Association Round Table

ROCKY MOUNTAIN SECTION, AAPG

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ABSTRACTS OF PAPERS

ASHER-BOLINDER, SIGRID, U.S. Geol. Survey, Denver, CO

Possible Mechanism for Lithium Accumulation in Miocene Popotosa Formation, South-Central New Mexico

The lower to middle Miocene Popotosa Formation records the history of sedimentation in the tectonically active closed Socorro basin before its disruption by late(?) Miocene rifting. The Ladron and Lemitar Mountains contain about 1,600 m of volcaniclastic alluvial-fan, alluvial-flat, and playa sediments intercalated with as many as 12 ash beds. Possible ash sources include the Datil-Mogollon volcanic field on the south, the Socorro caldera within the Socorro basin, and more distant calderas.

Ash samples collected from measured sections progressively farther north of Socorro caldera show increasing lithium content. Those taken 9 km north of the caldera averages 47 ppm; 17 km north, 355 ppm; and 27 km north, 2,640 ppm lithium. Still farther north, however, lithium content drops to 150 ppm.

Lithium enrichment of an individual ash within a section is generally inversely proportional to the potassium content of that ash. Yet the average potassium content of all ashes within a section remains nearly constant for all three sections, each farther north of the caldera.

Close to Socorro caldera, welded ash-flow tuffs show enrichment of potassium ascribed to postdepositional hydrothermal alteration. Such alteration could provide the mechanism for increased lithium enrichment away from the caldera.

Beds of unaltered volcanic ash have enormous surface area exposed to a variety of migrating fluids. Laboratory experiments suggest that 50% of total lithium can be leached from fresh volcanic glass by hot alkaline solutions through ionic exchange. Such (hydrothermal) solutions would increase in lithium as they travelled away from their heat source (Socorro caldera) until precipitation by cooling occurred. The same ash beds that may have been leached in the area of hydrothermal alteration have been altered farther away to dioctahedral smectites, clinoptilolite, feldspar, and silica under the less rigorous conditions of near-surface temperatures and pH's consistent with those of playa brines. Those smectites may now hold the precipitated lithium as interlayer cations.

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Upper Cretaceous Stratigraphy and Paleontology, Lower Tres Hermanos Sandstone, Sevilleta Grant near La Joya, Socorro County, New Mexico

More than 1,300 ft (396 m) of Upper Cretaceous rocks overlie shales of the Upper Triassic Dockum Formation and are exposed on the Sevilleta Grant, near La Joya, Socorro County, New Mexico. The Upper Cretaceous sequence extends from the Dakota Sandstone to the Dilco Member of the Crevasse Canyon Formation and consists largely of shales and sandstones. The included Tres Hermanos Sandstone Member of the Mancos Shale includes sandstones, shales, and two coal beds.

The lowermost sandstone unit is a moderately sorted, calcareous sandstone which coarsens upward and with small- and medium-scale tangential, wedge and trough-shaped sets of cross-beds. The sandstone is about 11 ft (3.4 m) thick and contains fossil-rich lenses of poorly sorted, dark yellow-brown-weathering sands that are friable to moderately indurated and calcite cemented. Shale galls are present in the fossil-rich lenses and, together with wood fragments, abundant turtle bone fragments, some crocodile tooth and scute fragments, amid vertebrae and teeth, indicate a nearshore environment with a nearby source of freshwater. Selachian teeth and probable coprolites are richly varied and abundant. The following genera have been recognized: *Hybodus, Lonchidion, Squalicorax, Squatina, Brachaelurus, Scapanorhynchus, Odontaspis, Cretoxyrhina, Cretolamna, Plicatolamna, Paranomotodon, Ischyrhiza, Ptychotrygon, Rhombodus* as well as several as yet indeterminate genera. The dominant invertebrate genus is the oyster *Crassostrea soleniscus* although at least two genera of gastropods are present.

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Upper Cretaceous Stratigraphy and Paleontology, Sevilleta Grant near La Joya, Socorro County, New Mexico

More than 1,300 ft (396 m) of Upper Cretaceous rocks overlies shales of the Upper Triassic Dockum Formation and are exposed on the Sevilleta Grant, near La Joya, Socorro County, New Mexico. The Upper Cretaceous sequence extends from the Dakota Sandstone to the Dilco Member of the Crevasse Canyon Formation and consists largely of shales and sandstones. The included Tres Hermanos Sandstone has been raised to formational status by Hook and Cobban and includes the lowermost Atarque Member, overlain by the Carthage Member and the Fite Ranch Member, respectively. The Atarque and Fite Ranch Members consist of sandstones; the Carthage Member consists of shales and sandstones and contains two coal beds.

The Atarque Member is a moderately sorted, calcareous sandstone which coarsens upward with small- and medium-