

Development of textural differentiation in soils: a quantitative analysis

Thesis submitted in accordance with the requirements of the University of
Adelaide for an Honours Degree in Environmental Geoscience

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November 2012



THE UNIVERSITY
of ADELAIDE

TITLE

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RUNNING TITLE

Textural differentiation in soils

ABSTRACT

A soil profile exhibiting strong textural differentiation between surface and subsurface horizons at Keyneton, South Australia, was sampled for quantitative and qualitative analyses of the processes responsible for development. From constant resistant mineral ratios throughout the profile it was concluded that the soil had formed from uniform parent material, suggesting that pedological processes had heavily influenced formation. Particle size distribution, clay mineralogy determined by XRD, and microstructural features indicated that clay accumulation in the subsurface was accompanied by a greater intensity of weathering in the surface horizons. The presence of void argillans in the B horizon provided strong evidence for the translocation of clay. Mass balance calculations showed significant volumetric expansion and mass gain throughout the entire profile, but greatest in the B horizons. Al, Fe, Na and Si were all gained in large quantities. The results indicate that clay translocation by illuviation is a dominant process in the development of textural differentiation, with some clay likely to have formed *in situ*.

KEYWORDS

Alfisol, Natric Palexeralf, texture contrast soil, duplex, red-brown earth, pedogenesis, clay translocation, eluviation, illuviation, weathering, mass balance.

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