Mid-latitude trans-Pacific reconstructions and comparisons of glacial advances based on soil stratigraphy of coverbeds

Alloway, B.V., [1,2], Almond, P.C., [3], Moreno, P.I., [4]; Sagredo, E., [5] Tonkin, P.J.[6]

[1] *School of Environment, The University of Auckland, Private Bag 92019, Auckland, New Zealand*

[2] *Centre for Archaeological Science (CAS), School of Earth and Environmental Sciences, University of Wollongong, Wollongong, NSW 2522, Australia*

[3] *Department of Soil and Physical Sciences, Faculty of Agriculture and Life Sciences, PO Box 8084, Lincoln University, Canterbury, New Zealand.*

[4] *Instituto de Ecología y Biodiversidad, Departamento de Ciencias Ecológicas, Universidad de Chile, Casilla 653, Santiago, Chile*

[5] *Instituto de Geografía, Pontificia Universidad Católica de Chile, Av. Vicuna Mackenna 4860, Santiago, Chile*

[6] *16 Rydal Street, Christchurch 8025, New Zealand*

South Westland and Southern Chile are narrow piedmonts confined between the ocean in the west and high mountain ranges in the east, which influence regional climate. In both these southern mid-latitude regions, evidence for extensive and repeated glaciations during cold and/or cool climate phases of the Quaternary manifests as arrays of glacial drift and associated outwash plains. In South Westland, these glacial landforms are mantled by layered (multisequal) soils characterised by slow loess accretion and pedogenesis in an extreme leaching and weathering environment. These cover-bed successions have undergone repeated phases of topdown and upbuilding soil formation that have been related to fluctuating cycles of Interglacial/warm and Glacial cool-cold climate during the Quaternary. Similarly, soil cover-beds overlying glacial landforms in southern continental Chile show multisequal soils but unlike those Podzol soils of South Westland, these are of dominantly volcanigenic (andic) provenance and are very similar to multisequal soils of andic provenance in western North Island, New Zealand. In order to explain the observed occurrence of multisequal soils mantling the glacial landforms of southern continental Chile, we develop a soil-stratigraphic model based on soil genesis analogues from New Zealand. Based on proxy data from southern Chile, we propose that conditions during cold and/or cool climate episodes tended to suppress the widespread production of loess despite extensive loess sources. In the absence of a loess flux, a constant input of Andean-sourced tephra continued to upbuild soils at the ground surface.