

Large-scale climate control on lake inflow in the Waitaki basin, New Zealand

DANIEL G. KINGSTON¹, CLARE S. WEBSTER¹ & PASCAL SIRGUEY²

1 Department of Geography, University of Otago, PO Box 56, Dunedin, New Zealand
daniel.kingston@otago.ac.nz

2 School of Surveying, University of Otago, PO Box 56, Dunedin, New Zealand

Abstract Improved understanding of causes of inflow to the main headwater lakes of the Waitaki basin (South Island, New Zealand) is an important challenge of direct practical relevance due to the role of this basin for hydroelectric power generation. This challenge is addressed here via investigation of large-scale climate drivers of monthly inflow to the three main Waitaki headwater lakes, Ohau, Pukaki and Tekapo. Analyses are undertaken using a novel combination of composite, correlation and wavelet analyses. Composite analysis indicates that variation in lake inflow is driven primarily by the strength of the NE–SW pressure gradient over the three lakes (i.e. parallel to the axis of the Southern Alps, from which the lakes originate). Correlation and wavelet analysis indicates that these conditions are described well by the MZ1 and MZ2 New Zealand-based circulation indices, but not larger-scale modes of atmospheric circulation.

Key words lake inflow; large-scale climate; atmospheric circulation; Trenberth indices; New Zealand