

Bert De Waele

Principal Consultant Geology


Profession

Geologist

Education

PhD (Geology), Curtin University of Technology, Perth, Australia, 2006

MSc (Geology), University of Ghent, Belgium, 1992

BSc (Geology), University of Ghent, Belgium, 1989

**Registrations/
Affiliations**

Adjunct Research Fellow, UWA

Specialisation

Bert is specialised in regional geological mapping and sampling programmes, with most of his field experience in Africa. He is also an accomplished geochronologist (U-Pb on Sensitive High Resolution Ion MicroProbe Mass Spectrometry (SHRIMP)) and active researcher with interests in global tectonics and palaeogeographic reconstruction.

Expertise

Bert has over 16 years of mapping experience, mostly in Precambrian terranes (Africa). In addition, he has acted as consultant on base-metal and gold prospects, setting up and running exploration programmes or interpreting regional geochemical data.

Bert's regional mapping experience includes mapping parts of quarter degree sheets 1625SE (Sichifulo River area, unpublished), 1231SW (Mupamadzi River area, published) and reconnaissance mapping throughout Zambia. His PhD encompassed the entire Irumide Belt of Zambia, and its tectonic foreland, the Bangweulu Block, and included extensive mapping between 1999 and 2003. His research interests focus on regional geology and tectonics, by integrating field and laboratory work (U-Pb microprobe geochronology, isotope (^{147}Sm - ^{144}Nd and ^{87}Rb - ^{86}Sr) and whole-rock geochemistry, electron microprobe mineral analyses and Geographic Information Systems). Most recently, Bert has been mapping in the Reguibat Shield of Mauritania (2003), the Irumide and Zambezi belts of Zambia (2004), Central and Northern Madagascar (2006-2008) and Papua New Guinea (2008).

Bert has a strong commitment to transfer of knowledge and has taught structural geology, computing in geoscience (GIS - Remote Sensing and DPA (Geosoft)) as well supervised field classes, mapping projects and theses (Bsc and Honours equivalent) both in French speaking and English speaking environments. Much of his work has included components of on-the-job training of sampling teams and mapping geologists.

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Employment Record

2006-2008	The British Geological Survey, United Kingdom	Senior Geologist - Responsible for mapping programmes in Madagascar and Papua New Guinea, and as geochronologist on projects in Madagascar and Niger.
2004-2006	The University of Western Australia	Research Scientist - Projects on Central Africa, the Albany-Fraser Belt and global palaeogeographic reconstructions; Some consultancy assignments were undertaken as well (gold, base-metal)
2000-2004	Curtin University of Technology	PhD researcher - Research on the Mesoproterozoic Irumide Belt of Zambia including mapping, geochronology, geochemistry and isotope geochemistry. His PhD won the prize of best thesis in Earth Sciences at Curtin University and the prestigious Lucien Cahen Prize of the Royal Academy of Sciences in Belgium.
2000	The University of Ghent, Belgium	Research Fellow - Digital Mapping and GIS work for the Belgian Government
1998-2000	The University of Zambia University of Ghent, Belgium	Project Manager, Mapping/Remote Sensing/GIS Unit. Providing consultancy services to the Mining/Exploration industry in Zambia; Training of students
1995-1998	The University of Zambia University of Ghent, Belgium	Lecturer/researcher - Lecturing Structural Geology, Geological Mapping and GIS; Research and some consultancy
1995	Caledonia Mining Ltd, Zambia	Chief Exploration Geologist - Setting up and running a base-metal (Cu-Co) exploration project in the Copperbelt of Zambia
1992-1995	Geological Survey of Zambia, Belgian Technical Assistance	Mapping Geologist - Carrying out regional mapping programmes in central and northwest Zambia; site investigation studies (small gold and gemstone prospects)
Languages	Dutch, English, French	

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Publications

1. De Waele, B. and Pisarevsky, S.A. 2008. Geochronology, palaeomagnetism and magnetic fabric of metamorphic rocks in the NE Fraser Belt, Western Australia. *Australian Journal of Earth Sciences* 55:5, 605-621
2. Pedreira, A.J. and De Waele, B. 2008. Contemporaneous evolution of the Palaeo/Mesoproterozoic sedimentary basins of the São Francisco - Congo Craton. Special Publication, Geological Society of London, Gondwana XII : Western Gondwana – the Ties that Bind. Vol.294: 33-48 (TSRC#380)
3. De Waele, B.; Johnson, S.P.; Pisarevsky, S.A. 2008. Palaeoproterozoic to Neoproterozoic growth and evolution of the eastern Congo Craton: its role in the Rodinia puzzle. *Precambrian Research* 160, 127-141 (TSRC#363)
4. Li, Z.X.; Bogdanova, S.V.; Collins, A.S.; Davidson, A.; De Waele, B.; Ernst, R.E.; Fitzsimons, I.C.W.; Fuck, R.A.; Gladkochub, D.P.; Jacobs, J.; Karlstrom, K.E.; Lu, S.; Natapov, L.M.; Pease, V.; Pisarevsky, S.A.; Thrane, K.; Vernikovsky, V. 2008. Assembly, configuration and break-up history of Rodinia: A synthesis. *Precambrian Research* 160, 179-210 (TSRC#387)
5. Johnson, S.P.; De Waele, B.; Tembo, F.; Katongo, C.; Tani, K.; Chang, Q.; Iizuka, T. and Dunkley, D. 2007. Geochemistry, geochronology and isotopic evolution of the Chewore-Rufunsa terrane, Southern Irumide Belt: A Mesoproterozoic, continental-margin-arc. *Journal of Petrology* 48, 1411-1441 (TSRC#405)
6. Abdallah, N., Liégeois, J.P., De Waele, B., Fezaa, N. and Ouabadi, A. 2007. The Temaguessine Fe-cordierite orbicular granite (Central Hoggar, Algeria): U-Pb SHRIMP age, origin and geodynamical consequences for the late Pan-African magmatism of the Tuareg shield. *Journal of African Earth Sciences* 49, 153-178 (TSRC#419)
7. De Waele, B. and Fitzsimons, I. C. W. 2007. The nature and timing of Palaeoproterozoic sedimentation at the southeastern margin of the Congo Craton. *Precambrian Research* 159, 95-116 (TSRC#422)
8. Biswal, T.K.; De Waele, B. and Ahuja, H. 2007 Timing and dynamics of the juxtaposition of the Eastern Ghats Mobile Belt against the Bhandara Craton, India: A structural and zircon U-Pb SHRIMP study of the fold-thrust belt and associated nepheline syenite. *Tectonics* 26, TC4006, doi:10.1029/2006TC002005 (TSRC#402)
9. Johnson, S. P.; De Waele, B.; Tembo, F.; Evans, D.; Iizuka, T. and Tani, K. 2007. Geochronology of the Zambezi Supracrustal sequence, southern Zambia: A record of Neoproterozoic divergent processes along the southern margin of the Congo Craton. *Journal of Geology* 115, 355-374 (TSRC#360)
10. Johnson, S.P., De Waele, B. and Liyungu, A.K. 2006. U-Pb SHRIMP geochronology of granitoid rocks in eastern Zambia: terrane subdivision of the Mesoproterozoic Southern Irumide Belt. *Tectonics* 25, TC6004, doi:10.1029/2006TC001977 (TSRC#373)
11. Pisarevsky, S.A.; Gladkochub, D.P.; Donskaya, T.A. and De Waele, B. 2006. Palaeomagnetism and geochronology of mafic dykes in the south-west Baikal Lake, south Siberia, Russia: the first precisely dated Early Permian palaeomagnetic pole from the Siberian Craton. *Geophysical Journal International*. doi: 10.1111/j.1365-246X.2006.03160.x (TSRC# 383)
12. Cutten, H.; Johnson, S. P. and De Waele. B. 2006. Protolith ages and timing of metasomatism related to the formation of whiteschist at Mautia Hill, Tanzania: Implications for the timing of assembly of Gondwana. *Journal of Geology* 114 (6), pp. 683-698 (TSRC#346)
13. De Waele, B.; Liégeois, J-P.; Nemchin, A.A. and Tembo, F. 2006. Isotopic and geochemical evidence of Proterozoic episodic crustal reworking within the Irumide Belt of south-central Africa: the southern metacratonic boundary of an Archaean Bangweulu Craton. *Precambrian Research* (TSRC#362)
14. De Waele, B., Kampunzu, A.B., Mapani, B., Tembo, F., 2006. The Irumide belt of Zambia. *Journal of African Earth Sciences* 46, 36-70 (TSRC#257)

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15. Johnson, S.P., Rivers, T. and De Waele, B. 2005. A Review of the Mesoproterozoic to early Palaeozoic magmatic and tectonothermal history of south-central Africa: implications for Rodinia and Gondwana. *Journal of the Geological Society of London* 162, 433-450 (TSRC#305)
16. Katongo, C., Köller, F., Klötzli, U., Koeberl, C., Tembo, F., De Waele, B. 2004. Petrography, geochemistry and geochronology of key granitoid rocks in the Neoproterozoic-Paleozoic Lufilian - Zambezi belt, Zambia: implications for the tectonic setting and regional correlation. *Journal of African Earth Sciences* 40, 219-244 (TSRC#299)
17. Key, R. M., De Waele, B., Liyungi, A.K. 2004. A multi-element baseline geochemical database from the western extension of the central Africa Copperbelt in NW Zambia. *Transactions of the Institute of Mining and Metallurgy, section B: Applied Earth Sciences* 113, B205-226 (TSRC#302)
18. Sikazwe, O.N. and De Waele, B. 2004. Assessment of the quality and reserves of bat guano at Chipongwe and Kapongo caves near Lusaka as fertiliser material. *UNZA Journal of Science and Technology, Special Edition June 2004.* pp. 32-42.
19. Cox, R., Coleman, D.S., Chokel, C.B., DeOreo, S.B., Wooden, J.L., Collins, A.S., De Waele, B., Kröner A., 2004. Proterozoic tectonostratigraphy and paleogeography of central Madagascar derived from detrital zircon U-Pb age populations. *Journal of Geology*, 114, 379-399 (TSRC#243)
20. De Waele, B., Wingate, M.T.D., Mapani, B., Fitzsimons, I.C.W., 2003. Untying the Kibaran knot: A reassessment of Mesoproterozoic correlations in southern Africa based on SHRIMP U-Pb data from the Irumide belt. *Geology*, 31: 509-512 (TSRC#218)
21. Johnson, S.P., Cutten, H.N.C., Muhongo, S., De Waele, B., 2003. Neoproterozoic magmatism and metamorphism of the western granulites in the central domain of the Mozambique belt, Tanzania: U-Pb SHRIMP geochronology and PT estimates. *Tectonophysics*, 375: 125-145 (TSRC#214)
22. De Waele, B., Mapani, B., 2002. Geology and correlation of the central Irumide belt. *Journal of African Earth Sciences*, 35: 385-397 (TSRC#222)
23. De Waele, B., Simasiku, S., 2002. An overview of the refractory mineral potential of Zambia. *International Geology Reviews*, 44: 254-263 (TSRC#221)
24. Tembo, F., De Waele, B., Nkemba, S., 2002. Syn- to post-orogenic granitoid magmatism in the Irumide belt of Zambia: Geochemical evidence. *Africa Geoscience Review*, 9: 1-17 (TSRC#220)
25. De Waele, B., Tembo, F., Key, R.M., 2000. Towards a better understanding of the Mesoproterozoic Irumide belt of Zambia: Report on a geotraverse across the belt. *Episodes*, 23: 126-130
26. De Waele, B., 1997. Geology and stratigraphy of the Mupamadzi river area and correlation with the adjoining areas within the Irumide belt. *Zambian Journal of Applied Earth Sciences*, 11: 34-48

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Key Experience - Mapping

Bert's main experience is in regional mapping, coupled with organisation and running of regional geochemical sampling programmes and the accompanying delineation of potential targets for detailed follow up work.

Bert is an accomplished trainer, both in formal to practical courses or in on-the-job training. His training programmes have included GIS, Data Analysis and Processing (geochemical and geophysical data sets), practical mapping and sampling methodologies.

Bert has also proved his mark as an accomplished research scientist, with broad interests ranging from regional/global tectonics to detailed geochronological field studies.

Recent mapping experience includes:

- The British Geological Survey (Keyworth, Nottingham, United Kingdom) (2006-2008): Mapping work concentrated on the central and northern zones of Madagascar (2006-2008; World Bank contract number 175/05 – MEM/SG/DG/UCP/PGRM), where Bert mapped in sixteen 100K map sheets and on the western highlands of Papua New Guinea (2008) where he mapped one sheet.
- Curtin University (Perth, Australia) (2000-2004): PhD research included extensive mapping work in the Irumide Belt and Bangweulu Block of Zambia. Bert also assisted in mapping classes in the Yilgarn Craton, Albany-Fraser Belt and the Carnarvon Basin (Western Australia).
- University of Zambia (1995-2000): In charge of student mapping projects and geological mapping classes and industrial placement of students in the mining/exploration industry.
- Caledonia Mining Ltd (1995): In charge of exploration in the Nama prospect. Apart from management this included mapping, sampling, trenching/pitting and drilling in the prospect.
- Geological Survey Department of Zambia (1992-1995): Regional mapping geologist in charge of mapping Mupamadzi River area (QDS 1231 SW) and assisting in mapping 1124SW (West-Lunga area) and 1625SE (Sichifulo River area).

Project experience includes:

- Principal Consultant, review of three deposits in Morocco including a vein-hosted gold prospect, a sedimentary iron prospect and a carbonatite complex.
- Consultant, Sfariates-Ouassat Gold exploration programme, Mauretania: Processing and interpreting geochemical data. Knowledge transfer to the Office Mauritanien de Recherches Géologiques.
- Digital Processing and GIS work on Geological maps of Eastern Zambia, Geological Survey Department - British Geological Survey – ERIPTA Project: Digitising and GIS database creation of nineteen 100K map sheets covering Eastern Zambia.
- Data processing and GIS work on Geophysical data over the Kagem emerald mine, Ndola, Zambia. (Zambian Privatisation Agency ZPA): Geophysical interpretation and GIS integration of ground magnetic, radiometric, resistivity and seismic data for Kagem Emerald Mine.
- Digital Processing and Digital Data Processing, Geological Survey Department - British Geological Survey – ERIPTA Project: Analysis of geochemical data on Mwinilunga and Kalene Hill sheets, northwestern Zambia.
- Practical course on Geographic Information Systems (use of Arcview 3.1), center for ticks and tick-borne diseases, Lilongwe-Malawi: A five day course on Geographic Information Systems offered to Veterinary Officers from Tanzania, Zimbabwe and Zambia. The course included modules on Principles of GIS, Desktop Cartography, Statistics and practical use of GIS (Arcview 3.1) in planning as applied to Veterinary Medicine.

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- Desktop Cartography and Database design on Copperbelt Environmental Impact Assessment project, Carl Duisburgh Gesellschaft: Desktop cartography and conversion of GIS data for production of Environmental Impact Assessment maps of the Zambian Copperbelt.
- Desktop Cartography of Kanyama and Chazanga Compounds in Lusaka, Scott & Wilson Consultants: Cartographic work based on aerial photography at scale 1:5000. Work included scanning of aerial photographs, collection of Ground Control Points (GCP's) with relational Global Position System, geocorrection of imagery, mosaicing and heads-up digitising. Maps were produced with Arcview 3.0a.
- Review of refractory mineral occurrences in Zambia, September 1998 (Italterrazzo): An extensive review and literature search to result in an Access[®] database of all occurrences, a GIS model with all refractory mineral occurrences and detailed descriptions of all localities.
- Geological Survey of the Spillway at Kafue Gorge Dam, Zambian Electricity Supply Corporation (ZESCO): Geotechnical study of the Kafue Gorge dam to assess controlling factors in the deformation of the dam's spillway gates. Ten days of fieldwork and three weeks of data analysis resulted in a report with recommendations on how to remedy and/or control the situation.