Geological History of the Cooma area

Information compiled by Dr Paul Lennox

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The outcropping sedimentary rocks in the Cooma area are mainly Early Paleozoic (Ordovician ~ 440-490 million years old) thinly bedded sandstones and mudstones (Johnson *et al.* 1994). They were deposited in the seas eastward of the older continent. They have been metamorphosed (heated) and deformed causing melting in some places forming migmatites (Figure 1) and in others creating new minerals.

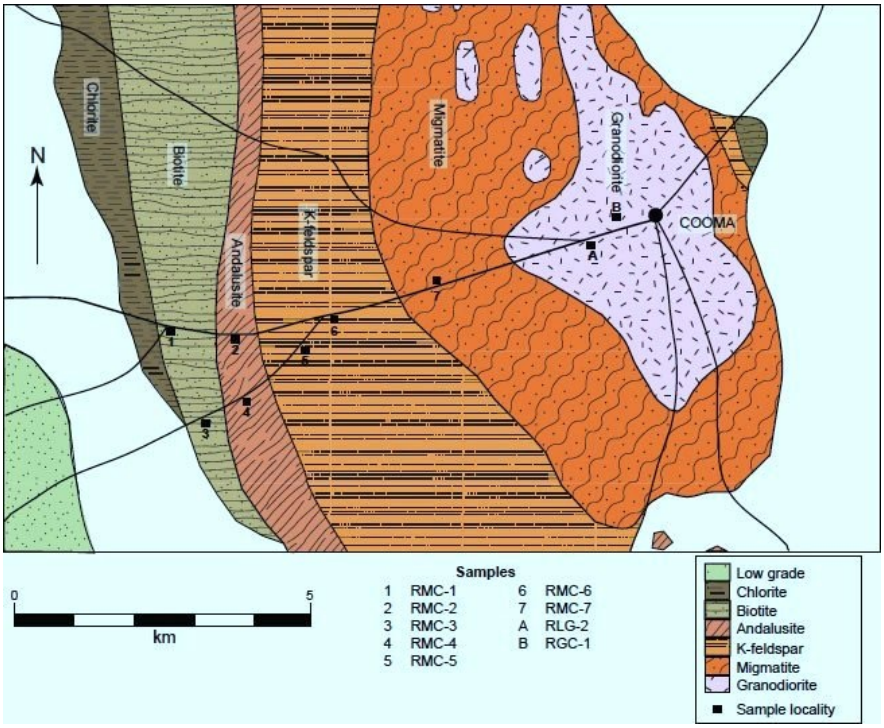


Figure 1. Geological map of the Cooma Complex (granodiorite + metamorphic zones) with the main roads, Cooma Granodiorite and metamorphic zones from low grade to K feldspar and melted rock (called migmatite).

This melting occurred around 440 million years forming the Cooma Granodiorite. The N-S elongated Cooma Granodiorite lies under and around Cooma township (Figure 1) and with its extensive surrounding partially molten rock (migmatite) outcrops over 30 km^2. The geological map in Figure 1 shows the km-wide metamorphic zones west of the township which are named according to their key minerals; from low grade, chlorite, biotite, sillimanite & andalusite in the west to K feldspar (high grade). The wider metamorphic zones to the west may reflect tilting of the rock column after the Cooma Granodiorite intruded by either folding or faulting (Figures 2- 3).

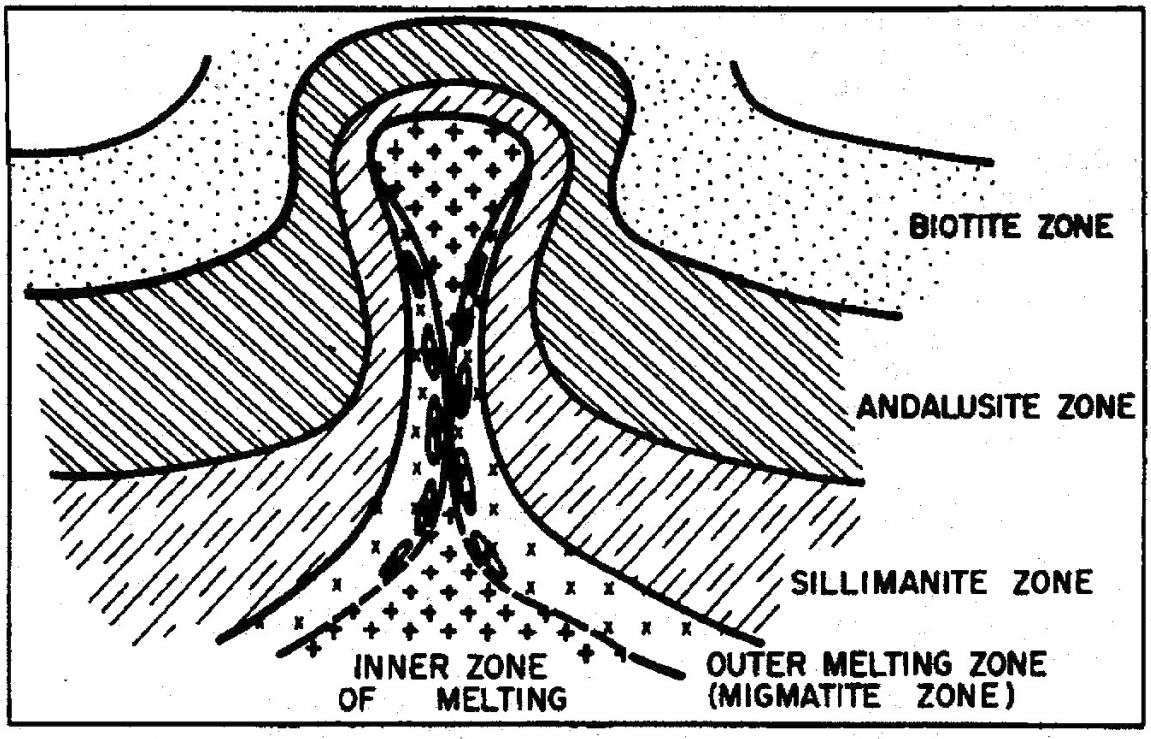


Figure 2. Schematic west (left) to east (right) cross section of the Cooma Granodiorite and its surrounding metamorphic zones at the time of emplacement. Flood & Vernon (1978).

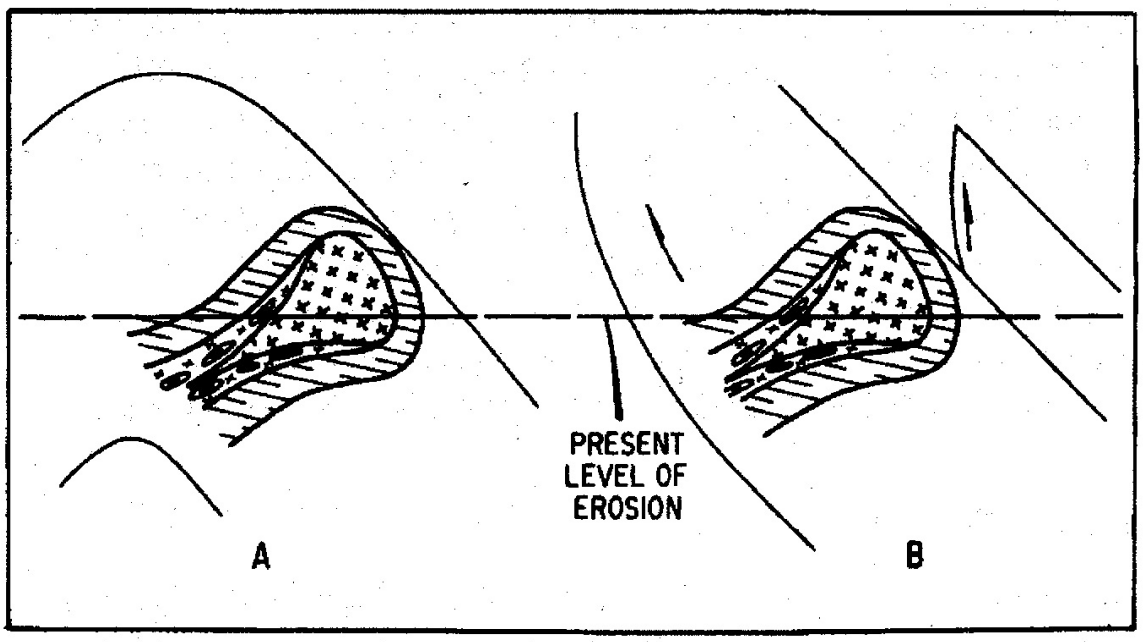


Figure 3. Schematic east-west cross section of the Cooma Complex showing how the wider metamorphic zones west of the Cooma Granodiorite could have resulted from tilting of the region by folding(A) or faulting(B) after emplacement. Flood & Vernon (1978).

In the Cenozoic (from 66 million years ago), the Kosciuszko Uplift formed the Snowy Mountains and the Great Dividing Range. Between 34-56 million years lava flows called the Monaro Volcanics

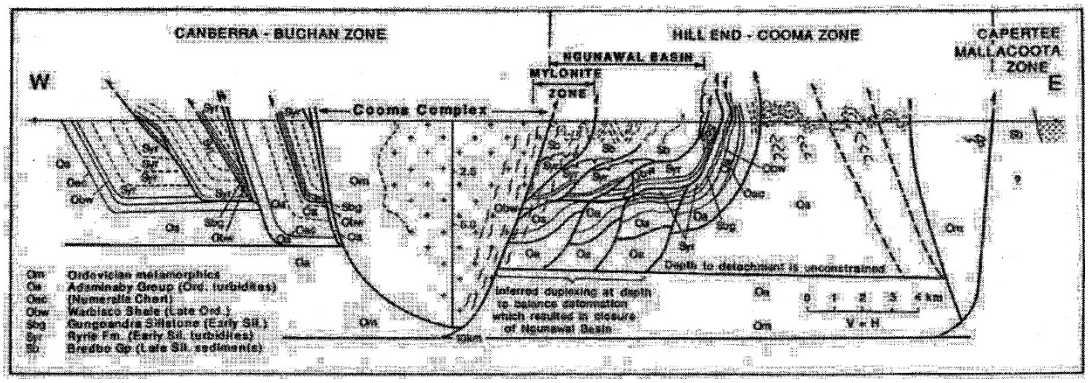
consisting of predominantly basalt covered the landscape especially to the south of Cooma filling in valleys in the eroded basement (Pratt *et al.* 1993). These flows covered an area of ~ 1930 square kilometres. The lava cooled to form basalt beneath the treeless Monaro Plain. The lava flows were produced by "quiet" volcanic eruptions from many small volcanoes. The Brothers, south of Cooma are volcanic plugs, that is they are remnants of past volcanoes. These are likely to be source regions for the flows.

References

Flood, R.H. & Vernon, R.H. 1978. The Cooma Granodiorite, Australia: An example of in situ crustal anatexis? *Geology* 6, 81-84.

Johnson, S.E., Vernon, R.H. & Hobbs, B.E. 1994. Deformation and metamorphism of the Cooma complex, Southeastern Australia. Specialist Group in Tectonics and Structural Geology, *Fieldtrip Guide No. 4*, Geological Society of Australia.

Pratt, G.W., Lewis, P.C., Taylor, G., Brown, M.C., Roach, I.C. & McQueen, K.G. 1993. The Monaro Volcanics of the Cooma District. Geological Survey of NSW, *Quarterly Notes* 92, 1-10.



This is a West(left) to East (right) cross section through the eastern part of the Lachlan Fold Belt just north of Cooma. Dick Glen always interprets steeply dipping faults being cut off by horizontal detachment faults such as that at 10km under the area. He recognises that the depth to detachment is unconstrained!!

Reference

Glen, R.A. 1992. Thrust, extensional and strike-slip tectonics in an evolving Palaeozoic orogen – a structural synthesis of the Lachlan Orogen of Southeastern Australia. *Tectonophysics* 214, 341-380.