

JOHANN P. ENGELBRECHT
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Desert Research Institute
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Education

University of Pretoria	Geology	Ph.D.	1987
University of Pretoria	Geology <i>cum laude</i>	M.Sc.	1973
University of Pretoria	Geology <i>cum laude</i>	B.Sc. (Hons)	1970
University of Pretoria	Chemistry, Physics	B.Sc.	1963

Professional Interests

Johann Engelbrecht, Research Professor Emeritus in the Division of Atmospheric Sciences (DAS) at the Desert Research Institute (DRI), has been working in Earth Sciences for 50 years, the last 30 years specifically on airborne dust and other aerosols. His career path initiated in South Africa and later continued in the U.S.A, Middle East and elsewhere. To better pursue his career, it was necessary to broaden his background from Chemistry and Physics to Geology, in addition to Mathematics and Statistics. On the analytical side he has many years of hands-on experience in X-ray fluorescence spectrometry (XRF), X-ray diffraction (XRD) analysis, Electron Probe Micro-analysis (EPMA), and Scanning Electron Microscopy (SEM).

He was principal investigator for several air quality studies in the industrialized regions of South Africa, including the Vaal Triangle Aerosol Monitoring and Source Apportionment Study, and the Qalabotjha Low-Smoke Fuels Macro-Scale Experiment. Specifics included the implementation of PM₁₀ and PM_{2.5} monitoring and analysis, as well as CMB receptor modeling.

Since joining the DRI in Reno Nevada in 2001, Dr. Engelbrecht has been principal or co-principal investigator on a variety of air quality studies, including the MARAMA receptor modeling study, the VISTAS organic tracers and CMB study, the DOE's Yucca Mountain air quality monitoring study, the DOD's Middle East, Enhanced Particulate Matter Surveillance Program, the Lake Tahoe Source Attribution study, and the Mobile Aerosol Monitoring System for the U.S. Department of Defense. He established the DRI's XRD laboratory (<http://www.dri.edu/das-laboratories/1770-x-ray-diffraction-analysis-of-mineral-dusts-in-aerosols>) and mineral dust re-suspension facility (<http://www.dri.edu/das-laboratories/4185-dust-entrainment-and-characterization-facility>).

Dr. Engelbrecht is the author or co-author of 52 peer reviewed publications, of 53 reports, and has made more than 87 presentations at international conferences and workshops, earning him more than 2300 citations (until November 2021).

His recent research interest includes characterizing windblown mineral dusts, from the Middle East and the Sahara, with emphasis on their potential health effects, and global climate. He spent two months in 2009, as invited visiting Professor at the University of Las Palmas in Gran Canaria, Spain, furthering his research on the health impact of Saharan dust. Since 2013 he has been collaborating with researchers at King Abdullah University of Science and Technology (KAUST) in Saudi Arabia, on the measurement of Arabian dust and its impact on the Red Sea. Early in 2016 the Geological Survey of Iran invited Dr. Engelbrecht to participate in the International Geosciences Conference in Tehran, followed by the 1st International Conference on Dust, at the Shahid Chamran University of Ahvaz, Iran. In 2018 he was invited as Keynote speaker at the 2nd International Conference on Dust, held at the Ilam University, in Iran, providing opportunities for collaboration on escalating dust issues in the region.

Professional Experience

2016 - present	Research Professor Emeritus, Desert Research Institute, Division of Atmospheric Sciences, Nevada, Reno, NV
2016 - 2020	Visiting Faculty, King Abdullah University of Science and Technology (KAUST), Thuwal, Saudi Arabia
2010 - 2016	Research Professor, Desert Research Institute, Division of Atmospheric Sciences, Nevada, Reno, NV
2001 - 2010	Associate Research Professor, Desert Research Institute, Division of Atmospheric Sciences, Nevada, Reno, NV
1989 - 2001	Specialist Scientist, Environmental & On-Line Analysis, Mintek, Mineralogy Division, South Africa
2001 - 2001	Associate Professor, Geology Department, Rand Afrikaans University, Johannesburg, South Africa
1985 - 1989	Senior Research Scientist, Geology Department, University of Potchefstroom for Christian Higher Education, South Africa
1975 - 1985	Senior Lecturer, Geology Department, University of Pretoria, South Africa
1973 - 1975	Lecturer, Geology Department, University of Port Elizabeth, South Africa
1972	Lecturer (temporary), Geology Department, University of Pretoria, South Africa
1967 - 1971	Lecturer, Department of Physical Sciences, Pretoria Technicon, South Africa
1966	Laboratory Assistant, Chemistry Department, University of Pretoria, South Africa
1964	Industrial Chemist, Consolidated Glass Works, Pretoria, South Africa

Professional Activities

Associations:

- Geological Society of America (GSA)
- American Geophysical Union (AGU)
- Geochemical Society
- International Medical Geology Association (IMGGA)

Past Involvement in Academic Institutions:

Examiner and Committees for MSc and PhD Theses

PhD	1.	Sadrian, M. R., Ph.D. Candidate. <i>Spectroscopy of Global Parent Soils: Application to Aerosol Mineral Dust</i> , Ph.D. University of Nevada, Reno
	2.	Banta, J.R., 2006. <i>Interpretation of Glaciochemical Records from an array of Greenland Ice Cores</i> , Ph.D., University of Nevada, Reno
	3.	Bohlender, F.H., 1993. <i>Igneous and metamorphic charnockitic rocks in the southern marginal zone of the Limpopo belt with special emphasis on the Matok enderbitic granitic suite</i> , Ph.D., Rand Afrikaans University (RAU).
MSc	4.	Strydom, J.H., 1983. <i>Geochemical and mineralogical distribution patterns in wall-rocks of tin-bearing ore bodies in the Zaaiplaats mine, Potgietersrus district</i> . M.Sc., University of Pretoria
	5.	Nell, J., 1984. <i>Geochemical and thermodynamic controls in the formation of mineral assemblages from the metamorphic aureole of the Bushveld Complex in the Potgietersrus area</i> . M.Sc., University of Pretoria
	6.	Van Zyl, A.M., 1996. <i>The sulphides of the Uitkomst Complex, Badplaas, South Africa</i> . M.Sc., University of Pretoria

Moderator & External Examiner for Graduate and Post-graduate Courses

7. B.Sc.(Hons.), (*Crystallography, Mineralogy, Igneous and Metamorphic Petrology*), University of Pretoria
8. B.Sc. (3rd, 4th year), (*Mineralogy, Igneous and Metamorphic Petrology*), Rand Afrikaans University

Lecturer Contracted to RAU by Mintek

9. B.Sc.(Hons.), (*Environmental Mineralogy, Geochemistry & Analysis*), Rand Afrikaans University

Awards and Honors

- MINTEK, Achievement Award, Gold Medal. The Measurement and Apportionment of Airborne Particulate Matter. November 1995
- MINTEK, Gold Coin. Air Pollution Research. December 1993

Publications

- Volkova, E., Nair, A.K.N., Engelbrecht, J., Schwingenschlögl, U., Sun, S., and Stenchikov, G., 2021. Molecular dynamics modeling of kaolinite particle associations. *Journal of Physical Chemistry C*, **125**, 24126-24136. <https://doi.org/10.1021/acs.jpcc.1c06598>
- Shevchenko, I, Engelbrecht, J.P., Mostamandi, S. and Stenchikov, G., 2021. Evaluation of minerals being deposited in the Red Sea using gravimetric, size distribution, and mineralogical analysis of dust deposition samples collected along the Red Sea coastal plain. *Aeolian Research*, **52**, 100717. <https://doi.org/10.1016/j.aeolia.2021.100717>
- Ahmady-Birgani, H., Engelbrecht, J.P., and Bazgir, M., 2019: How different source regions across the Middle East change aerosol and dust particle characteristics. *Dust*, **24**(1), 61-73. [10.22059/jdesert.2019.72441](https://doi.org/10.22059/jdesert.2019.72441)
- Engelbrecht, J.P., Stenchikov, G., Jish Prakash, P., Anisimov A., and Shevchenko, I., 2017: Physical and chemical properties of deposited airborne particulates over the Arabian Red Sea coastal plane. *Atmos. Chem. Phys.*, **17**, 11467-11490. <https://doi.org/10.5194/acp-17-11467-2017>
- Menéndez, I., Derbyshire, E., Carrillo, T., Caballero, E., Engelbrecht, J. P., Romero, L.E., Mayer, P.L., de Castro, F.R., Mangas, J., 2016: Saharan dust and the impact on adult and elderly allergic patients: the effect of threshold values in the northern sector of Gran Canaria, Spain. *International Journal of Environmental Health Research*, **27** (2), 144-160. [10.1080/09603123.2017.1292496](https://doi.org/10.1080/09603123.2017.1292496)
- Engelbrecht, J. P., Moosmüller, H., Pincock, S., Jayanty, R., Lersch, T., Casuccio, G., 2016: Technical Note: Mineralogical, chemical, morphological, and optical Interrelationships of mineral dust, *Atmos. Chem. Phys.*, **16**, 10809–10830. doi:10.5194/acp-16-10809-2016. [10.5194/acp-16-10809-2016](https://doi.org/10.5194/acp-16-10809-2016)
- Prakash, P. J., Stenchikov, G., Tao, W., Yapici, T., Warsama, B., Engelbrecht, J. P., 2016: Arabian Red Sea coastal soils as potential mineral dust sources, *Atmos. Chem. Phys.*, **16**, 11991-12004, doi:10.5194/acp-16-11991-2016. [10.5194/acp-16-11991-2016](https://doi.org/10.5194/acp-16-11991-2016)
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- PM2.5 in Southwestern Rural Nevada, USA, *Water Air Soil Pollut.*, **226**, 217, 1-13. [10.1007/s11270-015-2481-8](https://doi.org/10.1007/s11270-015-2481-8)
- Zhang, Y., Mahowald, N., Scanza, R. A., Journet, E., Desboeufs, K., Albani, S., Kok, J. F., Zhuang, G., Chen, Y., Cohen, D. D., Paytan, A., Patey, M. D., Achterberg, E. P., Engelbrecht, J. P., Fomba, K. W., 2015: Modeling the global emission, transport and deposition of trace elements associated with mineral dust, *Biogeosciences*, **12**, 5771-5792. <https://doi.org/10.5194/bg-12-5771-2015>
- Engelbrecht, J. P., Menéndez, I., Derbyshire, E., 2014: Sources of PM2.5 impacting on Gran Canaria, Spain, *Catena*, **117**, 119-132. [10.1016/j.catena.2013.06.017](https://doi.org/10.1016/j.catena.2013.06.017)
- Menéndez, I., Engelbrecht, J. P., Pérez-Chacón, E., Mangas, J., Tauler, E., Derbyshire, E., Cana, L., Alonso, I., 2014: Dust deposits on La Graciosa Island (Canary Islands, Spain): Texture, mineralogy and a case study of recent dust plume transport, *Catena*, **117**, 133-144. [10.1016/j.catena.2013.05.007](https://doi.org/10.1016/j.catena.2013.05.007)
- Engelbrecht, J. P., Jayanty, R. K., 2013: Assessing sources of airborne mineral dust and other aerosols, in Iraq, *Aeolian Res.*, **9**, 153-160. [10.1016/j.aeolia.2013.02.003](https://doi.org/10.1016/j.aeolia.2013.02.003)
- Engelbrecht, J. P., Gillies, J. A., Etyemezian, V. R., Kuhns, H. D., Baker, S. E., Zhu, D., Nikolich, G., Kohl, S. D., 2012: Controls on mineral dust emissions at four arid locations in the western USA, *Aeolian Res.*, **6**, 41-54. [10.1016/j.aeolia.2012.07.003](https://doi.org/10.1016/j.aeolia.2012.07.003)
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- Menéndez, I., Derbyshire, E., Engelbrecht J.P., Von Suchodoletz, Zöller, L., Dorta, P., Carrillo, T., and Rodríguez de Castro, F., 2009: Saharan dust and aerosols on the Canary Islands: past and present, in Cheng, M. and Liu, W. (editors) *Airborne Particulates*, NOVA Publishers Inc, New York, 39-80.
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- Engelbrecht, J.P., Van den Heever, P.C and De Bruyn, S.W., (1999). *The on-stream X-ray diffractometric analysis of phosphate-rock-bearing slurries for process control on a beneficiation plant*. In: *Beneficiation of Phosphates, Advances in Research and Practice*, eds. Zhang, P. El-Shall, H., and Wiegel, R. Society for Mining, Metallurgy, and Exploration, Inc., p. 237-246.
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- Engelbrecht, J.P., Swanepoel, L., Zunkel, M. and Chow, J. 1998: *Modelling PM₁₀ gravimetric data from the Qalabotjha Low-Smoke Fuels Macro-Scale Experiment in South Africa*, Papers of the International Union of Air Pollution Prevention and Environmental Protection Associations (IUAPPA), 11th World Clean Air and Environment Congress, Durban, South Africa, September 13-18, 1998.
- Engelbrecht, J.P., Swanepoel, L. and Chow, J., 1998: *Source Apportionment of Domestic Coal and Low-Smoke Fuel Combustion in Qalabotjha, South Africa*, Papers of the International Union of Air Pollution Prevention and Environmental Protection Associations (IUAPPA), 11th World Clean Air and Environment Congress, Durban, South Africa, September 13-18, 1998
- Engelbrecht, J.P. and Wells, R.B., 1996. Source Apportionment, in Gore, B.J., Surridge, A.D., Tosen, G.R., Turner, C.R. and Walmsley, R.D. (eds). *Air Pollution and its impacts on the South African Highveld*. *Environmental Scientific Association*, Cleveland, South Africa, 144pp.
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- Engelbrecht, J.P., De Villiers, J.P.R. and Annegarn, H.J., 1990. *Scanning electron microscope analysis of individual particles in a source-apportionment study of atmospheric pollution in the Vaal Triangle*, Papers of the 1st International Union of Air Pollution Prevention Associations (IUAPPA) Regional Conference on Air Pollution, and the National Association for Clean Air (NACA), Pretoria, South Africa, October 24-26, 1990.
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Reports

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- Engelbrecht, J.P. and Moosmüller, H., *Mobile Aerosol Monitoring System for Department of Defense – Continuous Aerosol and aerosol Optics Measurement in Theater*. Final report submitted to the U.S. Army Medical Research and Materiel Command, Fort Detrick, Maryland, 2014.
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- Engelbrecht, J.P., Gertler, A., and VanCuren, *Lake Tahoe Source Attribution Study (LTSAS): Receptor Modeling Study to Determine the Sources of Observed Ambient Particulate Matter in the Lake Tahoe Basin*, Final report submitted Jonathan Long, (Tahoe Research Program Manager, USDA Forest Service), (December, 2009)
- Fujita, E.M., Campbell, D., Engelbrecht, J.P., and Zielinska, B... *Characterization of Fine Particle Mass Using Particle-Phase Organic Compounds as Tracer*, Final report prepared for Pat Brewer (VISTAS Technical Coordinator) and John Hornback (SESARM Executive Director), (January 2009)

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