8th ANZGG Goolwa Conference
Pre-conference field excursion, November 1998

Geomorphology and landscape evolution: regolith, volcanism, neotectonics and fluvial geomorphology

Brian Finlayson, Bernie Joyce, Ian Rutherfurd & Ken Grimes

Friday 13th

Leave Melbourne 9 a.m.
a.m. Basalt Plains, Rowsley Fault scarp at Bacchus Marsh, plateau and ridges and neotectonic domes of the West Victorian Uplands around Ballarat (morning tea & buy lunch to take with us).
p.m. Skipton, basalt plains flow sequence mapping using regolith, with use of radiometrics and Landsat, in the Skipton-Lake Bolac area (afternoon tea).
Neotectonics, uplifted Tertiary shorelines and lateritic profiles around Chatsworth, also with use of radiometrics (Bernie Joyce - current research, and proposed 1999 Honours project for the GSV).
Past southern end of the Grampians Range at Dunkeld.
3 p.m. Byaduk lava caves in the young stony rise valley flow from Mt Napier, perhaps Victoria's youngest volcano - underground study, or surface study of Byaduk flow and Wallacedale tumuli (Ken Grimes) and discussion of proposed heritage "Volcanic Trail".

Overnight at Hamilton

Saturday 14th

a.m. Coleraine, Bryan's Creek sediment slugs (Ian Rutherfurd). Neotectonics, uplifted Tertiary shorelines and lateritic profiles developed on many rock types around Balmoral and Harrow (Dundas Tablelands area) again illustrating the use of radiometrics for regolith and landscape mapping (Bernie Joyce; Honours project by Natalie Quinn 1997). Soil studies information (Rob Fitzpatrick and others, CSIRO Glen Osmond).
p.m. Lunch at historic Harrow; Glenelg River at Harrow - sediment slugs (Ian Rutherfurd).

Overnight at Penola

Sunday 15th

a.m. To Naracoorte passing Fr Woods Tree and Coonawarra wineries, and discussion *en route* of proposed legal restriction of viticultural regional boundaries ("terroir") and relation to extent of terra rossa soil on Padthaway Formation and published soil and regolith mapping. World Heritage Victoria Fossil Cave - special inspection arranged for 8.30 a.m. by Ken Grimes.

End of cave visit at ca.10 a.m.
Then either:
Coast at Kingston, cross-section in Last Interglacial barrier, at the Woakwine Cutting, The Coorong, at Salt Creek the Last Interglacial shoreline (walk half a km up the dry creek) aboriginal middens and cemeteries, Meningie, Lake Albert, ferry, Lake Alexandrina, Strathalbyn, Goolwa (~366 km).
or:
continue north on inland road, with stop just south of Keith at Mt Monster quarry with regolith development on former granite island in the Quaternary sea, Keith, Tailem Bend and ferry, Lake Alexandrina, Strathalbyn, Goolwa (~333 km)

Arrive Goolwa late-afternoon to register for conference.

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Melbourne to Hamilton

Bernie Joyce

En route across the basalt plains northwest of Melbourne

Travel from Melbourne across the treeless grassland basalt plains with gilgai and stone fences, indicating the Dunkeld Regolith Terrain Unit of 2 to 3 Ma, and red to black gilgai soils,with eruption points of Mt Cotteril and Mt Kororoit, and occasional shallow valleys such as Toolern Creek with red gums.

Beyond Melton, road cuttings as the road descends into the Korkuperrimul Creek valley show deeply-weathered pale kaolinitic (pallid zone) Ordovician sediments, overlain by the basaltic lava of the plains with a red-brown to black cracking clay soil, but also with Tertiary gravels and sands.

En route - Anthony's Cutting

In the following major cutting, as we descend into the Bacchus Marsh, we can see the lava flow from Mt Bullengarook, to the north (right), which has been dated by K/Ar at 3.31 & 3.64 My, i.e. Pliocene. Note especially the exposures seen in the left-hand wall of the cutting, of a single lava flow, with alluvial clays and sand above the lava flow, and similar sub-basaltic sediments with some reddening by iron oxide just below the base of the flow. The deeply weathered bedrock is not exposed here.

After passing Bacchus Marsh the road rises up the Rowsley Fault scarp of over 300m to a plateau with extensive views back to the Port Phillip Sunkland and the city of Melbourne. The plateau extends ahead to Ballarat and the Great Divide near Creswick. On the climb up to the plateau road cuttings show yellow weathered Tertiary non-marine clays, red weathered Older Volcanic lava flows, and later:

Regolith on Permian glacial sediments - en route without stopping

The road cutting just before Pykes Creek reservoir, especially to the left of the bus, shows poorly bedded or nonbedded facetted and striated pebbles and boulders in a fine matrix, a typical tillite, but also with lenses of fluvioglacial sands and gravels. A yellow podsolic soil is present. The pebbles, including many exotic types, vary from fresh, through spalling and

cracking, to rotten. A characteristic purplish colour marks exposures of this regolith.

As the road rises onto a young basaltic lava plateau, eruption points can be seen to the north and south, and in the distance higher ridges on Ordovician sedimentary rocks and granites. Newer Volcanic lava flows extend to Ballarat, with major eruption points such as the scoria cone of Mt Warrenheip (Joyce 1992).

Ballarat (toilet and coffee stop)

Leaving the main street of Ballarat along the Skipton Road, the road crosses a wide basalt-filled valley beyond the city limits, and rises onto hills on Ordovician bedrock with a box-ironbark woodland.

Cuttings show typical profiles of bedrock regolith. The original bedrock lithologies of interbedded sandstone and mudstone are weathered to a kaolinitic pallid saprolite of sandy clays split open along cleavage. On the preserved parts of the early Tertiary surface such weathering extends to tens of metres depth. Above the saprolite is a duplex soil that consists of a stony topsoil of sandy loam characterised by angular quartz fragments above a mottled cracking clay subsoil (Taylor & Joyce 1996).

Fringing aprons of outwash fans and braid plains of White Hills Gravel cover the flanks of the Early Tertiary hills. Onlapping deposits such as this and many hilltop remnants at the same elevation allow reconstruction of the early Tertiary surface with its protruding interfluves of bedrock above the valleys filled with gravel. The gravel contains a mixture of well rounded vein quartz clasts recycled from the Mesozoic palaeosurface and more angular, locally derived vein quartz clasts. Old gold workings including sluiced areas show ferruginised and silicified gravels overlying thoroughly kaolinised bedrock. The remobilised nature of the material is shown by its high sphericity and moderate sorting, despite the proximity of the deposit to bedrock hills. The gold tends to be concentrated at the base of the gravels, but in many proximal deposits the grades were high enough throughout for the entire deposit to have been sluiced. Working of these deposits by sluicing has contributed to the deposition of Post Settlement Alluvium along nearby drainage lines.

The natural erosion of these Early Tertiary gravels supplied much of the gold for the later sub-basaltic placer deposits known locally as "deep leads" (Taylor & Joyce 1996).

At Smythesdale views to the valley floor on the right show areas disturbed by alluvial mining; Post Settlement Alluvium occurs along this valley floor. At Scarsdale mullock heaps mark the lines of sub-basaltic deep lead deposits.

The road crosses a forested high metamorphic aureole ridge to the more open farmed landscape of the Pittong granite. Deep pallid profiles are mined to the left of the route.

At Skipton the road runs down onto the Western Victorian Volcanic Plains which extend westwards to Hamilton. Several stops will be made to examine examples of Rouse, Dunkeld and Hamilton Regolith Terrain Units on the basaltic lava flows (Joyce in press, Regolith '98 publication)

Beyond Lake Bolac, with a lunette on its eastern margin, weathering profiles of lateritic type developed on a range of rocks including the Cambrian greenstone of the prospective Mt Stavely axis can be seen in road cuttings.

Deep kaolinitic weathering profiles may be seen on Ordovician sediments in a brick pit north of highway at Glen Thompson.

An excellent view of the southern edge of the Grampians Range near Dunkeld is followed by a traverse of a deeply-weathered basalt plain demonstrating the Hamilton RTU.

Hamilton
About 4 hours from Melbourne

The excursion goes south from Hamilton on the Port Fairy road to the Byaduk Caves reserve on Harman valley flow from Mt Napier volcano; downstream on the same flow are the Wallacedale tumuli. This young Holocene-age flow has been mapped as the Eccles RTU (Ollier & Joyce 1986).

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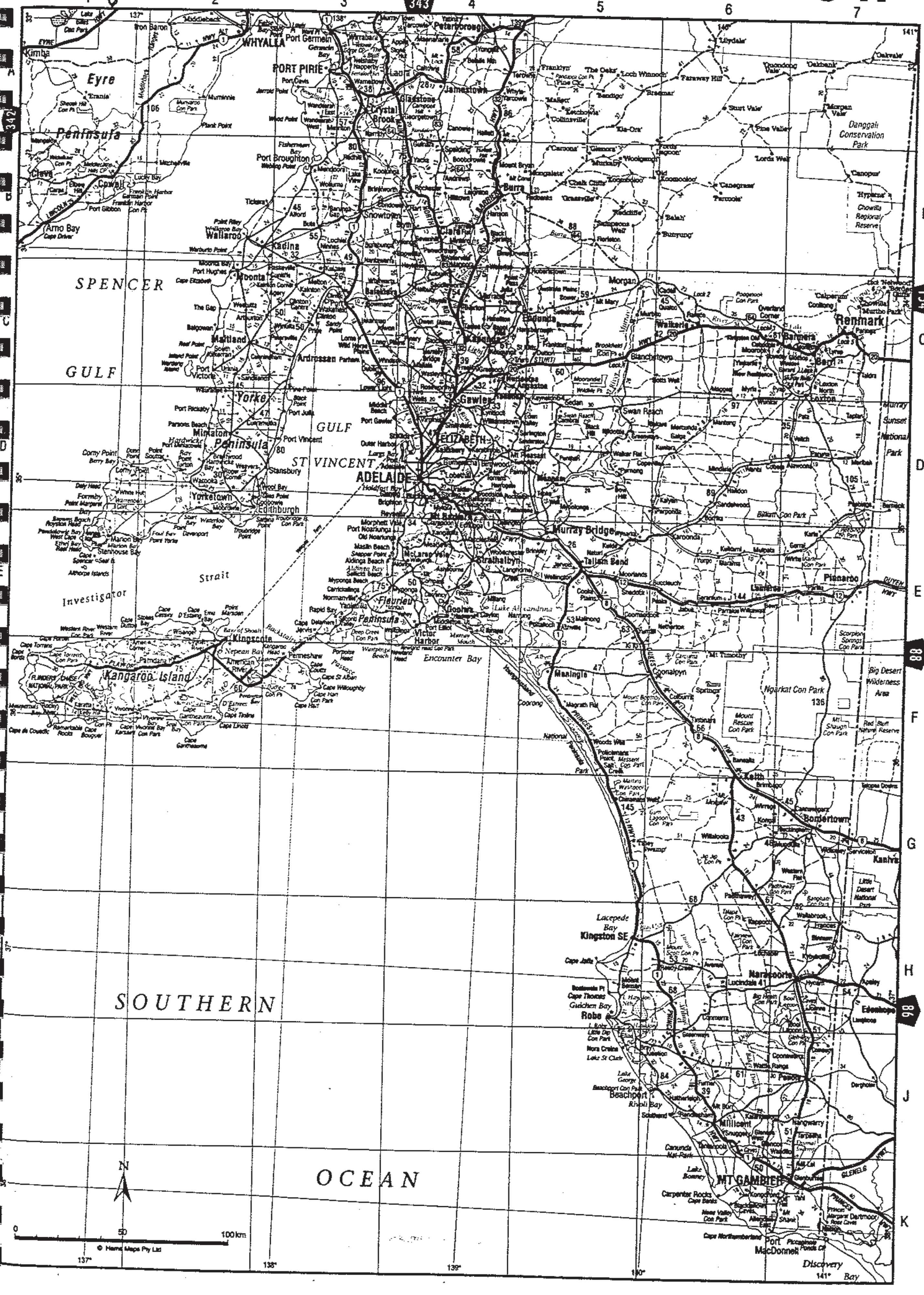
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Burra
Wallaroo
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Maitland
Ardrossan
Port Victoria
Minlaton
Yorke
Peninsula
Stansbury
Yorketown
Edithburgh
Clare
Balaklava
Kapunda
Gawler
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ADELAIDE
Mt Barker
Murray Bridge
Tailem Bend
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Peninsula
Victor Harbor
Goolwa
Encounter Bay
Lake Alexandrina
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Meningie
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