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Contrasting Cenozoic landscape development across the western Ross Sea sector of Antarctica resulting from the interplay of tectonics, climate and lithology

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The western Ross Sea sector of Antarctica (northern Victoria Land) comprises the northern segment of the Transantarctic Mountains and its western hinterland. Regional basement is composed by a succession of terranes that were accreted onto the East Antarctic Craton during the Paleozoic, and is overlain by a sequence of Mesozoic sedimentary rocks, and Jurassic flood basalts. A distinctive crustal pattern developed with the initiation of the Gondwana breakup in the Jurassic, comprising the tectonic depression of the Rennick Graben, and Outback Shoulder and Admiralty Block forming its western and eastern flank, respectively. The morphology of both shoulders of the Rennick Graben differs considerably. The Outback Shoulder represents a typical landscape associated with unconfined ice flow and periglacial activity, consisting of summit plateaus, glacial erosion terraces, and circues basins. The well-developed, moderately to strongly weathered summit plateaus and striated ridges reach topographic altitudes up to ˜2800 m. Despite of the high topographic altitudes, Cenozoic denudation is mostly less 2000 m as indicated by existing and new apatite fission track data ([1], [2]). Moreover, cosmogenic isotope ages up to 11.2 Ma suggest that these glacial erosion surfaces belong to the oldest known exposure-dated surfaces on Earth [3]. In general, the topography on the weathering resistant metamorphic basement of the Outback Shoulder is largely preserved by a predominantly protective permanent ice shield. Tectonic influence on landscape evolution is only obvious towards the Ren-

nick Graben where substantial denudation up to 4 km occurred since the Late Cretaceous ([1], [2]). In contrast to the Outback Shoulder, the morphology of the Admiralty Block is much more controlled by channelled ice flow. The major part of the Admiralty Block shows a high-Alpine topography characterised by arêtes, horns and glacial troughs. The highest peaks reach elevations in excess of 4000 m, and the maximum relief between summits and glacier valley bottoms may be in the same order. The rates and amounts of Cenozoic denudation vary considerably within the Admiralty Block, but commonly exceed 80 m/My, and 5000 m, respectively [1]. Cosmogenic isotope data indicate surface exposition since the Late Pliocene [3]. The landscape evolution of the Admiralty Block is very much the result of tectonic activities, in particular of the rifting of the Cenozoic West Antarctic Rift System. Relief formation and differential denudation were intensified by the presence of unconsolidated cover rocks and the contrast of (protective) dry freezing in high altitudes and wet glacial erosion in the valleys near sea level, and by the respective isostatic rebound.

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