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Zircon U-Pb ages of the mafic gneiss and leucogneiss from the Bailey Peninsula: Constraints on timing of tectonothermal events related to the amalgamation of Rodinia in the Windmill Islands, East Antarctica

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We report new geochronological data of the mafic gneiss and leucogneiss from the Windmill Islands , East Antarctica, in order to unravel the tectonothermal events related to the amalgamation of Rodinia. SHRIMP zircon U-Pb dating of the mafic gneiss (Hbl-Cpx-Opx-Bt-Pl-Qtz-Mag-Zrn) yielded early Mesoproterozoic magmatic ages of 1403±28 Ma from igneous cores, and middle Mesoproterozoic metamorphic ages of 1318±34 Ma from overgrown rims. The leucogneiss (Pl-Kfs-Qtz-Bt-Zrn) in the Bailey Peninsula has intrusive ages of 1257±51 Ma from magmatic origin zircon cores, and metamorphic ages of 1197±26 Ma from overgrown rims and/or structureless grains. The intrusive age of mafic gneiss indicates existence of a c. 1.40 Ga igneous activity in the Windmill Islands. This is likely the earliest igneous record in the Windmill Islands possibly relating to the final period of igneous activity of the Mawson Continent. The age of high-grade metamporphism of the mafic gneiss from the Bailey Peninsula can be constrained by the metamorphic zircon overgrowth at 1318±34 Ma, suggesting that the Windmill Islands were possibly involved in the Albany-Fraser-Windmill (East Antarctic) orogeny during the 1340-1140 Ma period. This study further supports the tectonic model in which the Windmill Islands and the Albany-Fraser Orogeny are parallel convergence during the Mesoproterozoic Rodinia amalgamation.