



An extreme average annual precipitation gradient measured in a lee mountain catchment, South Island, New Zealand

T. Kerr (1), I. Owens (1), R. Henderson (2)

(1) The Department of Geography, University of Canterbury, Christchurch, New Zealand, (2) National Institute of Water and Atmospheric Research Ltd, Christchurch, New Zealand.
(trk21@student.canterbury.ac.nz / +64 3 364 2987 ext. 4842)

The Lake Pukaki catchment lies immediately south-east of the Southern Alps of New Zealand, in the lee of the Main Divide from the predominant westerly conditions at 43.7°S, 170.1°E. The 1360 km² catchment ranges in elevation from 524 m (the lake level) to 3754 m, the height of New Zealand's highest peak, Aoraki/Mt Cook.

Precipitation data were obtained from numerous current and historic gauges of a range of types and measurement periods. Short term measurement sets were compared to long term sites to establish average annual precipitation totals. Prior to 2006, most gauges have been located at low level, accessible sites. Since February 2006, a number of new gauges have been operating at more remote locations enabling sampling of the higher precipitation regions and the extension of the measured precipitation gradient profile. The new set of measurements used gauges without wind shields, with a 2 m orifice height and tended to be in cooler environments with regular snowfall through the winter months. No attempt to account for gauge undercatch has been made so the measurements at these high precipitation sites may be considered conservative.

Within the Lake Pukaki catchment, precipitation measurements indicate an average annual precipitation from 606 mm in the south east to over 15000 mm, 72 km to the north. While the precipitation is greater in the more mountainous region of the catchment, precipitation measurements have poor correlation with elevation. The precipitation gradient appears more closely related to the distance to a southwest-northeast line which represents the barrier that the Southern Alps presents to the predominant westerlies. An empirical relationship between the distance to this line and annual av-

average precipitation in the Pukaki catchment is of an exponential form. This form is similar to other assessments of Southern Alps catchments flowing to the east coast of New Zealand. However the magnitude is much greater than previously established such that the largest estimated gauge average annual precipitation is comparable to maximum values for the world.