



Colorado Scientific Society

*The objective of the Society is to promote
The knowledge and understanding of Earth science,
And its application to human needs*

Colorado Scientific Society Student Night



Thursday, November 16, 2006

American Mountaineering Center

**710 10th St. (NE corner with Washington), Golden
Social half-hour – 6:30 p.m. Meeting time – 7:00 p.m.**

Abstract

Regional zoning of alteration and mineralization of Espino Iron-oxide Copper Gold (IOCG) district, Coastal Cordillera of Northern Chile

By Gloria Lopez, Dept. of Geology and Geological Engineering, Colorado School of Mines

The Espino district is located in the Chilean Coastal Range to the south of other known IOCG deposits. The district contains a number of copper and gold veins that have been exploited since colonial times.

The regional setting of Espino is characterized by an Early Cretaceous volcanic arc formed at a continental margin with recurrent marine transgressions. The district contains a series of intermediate stocks of granodioritic to dioritic composition that intruded the volcanic sequence, and a relatively small marine to transitional sedimentary basin. Both the intrusive rocks and the volcanic-sedimentary rocks have been hydrothermally altered.

Sodic alteration characterized by albite is extensively developed in the district at low to

intermediate structural levels. Sodic alteration is overprinted by a spatially more restricted sodic-calcic alteration (88.4 ± 0.6 Ma) at intermediate and low levels. Potassic alteration has been recognized in limited exposures at the structurally lowest portions of the hydrothermal system. Hydrolytic alteration (87.9 ± 0.6 Ma) occurs at higher levels of the system, and, locally, at intermediate levels. Hydrolytic alteration is focused along N- to NE-striking veins composed of chlorite-sericite or quartz-sericite accompanied by iron oxide and sulfide with anomalous gold and copper. Quartz, with minor hematite, is abundant at the highest portion of the system, whereas at intermediate levels hematite is abundant and quartz is minor. At deeper levels, quartz is rare and magnetite is dominant.

Notes:

Abstract

Shatter Cone Occurrences Indicate A Possible Impact Structure Near Santa Fe, New Mexico

By Siobhan Fackelman, University of Northern Colorado

Shatter cone-like features have been documented ~5km northeast of Santa Fe, New Mexico, where they are exposed along, and laterally adjacent to, Hyde Park Road. Several continuous exposures of nested, sub-conical, planar to slightly curved multiply striated fracture surfaces occur within Proterozoic rocks including, granitic gneiss, amphibolite, mica schist, and quartzite. We interpret these features to be shatter cones, indicating the remnant of an old, eroded impact structure. The striated surfaces are best developed within equigranular, potassium feldspar-rich granitic gneiss. Mapping to date has identified the cone structures only within Proterozoic metamorphic and crystalline rocks; the structures apparently are not present in nearby outcrops of the unconformably overlying sedimentary rocks of the

Carboniferous Madera Group. If impact evidence is proven to be lacking within the Paleozoic sequence, this would constrain initially the age of the event to post-Mesoproterozoic and pre-Early Carboniferous. The shatter cones, which are well exposed for more than 1 km along and north of Hyde Park Road, are individually up to 1 m long, and display a general NE trend of their cone axes, which plunge to the SW. The trend of the cone axes cuts the foliation of the host rock, which strikes S to SE. An average apical angle of approximately 65 degrees was measured for the master cones and the minor cones, conjunctively. Ongoing research is further documenting the structure, orientation, texture, and petrography of the shatter cones and the detailed structural fabric of their host rocks.

Notes:

Abstract

Processes of Magma Evolution: A Trace Element Study of Magmatic Epidote

By Ian Merkel, Colorado State University

Two weakly deformed Cretaceous pegmatitic tonalite dikes, representing part of the high-pressure magmatic plumbing of the North Western U.S. paleo-volcanic arc system, occur in the North Cascade Mountains, Washington. These dikes contain quartz, plagioclase, muscovite, epidote and rare garnet, and apatite. Significantly, the epidote occurs in more than seven texturally and chemically distinct populations, with individual crystals in excess of 13 cm. Trace element (TE) analyses have been carried out on the epidote populations to test hypotheses of magmatic processes associated with an evolving tonalite magma system (magma recharge, country rock assimilation, differentiation, phase-reaction evolution), as well as to constrain the relative chronology of these populations.

Geochemical interpretations indicate that two of the hypothesized magmatic processes were dominant in the early evolution of this system. First, magmatic differentiation, resulting from

fractionated high temperature/pressure magmatic phases, led to decreasing TE concentrations; second, the breakdown of a heavy rare earth element (HREE) phase significantly adjusted to HREE geochemical patterns of subsequent epidote populations. It has also been determined that TE variations of these epidotes can be used to construct the relative chronology of the epidote populations. These results are important because they demonstrate the ability to use distinct populations of trace minerals to acquire insight into early magmatic processes and geochemical evolution. Early magmatic processes, which often lack constraints due to evolutionary late crystallization processes that dominate the geochemical signature of the final rocks, are important in reconstructions of tectonic regimes, in particular, the deep plumbing systems of continental volcanic arcs.

Notes:



Earth Science Meetings and Talks

Newsletter items must be received by the 25th of each month. Items may include special events, open houses, etc...thanks!



Colorado Scientific Society's regular meetings are held the 3rd Thursday of the month at the American Mountaineering Center in Golden (unless otherwise advertised). Social time begins at 6:30 p.m. and talks start at 7:00 p.m. For more information, contact Chuck Kluth at 303-273-3889 or ckluth@mines.edu

Denver Mining Club meets every Monday (except when noted) at Country Buffet near Bowles and Wadsworth (at 8100 W. Crestline Ave.) 11:30-1:00. Nov 13, Dan Plazak, "The Overselling of Stratton's Independence mine, Cripple Creek, Colorado". Nov 20, Michael Brittan, Goldfields Exploration, "Goldfields' Ghana Operations". <http://china-resources.net>.

Denver International Petroleum Society meets the second Friday of each month at the Wynkoop Brewing Co., 18th and Wynkoop Streets. Reception begins at 11:30, luncheon at noon, program at 12:30. Make reservations (required) by leaving message at (303) 623-5396. Reservations accepted after 8 a.m. on Friday until 10:30 a.m. on Wednesday prior to the meeting. Cancellations accepted until 11:00 am Wednesday prior to the meeting. Cost: \$15 for lunches; talk only is available for \$2 (make checks payable to "D.I.P.S."). Contact Keith Murray at (303) 986-8554 for information.

Denver Region Exploration Geologists' Society (DREGS) meets in the Mutual Consolidated Water Building, 12700 West 27th Avenue, Lakewood. Social hour 6:00-7:00 p.m. Technical presentation at 7:00 p.m. Meetings are normally scheduled for the first Monday of each month. For information contact Jim Piper, (303) 932-0137, or the website <http://www.dregs.org>.

Denver Well Logging Society (DWLS) meets on the third Tuesday of each month, Sept. through May. Lunch and a technical talk at the Wynkoop Brewery begins at 11:30 a.m., 18th and Wynkoop Sts. in Denver. Subject matter usually deals with the application of well logs to oil and gas exploration. Call Eleice Wickham at 303-573-2781 for reservations. Web page: <http://dwls.spwla.org>.

Rocky Mountain Association of Geologists (RMAG) Reception at 11:30, lunch at noon, talk at 12:30. Reservations by recording at 303-623-5396 until 10:30 a.m., Wed. before the luncheon. Cancellations until 11:00 a.m. on Wed. at 303-573-8621. Luncheon is \$20 payable to RMAG at the door. Talk only (no res)—cost is \$3. Location: Denver Marriott, 17th & California. Nov 17, Dave Schmude, "The Jurassic of Wyoming". Web page: <http://www.rmag.org>.

Rocky Mountain SEPM Reception at 11:30, lunch at noon, speaker at 12:30. Reservations, Dave Uhl:303-389-5092 before noon of preceding Friday. \$15.00 lunch, \$3 talk only. Wynkoop Brewing Company, 1634 18th St., Denver. David.uhl@EnCana.com.

University of Colorado at Boulder, Geological Sciences Colloquium Wednesdays, 4:00-5:30, Rm. 180.Refreshments at 3:30 on the 3rd floor. Nov 29, Shemin Ge, "Implications of earthquake induced fluid flow." Dec 6, Jim McCalpin, "Neotectonics of the Sangre de Cristo fault, Colorado's most active fault." 303-492-8141. Web page: <http://www.colorado.edu/GeolSci>.

Colorado State University, Dept of Geosciences, Rm 320 Natural Resources Bldg, 4:10 pm. Nov 13, Geovanni Romero, New Mexico State, "Evaluation of the Allochthonous Model for the formation of Waulsortian Mud Mounds in the Sacramento Mountains, South Central New Mexico". Nov 27, Dan Centerelli, USFS, "Applying Geomorphic Principles to Restore Fluvial Processes and Aquatic Organism Passage at Road-Stream Crossings." 970-491-5661. <http://www.cnr.colostate.edu/geo/seminars>

Friends of Dinosaur Ridge. Morrison Town Hall, 7:00p.m. Web page: <http://www.dinoridge.org>. Admission is free, but donations are welcome. For more information contact the FODR Visitor Center at (303) 697-3466.

Colorado School of Mines, Van Tuyl Lectures Thursdays from 4-5 p.m. in Berthoud Hall room 108. Nov 9, Roy Dokka, Louisiana State, "Geodetic measurements of modern subsidence in South Louisiana—ongoing inundation of the Gulf Coast". Nov 16, John Van Wagner, ExxonMobil, "The origin, evolution, and organization of structure in sedimentary systems". <http://www.mines.edu/academic/geology.html>

USGS Geologic Division Colloquium. Thursdays, 1:30, Foord Room, Building 20, Denver Federal Center. For more information contact: Peter J. Modreski, U.S. Geological Survey, Denver, Colorado tel. 303-202-4766, fax 303-202-4767 email pmodreski@usgs.gov.

For a constantly updated, online geo-calendar, visit the Colorado Geological Survey at
<http://geosurvey.state.co.us>

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