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Depositional patterns at Drift 7, Antarctic Peninsula: along-slope versus down-slope sediment transport as indicators for oceanic currents and climatic conditions

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Understanding the processes and phases of deep-sea sediment drift formation is essential for a reconstruction of their evolution. This leads to a better understanding of the properties of oceanographic currents active during drift formation and in turn to information on the climatic conditions. A system of sediment drifts at the Antarctic Peninsula Pacific rise has been chosen to learn more about the Neogene evolution of both current systems and palaeo-climate in that area. Drift 7 was extensively surveyed (seismic and sampling), and two ODP Leg 178 sites were drilled there. Using this information maps of reflectors depth and seismic unit thickness were compiled and interpreted regarding the controlling depositional processes. The depositional model shows an initially major along-slope sediment transport by a SW-setting bottom current (25-15 Ma), which deflected sediment supplied from the continental shelf. Between 15 Ma and 9.5 Ma down-slope transport took over as a result of the growth of the Antarctic Peninsula ice sheet. The SW setting bottom current appears to have broken down. Down-slope transport has decreased since 9.5 Ma, but a re-onset of the bottom current can only be observed since 5.3 Ma. The analysis has further shown that the nucleus of the drift is connected to a basement ridge. It is hence inferred that basement topography played a major role in the formation of this sediment drift.