



ANTARCTICA NEW ZEALAND INFORMATION SHEET

CONNECTIONS BETWEEN ANTARCTICA AND NEW ZEALAND

New Zealand and Antarctica originally formed part of the super-continent Gondwana. About 80 million years ago, New Zealand rifted from Antarctica and drifted northwards. The subsequent evolution of the circum-Antarctic seaways and major ocean currents between the two are considered to have led to the thermal isolation of Antarctica. This thermal isolation led to the development of the cryosphere (with its subsequent role on the climate and weather patterns of the region) and the present global ocean circulation system.

A knowledge of the evolution of the Antarctic/New Zealand region and the atmospheric, biological, geological, and oceanographic processes which have acted there (either as a cause or a result of this evolution) is essential for understanding the present environment and ecology of the region and their future development. These processes are closely related to the geological resources and hazards of New Zealand, climate and weather, bio-diversity and adaptation, physical oceanography and marine resources, and regional pollution transfer. Studies of the commonalities and linkages between Antarctica and New Zealand are therefore of great importance to New Zealand in two ways. First of all, to better understand the present New Zealand situation through understanding the regional evolution (e.g. New Zealand geological resources). Second of all, to understand the present direct interaction between the Antarctic and New Zealand environments by regional processes (e.g. weather).

The close proximity of New Zealand to Antarctica and the regional to hemispheric scale of many natural phenomena (e.g. weather, ocean circulation, pollution) results in processes in Antarctica impacting on New Zealand or being part of an Antarctica - New Zealand (and wider) process or system. For example an El Nino Southern Oscillation (ENSO) component has been noted in recent work on Antarctic climate, the development of the ozone hole over Antarctica is affecting the level of ozone over New Zealand as it spreads and breaks up in the late spring/summer. The Antarctic region plays a crucial role in Southern Hemisphere weather.

The geological resources and hazards of New Zealand are of fundamental importance to the New Zealand economy and society. The geology of the New Zealand region, and its associated resources and hazards are intimately related to its evolution, with Antarctica, originally as part of the super-continent Gondwana, and subsequently as separate continental fragments. The evolution of the two regions are linked by plate tectonic processes, and also provide the basis for the development of the present global ocean current system and for the bio-diversity of the region.

An understanding of the accretion of terranes to the Gondwana margin in the Ross Sea region, the process involved in these events, the subsequent fragmentation and northwards drift of New Zealand about 80 million years ago, and the present plate tectonic processes provide the essential framework for our understanding of resource and hazard.

The geological evolution of Antarctica and the Southern Ocean since the break-up of Gondwana is the result of fundamental earth processes which are still active at the present time. These processes have influenced the development of the Antarctic ice sheets, the landforms of Antarctic and the evolution of

the Southern Ocean. The processes causing the unique features of present day tectonics in Antarctica (e.g. the aseismic nature of Antarctica where active tectonism is occurring) cannot be separated from the global and regional plate tectonic processes.

The active earth processes of basic soil science, weathering and mineralogy, geochemistry, permafrost, hydrology and geomorphology have contributed significantly to the knowledge of events in Antarctica from the Oligocene or early Miocene period to the present. Associated with the understanding of this evolutionary process, the investigation of unique features, such as the major rift mountain chain - the Trans-Antarctic Mountains, the unusual volcanic rocks of the Mount Erebus, provide understanding on generic geologic processes of importance for New Zealand and global tectonic processes.