Cheney, WA 99004; Lavin, Owen P., Dept. of Geological Sciences, Queen's University, Kingston, Ontario, Canada; and Mutschler, Felix E., Dept. of Geology, Eastern Washington State College, Cheney, WA 99004

"PETROS" (Mutschler and others, 1976) is a fixed format magnetic tape data bank of major element chemical analyses of over 23,000 igneous rocks. Interactive remote terminal accessing systems can greatly expand the usefulness of "PETROS".

"KEYBAM" is a system of interactive FORTRAN IV programs for accessing and operating on "PETROS" data. Its present capabilities include: (1) selection routines for creating working or reference files based on user supplied criteria; (2) normative calculations and rock classification based on the system of Irvine and Baragar (1971); (3) graphical displays including histograms, orthogonal X-Y plots, and triangular plots; and various statistical analyses based largely on the SPSS system. We have attempted to design "KEYBAM" so that it is relatively machine indepenent and can be used for research and teaching in petrology at most modern computer installations.

## UTILIZATION OF GEOTHERMOMETER AND ISOTOPE MODELS IN THE BUENA VISTA THERMAL AREA, COLORADO

BARRETT, James K., Colorado Geological Survey, 1333 Sherman St. Denver, Colorado 80203; PEARL, Richard H., Colorado Geological Survey, 1313 Sherman St. Denver, Colorado 80203

The Buena Vista Thermal Area encompasses all of Mt. Princeton which is located approximately ten miles southwest of Buena Vista, Colorado in the upper Arkansas Valley. Two hot spring groups occur in this area: Mt. Princeton Hot Spring Group on the south and Cottonwood Hot Spring Group on the north flank of Mt. Princeton.

Both hot spring groups are located within intense shear zones. Within these shear zones the quartz monzonite of the Mt. Princeton batholith has been locally altered and zeolitized. Hot springs of both groups are surrounded by a zone of green-gray propylitized fault gouge, offset quartz veins and brecciated quartz monzonite, which grades abruptly into zeolitized (laumontite) quartz monzonite breccia.

Estimated resevoir temperatures based on $SiO_2$, Na-K, and Na-K-Ca geothermometer models, respectively, are as follows: 97 to 110 C 131 C to 141 C, 170 C to 173 C at Cottonwood Hot Springs Group and 103 C to 120 C, 135 C to 156 C, 168 C to 214 C at Mt. Princeton Hot Springs Group. Mixing model studies yield subsurface temperature estimates from 147 C to 198 C with cold water fractions from 52% to 80% of the spring flow. Environmental conditions neccessary for the formation of laumontite fall within a temperature range of 145 C to 220 C, providing a close correlation with the geothermometer temperature results.

Isotope analysis of the hot springs and cold waters adjacent to the Buena Vista Thermal Area will be conducted this summer. Results of this study and use of the geothermometer techniques will be presented.

## CLIMATIC CONDITIONS FOR GLACIERIZATION AND ICE SHEET GROWTH

BARRY, R. G., Institute of Arctic and Alpine Research and Department of Geography, University of Colorado, Boulder, Colorado 80309

The climatic conditions that favored inception of the North American Laurentide ice sheet can only be examined indirectly at the present time. Procedures for examining the immediate mechanism of glacierization include: (1) analog studies of snowy winters and cool summers at the lack of cores that could penetrate the surficial sands and define acoustic reflectors. In 1975, a set of long vibracores was obtained in this area at stations selected on the basis of intensive bathymetric and high-resolution seismic-reflection surveys. Textural and radiocarbon analyses of these core sediments show that a shelly, poorly sorted, medium to coarse sand sheet of Holocene age overlies muddy, texturally diverse, upper Pleistocene sediments. The acoustic profiles indicate that the thickness of the surficial sand sheet ranges from less than 1 to 20 m, is closely related to the bottom morphology, and reflects both relict and modern sedimentary processes. Paleoenvironmental interpretations based on foraminiferal assemblages suggest that both units accumulated under a variety of environments ranging from lagoonal to inner shelf to middle shelf. These results define the distribution of potentially mobile sediments on this part of the shelf, provide a basis for regional estimates of sand volume, indicate that foraminiferal assemblages may be used to recognize different paleoenvironments within the sand sheet, and suggest that lagoonal deposits, which are common on the inner shelf, may not be as widespread farther offshore.

STRUCTURAL FEATURES IN THE RIO GRANDE RIFT ZONE NEAR SALIDA, COLORADO

KNEPPER, D.H., Jr., Institute of Arctic and Alpine Research and Department of Geological Sciences, University of Colorado, Boulder, Colorado 80309

Late Cenozoic tectonism along the axial portion of the Rio Grande rift zone progressively fragmented and complicated the tectonic framework of central Colorado. The series of block-faulted uplifts and basins that evolved are clearly delineated by major normal faults and the distribution of Miocene to Pleistocene sediments. Initial faulting occurred along the major north-trending normal faults that bound the Upper Arkansas graben and was accompanied by the deposition of Miocene Browns Canyon Formation within the graben basin. Accelerated movement along these faults enhanced the graben's structural outline, producing upland source areas for the graben-fill sediments of the Miocene-Pliocene Dry Union Formation. Fault movement must have continued into into the Pliocene, since even the youngest Dry Union sediments are cut by north-trending faults. To the south, the San Luis graben probably had a similar history, but it is buried beneath Pleistocene sediments and cannot be studied directly. In late Pliocene and early Pleistocene time, a series of northwest-trending uplifts and basins were superimposed on the Upper Arkansas and San Luis grabens and their bordering uplifts. The major features formed at this time are the Sangre de Cristo and Browns Canyon horsts, the Salida and Pleasant Velley grabens and the San Luis tilted block basin. The South Arkansas tilted block near Poncha Springs is a remnant of the Upper Arkansas graben perched upon the Sangre de Cristo horst. Tectonism has continued into Holocene time, although much reduced in magnitude.

COMPUTER PREDICTION OF MASS AND ENERGY TRANSPORT IN COSO GEOTHERMAL SYSTEMS, INYO CO., CALIFORNIA

Knight, Jerry E., Department of Geosciences, University of Arizona, Tucson, Arizona 85721; Norton, Denis, Department of Geosciences, University of Arizona, Tucson, Arizona 85721

Published micro-seismic, p-wave velocity, electrical resistivity, heat flux, gravity, and field data were used to construct a 36 x 9 km 2-D cross-section of the Coso ring structure. The cross-section includes a central fracture zone and, at 5 km depth, a molten intrusive.

Energy and mass t
finite difference
system fluid prop
surface (12-20 HF
thermal gradients
depth because con
temperature gradi
tures are nearly
pluton's anomalous
region in the ini
affects the redis
are too low for c
meability zones p
do unconfined sys
than conductive f
face heat flux ex
pluton, which coi
limits of the sub
In spite of a div
of subsurface ene
types of data are

USE OF EARTH SCIE
IN THE SAN FRANCIS
KOCKELMAN, Wi
An inventory of th
ning and decision
counties. This in
products prepared
and Resources Plan
and suggest ways t
products include 8
flood hazards, min
The inventory
the counties were
over half of the c
documents which ci
plans, open-space
uses most often ma
once for a wide va
seven products tha
coverage, hazard-t
were interviewed.
maps, additional d
ity to interpret t
Suggestions to
tion include: mon
and regulations; c
pretations and use
ance in connection
designed for plann

DEVELOPMENT OF INV
INFORMATION RESOURC
KOHN, Robert S.,
Ohio 43201
Between June, 1974,