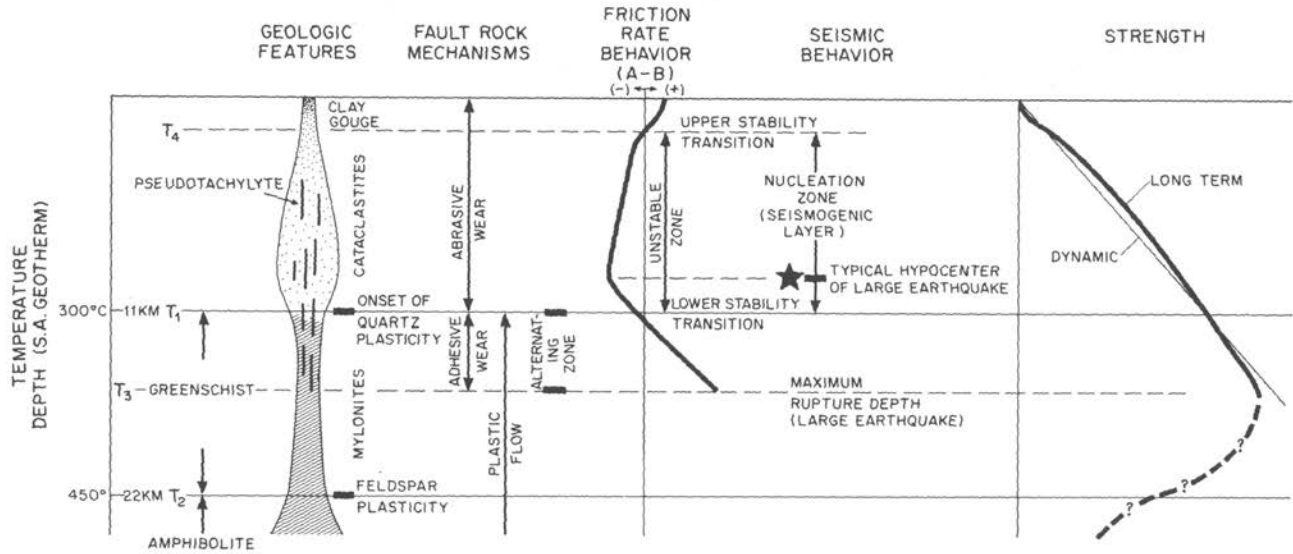
a brittle rheology model?   along strike....

San Andreas: Offset 250 km; Length 1000 km
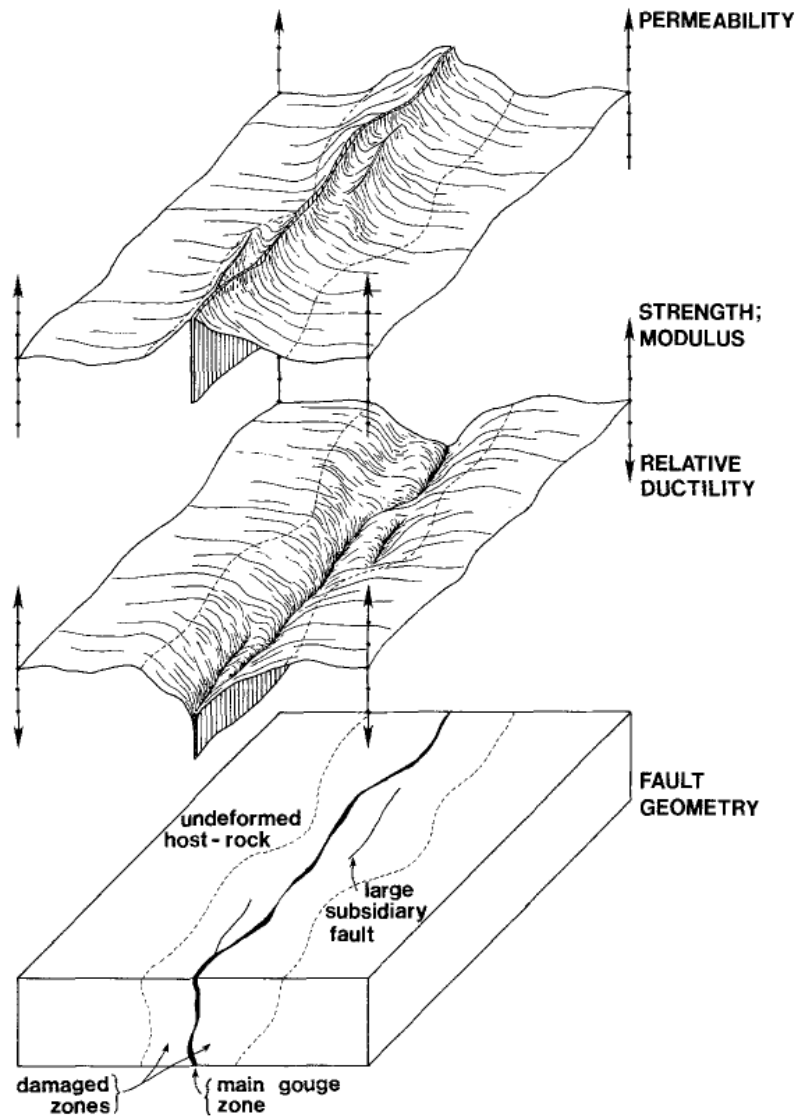

Wesnousky (1988)

Sibson (1983)

Scholz (1988)

a brittle rheology model?   *pore pressure, permeability…*

what's the effective stress ?

F. M. Chester and J. M. Logan   1986

Rice 1992

PERMEABILITY

STRENGTH; MODULUS

RELATIVE DUCTILITY

FAULT GEOMETRY

undeformed host - rock

large subsidiary fault

damaged zones

main gouge zone

σ (normal stress on fault)

p, for $\bar{\sigma} = 100$ b at depth

p, for $\bar{\sigma} = 200$ b

hydrostatic

(for $\sigma* = 50$ b)

depth (in km)

pore pressure (in b [= bars])

$\lambda_v = \dfrac{p}{\sigma_v} \approx 0.4$

$\lambda_v = g(z) \rightarrow 1$