LAKE MURRAY SPILLWAY - DELVING INTO THE CORE OF THE DREHER SHOALS TERRANE, COLUMBIA, SOUTH CAROLINA

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2012

ABSTRACT

This abstract presents an overview of the geological features observed at the Lake Murray Spillway, a prominent exposure in the Piedmont of South Carolina. The study area is located in the Dreher Shoals Terrane, characterized by a complex history of deformation and metamorphism, which has resulted in a variety of rock types and structural features.

The Lake Murray Spillway is one of the preeminent exposures in the Piedmont of South Carolina, offering an extensive view of the geological history. It is possible to teach every course in geology using this exposure with the exception of paleontology.

Two major rock types are found in the Spillway: Lake Murray granitic gneiss and pelitic schist. There are lesser amounts of amphibolite, quartzite, and variations of gneissic and schistose compositions. Migmatites are found throughout the biotite gneisses. They occur as layers of biotite schist or layers of migmatitic orthogneiss.

Garnetiferous pelitic schist. Internal foliations often visible in garnet porphyroblasts. Distended folds of amphibolite and quartzite layers in pelitic schist.

The Lake Murray gneiss is an orthogneiss with an age of 421 Ma (Samson and Secor, 2002). It contains amphibolite facies assemblages that include kyanite and staurolite. Numerous pegmatitic veins cut the gneiss, and a quartz diorite porphyry occurs as a layer of pegmatite; this must be something other than an Irmo (F4) fold.

The Irmo quadrangle supports the distribution of D4 structures, and the width of the Irmo shear zone is evident. On the basis of the distribution of D4 structures, it is thought that the dextral Irmo shear zone developed early to mid-Paleozoic deformation (post Cambrian deposition and pre Devonian intrusions) as associated with low- to medium-grade metamorphism. D1 deformation was manifested as an isoclinal folding event that developed in late Paleozoic time (post Ordovician). D1 deformation is recorded by the development of isoclinal folds of one deformational event look much like isoclinal folds from another deformational event. D1 deformation produced spectacular isoclinal folds of one deformational event that were refolded by D4 deformation.

D2 deformation (Modoc shear) recorded intense mylonitization associated with the Modoc shear zone. D3 deformation, a regional cataclasis event, is characterized by the development of open flexural slip folds. The Lake Murray gneiss is an orthogneiss with an age of 421 Ma (Samson and Secor, 2002). It contains amphibolite facies assemblages that include kyanite and staurolite. Numerous pegmatitic veins cut the gneiss, and a quartz diorite porphyry occurs as a layer of pegmatite; this must be something other than an Irmo (F4) fold.

Detailed mapping and structural analysis indicate that the Lake Murray Spillway is a region with a complex history of deformation and metamorphism. The Lake Murray gneiss is an orthogneiss with an age of 421 Ma (Samson and Secor, 2002). It contains amphibolite facies assemblages that include kyanite and staurolite. Numerous pegmatitic veins cut the gneiss, and a quartz diorite porphyry occurs as a layer of pegmatite; this must be something other than an Irmo (F4) fold.

Figure 3. Detail of Figure 2 and cross section showing potential detachment zone as modeled to the northwest. Early folds are interpreted to have developed due to the activities of the Modoc shear zone. D4 deformation is recorded by the development of isoclinal folds of one deformational event look much like isoclinal folds from another deformational event. D1 deformation produced spectacular isoclinal folds of one deformational event that were refolded by D4 deformation.

Key for analyzing F1 fold:

- F1 fold: isoclinal folding event that developed in late Paleozoic time (post Ordovician).
- F2 fold: regional cataclasis event recorded by the development of open flexural slip folds.
- F3 fold: regional cataclasis event associated with low- to medium-grade metamorphism.
- F4 fold: regional cataclasis event associated with the Modoc shear zone.
- F5 fold: regional cataclasis event associated with the Irmo shear zone.

Variation of Pumpelly’s Rule, large structures mimicking the small structures. Large scale 1:24,000, 1 sheet, 42 p. text.


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