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stituents may result in elimination of the latter three waste streams in the near future. EAF
t, by weight is far and away the largest waste stream. Unlike most steel manufacturers, OSM
s developed a unique process to transform this waste into useable, non-hazardous products for
e in other industries, including building materials and petroleum exploration.
lid Waste
weight, the majority of solid wastes generated consist of used oils and greases and clay-based
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rocessed on site for resale or re-use in the casting process.
cyclable Materials
cyclable materials consist primarily of cardboard, wood, office paper and mixed paper.
-Products
a co-product of the melting of steel scrap, OSM produces a high-quality slag-derived
regate. Dolomitic refractories, produced in steel melting and rolling, show tremendous
mise as soil amendments. Mill scale from scarfing and rolling is used on and off-site as a
rous metal source.

: 12738

OST-EMPLACEMENT SINKING OF PLUTONS

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tually all plutons rise to their observed emplacement level from a deeper source, and should nerate structures that reflect ascent. However, many plutons in the Great Basin are located in nclines that suggest downward movement of the plutons relative to wall rocks. In particular, any Jurassic plutons in eastern California, NW Utah and NE Nevada lie in metasedimentary cks whose strata swing down into steep dips along pluton margins, with younger strata against e pluton. We propose that these synclines form by post-emplacement sinking of the plutons.

Evidence in support of this hypothesis comes from consideration of the relative densities of agmas and wall rocks. Granodioritic magma has a density of 2.4–2.5 g/cm^3 when completely olten and 2.7–2.75 when solidified but still hot. Wall rocks are composed mainly of quartz and lcite, with densities around 2.6 and 2.68, respectively, at midcrustal temperatures. Negative agma buoyancy drives ascent, but as the pluton cools it becomes more viscous and denser, entually stalling. When completely solidified, the pluton is denser than its wall rocks. It is also gnificantly hotter than the temperatures at which quartz and calcite will undergo ductile flow at ologic strain rates (≈200–250°C). We propose that downward flexure of strata adjacent to plu- ns occurs as the plutons sink into thermally softened aureoles. Sinking stops when an aure- e cools below the temperature at which wall rocks will flow. Preliminary calculations indicate at a pluton 5 km in radius will have enough thermal energy to soften wall rocks and sink up to veral km, in accord with field observations.

This hypothesis makes several testable predictions. First, kinematic studies of aureoles ound dense plutons should show evidence for downward pluton movement. Second, only nser plutons (granodiorites, diorites, and gabbros) should show evidence for sinking; gran- s are not dense enough. Third, development of these structures should occur late in the placement history of the pluton. Fourth, granodioritic plutons should not sink if emplaced in ck dolomite sequences, because dolomite is both much denser (≈2.8) and stronger (ductile ≈450°C) than quartz or calcite. Fifth, plutons emplaced at deeper levels (and thus into hotter ll rocks) should show these features more commonly than shallow plutons. Observations m eastern California, NW Utah and NE Nevada generally bear out these predictions.

: 15914

PHIOLITIC BASEMENT TO THE GREAT VALLEY FOREARC BASIN, ALIFORNIA, FROM SEISMIC AND GRAVITY DATA: IMPLICATIONS FOR RUSTAL GROWTH AT THE NORTH AMERICAN CONTINENTAL MARGIN.

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e nature of the Great Valley basement, whether oceanic or continental, has long been ource of controversy. A velocity model (derived from a 200-km-long east-west flection/refraction profile collected south of the Mendocino Triple Junction, northern alifornia, in 1993) and a density model (derived from gravity data along the same ofile) reveal an ophiolite (Great Valley Ophiolite, or GVO) sequence underlying the eat Valley, which in turn is underlain by a westward extension of low-density rran affinity material (SAM). A well-constrained velocity model of the upper crust kes our density model of the lower crust more meaningful than a model derived m gravity alone. The GVO extends only as far west as the western margin of the eat Valley and does not extend west beneath the Coast Ranges. The crustal section GVO is 7 - 8 km thick with the GVO Moho at about 11 km depth. There is at least km thickness of lower-density SAM beneath a 6 - 7 km-thick GVO mantle section. mid-crustal depths, the boundary between the eastern extent of the GVO and the stern extent of SAM is a near-vertical velocity and density discontinuity about 80 - km east of the western margin of the Great Valley. This has important plications for crustal growth at the North American continental margin, since it plies an ophiolite sequence was obducted onto continental material, probably during Late-Jurassic Nevadan orogeny. Our model also includes a relatively high-velocity d high-density layer at 17 - 21 km depth beneath the Coast Ranges, which coincides th the position of anomalously high-amplitude near-vertical reflections (*Levander et* submitted), and which we interpret as either stalled slab or underplated material ulting from the northward passage of the Mendocino Triple Junction.

№ 38623

WIDTH OF THE SEISMOGENIC PLATE BOUNDARY IN CASCADIA: STRUCTURAL INDICATORS OF STRONG AND WEAK COUPLING

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The Cascadia subduction zone has generated great (M 8-9) earthquakes, based on coseismically buried coastal marshes, modern strain accumulation, and tsunami evidence. The Cascadia plate interface is unusually hot due to the young age of the sediment-insulated subducting plate. High temperatures in Cascadia shift the thermally controlled seismogenic zone offshore, seaward of its position in other subduction zones. A paradox presented by Cascadia is that thermal considerations and modeling of onshore uplift data force the seismogenic plate boundary seaward into the young accretionary wedge, yet other accretionary wedges around the world are aseismic.

A structural boundary occurs between the young (Pleistocene-Holocene) and older (Pliocene and older) accretionary complexes that may mark the updip limit of the seismogenic plate interface. We attribute this abrupt structural boundary to rapid accretion of a thick Pleistocene section to the margin during the last 1 Ma. The younger prism has two or more of the following features: very low wedge taper; margin-parallel folds; widely spaced folds; and landward-vergent thrusting. This morphology suggests extremely low basal shear stress on the décollement, and a principal horizontal stress oriented normal to the margin. An abrupt break in slope separates the young wedge from the older accretionary complex which has steeper wedge taper; fold trends roughly perpendicular to the plate convergence direction; closely spaced folds; and seaward vergent thrusting. We infer that low basal shear stress along the seaward part of the central Cascadia margin results from lithostatic fluid pressures induced by the rapid deposition of the Pleistocene Astoria and Nitinat submarine fans, and tectonic compression during accretion. We hypothesize that the width of the seismogenic plate boundary is controlled by temperature at the downdip end, and by fluid pressure at the updip end. The high temperatures in the young accretionary wedge contribute to overpressuring by dehydration of clay minerals. Decoupling of the converging plates in part of the central Cascadia margin may occur where the hypothesized updip and downdip limits converge, and may be responsible for reduced elastic strain accumulation observed in adjacent coastal areas. The patchy modern strain accumulation onshore may thus represent a typical strain cycle in central Cascadia. This weakly coupled segment of the margin may represent a barrier to rupture propagation during interplate earthquakes.

№ 16771

UPPER EOCENE-OLIGOCENE(?)DEPOSITIONAL SYSTEMS AND BASIN DEVELOPMENT, SOUTHERN UTAH

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From Cretaceous to the present, reactivation of structural weaknesses in south-central Utah have created several sub-basins with complex histories. The stratigraphy and diverse fauna of one of these sub-basins (exposed in the Sevier Plateau), overlying the Claron Fm and underlying the Mt Dutton Fm, provides an important record of the tectonic and sedimentary development of this region between the Laramide Orogeny and the onset of extensive Oligocene volcanism.

A preliminary section measured along the southwestern margin of the Sevier Plateau consists of 255 m of mudstone, siltstone, sandstone, and minor conglomerate deposited in paludal and fluvial environments. This sequence is informally divided into a lower variegated unit and upper volcaniclastic unit. The variegated unit coarsens upward from bentonitic mudstone to cross-stratified sandstone. Charophytes, gastropods, ostracods, and late Eocene vertebrates (including turtles, fish, alligatorids, and mammals) are common in this unit. The volcaniclastic unit coarsens upward from fine-grained sandstone and bentonitic siltstone to coarse-grained sandstone and minor channelized conglomerate. The sandstone and conglomerate were derived from Proterozoic or Paleozoic quartzite and Tertiary intermediate volcanic sources to the southwest and southeast.

№ 15025

USING ELECTRONIC MEDIA WITH INTRODUCTORY GEOSCIENCE STUDENTS

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Readily available microcomputer technology provides geoscience students with an avenue for developing observational and problem solving skills. This technology makes it possible for both students and instructors to work with simulations of physical events and processes and access real-time and archived geophysical data. This makes these tools useful for promoting student participation in lecture and fostering both individual and collaborative efforts in laboratory. The purpose of this paper is to present several strategies for creating and using computer based tools in undergraduate, introductory geology, oceanography, meteorology, and astronomy courses. The primary topics discussed include the following:

- Methods for using computer simulations and computer interfaces in both lecture and laboratory.
- Methods for using presentation software to create media managers for use in