M.Sc. Thesis Abstract: Late Pleistocene Geocryology of the Bogong High Plains

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The Bogong High Plains comprises fragmented, elevated surfaces (at 1600m to 1986m elevation), of low to moderate relief and contains relic cryogenic features. Conclusive evidence of glacial features has not been observed on the Bogong High Plains.

This thesis has examined the distribution of the cryogenic features and their lateral equivalents in the adjoining valleys of the Mitta Mitta and Kiewa Rivers, with a view to defining processes active in the late Pleistocene. The stratigraphy of thirty-six sites in these valleys reveals relic alluvial fans on the valley sides and in the piedmont zone up to 1200m ASL. These relic alluvial fans correlate with relic cryogenic features at higher altitudes.

Three areas at Mt Nelse, Basalt Hill and Pretty Valley were targeted for detailed description and analysis of surficial geology. The cryogenic features defined from this study have been compared to those described in other studies of Alpine areas in south-eastern Australia.

The suite of relic cryogenic features mapped and described in detail includes: cryoplanation surfaces, nivation hollows, blockfields, block glaciis, block slopes, block streams and talus. The differentiation of these block deposits is based on distribution patterns controlled by slope angle, aspect, prevailing wind direction, altitude range and availability of moisture, as well as the availability of appropriately jointed bedrock, such as basalt and granodiorite. There would appear to be an associated suite of transport mechanisms ranging from low angle (<2°) transport of cobbles and blocks by frost creep and possibly gelification to high angle (230°) rolling and sliding downslope.

Surface features, including thermokarst, on some of the block accumulations suggest considerable interstitial ice during the period of accumulation.

The relic status of block accumulations is evident from encroaching vegetation, insitu weathering and adjoining stratigraphy. Frost wedging and associated frost creep appear dormant now and the shallow depth of seasonal frost prohibits gelification within the present climate. The development of blockstreams and blockslopes which bear thermokarst pitting would appear to have required deep seasonal freezing and accretion of interstitial ice as lenses or blisters near the water table beneath the block layer.

The model for accumulation of these block deposits presented in this thesis requires deep seasonal freezing without the need for permafrost conditions. Mean annual temperatures of about 0°C would have been necessary to preserve interstitial ice down to about 1300m ASL, during the period of accumulation.

Relic nivation hollows at 1500m to 1600m ASL suggest a minimum 5°C decrease in average temperatures during the last cold climate phase. The lateral equivalents of these block deposits in the adjoining valleys (relic alluvial fans) suggest semi-arid conditions with at least 50% less precipitation than present.

Transistion of the above relic cryogenic features towards rock glaciers is suggested in the Kosciusko area, which is generally 300m higher than the Bogong High Plains. Increased snow accumulation and increased depth of freezing in the Kosciusko area may account for this transistion.

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