regarded as forming by collapse due to salt dissolution. However, surface geology and dynamically scaled experiments suggest that those grabens formed primarily by regional extension during Meso-Cenozoic time. The diapiric crests feature normal faults, rollover anticlines with crestal grabens, and fault-displacement folds. Moreover, these crestal grabens indent the underlying salt, forming adjoining cusps of salt (Fig. 1). This combination of structural styles unambiguously indicates regional extension.

Physical models of dry sand simulating brittle rocks and silicone simulating ductile salt suggest that regional extension reactivates buried diapirs, forming crestal grabens and rollover anticlines. Diapirs rise if the salt source layer is thick and extension is slow; conversely, diapirs fall if the source layer is depleted or if extension is rapid (as in Fig. 1). In contrast, our models show that salt dissolution creates grabens having a contractional center rimmed and balanced by an extensional zone (Fig. 2). Such reverse faults have not been observed in the Paradox diapirs. Rare, local buckling appears to be the only unquestioned deformation structures produced by dissolution, which is largely a Neogene phenomenon. Other effects of dissolution are probably masked by older extensional structures.

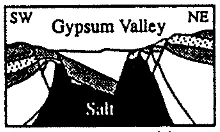

Figure 1 1 km

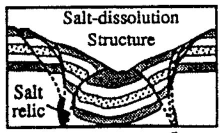

Figure 2 5 cm

№ 18675

EARTH SCIENCE FOR ALL AMERICANS, 1994-2001: AN OVERVIEW OF THE GEOLOGICAL SOCIETY OF AMERICA'S K-16 EDUCATION PROGRAMS.

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Supporting systemic science education reform, creating more effective teacher-scientist partnerships, increasing participation of under-represented groups in the earth sciences, disseminating outstanding earth science education programs and materials, and enhancing Earth appreciation for all Americans are goals of the Geological Society of America's current and future K-16 education programs.

To achieve these goals, GSA is working with the Coalition for Earth Science Education and other groups to strengthen the emerging National Science Standards and to support State Systemic reform efforts. GSA is also working on several new earth science education initiatives, including: In-STEP, a partner training and support program to foster more effective scientist-teacher partnerships, Project MAP, a national conference to address minority issues and concerns in earth science education, Project Earth S.E.E.D., a training, dissemination, and support program for potential project directors who want to develop their own earth science teacher enhancement programs, Project RISE, an interdisciplinary curriculum development and training program for K-12 educators, their students, and people whose jobs or volunteer efforts involve educating others about the natural systems of Earth and space and our relationship with them, and Project Earth Appreciation, a collaborative program with the National Park Service to enhance the public's appreciation of Earth's history, resources, and natural wonders.

GSA invites your comments about, and participation in, these and other earth science education initiatives.

№ 05757

FACTORS INFLUENCING THE CHARACTERISTICS OF SOILS IN GLACIAL DEPOSITS IN THE MEADOW CREEK BASIN, TOBACCO ROOT RANGE, SOUTHWESTERN MONTANA

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The characteristics of soils developed in alpine glacial deposits are influenced by the age of the parent materials as well as several other factors. In the Meadow Creek basin, there is a record of five or six first-order glacial and/or periglacial events that has been deciphered primarily on the basis of detailed mapping. Soils developed in the older deposits (provisionally assigned to the Bull Lake glaciation) occur as both surface soils and buried soils. These soils have Bt horizons that average at least 80 cm thick and have up to 15 percent clay. Soils developed in younger deposits (provisionally assigned to the early Wisconsinan, Pinedale, and type Temple Lake glaciations) occur only as surface soils. These soils have Bt horizons (ranging from 8 to 54 cm) or Bw horizons (ranging from 9 to 64 cm) generally with less than 10 percent clay. However, there is considerable variability in these younger soils that seems related to their locations both within the basin as a whole and locally along glacial landforms. The most important factors influencing development of the younger soils seem to be parent material, mesoclimate, vegetation cover, and the influx of loess. The best developed soils are at the higher and wetter locations under a forest cover with a heavy loess influence.

№ 06712

SEQUENCE STRATIGRAPHY AND DEPOSITIONAL DYNAMICS OF THE LOWER DESMOINESIAN BARKER CREEK AND AKAH INTERVALS, SOUTHWESTERN PARADOX BASIN, UTAH.

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The stratigraphic evolution of the southwestern shelf of the Paradox basin during lower Desmoinesian deposition (Barker Creek and Akah intervals) was the complex result of sea level change, tectonism, sediment transport and production, and inherited topography.

Within the 20 km of continuously exposed outcrops along the San Jaun River, the studied intervals consist of a minimum of 19 sub-aerial bounded depositional sequences which are grouped in to 3 sequence sets defined on the basis of fluvial deposition and incision. The lower fluvial system consists of 8-10m of non-marine variegated siltstones and coarse quartz, sandstone with minor feldspar, metamorphic and volcanic lithic fragments indicative of the uplift and erosion of Precambrian basement. The second fluvial system overlies a subaerial exposure surface cut by up to 9m of fluvial incision and fill, which indicates a significant drop in base level. Siliciclastic sediment supply fluctuated through out the Lower Desmoinesian with fine sandstones and siltstones most commonly occurring at the base of sequences due to the bypassing and trapping during lowstand and transgression. However, dolomitic quartz sandstones were deposited during late highstand in the upper sequence set as the result of a shifting accommodation hinge zone and source proximity. The carbonates of the second sequence set are diverse and onlap a mud rich, opthalmid, *Chaetetes* and stromatolite bioherm in one sequence. In the third sequence set higher energy *Chaetetes* framestone reefs and stromatolitic bioherms alternate with siliciclastics to produce shingle-like progradational geometries suggestive of limited accommodation space. In addition, in the upper sequence set, inherited topography partially controled buildup distribution and fluvial incision.

This detailed sequence stratigraphic analysis demonstrates that low-angle carbonate/siliciclastic ramps deposited during high frequency "ice house" conditions responded to variety of influences in addition to sea level changes.

№ 01949

INTERACTIVE OUTREACH: GETTING STUDENTS INTERESTED IN SCIENCE

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The U.S. Department of Energy (DOE) is responsible for the safe, permanent disposal of high-level radioactive waste, and is currently studying Yucca Mountain, Nevada, as a potential site for a permanent geologic repository for the waste. Nearly 1900 scientists, engineers and technicians are employed by DOE, the national laboratories, and contractors supporting these studies.

DOE is actively involved in increasing students' interest and understanding of the complex technical issues related to radioactive waste disposal. An important part of increasing students' interest in science is the potential for career opportunities; the high-level waste management program offers tremendous opportunities for young people interested in a wide variety of technical fields. Disposal of high-level radioactive waste is a challenging and technically complex endeavor that will require the skills of thousands of trained scientists, engineers, and technicians.

Project scientists and engineers are involved in interactive student outreach in a number of forums, including hands-on demonstrations of stream action, fossil- and volcano-making demonstrations, and field trips to Yucca Mountain. In addition, the students have the opportunity to interact directly with the scientists and engineers actually doing site characterization work and repository design. This interactive approach is an integral part of DOE's outreach program, and has been shown to be an effective way to reach and interest students in technical careers and to clarify the complex technical issues involved in high-level radioactive waste disposal.

№ 08341

PETROLOGY OF THE PROTEROZOIC MT. ROSA INTRUSIVE COMPLEX, PIKES PEAK BATHOLITH, COLORADO.

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The Mount Rosa intrusive complex is one of seven alkalic plutons within the anorogenic 1080 Ma Pikes Peak batholith. It includes faylite-bearing granitoids, "riebeckite" granite and a variety of dikes including lamprophyres, diabase, syenite, quartz diorite and granite.

The fayalite-bearing rocks range from syenite to granite. They have variable mineralogies of quartz, microcline/perthite, and oligoclase. Annite is the most common mafic mineral with accessory magmatic epidote, fluorite, amphibole, and fayalite. They are chemically homogeneous with SiO2 ranging from 67 to 74 wt.%, Na2O (4%), K2O (5.5%), high REE and LREE-enriched contents with a negative Eu anomaly. They all plot as A-type granite on various discriminants. The zircon suggests near-liquidus temperatures in the range from 865°C to 966°C. The magmatic epidote suggests pressures of at least 8Kb, much greater than previously believed. Variations among the granitoids can be explained through fractionation of anorthite, with orthopyroxene, amphibole and biotite. The Mt. Rosa granite contains quartz, microcline/perthite, and oligoclase with annite and arfvedsonite (not riebeckite) (Giambalvo,1993). Accessory muscovite, astrophyllite, zircon, aegerine and opaques also occur. SiO2 contents range from 73 to 78 wt.% SiO2, 2-5% Na2O and 4-6% K2O. They are strongly enriched in LREE with a negative Eu anomaly. They are within-plate, A-type granite. Field evidence supports the occurrence of mafic dikes contemporaneous with the Mt. Rosa granitoids. These include augite-bearing camptonite and tholeiitic hornblende diabase. Nd-isotopes indicate an undepleted or enriched mantle source for the diabase, though low Mg- numbers (average of 37) suggest they are evolved and contaminated. Discriminant diagrams place both sets of dikes as within-plate.

Isotopic data (Douglass,1993) require a mantle component in the Mt. Rosa granitoids and indicates the fayalite and arfvedsonite granites are related, though computer modelling suggests simple crystal fractionation is insufficient to derive the arfvedsonite granite from the fayalite-bearing rocks. The diabase may be evolved from the required mantle source that produced the Mt. Rosa intrusives.