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## THE FOUNDATIONS OF SOUTH AUSTRALIAN GEOLOGY : 1802-1860

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### ABSTRACT

The Colony of South Australia was founded at a time when the science of geology was developing rapidly and increasing in popularity among all levels of society. Adelaide, the foundation city, had good reason to foster its 'sense of difference' from the other colonies in Australia, being largely isolated from them, but also, and more significantly, because it had been established by free settlers. Among these was a group of well-educated men concerned with geological matters partly from necessity and the need to locate useful natural resources but equally, imbued with a well-developed sense of intellectual curiosity. The early observations were made by explorers, surveyors and interested laymen who applied their imported concepts and ideas in the new and unknown land. Their writings reflect the varied strands of current thought during this formative period in the history of geology and their investigations, though uncoordinated, provided a foundation upon which later workers were able to build as the century progressed.

## A HISTORY OF GEOLOGICAL EXPLORATION IN THE CANNING BASIN, WESTERN AUSTRALIA

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### ABSTRACT

The Canning Basin in northern Western Australia is a large, relatively remote, mainly desert-covered Phanerozoic basin covering 595 000 sq km. Aborigines probably first entered the basin area 30-40 000 years ago, but the main European expeditions were not until the nineteenth and twentieth centuries. Geological exploration in the basin has been largely devoted to the discovery and exploitation of natural resources, primarily oil. Earliest geological traverses were conducted by geologists of the Geological Survey of Western Australia (GSWA). The accidental discovery of traces of oil in a water well in 1919 in the northern part of the basin diverted exploration to assessment of sediments and structures for petroleum potential. The earliest phase of oil exploration was a pioneering phase, concentrating on surface mapping and surface delineated structures as drilling sites, that was dominated by the Freney Kimberley Oil Company. West Australia Petroleum Ltd became the most active oil exploration company in the 1950s, 1960s and 1970s, using geophysics as an exploration tool in petroleum search in the basin. The late 1970s and 1980s saw an influx of companies and the application of diverse scientific approaches to the oil search. Persistence was rewarded in 1981 and 1982 with the discovery of the Blina and Sundown fields, small commercial oil accumulations. Commonwealth Government involvement in exploration was initially in the form of financial aid to exploring companies or commissioning specialist consultants for special studies. In the 1940s and 1950s

and again in the 1970s the Bureau of Mineral Resources carried out basin-wide regional geological mapping in conjunction with the GSWA; onshore and offshore geophysical surveys were conducted until the 1970s. Exploration has revealed exploitable resources in the basin besides oil - diamonds, lead-zinc, coal, salt, phosphate, uranium, and heavy minerals. Only lead- zinc has present economic viability.

## GEOPHYSICS IN AUSTRALIA

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### ABSTRACT

Geophysical observations began in Australia with the arrival of the first European explorers in the late 18th Century and there have been strong connections with European and North American geophysics ever since, both in academic and exploration geophysics. Government institutions, particularly the Bureau of Mineral Resources, have played a large part in the development of the subject in Australia, certainly more so than in North America. Academic research in geophysics has been dominated by that at the Australian National University. Palaeomagnetic research at the Australian National University has been particularly valuable, showing the large northerly drift of the continent in Cainozoic times as part of the Australia-India plate. Heat flow, electrical conductivity and upper mantle seismic velocities have been shown to be significantly different between Phanerozoic eastern Australia and the Western Shield. Geophysical exploration for metals and hydrocarbons began in the 1920s but did not develop strongly until the 1950s and 1960s. There are relatively few Australian geophysical companies and contracting companies, and instrumentation from North America and Europe have played an important role in exploration. Exploration for metals has been hampered by the deep weathered mantle over much of the continent, but the development of pulsed (transient) electromagnetic methods, including an Australian instrument (SIROTEM), has improved the situation. Geophysics has been important in several discoveries of ore-bodies. In hydrocarbon exploration the introduction of common depth point stacking and digital recording and processing in reflection surveys have played an important part in the discovery of offshore and onshore fields, as in other countries.

## A HISTORY OF RESEARCH ON HUNTER FAULT SYSTEM OR "LINEAMENT"

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### ABSTRACT

The Hunter Fault System or "Lineament" separates the Permian and Triassic of Sydney Basin in New South Wales from the relatively complicated region to the north and east with exposed Carboniferous and older rocks and an increasing amount of identified Permian. David in his inimitable fashion grasped the essentials in 1907. He noted that the fold movements began towards the end of the Upper Permian with an important phase between the Upper Coal Measures and the Narrabeen Series. He also noted the main north-south component. The interest kindled by David was reflected in the work of Browne, Carey, Osborne, Raggatt, and Voisey.

These workers established that the Carboniferous was affected by tectonic movement prior to the Permian and that the main ("orogenic") folding of the Permian/Triassic began with deposition of the Muree Formation and continued during the Upper Permian with overthrusting at the end of the Permian followed by strong rotational stress. This entire episode was called the Hunter-Bowen Movement by Carey and Browne in 1938. They also noted that the area of the subsequently developed Sydney Basin supplied sediment in the Carboniferous to the north and east. Raggatt, in his unpublished thesis of 1938 had already concluded that increasing compression led to upthrusting and eventually to torsion. Much of this seems to have been lost sight of in recent work. Current work confirms that the Permian/Triassic folding began with the MuGee and that prior to this in the Permian a northwest to southeast graben was present to the south and west of the Hunter structure. Prior to the Permian the area of the Sydney Basin supplied detritus in the Carboniferous north and east of the Hunter structure apparently indicating a long-lived structure or lineament on which a reversal of movement took place.