Data gained using various geologic tools from large, composite batholiths, such as the 95–85 Ma old Tuolumne Batholith (TB), Sierra Nevada, CA, indicate complex batholithic processes at the chamber construction site, in part since they record different increments of batholith construction through time. Large structural and compositional complexity generally occurs throughout the main batholith such as (1) geochemistry, (2) internal contacts between different units (Bateman, 1992; Zak & Paterson, 2005), (3) batholith/host rock contacts, (4) geochronology (Coleman et al., 2004; Matzel et al., 2005, 2006), and (5) internal structures such as schlieren layering and fabrics (Bateman, 1992; Zak et al., 2006) leading to controversies regarding batholith construction models. By using magmatic lobes – tongues of individual batholithic units that extend into the host rock away from the main batholith – we avoid some of the complexity that evolved over longer times within the main batholith. Magmatic lobes are "simpler" systems, because they are spatially separated from other units of the batholith and thus ideally represent processes in just one unit at the time of emplacement. Furthermore, they are shorter lived than the main batholith since they are surrounded by relatively cold host rock and "freeze in" (1) "snapshots" of batholith construction, and (2) relatively short-lived internal processes and resulting structures and composition in each individual unit. Thus, data from lobes of all batholith units representing different stages of a batholith's lifetime, help us to understand internal magmatic and external host rock processes during batholith construction. Based on field and analytic data from magmatic lobes of the Kuna Crest, Half Dome, and the Cathedral Peak granodiorites, we conclude that (1) the significance of internal processes in the lobes (fractionation versus mixing versus source heterogeneity) is unique for each individual TB unit; (2) emplacement mechanisms such as stoping, downward flow or ductile deformation of host rock act in a very short period of time (only a few 100,000 yrs); and (3) a variety of different magmatic fabrics, formed by strain caused by magma flow, marginal effects, or regional stress, can be found in each lobe. These data lead to the conclusion that the size of the...
studied lobes indicate the minimum pulse size for TB construction and that fractionation crystallization, even though slightly varying in its magnitude, is an important internal process in each individual TB unit.

DE: 8145 Physics of magma and magma bodies
DE: 8178 Tectonics and magmatism
DE: 8434 Magma migration and fragmentation
DE: 8486 Field relationships (1090, 3690)
SC: Volcanology, Geochemistry, Petrology [V]
MN: 2006 Fall Meeting