Late Precambrian-Earty Cambrian orogeny in the South Carolina piedmont

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New U/Pb zircon dates and re-examination of map patterns strongly suggest a Late Precambrian-Early Cambrian orogenic event in the Carolina Terrane of South Carolina. This event is expressed in greenschist to amphibolite facies metamorphism and a regionally extensive schistosity or cleavage. In Spartanburg and Union Counties, we have dated deformed and metamorphosed and undeformed, unmetamorphosed plutons: two strongly foliated, metagranodiorites yield crystallization ages of 579 ± 4 and 571 ± 16 Ma. These plutons intrude metamafic volcanic rocks, and appear to contain all the fabric elements carried by the metavolcanic rocks. Heterogeneously deformed Means Crossroads complex metadiorite yields a crystallization age of 538 ± 5 Ma. An undeformed, post-metamorphic diorite intrudes the contact between Mean Crossroads metadiorite and mafic metavolcanic rocks. This pluton contains abundant equidimensional mafic enclaves and carries no solid state fabric. Two samples from this pluton yield crystallization age of 535 ± 4 and 541 ± 8/-4 Ma. The oldest $^{206}Pb^*/^{238}U$ from the latter indicates the minimum age for this pluton is 537 Ma. We interpret these data to indicate a deformation and metamorphic event *ca.* 570 to 537 Ma. In Kershaw County, the Longtown metagranite is heterogeneously deformed but not as strongly deformed as the Persimmon Fork Formation it intrudes: this may reflect contrasting rheology or grain size; it may also be that the pluton was intruded relatively late in the deformation. The Longtown metagranite yields a crystallization age of 550 Ma. In Lexington County, the trilobite-bearing, upper mudstone unit of the Asbill Pond formation is interpreted to lie in angular unconformity above the lower parts of the Asbill Pond. Middle Cambrian trilobites recovered from this unit are weakly deformed or undeformed. We interpret these data to indicate deposition of the upper trilobite-bearing mudstone following the 570 to 537 Ma event. We believe this unit represents the youngest preserved Paleozoic strata in the Piedmont of the Carolinas and Georgia (post-Richtex, post-Ablemarle Group). Therefore, the orogeny predates accretion of the Carolina Terrane to Laurentia: the Asbill Pond fauna is an Acado-Baltic assemblage that accumulated on the fringes of Gondowana. Hence, we believe that the structures and metamorphism we describe here are related to intra-arc rifting or changes in convergent plate boundary kinematics, or both, and not to be accretion of the Carolina arc to Laurentia.