# UHP terranes under NSW, Australia

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Eastern Australia was accreted by Cambrian to Mesozoic subduction. After Devonian, subduction included collision with microcontinents. Two million diamonds were won from the Copeton-Bingara district, north eastern NSW, from paleoplacers below Tertiary intraplate basalt, on low-grade Devonian basement rocks. Unusual diamond inclusions indicate a subduction source, and reported age dates are Carboniferous and Triassic [1,2,3]. We determined positive remnant pressures on clinopyroxene and other diamond inclusions using laser Raman spectroscopy. These indicate reported Ar age dates are crystallization ages, and diamond formation conditions fall in the range 200 to 800 ºC and 25 to 55 kbar. Diamond ages match two regional termination of subduction events, and formation conditions match those from UHP terranes, so they are Phanerozoic UHP diamonds.

Rimfire Pacific Mining NL at Bingara targetted eight basanitic intrusive complexes. Amongst high grade metamorphic minerals were garnet and diamonds. Garnet chemistry (3500 grains) revealed that 65% represent lithologies subducted to mantle depths, including diamond eclogite, diamond lherzolite and UHP orthogneiss/schist [3]. About 26% of both eclogitic and crustal garnets show rutile exsolution due to decompression by partial exhumation. These minerals were entrained by the shallow-sourced basanitic intrusions from partially exhumed Phanerozoic slab(s) forming a unique buried UHP terrane compared with exposed UHP terranes worldwide: Diamond ages suggest two Phanerozoic UHP metamorphic events; ungraphitised UHP macro-diamonds are present; decompression exsolution occurs in both eclogitic and crustal garnets; and garnet populations show high relative eclogite abundance (77%), but eclogitic/UHP crustal garnet ratio changes rapidly (range 0.03 to 160) geographically indicating lithological variation.

Garnets (5300 grains) in 30 basanitic diatremes across eastern NSW and Queensland have similar mantle depth chemistry (2%) and decompression textures (1%). Thousands of paleoplacer macro-diamonds show locally characteristic morphologies different from Copeton-Bingara diamonds. We propose a three stage macro-diamond conceptual model; 1) subduction and UHP metamorphism, 2) decompression by partial exhumation after termination of subduction, and 3) delivery by shallow-sourced intrusives. Elsewhere, geologically similar regions may hide buried UHP terranes.

**References**

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