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The Campbell Fault: structural data along a major right-lateral strike-slip fault system in north Victoria Land, Antarctica

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The Ross Sea Region, at the northeastern edge of the Antarctic Plate, is characterised by the widespread occurrence of post-rift right-lateral strike-slip fault systems. They strike northwest southeast and cut across north Victoria Land, connecting the passive margin of the Southern Ocean, to the north, with that of the western Ross Sea, to the south. The activity of these strike-slip fault systems started in Eocene times and caused the transition from orthogonal to oblique rifting in the Ross Sea. This tectonic architecture is unexpected in classical passive margins and suggests that a peculiar geodynamic scenario has been developing in the last 50-40 Ma in this region of Antarctica. The relevance of this scenario and the ongoing debate on it encourage additional research. In this contribution, we report on new structural data collected along the Campbell Fault, located along the homonymous glacier and surrounding areas. The fault system mainly cuts across granitic rocks, with minor metamorphic relics and volcanic rocks. Despite the principal displacement zone of this fault system is inferred to lie below the glacier, subsidiary fault data in the damage zones allowed us to constrain the kinematics of this major brittle shear zone. Many subsidiary faults have narrow cores of cataclastic rocks, sometimes including pseudotachylytes. Shear sense criteria were provided by grooves, corrugations, and by subsidiary faults and fractures associated to the master slip surfaces and, in few cases, by quartz shear fibres on slickensides. Structural data analysis indicates for this fault system a right-lateral strike-slip sense of shear, supporting previous inferences. Faulted Late Cenozoic volcanic rocks of the Mt. Melbourne volcanic complex indicate a recent tectonic activity of this crustal-scale shear zone. Our contribution provide further support to the role of major right-lateral strike-slip fault systems in determining the Cenozoic post-rift tectono-magmatic picture of Victoria Land and the Ross Sea.