



## **Tau Geophysical Consultants**

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## **Magdel Combrinck**

### **General:**

**Full name:** Magdalena Combrinck  
**Date of birth:** 1974/06/17  
**Nationality:** South African  
**Permanent Residence:** Canada (since June 2010)  
**Sex:** Female

### **Education:**

*2000-2006: University of Pretoria Pretoria, RSA*  
PhD. Exploration Geophysics  
Thesis: Development of an automated analysis of TDEM data for the delineation of a finite conductor in a conductive half space.

*1997-1999: University of Pretoria Pretoria, RSA*  
MSc., Exploration Geophysics. (Cum Laude)  
Thesis: Integrated approach to groundwater exploration on the Nebo Granites

*1996: University of Pretoria Pretoria, RSA*  
BSc. (Hons.), Exploration Geophysics. (Cum Laude)

*1993-1995: University of Pretoria Pretoria, RSA*  
B.Sc. Majoring in Exploration Geophysics and Applied Mathematics. (Cum Laude) Other Subjects: Chemistry, Geology, Physics, Mathematics.

*1992 Centurion Secondary School Centurion, RSA*  
Pass national matriculation examination with seven distinctions (Afrikaans, English, Mathematics, Physical Science, Geography, Accounting, Computer Science)

### **Academic Awards:**

*1996:*  
South African Geophysical Association's award for the best BSc. (Hons.) student in Geophysics at the University of Pretoria.

*1995:*  
Chancellor's award for best second year student in the Faculty of Science.



## List of Oral Presentations:

*March 2014:*

**PDAC (Prospectors and Developers Association of Canada) Convention 2014, Toronto, Canada.** 3D VTEM inversion for delineating sub-vertical shear zones in the West African gold belt (**M. Combrinck, L.H. Cox, G. A. Wilson, M. S. Zhdanov**)

**(INVITED SPEAKER)**

*October 2013:*

**AEM (Airborne Electromagnetics) 6<sup>th</sup> International Conference and Exhibition, Kruger National Park, SA.** Developing an efficient modelling and data presentation strategy for ATDEM system choice and survey design (**M. Combrinck**)

**(THIS PRESENTATION WAS AWARDED "BEST PAPER OF THE CONFERENCE")**

*October 2013:*

**SAGA (South African Geophysical Association) 13<sup>th</sup> Biennial Conference and Exhibition, Kruger National Park, SA.** Shallow alluvial diamond exploration with GENESIS airborne TEM (225Hz) system (**M. Combrinck, R. van Buren**)

*February 2012:*

**ASEG (Australian Society for Exploration Geophysicists) 22<sup>nd</sup> International Geophysical Conference and Exhibition, Brisbane, Australia.** 3D VTEM inversion for delineating sub-vertical shear zones in the West African gold belt (**M. Combrinck, L.H. Cox, G. A. Wilson, M. S. Zhdanov**)

*October 2011:*

**SAGA (South African Geophysical Association) 12<sup>th</sup> Biennial Conference and Exhibition, Cape Town.** Decay characteristics of airborne time-domain electromagnetic data: Where to find the constant (tau). (**M. Combrinck, W. J. Botha**)

*September 2011:*

**Recent Advances in Ground and Airborne Electromagnetic Methods – Innovations in Processing and Inversion Techniques, Hyderabad, India.** A time and place for everything: an overview of AEM interpretation methods. (**M. Combrinck**)

**(INVITED SPEAKER)**

*August 2010:*

**ASEG (Australian Society for Exploration Geophysicists) 21<sup>st</sup> International Geophysical Conference and Exhibition, Sydney, New South Wales, Australia.** The impact of AEM receiver noise levels on detection, discrimination and resolvability of marginal targets. (**M. Combrinck**)



*April 2010:*

**EGM 2010 International Workshop. Adding new value to EM, Grav and Mag Methods for Exploration, Capri, Italy.** Imaging VTEM data: mapping contamination plumes in Tarlton, South Africa. (**M. Combrinck**)

*October 2009:*

**SAGA (South African Geophysical Association) 11<sup>th</sup> Biennial Conference and Exhibition, Swaziland.** The use of VTEM data in geological mapping and mineral exploration in north-eastern Namibia. (**M. Combrinck**, W. J. Botha, D. Hutchins)

*November 2009:*

**ASEG (Australian Society for Exploration Geophysicists) 20<sup>th</sup> International Geophysical Conference and Exhibition, Adelaide, South Australia.** Base metal discoveries in Africa and Australia from VTEM data. (**M. Combrinck**, R. Mortimer, B. Peters)

*May 2008:*

**AEM2008 5th International Conference on Airborne Electromagnetics Haikko Manor, Finland.** Detecting basement conductors in a conductive environment: an example from the Nepean mine VTEM survey. (**M. Combrinck**, P. Mutton, Bob Lo)

*November 2007:*

**ASEG (Australian Society for Exploration Geophysicists) 19<sup>th</sup> International Geophysical Conference and Exhibition, Perth, Australia.** Calculation of a depth correction factor for the S-Layer differential transform. (**M. Combrinck**)

*October 2007:*

**SAGA (South African Geophysical Association) Tenth Biennial Conference and Exhibition, Wild Coast Sun, South Africa.** VTEM improvements to meet exploration challenges demonstrated at Caber and Fox River Projects. (**M. Combrinck**, Bob Lo)

*September 2005:*

**SAGA (South African Geophysical Association) Ninth Biennial Conference and Exhibition, Cape Town, South Africa.** Application of an improved S-layer differential transform on TDEM sounding data to delineate an iron ore deposit. (**M. Combrinck**)

*June 2004:*

**European Association of Geoscientists & Engineers (EAGE) 66th Conference and Exhibition, Paris, France,** Towards an automated procedure for finding confined conductors in a conductive halfspace.\* (**M. Combrinck**, W. J. Botha)

*\*The same paper as given in Pilanesberg 2003 (SAGA). It was chosen as one of the four best papers of the conference and presented in Paris on invitation.*

*October 2003:*



**SAGA (South African Geophysical Association) Eighth Biennial Conference and Exhibition, Pilanesberg, South Africa.** Towards an automated procedure for finding confined conductors in a conductive halfspace. (M. Combrinck, W. J. Botha)

*September 1999:*

**SAGA (South African Geophysical Association) Sixth Biennial Conference and Exhibition, Cape Town, South Africa.** Alternative approach to groundwater exploration on the Nebo Granites (continued from 1997). (M. Combrinck, W. J. Botha, G. Ngaisiue, B.C. Havemann)

*February 1998:*

**EGS/SEG/EAGE Africa/Middle East Second International Geophysical Conference & Exposition, Cairo, Egypt.** Integrated approach to groundwater exploration on the Lebowa Granite Suite (W. J. Botha and M. Combrinck)

*September 1997:*

**SAGA (South African Geophysical Association) Fifth Technical Meeting, Swakopmund, Namibia.** Groundwater exploration on the Nebo Granites (M. Combrinck and W. J. Botha)

*(Receives award for the best presentation by a student)*

### List of Poster Presentations:

*August 2004:*

**ASEG 17th Geophysical Conference and Exhibition, Sydney, Australia.** The Application of Euler Deconvolution to Airborne EM Data. (G R J Cooper, M Combrinck, D R Cowan)

*October 2003:*

**SAGA (South African Geophysical Association) Eighth Biennial Conference and Exhibition, Pilanesberg, South Africa.** Preliminary Results of the Application of Euler Deconvolution to Airborne EM Data. (G R J Cooper, M Combrinck, D R Cowan)

### Published reports:

*2001:*

Water Research Commission: Project: K5/862/0/1

A multi-disciplinary geophysical approach to groundwater exploration in the Nebo Granite, Northern Province. (M. Combrinck and W. J. Botha)

### Publications in peer reviewed journals:

- 1) Combrinck, M., 2014. Developing an efficient modelling and data presentation strategy for ATDEM system comparison and survey design. *Exploration Geophysics*. (*Exploration Geophysics* - <http://dx.doi.org/10.1071/EG14026>  
Submitted: 13 March 2014 Accepted: 8 August 2014 Published online: 1 October 2014)



- 2) Combrinck, M., 2009. Analysis of numerical differentiation methods applied to time domain electromagnetic (TDEM) geophysical data in the S-layer differential transform. *Computers & Geosciences*, Vol. 35, No. 8, pp. 1563-1573
- 3) Combrinck, M., 2008. Calculation of conductivity and depth correction factors for the S-layer differential transform. *Exploration Geophysics*, Vol. 39, No. 2, pp. 133-138
- 4) Combrinck, M., 2001. Transient electromagnetic exploration techniques: can they be applied to the landmine discrimination problem? *Journal of African Earth Sciences*, Vol. 33, pp. 693-698

### Professional Registration:

Registered as a "Professional Natural Scientist" at the South African Council for Natural Scientific Professions. (Reg. nr. 400075/09)

### 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.

*Dec. 2006- March 2011: Geotech Airborne Ltd., South Africa*

Contract geophysicist involved with data processing, interpretation, research and development.

*2003- Nov. 2006: University of Pretoria, South Africa*

Lecturer in geophysics, presenting 2<sup>nd</sup> year, 3<sup>rd</sup> year, BSc (Hons) (4<sup>th</sup> year) courses and acting as promoter for MSc students.

*1999: University of Pretoria, South Africa*

Employed by the University of Pretoria, Dept of Earth Sciences, as a full time researcher on a one-year contract. Continued research on Nebo granite groundwater project.

*1997-1998: Council for Geoscience, South Africa*

Employed by the Council for Geoscience, seconded to the University of Pretoria for two years to do research on the application of mineral exploration type surveys applied to groundwater exploration in low yielding, hard rock environments. This work also formed the basis of the specified MSc degree.

Experience gained through this project includes:

- Compilation of a Geographic Information System in Arcview format.
- Processing and interpretation of high-density airborne magnetic data, airborne EM (DIGHEM) and radiometric data.



- Several months of ground follow-up work consisting of target identification, EM34, MaxMin and magnetic data acquisition
- Siting of boreholes based on geophysical interpretation.

*1996-2004: Contract experience in South Africa, Namibia & Madagascar*

*This section lists experience gained through contracting jobs, varying in duration from one week to four months, undertaken concurrently with post-graduate studies.*

- Mapping of contaminated zones due to slimes dams leakage, using EM34 and magnetic surveys, Secunda, RSA. (Client: SASOL)
- Seismic Refraction Survey at Kroondal, RSA. (Client: GAP Geophysics)
- Diamond exploration using airborne and ground magnetics and EM near Vryburg and Marble Hall, RSA. (Client: Strike Exploration)
- Seismic refraction survey to determine depth to bedrock at Hazyview, RSA. (Client: Knight Hall Henry)
- Preparing a GIS database in Arcview, with information and application relevant to Water Management in the Southern Gauteng District, RSA. (Client: Knight Hall Henry)
- Extensive dam site investigation in the Tugela and Boesman river valleys used in a feasibility study. This very challenging fieldwork included seismic refraction, EM34 and magnetic surveys in densely vegetated, very steep topographic regions. The data were interpreted to give depth to bedrock, positions of dykes, sills, faults or weathered zones, and to aid in the geological mapping in general. (Client: Knight Hall Henry on contract to the Department of Water Affairs and Forestry)
- 25 km EM34 and magnetic survey to delineate weathered zones and structural features, and aid in geological mapping of a proposed pipeline (4m diameter) site. (Client: Knight Hall Henry)
- 40 km EM34 survey at Rosh Pinah Mine, Namibia to map shallow conductive structures. (Client: Kumba Resources)
- Acquisition (sub-contracted) and interpretation of TEM data to model subsurface conductors near Gravelotte, RSA. (Client: Maranda Mining Company)
- Seismic refraction survey (acquisition and interpretation) to determine the depth to bedrock on a lake edge, Madagascar. (Client: Phelps Dodge )
- Interpretation of TEM data to model subsurface conductors for base metal prospects in RSA and Namibia. (Client: Kumba Resources)
- Seismic refraction survey (acquisition and interpretation) to determine depth to bedrock at Palaborwa Mine, RSA. (Client: Northern Environmental for Palaborwa Mining Company)
- EM34 data acquisition and interpretation to map fault zones influencing contaminated ground water distribution at Louis Trichardt Air Force Base. (Client: VNM & Associates: Geotechnical, Environmental, Civil Consulting Engineers)
- Gravity data acquisition (Scintrex CG-3) and processing in the Northern Cape to map iron ore, RSA. (Client: Kumba Resources)



- Literature study and preliminary design of system parameters for a tool to measure coal thickness. (*Client: Miningtek: COALTECH project*)

### **Short courses presented:**

*2000:*

Preparation and presentation of "Potential Field Methods" and "GIS applied to mineral exploration" modules in a 3 day short course entitled "Geophysics for Non-Geophysicists" presented at ISCOR Ltd., Pretoria, South Africa (for Southern Geophysical Exploration)

*2012:*

Preparation and presentation of "Airborne Electromagnetics – exploring the black box A practical Course for Geologists and Prospectors"; a one day short course at the request of the Mineral Exploration Group, Calgary, Canada.

### **Computer Literacy:**

Extensive knowledge of, and experienced in:

- Microsoft Office
- Geosoft Oasis Montaj
- Maxwell
- EMFlow

Workable knowledge of:

- ModelVision Pro
- MapInfo
- Arcview

Programming Languages

- C/C++ , Geosoft GX developers code

### **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.

### **Membership of Professional Organizations:**

*1996- current:*

Society for Exploration Geophysicists (SEG)

*1996- current:*

South African Geophysical Association (SAGA)

(Council Member: 1999-2000, 2002-2006)

(Member of organizing committee for 2001 Drakensberg Biennial Conference and Exhibition as well as 2003 Pilanesberg Biennial Conference and Exhibition)



*1993-1996:*

Geological Society of the University of Pretoria (Student Organization)

(Council Member: 1995)

**Research Interests:**

- Electromagnetic modeling and interpretation
- Integrated interpretation of airborne geophysical data applied to mineral exploration