

## **New Zealand as a Potential Source of Mineral Dust to the Atmosphere and Ocean during Glacials**

B. Koffman<sup>1,2</sup>, S.L. Goldstein<sup>2</sup>, G. Winckler<sup>2</sup>, M. Kaplan<sup>2</sup>, L. Bolge<sup>2</sup>, Y. Cai<sup>2</sup>, C. Recasens<sup>2</sup>, T. Koffman<sup>2</sup>

<sup>1</sup>Department of Geology, Colby College, 5800 Mayflower Hill Dr., Waterville, ME 04901; bess.koffman@colby.edu

<sup>2</sup>Lamont-Doherty Earth Observatory of Columbia University, 61 Route 9W, Palisades NY 10964

During past glacial climates, much of the South Island of New Zealand (NZ) was blanketed by temperate erosive glacier systems, which significantly would have enhanced sediment and dust production. We systematically characterized the geochemical compositions of likely sediment- and dust-producing regions from the NZ South Island. We observe a strong relationship between sediment geochemical composition and geologic setting. Specifically, sediments from the central South Island, including the Canterbury Plains and Mackenzie Basin, where glaciers eroded mainly the Torlesse Greywacke, have a relatively homogenous isotopic composition, with  $^{87}\text{Sr}/^{86}\text{Sr} = 0.7095\text{-}0.7165$ ,  $\epsilon\text{Nd} = -6.5$  to  $-4.0$ ,  $^{206}\text{Pb}/^{204}\text{Pb} = 18.75\text{-}19.04$ ,  $^{207}\text{Pb}/^{204}\text{Pb} = 15.65\text{-}15.68$ ,  $^{208}\text{Pb}/^{204}\text{Pb} = 38.68\text{-}38.93$ . Southern South Island sediment sources, including southern Otago and Southland, show younger crust formation ages and more variable Sr and Nd isotopic compositions, reflecting the presence of Paleozoic volcanic complexes. Here  $^{87}\text{Sr}/^{86}\text{Sr} = 0.7041\text{-}0.7140$ ,  $\epsilon\text{Nd} = -4.0$  to  $+5.3$ ,  $^{206}\text{Pb}/^{204}\text{Pb} = 18.71\text{-}18.92$ ,  $^{207}\text{Pb}/^{204}\text{Pb} = 15.62\text{-}15.65$ ,  $^{208}\text{Pb}/^{204}\text{Pb} = 38.44\text{-}38.87$ . During the Last Glacial Maximum, glacial outwash and associated fluvial systems were greatly expanded relative to present day, especially given a sea level lowering of 130 m. We suggest that the NZ South Island, though limited in extent compared to larger southern landmasses, may have served as an important source of dust and sediment during ice age climates.