

Tectonic Implications of Cambrian Boninite Production in the Gondwanan Margin

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Boninite magma is attributed to the early stages of subduction (Stern et al., 2012). Cambrian boninite is reported from numerous sites in the eastern margin of Gondwana, including ; Tasmania (Crawford and Berry, 1992), Vic., SA, NZ and Antarctica. Boninite is the product of low P, wet melting of depleted harzburgite re-enriched by subduction component (Falloon and Danyushevsky, 2000). The Heazelwood Complex is the largest Cambrian ultramafic body in Tasmania and like Adamsfield (Varne and Brown, 1978) and Serpentine Hill (Rubenach, 1974) is a layered intrusion into a Cambrian, forearc sediment sequence (Luina Group; Cummings et al., 2016). The ~5km thick Heazelwood complex shows changes in mineralogy and mineral composition from base to top. This succession : Ol+CrSp, OPX+Ol+CrSp, OPX (\pm post cumulate Plag) , OPX+CPX+Plag \pm Amphibole, is reproduced by wet melting (5% H₂O) of Cape Vogel type C boninite. OPX shows base to top Mg# (92 to 65) and Cr₂O₃ (0.5% to 0.05%). The Luina Group also hosts low-Ti tholeiite and boninite lavas and was thrust over the continental margin in the Early-Middle Cambrian. Boninite requires a depleted and OPX-rich harzburgite source. Depletion is commonly attributed to early extraction of MORB-like or low-Ti tholeiite from the mantle wedge at earliest stages of the subduction (e.g. Stern et al., 2012). Although this consistent with the Tasmanian association of low-Ti tholeiite and boninite, there remains some evidence including Os-model ages that that mantle depletion could have taken place earlier in the Neoproterozoic during assembly post-Rodinian rifting.

References Crawford, A.J. & Berry, R.F., 1992. *Tectonophys.*, 214, 37-56; Cummings, G., et al., 2016, *Tas. Geol. Survey Record*, UR2016/04. Falloon, T.J. & Danyushevsky, L.V., 2000. *J. Petrol.* 41, 257–283; Rubenach, M., 1974, *J. Geol. Soc. Aus.*, 21, 91-106; Varne, R. & Brown, A.V., 1978. *Contrib. Mineral. Petrol.* 67, 195–207; Stern, R. et al., 2012, *Lithosphere* 4, 469-483