Windy Craggy 114P/13 676043

№ 01387

THE LATE TRIASSIC METALLOGENY OF THE ALEXANDER TERRANE, SOUTHEASTERN ALASKA AND BRITISH COLUMBIA

TAYLOR, Cliff D., PREMO, Wayne R., and MEIER, Alan L., U.S. Geological Survey, Box 25046 Federal Center, Denver, CO 80225-0046, ctaylor@usgs.gov

A belt of Kuroko/Besshi(?)-type volcanogenic massive sulfide (VMS) occurrences is located along the eastern margin of the Alexander terrane. Deposits within this belt include Greens Creek and Windy Craggy, the most significant VMS deposit in Alaska and the largest in North America, respectively. The occurrences are hosted by a discontinuously exposed, 600-km-long belt of rocks that consist of a 200-800 m thick rift-fill sedimentary sequence intercalated with bi-modal volcanic rocks and intruded by mafic-ultramafic dikes and sills. The age of the host rocks is bracketed between early Carnian (early Late Triassic) and late Norian (late Late Triassic).

The VMS occurrences show crude but systematic differences in structural appearance, mineralogy, and stratigraphic setting along the belt that suggest important spatial or temporal changes in the tectonic environment. The style of the mineral occurrences is mirrored by an evolution of the volcanics from arc-like at the south end to MORB-like to the north. In the southern end, the lower part of the sequence consists of peralkaline rhyolites overlain by shallow water limestones. In the southern and middle portion of the belt, the base of the section is marked by a distinctive pebble conglomerate indicative of high-energy deposition in a near slope or basin margin setting. At the north end the conglomerates, limestones, and felsic volcanics are absent and the belt is composed of deep-water sediments, primitive mafic volcanics, and mafic-ultramafic intrusives. This northward change in depositional environment is accompanied by a northward transition from epithermal-looking occurrences with relatively simple mineralogy hosted in the volcanics and limestones, to sulfosalt-enriched VMS occurrences, and finally to Cu-Co-enriched occurrences with larger and more clearly stratiform orebody morphologies, hosted at contacts between mafic igneous rocks and thick shale sequences. The geologic setting in the south is consistent with shallow subaqueous emplacement on the flanks of the Alexander arc. Northwards, the setting changes to increasingly deeper subaqueous deposition in an evolving back-arc or intra-arc rift basin.

№ 13110

DISTRIBUTION OF INORGANIC MERCURY IN SACRAMENTO RIVER WATER AND SEDIMENTS

TAYLOR, Howard E., U.S. Geological Survey, 3215 Marine St., Boulder, CO, 80303, hetaylor@usgs.gov ROTH, David A., PEART, Dale B. and ANTWEILER, Ronald C., U.S. Geological Survey, 3215 Marine St., Boulder, CO, 80303; DOMALGALSKI, Joseph L., DILEANIS, Peter and ALPERS, Charles, N., U.S. Geological Survey, 6000 J St., Placer Hall, Sacramento, CA, 95819

The concentration and distribution of inorganic mercury was measured using cold-vapor atomic fluorescence spectrometry in samples collected at selected sites on the Sacramento River from below Shasta Dam to Freeport, CA at 6 separate times between 1996 and 1997. Dissolved (ultrafiltered, 0.005 micron equivalent pore-size) mercury concentrations remained relatively constant throughout the system, ranging from the detection limit (< 0.4 ng/L) to 2.2 ng/L. Total mercury (dissolved plus colloidal suspended sediment) concentrations ranged from the detection limit at the site below Shasta Dam in September 1996 to 81 ng/L at the Colusa site in January 1997, demonstrating that colloidal sediment plays an important role in the downriver mercury transport. Sequential extractions of colloid concentrates indicate that the greatest amount of mercury associated with sediment was found in the "residual" (mineral) phase with a significant quantity also occurring in the "oxidizable" phase. Only a minor amount of mercury was observed in the "reducible" phase. Dissolved mercury loading remained constant or increased slightly in the downstream direction through the study area, whereas the total inorganic mercury load increased significantly downstream, especially in the reach of the river between Bend bridge and Colusa. Analysis of temporal variations showed that mercury loading was positively correlated to discharge.

№ 02391

COMPOSITIONAL AND TEXTURAL TRENDS RELATING TO ELEVATION WITHIN THE EL CAPITAN GRANITE, YOSEMITE NATIONAL PARK, CA

Taylor, Ryan Z., Frankel, Kurt L., and **Ratajeski, Kent,** Deptartment of Geological Sciences, University of North Carolina, Chapel Hill, NC 27599-3315

The El Capitan granite (~103 Ma) is a large, equigranular to porphyritic, granitic to granodioritic pluton which comprises the bulk of the Intrusive Suite of Yosemite Valley in the central Sierra Nevada batholith. Extreme vertical relief in and around Yosemite Valley was exploited to determine if the unit exhibits textural and/or compositional variations that correlate with elevation.

Samples and field observations were obtained from 43 stations ranging in elevation from the valley floor (4000') to the summit of Mt. Hoffman (10,850'). Photos of 0.2 m^2 outcrop areas were taken at 34 of these stations, and the areas of the 10 largest K-feldspar megacrysts in each (defined as the average megacryst area) were measured from digitized photos. Samples from 16 of the stations were analyzed for whole-rock major and trace elements by DCP. These data reveal four significant results:

- There is a significant increase in megacryst area with elevation. The average megacryst area varies from 0.26 cm^2 to 4 cm^2 at low elevations, but all stations above 5800' have an average > 2.02 cm^2.
- The incompatible elements K and Rb increase in concentration with elevation, reflecting an increase in the modal abundance of K-feldspar. These elements approximately double as elevation increases from 4000' to 7500'. The compatible elements Mg, Fe, and Ca decrease in abundance over the same range in elevation.
- Dispersed mafic enclaves are more abundant at low elevations. Although this relationship is unquantified, field observation indicates that enclaves are far more abundant at low elevations than at high elevations where they are sparse and occur in enclave-choked dikes.
- Granitoids on Mt. Hoffman, 15 km northeast of Yosemite Valley, are shown as El Capitan granite on the 1989 park geologic map. However, textures and chemical compositions of the samples collected from the Mt. Hoffman area show marked differences with the other samples. Unlike typical, undeformed El Capitan granite, the granite at Mt. Hoffman is strongly foliated. In addition, data from Mt. Hoffman lie off the major element-elevation trends defined by the other samples of El Capitan granite.

№ 06347

TECTONIC SETTING AND PALEOGEOGRAPHY OF K-EOCENE BASINS, NEVADA AND UTAH

TAYLOR, W.J., WILLIAMS, N.D., and SHIGEHIRO, M., Dept. of Geoscience, UNLV, Las Vegas, NV 89154-4010, wjt@nevada.edu

Cretaceous (K) - Eocene sedimentary basins in the western U.S. formed during a change in tectonics from contraction to extension. In the early K, thrusting ended or waned in the Sevier orogenic belt (SB) internal zone, including the central Nevada thrust belt (CNTB). Late K-Eocene movement occurred and ceased on Laramide uplifts, and extension related to overthickened crust occurred near the UT - NV border.

We use K - Eocene sedimentary units to clarify the paleogeography and tectonic activity at that time. The early K Newark Canyon Formation (Fm) relates to CNTB thrusts in the internal zone. K-Eocene units include basin-fill related to and near Laramide uplifts to the east, detritus shed ~E off the SB front (Wasatch & Claron Fms) and the Sheep Pass, Elko and White Sage Fms that are associated with extension.

The coeval Elko, White Sage and Sheep Pass Fms formed after or during early extension in the thrust belt internal zone. In this zone, an ~E-W trending topographic high divided the southern Elko and White Sage basins, which relate to detachment systems, from the Sheep Pass Fm basins, which relate to a distinct high-angle normal fault set. This newly recognized highland resulted directly from K-Eocene extension.

The late K-Eocene Sheep Pass Fm occurs in isolated normal-fault-bounded basins in eastern NV. Basal conglomerate and landslide debris underlie fluvial, pluvial, and lacustrine units. Syndepositional normal faulting, S-ward paleocurrents and a S-ward shifting depocenter show a syndepositional E-W trending highland at or N of ~39°15'N.

Eocene, pre-37 Ma, Elko Fm crops out near the town of Elko, NV. The basal unit contains conglomerate, sandstone, and siltstone. These alluvial rocks underlie organic-rich shale and tuffaceous beds. The Elko Fm was deposited near and W of areas of known K - Eocene extension suggesting an association of a topographic low with extension. The depocenter migrated southward but remained N of 40°N latitude.

The Eocene, pre-39.6 Ma, White Sage Fm crops out near the UT-NV line N of 40°N latitude. This mostly lacustrine unit unconformably overlies normal faults showing a link between basin formation and K-Eocene extension with a southern limit near 40°N.

№ 12858

ACCRETION, METAMORPHISM, AND EXHUMATION OF THE FRANCISCAN COMPLEX

TERABAYASHI, Masaru, Kagawa University, Takamatsu, Kagawa 760-8526, Japan, tera@eng.kagawa-u.ac.jp; MARUYAMA, Shigenori, Tokyo Institute of Technology, Meguro, Tokyo 152-8551, Japan; KIMURA, Gaku, Dept. Geology, Univ. Tokyo, Hongo, Tokyo 113-0033, Japan

Franciscan-type mélange was originally regarded as one of the most characteristic rocks to define an accretionary complex (Hamilton, 1969). Recognition of accretionary complexes has changed (Matsuda and Isozaki, 1991, etc.). Kimura et al. (1992; 1996) reexamined the Pacheco Pass region in the Diablo Range and recognized duplex structures modified by subsequent folding and faulting. A sequence composed of pillowed basalt overlain by bedded chert provides a key stratigraphic marker to define the west-vergent duplex. Terabayashi and Maruyama (1998) have investigated the regional distribution of high-pressure minerals in northern and central California, and concluded that both the matrix-forming mélange shale and exotic blocks of the entire Central belt suffered high-P/T metamorphism. Along the gently eastward-dipping thrust plane between the underlying Coastal and overlying Central belts, more than 2.5 kbar pressure break is obtained through the lawsonite-laumontite-aragonite-quartz relations. The internal thermobaric structure of the Franciscan Central belt is subhorizontal, and the structurally intermediate horizon has the highest metamorphic grade. Such a large pressure gap and thermobaric structure were formed during the exhumation process of the Central belt of the Franciscan Complex. Terabayashi et al. (1996) proposed a mechanism to create a sandwiched thermobaric structure that involves two stages: a wedge extrusion elevates high-P-T rocks to shallower levels, followed by doming with secondary normal faults. To create such a structure, a wedge extrusion is necessary to selectively exhume the higher-grade part into the intermediate structural position capped by the lower-grade part on both sides (Maruyama, 1990; 1992).

№ 12881

CONTRIBUTIONS OF WILLIAM P. BLAKE TO EARLY CALIFORNIA GEOLOGY & HISTORY

TESTA, Stephen M., Testa Environmental Corporation, 19814 Jesus Maria Road, Mokelumne Hill, CA 95245, stesta@goldrush.com

Blake's pioneering accomplishments in the early geological exploration of the west, throughout the United States, and internationally, during the latter half of the 19th Century, are less well known and undervalued relative to those individuals who comprised the first California Geological Survey in the 1860s, and later regional surveys of King, Hayden, Powell and Wheeler. Blake was the first professional geologist to explore the southwest, thus providing the earliest scientific accounts of the region. Blake is best known for his service as a geologist for the Pacific Railroad Survey (1853-1854). Blake felt that ancient Lake Cahuilla was his most important discovery made during this period. Blake also clearly recognized the persistent winds in the upper Coachella Valley as a significant erosional force, making detailed observations regarding erosional, depositional and weathering processes. In 1860, Blake opposed his distant cousin J. D. Whitney for director of the first geological survey of California. Despite the lack of prior geologic experience, political connections and an aggressive campaign resulted in Whitney serving as the survey's first director, and Whitney never referenced Blake's earlier pioneering works. The survey was abandoned in 1874 due in part to an over-emphasis on issues considered by the legislature as too academic and of little practical value in a post-goldrush period where the development of additional mineral resources was desired. In 1861, Blake served as a mining consultant and promotor of his uncle's stone- and ore-breaker, and successfully opposed Whitney for the position of commissioner to the London International Exhibition. Blake also correctly disagreed with Whitney on several important issues of the times including the economic potential of the Bodie Mines, economic value of gas and oil, the glaciated nature of Yosemite Valley and other areas of the high Sierras, and the origin and significance of the Calaveras Skull. Academically, Blake was the first director and professor in mineralogy, geology, and mining at the College of California (1864-1867), and was later elected California's commissioner to the Paris Universal Exposition (1887). Blake's contributions to the early geological understanding of California were influential, correctly forecasting its growth potential, providing insight into the geology, and mineral and water resources of the region, and significantly contributing to its early academic development. It is speculated that the ultimate fate of the first geological survey of California may have been very different if Blake had been selected over Whitney.