

## Willem Botha

### General:

**Full name:** Willem Jacobus Botha  
**Date of birth:** 1945/02/15  
**Nationality:** South African/Canadian  
**Sex:** Male

### Education:

1980: *Colorado School of Mines* *Golden, Colorado, U.S.A.*

**PhD. Exploration Geophysics**

Thesis: Basis of the theory and interpretation of the dual frequency method. (Prof. A. Kaufman as thesis adviser)

1978: *Colorado School of Mines* *Golden, Colorado, U.S.A.*

**MS., Exploration Geophysics.**

Thesis: Horizontal electrical profiling in groundwater exploration. (Prof. G. V. Keller as thesis adviser)

1971: *University of Pretoria* *Pretoria, RSA*

**MSc., Physics**

Thesis: Magnetic properties of thin (500A) iron layers. (Prof G. Gaigher as thesis adviser)

1971: *Pretoria Teachers College* *Pretoria, RSA*

THOD. (Secondary School Teachers Diploma)

1966: *University of Pretoria* *Pretoria, RSA*

**B.Sc.** Major in Physics and Mathematics.

### Professional Experience:

April 2011- current: *Tau Geophysical Consultants Inc., Canada*

President and principal geophysicist.

Providing consultation services for interpretation of airborne geophysical data applied to mineral exploration; specializing in time domain EM.

*Aug 2007- CONSULTANT*

*Processing, interpretation and target generation for:*

*EXXARO Resources*

*GEOTECH AIRBORNE Pty Ltd*

*Londoloza Resources Corp.*

*April 2000-Aug 2007 ISCOR/KUMBA/EXXARO*

*Principle Geophysicist – Initiating, managing and interpretation of all geophysical projects in the company.*

*Areas of applications include:*

*Base Metal exploration*

- Rosh Pinah
- Sperrgebiet
- DRC (Atlantis project in Katanga province)
- Northern Namibia
- Northern Cape (RSA)

*Iron Ore*

- Sishen mine
- Sishen South
- Falcon airborne gravity project
- Thabazimbi iron ore mine
- Faleme (Senegal)
- Guinea
- Gabon

*Coal*

- Groote Geluk Mine
- Tshikondeni Mine
- Waterberg coal exploration
- Leewpan
- Hlobane

*Heavy Mineral Sands*

- Hillendale
- Toliare (Madagaskar)

*1984–2000 Department of Earth Sciences, University of Pretoria*

*Professor in Exploration Geophysics and Head of the Geophysics division. During this time I was also the owner and director of*

**Southern Geophysical Exploration CC**

*Clients and projects during this period:*

*Rio Tinto (Botswana)*

Time Domain survey of prospect near lake Ngami.

*Malopo Botswana*

Time Domain profiling and borehole logging, Malopo Farms Complex.

*Rösing Uranium*

Time Domain profiling of prospect near Helmering-hausing, Namibia

*Anglovaal, Namibia*

Interpretation of Time domain data.

*Anglovaal (RSA)*

Borehole time domain EM survey near Badplaas

*Goldfields*

- Time domain EM survey of various prospects in Namaqualand and Bushmanland.
- Development of shallow seismic reflection technique for application on the Bushveld.

*Gencor*

- Development of interpretation software for conventional time domain EM surveys.
- Further development of software for large loop (10km X 10km) TDEM surveys.

*Rand Mines*

Borehole and surface time domain investigation of the Olifantsgeraamte anomaly on the Long Tom pass.

*JCI*

- Time domain survey near Potgietersrus
- Groundwater exploration near Potgietersrus

*GAP Geophysical*

Seismic refraction surveys for groundwater development near Rustenburg

*Dept Of Water Affairs, Botswana*

Emergency Groundwater Project

*Dept of Water Affairs, RSA*

- Evaluation of Time Domain sounding technique for mapping aquifers in the Kalahari.
- Applying shallow seismic reflection to the mapping of bedrock topography in the Kalahari (near Bray)

*Water Research Commission*

- Evaluating seismic reflection techniques for groundwater mapping in the Kalahari
- Evaluation of various frequency domain equipment and techniques in mapping faults and fracture zones in metamorphic terrain.
- Using an integrated approach in groundwater exploration in the Nebo granites.

*Sasol*

- High resolution seismic reflection mapping of coal near Sasolburg
- High resolution seismic reflection mapping of coal near Secunda

*Iscor*

Experimental work on the application of shallow seismic reflection techniques on coal.

*Knight Hall Henry (Pty) Ltd*

- Magnetic, seismic and electromagnetic site investigations as part of the Tugela Water Development Scheme
- Electromagnetic survey along a proposed pipeline route from Clarence to Heidelberg.

**1982–1984 Hardy Associates (1978) Pty. Ltd. (Canada)**

I was second in charge of the Geophysics group (11 professional geophysicists) in this consulting company consisting of 475 professional engineers.

*Clients and projects during this period:*

*Dome Petroleum*

Conductivity mapping of permafrost distribution along a pipeline route south from Norman Wells.

*Sohio Oil*

- IP survey of gravel deposits in Prudoe Bay, Alaska.
- Time Domain soundings to determine the thickness of the subsurface permafrost in the Alaska.

*Saskatchewan Uranium*

Time Domain soundings for Uranium deposits, Russel Lake, Saskatchewan.

*CN Rail*

High resolution seismic mapping of a glacier, Kicking Horse Pass.

*Shell Canada*

Conductivity mapping of contamination plume, Alberta.

**1980 - 1982 Geo-physi-con Co. Ltd., Canada**

Senior Geophysicist: Primary responsibility the development of TDEM software.

*Clients and projects during this period:*

*Alyeska*

Mapping of permafrost distribution along proposed Alaska pipeline route.

*Marline Oil*

Time domain EM prospecting for Uranium, Saskatchewan

*Hudson Bay Minerals*

Time domain EM prospecting for massive sulfides, Whitehorse, Yukon

*Anaconda*

Time domain EM mapping of massive sulfides, Montana, USA

**1970 - 1980 Geological Survey of South Africa**

Senior Geophysicist in charge of engineering geophysics and groundwater exploration.

**1968 - 1970 Pretoria Teachers College**

Lecturer in Physics

**1965 - 1968 University of Pretoria**

Laboratory Assistant

## Research:

Theses completed under my supervision

### PhD

- Stettler, E.H., 1987, *Theoretical basis of an induction borehole logging technique in the **frequency and time domain***
- Weder, E.E.W., 1990, *The significance of **gravity** and **seismic** reflection techniques in deriving a new model for the area south of the Central Rand gold fields.*
- Combrinck, M., 2006, *Development of an automated analysis of **TDEM data** for the delineation of a finite conductor in a conductive half space.*

### MSc

- Slee, J.C., 1987, *Removal of host rock response from **time domain electromagnetic** data by transforming to, and filtering in the frequency domain.*
- Dippenaar, A., 1987, *The development of micro-computer software for the processing and interpretation of **shallow reflection seismic** data.*
- Van der Ahee Coetzee, 1987, *Equivalence in **time domain** sounding*
- Muller, B., 1990, *An evaluation of the application of the high **resolution seismic** method on coalfields in South Africa.*
- Wiegmans, F., 1990, *Evaluation of **frequency domain** methods in ground water exploration.*
- Van der Walt, J., 1991, *Evaluation of the **time domain** electromagnetic technique for ground water exploration in the Kalahari.*
- Van Dalsen, M., 1993, *Prestack partial migration dip moveout and migration velocity determination with application in South Africa.*
- Vorster, A., 1993, *Die toepassing van hoe resoluie **seismiese refleksie** tegnieke in grondwater eksplorasië in die Kalahari.*
- Fourie, C.S.J., 1994, *The development of a National Physical Modelling facility for the modeling of **TDEM** data.*
- Van Biljon, W., 1995, ***TDEM** soundings outside the transmitter loop in a laterally inhomogeneous medium.*
- Fourie, F., 1996, ***TDEM** response of multiple conductors.*
- Combrinck, M. 1998, *Integrated approach to groundwater exploration on the Lebowa Granite Suite.*
- Babayeju, O.K.T., 1999, *Geophysical investigation of the Marble Hall Fragment of the Bushveld Complex.*
- Prinsloo, J., 1999, *Determining the best apparent resistivity versus frequency definition for a **magnetotelluric** sounding : a comparison between two statistical*

techniques

#### List of publications

- Eriksson, P.G., Meyer, R., **Botha, W.J.**, 1988, *A hypothesis on the nature of the Pretoria Group Basin*: S.A. tydskrif vir Geologie, vol. 91, pp490-497.
- Hinds, R.C., Kuzmiski, R., **Botha, W.J.**, 1989, *Vertical and lateral seismic profiles: The Geophysical Reservoir Atlas for Western Canada*. A CSEG/CSPG publication.
- Eriksson, P.G., Meyer, R., **Botha, W.J.**, 1990, *A hypothesis on the nature of the Pretoria Group Basin: Authors reply to discussion*: S.A. tydskrif vir Geologie, vol. 91, pp705-708.
- Weder, E.E.W., **Botha, W.J.**, De la Rey Winter, H., 1992, *A new structural model for the area south of the Central and East Rand gold fields, derived from a detailed gravity survey*: S.A tydskrif vir Geologie, Vol. 95, no. 3/4, pp 102-107.
- Eales, H.V., **Botha, W.J.**, Hattingh, P.J., de Klerk, W.J., Maier, W.D., Odgers, A.T.R., *The mafic rocks of the Bushveld Complex: a review of emplacement and crystallization history, and mineralization in the light of recent data*: Journal of African Earth Sciences, Vol 16.
- Smith, R.M.H., Eriksson, P.G., **Botha, W.J.**, *A review of the stratigraphy and sedimentary environment of the Karoo-aged basins of Southern Africa*: Journal of African Earth Sciences, Vol 16.
- Snyman, C.P., **Botha, W.J.**, *Coal in South Africa*: Journal of Earth Sciences, Vol 16.
- **Botha, W.J.**, Alchin, D.J., 2002. *Interpretation of the airborne DIGHEM geophysical survey data north of Rosh Pinah*. 11<sup>th</sup> Quadrennial IAGOD Symposium and Geocongress 2002. (Ed. By L. Robb and R. Montjoie), Geological Society of Namibia.
- Alchin, D. J., **Botha, W. J.**, 2006, *The structural/stratigraphic development of the Sishen South (Welgevonden) iron ore deposit, South Africa, as deduced from ground gravity data modelling*. Applied Earth Science: IMM Transactions section B, Vol 115 #4 pp. 174-186.

#### List of oral presentations

- **Offshore Technology Conference, Houston, Texas, 1983**, *Water-borne resistivity/induced polarization survey in Prudhoe Bay*.
- **Permafrost, Fourth international conference, Fairbanks, Alaska, 1983**, *Continuous geophysical investigation for mapping permafrost distribution, Mackenzie Valley, N.W.T., Canada*.
- **Society of Exploration Geophysicists, 56<sup>th</sup> Annual International Meeting, Houston, Texas, 1986**, *Removal of the host rock response from time domain data by transferring to, and filtering in the frequency domain*.
- **SAGA second technical meeting, Johannesburg, 1991**, (Botha and Guest). *Development and application of time domain electromagnetic borehole logging*

*methodology and interpretation techniques.*

- **SAGA second technical meeting, Johannesburg, 1991**, (Fourie and Botha) *A national facility for the physical modelling of geophysical data.*
- **SAGA second technical meeting, Johannesburg, 1991**, *An evaluation of the application of the high resolution seismic method on coalfields in South Africa.*
- **SAGA second technical meeting, Johannesburg, 1991**, (Hinds and Botha). *Interpretive processing of the Northeast Bushveld Seismic line.*
- **SAGA second technical meeting, Johannesburg, 1991**, *A review and evaluation of least squares inversion techniques and its application to the inversion of potential field data.*
- **European Association of Exploration Geophysicists, 55<sup>th</sup> technical programme, Stavanger, Norway, 1993**, *Geophysics applied to groundwater exploration in the Kalahari regions of Southern Africa.*
- **SAGA Conference '95, Vic Falls, Zimbabwe, 1995**, *Seismic targets: a review of seismic resolution (when to do, or not to do, a seismic survey).*
- **SAGA Conference '95, Vic Falls, Zimbabwe, 1995**, (Vorster and Botha) *A comparison between high resolution shallow and deep seismic surveys.*
- **SAGA Conference '95, Vic Falls, Zimbabwe, 1995**, (Du Pisani and Botha) *The development of a pseudo-sounding technique using EM34 frequency domain system.*
- **SAGA Conference '95, Vic Falls, Zimbabwe, 1995**, (Fourie and Botha), *Modeling the time domain electromagnetic response of multiple conductors for Geonics EM37system.*
- **SAGA Conference '95, Vic Falls, Zimbabwe, 1995**, (Conradie and Botha), *Building thick bodies of moderate to low conductivity for electromagnetic scale modelling.*
- **Geology for Engineering, Urban Planning and the Environment, Nov. 1997**, (Botha, W.J., Mouton, D.J.) *An evaluation of the time domain electromagnetic method as a tool for investigating potential sinkhole formation areas in dolomite.*
- **Africa/Middle East Second International Geophysical Conference & Exposition, Cairo 1998**, (Botha, W.J. and Combrinck, M) *Integrated geophysical approach to groundwater exploration on the Nebo Granite Suite.*
- **SAGA (South African Geophysical Association) Sixth Biennial Conference and Exhibition, Cape Town, South Africa, 1999**, (M Combrinck, W. J. Botha, G. Ngaisiue, B.C. Havemann) *Alternative approach to groundwater exploration on the Nebo Granites*
- **SAGA (South African Geophysical Association) Sixth Biennial Conference and Exhibition, Cape Town, South Africa, 1999**, (O.K.T. Babajeyeju, W.J. Botha (presenter), S.A. de Waal) *Geophysical investigation of the Marble Hall fragment of the Bushveld Complex.*
- **European Association of Geoscientists & Engineers (EAGE) 66th Conference and Exhibition, Paris, France, 2004**, *Towards an automated procedure for finding confined conductors in a conductive halfspace. (M. Combrinck, W. J. Botha).*

- **Australian Society of Exploration Geophysicists (ASEG), 2009**, *The application of airborne geophysics in the exploration for iron ore in the Zouerate area of Mauritania.* (**W.J. Botha** and M. Yeslem)

#### **Computer Literacy:**

Extensive knowledge of, and experienced in:

- Microsoft Office
- Geosoft Oasis Montaj
- Maxwell
- EMFlow
- ModelVision Pro
- CorrelDraw
- Photoshop

#### **Programming Skills and Experience**

Basic programming skills sufficient for research and development of focused scientific applications, but not up to the professional standard required for commercial software releases. Programming experience consists of applications written to aid in geophysical data processing, interpretation and modeling.

#### **Personal Interests:**

- Travel
- Wildlife Photography