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Pliocene age of Meyer Desert Fm. (Sirius Group) Terrestrial Biota at Oliver Bluffs, Dominion Range: a Comparison of Diatom Floras from Glacial, Wind and Ejecta Pathways

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The age of the Meyer Desert Formation (Sirius Group) at Oliver Bluffs in the Transantarctic Mountains (TAM), and the terrestrial biota enclosed within these glacigene strata, has been a topic of discussion and disagreement. The Pliocene age derived from the occurrence of reworked late Miocene and early Pliocene marine diatoms within the enclosing sediments has been challenged by the assertion that the diatoms are surface contaminants. Reports of diatoms within Antarctic ice cores and on Antarctic surfaces in other areas of the TAM has provided an alternate explanation for the occurrence of the marine diatoms in the in the Meyer Desert Formation and other Sirius Group deposits. However, the diatom assemblage characteristics of the marine diatoms in the Meyer Desert Fm. and that of the eolian floras in ice cores and surface deposits are very different. These assemblages cannot be derived from the same source or delivered to the Meyer Desert Formation by the same processes. This paper will contrast these different diatom assemblages by comparing their (1) ecology, (2) size, (3) age, (4) taxonomic composition, and (5) potential source areas as criteria to establish the unique features of the glacial-sourced and the eolian-sourced diatom assemblages. Erosion of the face of Oliver Bluffs by a late Pleistocene advance of Beardmore Glacier, as well as ongoing erosion by wind deflation and snow-melt dissection of the Bluffs, produced fresh exposures of the Meyer Desert Formation, which were sampled for diatom analyses. These strata that yielded the marine diatom assemblages were not exposed at the time of the Eltanin asteroid impact (2.5 Ma, late Pliocene). The sampled strata have been exposed only recently to surface processes. Thus, the suggestion that marine diatoms were incorporated onto the surface of the

Meyer Desert Formation by fallout of impact ejecta at this location is untenable. However, if ejecta-sourced marine diatoms did blanket the ice sheet and TAM from the 2.5 Ma event, and these diatoms were subsequently picked-up by the ice that deposited the Meyer Desert Formation, they would indicate that the Meyer Desert Formation and enclosed biota was less than 2.5 million years old. Establishing the age of this important paleontological site is critical to the correct assessment of Late Neogene climate evolution of the Antarctic region. These results affirm the Pliocene age of the Meyer Desert Formation paleoflora and associated fauna.