

Cr-pyrope and chromite inside and outside diamond: - a tribute to the work of Jeff Harris

H.S. GRUTTER¹

¹ BHP Billiton World Exploration Inc., Suite 800, Four Bentall Centre, 1055 Dunsmuir Street, Vancouver, B.C., V7X 1L2, Canada; herman.grutter@bhpbilliton.com

Jeff Harris and co-workers provided us with some of the first comprehensive descriptions of diamond populations [1] and the minerals included within diamonds [2]. Ca-poor Cr-pyrope and chromite were rapidly recognized as distinctive members of the peridotitic inclusion suite. The compositions of many such inclusions were documented in a research career spanning nearly 40 years, and encompassing many inter-disciplinary collaborations and 131 peer-reviewed journal publications (to date).

In this partly retrospective tribute to Jeff's work, new interpretations of small- and large-scale lithospheric processes are teased from familiar compositional relationships. Garnet Cr₂O₃-CaO compositions are shown to reflect moderate to extreme melt-depletion at low mantle pressures, garnet growth during subduction or subcretion of the depleted residues, growth of diamond at high pressure during high-temperature thermal perturbations, and post-diamond metasomatism of subcontinental lithospheric mantle. The Fe³⁺ and Ti content of chromite is used to monitor relative oxygen fugacity and the presence of incompatible-enriched fluids before, during and after the growth of diamond.

The relative importance of lithosphere-modifying geochemical events can be discerned by comparing mineral compositions inside and outside diamond "capsules". The public-domain data set currently available allows this comparison to be made for a significant number of craton-root settings:- initial observations suggest that lithospheric roots underlying Archean cratons each contain reasonably distinct compositional and stratigraphic characteristics. Unravelling the contained evolutionary history now falls in the hands of the next generation of mantle maniacs – thanks for showing us the way Jeff !

References

- [1] Harris J.W., Hawthorne, J.B. and Oosterveld, M.M. (1979) *2IKC Proc AGU*, pp. 27-41.
- [2] Gurney J.J., Harris J.W. and Rickard, R.S. (1979) *2IKC Proc AGU*, pp. 1-15.