UNIVERSITY OF PRETORIA

CURRICULUM VITAE

1. BIOGRAPHICAL SKETCH

1.1 GENERAL INFORMATION

Surname	Landman		
First names	Willem Adolf	**ID Number**	6404285183081
Citizenship	South African	**Title**	Prof
Place of birth	Pretoria, South Africa	**Date of birth**	1964-04-28
Population group		**White**	
Department	Geography, Geoinformatics and Meteorology	**Position**	Professor
Direct Telephone	012-420-3713	**Direct Telefax**	
E-mail	Willem.Landman@up.ac.za / WALandman1981@gmail.com		
Date of appointment	2016-01-01	**Permanent full-time**	X
		Temporary full-time	

1.2 ACADEMIC QUALIFICATIONS OBTAINED

Degree/ Diploma	Field of study	Higher education institution	Year	Distinctions
PhD	Science	University of the Witwatersrand	2000	
MSc	Meteorology	University of Pretoria	1997	Cum Laude
BSc (Honours)	Meteorology	University of Pretoria	1991	Cum Laude
BSc	Meteorology	University of Pretoria	1987	

1.3 WORK EXPERIENCE TO DATE

Name of employer	Capacity and/or type of work	Period From mm//yy to *mm//yy*
University of Pretoria	Professor (Full)	1/2016 to present
Council for Scientific and Industrial Research	Chief Researcher: Climate Studies, Modelling and Environmental Health	11/2009 to 12/2015
South African Weather Service	Chief Scientist: Seasonal Forecasting	11/1986 to 10/2009

2. TEACHING ACTIVITIES

2.1 Courses presented

Course	Level *(e.g., second year, Masters)*	Self developed *(Yes or No)*
Quasi-Geostrophic Analysis	Third year	Yes
Synoptic-Scale Circulation Dynamics and Vorticity in Mid-Latitudes	Third year	Yes
Numerical Modelling: Basic Concepts	Honours	No
Seasonal Climate Modelling	Honours	Yes
Dynamic Meteorology	Honours	No
Cloud Dynamics	Third year	No
Cloud Physics	Third year	No

2.2 Other education and pedagogic courses presented

Course	Year	Institution
Drought Forecasting and its Use in Informed Decision Making	2013 (one week)	International Centre for Advanced Mediterranean Agronomic Studies in Zaragoza, Spain
Fifth Workshop on Regional Climate Prediction and Applications	2005 (three weeks)	University of Oklahoma, USA
Statistical Climate Modelling	1997 (six weeks)	African Centre for Meteorological Applications for Development (ACMAD) in Niamey, Niger
Quasi-Geostrophic Theory	1992, 1994	Tshwane University of Technology

3 TEACHING OUTPUTS

3.1 Educational publications and products

Self-prepared comprehensive lecture notes and PowerPoint presentations available on https://tinyurl.com/ForecastProf for 1) Seasonal Climate Modelling (WKD 703), 2) Southern Hemisphere Dynamic Meteorology and its General Circulation (WKD 352 and WKD 361)

4. OTHER TEACHING CONTRIBUTIONS

4.1 Membership of national and international bodies

South African Society for Atmospheric Sciences: Full member

American Meteorological Society: Full member

4.2 Visits to local and overseas universities as guest professor or lecturer in regard to teaching

University of the Free State, 2008.

4.3 Participation in national and international teaching associations, bodies, committees

Member of the Climate Variability and Predictability (CLIVAR) Project's Working Group on Seasonal to Interannual Prediction (WGSIP) from 2005 to 2011.

WMO Expert Team on Long-Range Forecast Infrastructure from 2004 to 2009. Served as Team Leader in 2005.

Member of the Working Group on Regional Climate (WGRC) for the World Climate Research Programme (WCRP) from 2012.

Member of the S2S (subseasonal-to-seasonal) Prediction Project Steering Group from 2016 to 2019.

Member of the Expanded Freshwater and Terrestrial Environmental Observation Network (EFTEON) Thematic Technical Committee on Meteorology and Atmospheric Science from 2019

Member of the Met Office Hadley Centre Climate Programme Science Review Group since 2024

5 RESEARCH ACTIVITIES

Name of student	Degree/Title of dissertation/ thesis and date	Supervisor	Co-supervisor(s)
E. Klopper	MSc: study of the predictability of seasonal temperature in South Africa. 1997	W.A. Landman	J. van Heerden
A.C. Kruger	MSc: The relationship between ENSO, seasonal rainfall, and circulation patterns in South Africa. 1999	B.C. Hewitson	W.A. Landman
A.G. Bartman	MSc: Pattern analysis and recalibration of a perfectly forced atmospheric general circulation model. 2003	W.A. Landman	H. Rautenbach
M. Shongwe	MSc: An assessment of the performance of recalibration systems of GCM forecasts over southern Africa. 2006	W.A. Landman	
M. Kgatuke	MSc: The internal variability of the regional climate model RegCM3 over southern Africa. 2006	W.A. Landman	
P. Moatshe	MSc: Verification of the South African Weather Service operational seasonal forecasts. 2008	W.A. Landman	
N. Somers	MSc: Seasonal maize yield simulations for South Africa using a multi-model ensemble system. 2009	W.A. Landman	
M. Mbedzi	MSc: Simulations of tropical cyclone-like vortices over the south-western Indian Ocean. 2010	W.A. Landman	
M. Moeletsi	PhD: Agroclimatological risk assessment for dryland maize production in the Free State, South Africa. 2011	S. Walker	W.A. Landman
M. Bopape	PhD: Simulations of moist convection using the quasi-elastic equations. 2013	W.A. Landman	F.A. Engelbrecht

J. Malherbe	PhD: Tropical systems from the southwest Indian Ocean over southern Africa: Impacts, dynamics and projected changes. 2014	W.A. Landman	F.A. Engelbrecht
R. Park	MSc: An ensemble numerical weather predictions system for southern Africa. 2014	W.A. Landman	
S. Muchuru	PhD: Predictability of Seasonal Rainfall and Inflows for Water Resource Management at Lake Kariba. 2015	W.A. Landman	
Q. Jacobs	MSc: Evaluating human-processed forecasts provided to the aviation industry in South Africa. 2015	W.A. Landman	
A. Beraki	PhD: ECHAM4.5 global circulation model as a seasonal forecasting system for southern Africa: Coupled vs. uncoupled. 2016	W.A. Landman	G. DeWitt
C. Engelbrecht	PhD: Dynamics of climate variability over the all-year rainfall region of South Africa. 2016	W.A. Landman	
K. Mathole	MSc: Impact of lower stratospheric dynamics on the predictability of summer rainfall over South Africa. 2016	W.A. Landman	T Ndarana
A. Dalton	MSc: Contaminated land as a result of coal fired power generation. 2017	W.A. Landman	G. Feig
S. Phakula	MSc: Modelling seasonal rainfall characteristics over South Africa. 2017	W.A. Landman	
P. Maluleke	MSc: Estimating a dynamically adjusted carrying capacity output for Limpopo Province using seasonal forecasts and remote sensing products. 2017	W.A. Landman	E Archer, J Malherbe
P. Shibambu	MSc: A heat-watch warning system for South Africa for the benefit of the health sector. 2018	W.A. Landman	R Garland
M. Erasmus	MSc: Formation and development of tropical temperate troughs across southern Africa as simulated by a state-of-the-art coupled model. 2020	W.A. Landman	C. Engelbrecht
A. De Beer	MSc: Review and verification study of atmospheric visibility reduction during fog and mist. 2021	W.A. Landman	S. Landman
E. Engelbrecht	MSc: The impact of high-resolution soil moisture states on short-term numerical weather prediction of convective initiation over South Africa. 2021	W.A. Landman	S. Landman
M. Barnes	PhD: The dynamics of cut-off lows and their vertical extension to the surface. 2021	T. Ndarana	W.A. Landman
S. Phakula	PhD: Atmospheric predictability over southern Africa on sub-seasonal to seasonal time-scales. 2025	W.A. Landman	C. Engelbrecht
T. Ramotubei	PhD: Numerical experimentation on the mechanisms and processes of the inter-tropical convergence zone meridional shift: seasonal context. 2025	A. Beraki	W.A. Landman, M. Mateyisi
A. Fourie	MSc: Influence of the El Niño – Southern Oscillation on the southern Atlantic Ocean and southern African climate variability. 2025	W.A. Landman	T. Ndarana, M. Barnes
N. Maduna	MSc: Seasonal-to-interannual river flow predictability over southern Africa. 2025	W.A. Landman	G. Kay

M. Ntele	MSc: Supporting adaptation to climate change through optimized maximum temperature seasonal climate forecasts. 2025	W.A. Landman	E. Archer
A. Serafini	MSc: Innovative tailored seasonal forecasting for farming systems in Namibia. 2025	W.A. Landman	N. Sweijd

5.3 Obtaining research funds *(Since joining UP fulltime, and as PI)*

Origin of research funds (e.g. contract research, THRIP, international funding organisations, other(s)	**Title of research project or programme**	**Duration**	**Money allocated (R) *(Optional - exact amounts not required)***
NRF	Investigating predictability of seasonal anomalies for societal benefit	2018 – 2020	ZAR 12,072,000
WRC/The Swedish Foundation for International Cooperation in Research and Higher education	Research-based Assessment of Integrated approaches to Nature-based SOLUTIONS - RainSolutions	2019-2022	Euro 24,000
NRF	Application of Knowledge for the Management of Extreme Climate Events (APECX)	2022-2024	ZAR 2,027,400

6 RESEARCH OUTPUTS

6.1 Publications in peer-reviewed or refereed journals.

1. Archer, E.R.M., Du Toit, J., Engelbrecht, C., Hoffman, M.T., Landman, W.A., Malherbe, J., Stern, M. (2022). The 2015-19 multi year drought in the Eastern Cape, South Africa: it's evolution and impacts on agriculture. Journal of Arid Environments, 196, 104630
2. Archer, E.R.M.; Landman, W.A., Malherbe, J., Maluleke, P., Weepener, H. (2021). Managing climate risk in livestock production in southern Africa: how might improved tailored forecasting contribute? Climate Risk Management, 32, 100312, doi: 10.1016/j.crm.2021.100312.
3. Archer, E., Landman W.A., Malherbe, J., Tadross, M. and Pretorius, S. (2019). South Africa's winter rainfall region drought: a region in transition? Climate Risk Management. 25, 100188. DOI: 10.1016/j.crm.2019.100188.
4. Archer, E., Landman, W.A., Tadross, M., Malherbe, J., Weepener, H., Maluleke, P. and Marumbwa, F. (2017). Understanding the evolution of the 2014-2016 summer rainfall seasons in southern Africa: key lessons. Climate Risk Management, 16, 22-28, DOI: http://dx.doi.org/10.1016/j.crm.2017.03.006.
5. Barcley, J.J., Jury, M.R. and Landman, W.A. (1993). Climatological and structural differences between wet and dry troughs over southern Africa in the early summer. Meteorology and Atmospheric Physics, 51, 41-54.
6. Barnes, M.A., Ndarana, T., Landman, W.A. (2021). Cut-off lows in the Southern Hemisphere and their extension to the surface. Climate Dynamics, doi: 10.1007/s00382-021-05662-7.
7. Barnes, M.A., Turner, K., Ndarana, T. and Landman, W.A. (2021). Cape Storm: A dynamical study of a cut-off low and its impact on South Africa. Atmospheric Research, 249, 105290, doi: 10.1016/j.atmosres.2020.105290.
8. Barnes, M.A., Ndarana, T., Sprenger, M., Landman, W.A. 2021. Stratospheric intrusion

depth and its effect on surface cyclogenesis: An idealized PV inversion experiment. Weather and Climate Dynamics. [preprint], doi: 10.5194/wcd-2021-24, in review.
9. Bartman, A.G., Landman, W.A. and Rautenbach, C.J.deW. (2003). Recalibration of general circulation model output to austral summer rainfall over southern Africa. International Journal of Climatology, 23, 1407-1419.
10. Beraki, A.F., DeWitt, D., Landman, W.A. and Olivier, C. (2014). Dynamical seasonal climate prediction using an ocean-atmosphere coupled climate model developed in partnership between South Africa and the IRI. Journal of Climate, 27, 1719-1741.
11. Beraki, A.F., Landman, W.A., DeWitt, D. and Olivier, C. (2016). Global dynamical forecasting system conditioned to robust initial and boundary forcings: seasonal context. International Journal of Climatology, 36, 4455-4474, DOI: 10.1002/joc.4643.
12. Beraki, A.F., Landman, W.A. and DeWitt, D. (2015). On the comparison between seasonal predictive skill of global circulation models: coupled versus uncoupled. Journal of Geophysical Research – Atmospheres, 120, 11151-11172, DOI:10.1002/2015JD023839.
13. Bopape, M.M., Engelbrecht, F.A., Randall, D.A. and Landman, W.A. (2014). Simulations of an isolated two-dimensional thunderstorm: sensitivity to cloud droplet size and the presence of graupel. Asia Pacific Journal of Atmospheric Science, 50, 139-151, DOI:10.1007/s13143-014-0003-z
14. Bopape, M.M., Engelbrecht, F.A., Randall, D.A. and Landman, W.A. (2014). Advances towards the development of a cloud resolving model in South Africa. South African Journal of Science, 110(9/10), 61-72.
15. Conway, D., Archer van Garderen, E., Deryng, D., Dorling, S., Krueger, T., Landman, W.A., Lankford, B., Lebek, K., Osborn, T., Ringler, C., Thurlow, J., Zhu T. and Dalin, C. (2015). Climate and southern Africa's water-energy-food nexus. Nature Climate Change, 5, 837-846, DOI: 10.1038/NCLIMATE2735.
16. Conway, D., Dalin, C., Landman, W.A. and Osborn, T.J. (2017). Hydropower plans in eastern and southern Africa increase risk of concurrent climate-related electricity supply disruption. Nature Energy, 2, 946-953, DOI: 10.1038/s41560-017-0037-4.
17. Engelbrecht, C.J., Landman, W.A. (2016). Interannual variability of seasonal rainfall over the Cape south coast of South Africa and synoptic type association. Climate Dynamics, 47, 295-313, DOI 10.1007/s00382-015-2836-2
18. Engelbrecht, C.J., Landman, W.A., Engelbrecht F.A. and Malherbe, J. (2015). A synoptic decomposition of rainfall over the Cape south coast of South Africa. Climate Dynamics, 44(9-10), 2589-2607, DOI 10.1007/s00382-014-2230-5.
19. Engelbrecht, C.J., Landman, W.A., Graham, R.J. and McLean, P. (2017). Seasonal predictive skill of intraseasonal synoptic type variability over the Cape south coast of South Africa by making use of the Met Office Global Seasonal Forecast system 5. International Journal of Climatology, 37, 1998-2012, DOI: 10.1002/joc.4830.
20. Engelbrecht C.J., Phakula S., Landman W.A., Engelbrecht F.A.. (2021). Subseasonal deterministic prediction skill of low-level geopotential height affecting southern Africa. Weather and Forecasting, 36, 195-205, doi: 10.1175/WAF-D-20-0008.1.
21. Engelbrecht, F.A., Landman, W.A., Engelbrecht, C.J., Landman, S., Bopape, M.M., Roux, B., McGregor, J.L. and Thatcher, M. (2011). Multi-scale climate modelling over southern Africa using a variable-resolution global model. Water SA, 37, 647-658.
22. Garland, R.M., Matooane, M., Engelbrecht, F.A., Bopape, M., Landman, W.A., Naidoo, M., van der Merwe, J. and Wright, C.Y. (2015). Regional projections of extreme apparent temperature days in Africa and the related potential risk to human health. International Journal of Environmental Research and Public Health, 12, 12577-12604; doi:10.3390/ijerph121012577.
23. Horowitz. H.M., Garland, R.M., Thatcher, M., Landman, W.A., Dedekind, Z., Van der Merwe, J. and Engelbrecht, F.A. (2017). Evaluation of climate model aerosol seasonal and spatial variability over Africa using AERONET. Atmospheric Chemistry and Physics

Discussions, 17, 13999-14023, https://doi.org/10.5194/acp-17-13999-2017.
24. Jacobs, Q. and Landman, W.A. (2019). Adding value to numerical weather predictions for the aviation industry in South Africa. International Journal of Aviation, Aeronautics, and Aerospace, 6(5). https://commons.erau.edu/ijaaa/vol6/iss5/11.
25. Jury, M.R., Pathack, B., Campbell, G., Wang, B. and Landman, W.A. (1991). Transient convective waves of the tropical SW Indian Ocean. Meteorology and Atmospheric Physics, 47, 27-36.
26. Kapwata, T., Caradee, Y.W., du Preez, D.J., Kunene, Z., Mathee, A., Ikeda, T., Landman, W., Maharaj, R., Sweijd, N., Minakawa, N., Blesic, S. (2021). Exploring rural hospital admissions for diarrhoeal disease, malaria, pneumonia, and asthma in relation to temperature, rainfall and air pollution using wavelet transform analysis. Science of the Total Environment, 791, 148307, https://doi.org/10.1016/j.scitotenv.2021.148307.
27. Kgatuke, M.M., Landman, W.A., Beraki, A. and Mbedzi, M. (2008). The internal variability of the RegCM3 over South Africa. International Journal of Climatology, 28, 505-520.
28. Klopper, E. and Landman, W.A. (2003). A simple approach for combining seasonal forecasts for southern Africa. Meteorological Applications, 10, 319-327.
29. Klopper, E., Landman, W.A. and Van Heerden J. (1997). The predictability of seasonal maximum temperature in South Africa. International Journal of Climatology, 18, 741-758.
30. Klopper, E., Vogel, C.H. and Landman, W.A. (2006). Seasonal climate forecasts – potential agricultural-risk management tools? Climatic Change, 76, 73-90.
31. Landman, S., Engelbrecht, F.A., Engelbrecht, C.J., Dyson, L.L. and Landman, W.A. (2012). A short-range weather prediction system for South Africa based on a multi-model approach. Water SA, 38, 765-773.
32. Landman, W.A. (2014). How the International Research Institute for Climate and Society has contributed towards seasonal climate forecast modelling and operations in South Africa. Earth Perspectives, 1:22, DOI: 10.1186/2194-6434-1-22.
33. Landman, W.A., and Barnston, A.G. (2025). Verification of operational Niño3.4 SST forecasts produced in South Africa since the 2015 El Niño event. Environmental Development, 55, 101214, ISSN 2211-4645, https://doi.org/10.1016/j.envdev.2025.101214.
34. Landman, W.A., and Beraki, A. (2012). Multi-model forecast skill for midsummer rainfall over southern Africa. International Journal of Climatology, 32, 303-314, DOI: 10.1002/joc.2273.
35. Landman, W.A. and Goddard, L. (2002). Statistical recalibration of GCM forecasts over southern Africa using model output statistics. Journal of Climate, 15, 2038-2055.
36. Landman, W.A. and Goddard, L. (2005). Predicting southern African summer rainfall using a combination of MOS and perfect prognosis. Geophysical Research Letters, 32, L15809, DOI: 10.1029/2005GL022910.
37. Landman, W.A. and Klopper, E. (1998). 15-year simulation of the December to March rainfall season of the 1980s and the 1990s using canonical correlation analysis (CCA). Water SA, 24, 281-285.
38. Landman, W.A and Mason, S.J. (1999). Operational long-lead prediction of South African rainfall using canonical correlation analysis. International Journal of Climatology, 19, 1073-1090.
39. Landman, W.A. and Mason, S.J. (1999). Change in the association between Indian Ocean sea-surface temperatures and summer rainfall over South Africa and Namibia. International Journal of Climatology, 19, 1477-1492.
40. Landman, W.A. and Mason, S.J. (2001). Forecasts of near-global sea-surface temperatures using canonical correlation analysis. Journal of Climate, 14, 3819-3833.
41. Landman, W.A. and Tennant, W.J. (2000). Statistical downscaling of monthly forecasts. International Journal of Climatology, 20, 1521-1532.
42. Landman, W.A., Archer, E.R.M and Tadross, M.A (2020). Citizen science for the

prediction of climate extremes in South Africa and Namibia. Frontiers in Climate, 2:5, doi: 10.3389/fclim.2020.00005.
43. Landman, W.A., Seth, A. and Camargo, S.J. (2005). The effect of regional climate model domain choice on the simulation of tropical cyclone-like vortices in the southwestern Indian Ocean, Journal of Climate, 18, 1263-1274.
44. Landman, W.A., Barnston, A.G., Vogel, C. and Savy, J. (2019). Use of El Niño-Southern Oscillation related seasonal precipitation predictability in developing regions for potential societal benefit. International Journal of Climatology, 39, 5327-5337. DOI: 10.1002/JOC.6157
45. Landman, W.A., Beraki, A., DeWitt, D. and Lötter, D. (2014). SST prediction methodologies and verification considerations for dynamical mid-summer rainfall forecasts for South Africa, Water SA, 40(4), 615-622, http://dx.doi.org/10.4314/wsa.v40i4.6.
46. Landman, W.A., Botes, S., Goddard, L., and Shongwe, M. (2005). Assessing the predictability of extreme rainfall seasons over southern Africa. Geophysical Research Letters, 32, L23818, DOI: 10.1029/2005GL023965.
47. Landman, W.A., Mason, S.J., Tyson, P.D. and Tennant, W.J. (2001). Retro-active skill of multi-tiered forecasts of summer rainfall over southern Africa. International Journal of Climatology, 21, 1-19.
48. Landman, W.A., Mason, S.J. Tyson, P.D. and Tennant, W.J. (2001). Statistical downscaling of GCM simulations to streamflow. Journal of Hydrology, 252, 221-236.
49. Landman, W.A., Sweijd, N., Masedi, N. Minakawa, N. (2020). The development and prudent application of climate-based forecasts of seasonal malaria in the Limpopo province in South Africa. Environmental Development, 35, 100522, doi: 10.1016/j.envdev.2020.100522.
50. Landman, W.A., Tadross, M., Archer, E., Johnston, P. (2023). Probabilistic vs deterministic forecasts - interpreting skill statistics for the benefit of users. Water SA, 49(3), 192–198. https://doi.org/10.17159/wsa/2023.v49.i3.4058
51. Landman, W.A., DeWitt, D. Lee, D.-E., Beraki, A. and Lötter, D. (2012). Seasonal rainfall prediction skill over South Africa: 1- vs. 2-tiered forecasting systems. Weather and Forecasting, 27, 489-501. DOI: 10.1175/WAF-D-11-00078.1.
52. Landman, W.A., Engelbrecht, F.A., Hewitson, B., Malherbe, J., and Van der Merwe, J. (2018). Towards bridging the gap between climate change projections and maize producers in South Africa. Theoretical and Applied Climatology, 132, 1153-1163, DOI: 10.1007/s00704-017-2168-8.
53. Landman, W.A., Kgatuke, M.M., Mbedzi, M., Beraki, A., Bartman, A. and du Piesanie, A. (2009). Performance comparison of some dynamical and empirical downscaling methods for South Africa from a seasonal climate modelling perspective. International Journal of Climatology, 29, 1535-1549. DOI: 10.1002/joc.1766.
54. Lazenby, M., Landman, W.A., Garland, R. and DeWitt, D. (2014). Seasonal temperature prediction skill over southern Africa and human health. Meteorological Applications, 21, 963-974. DOI: 10.1002/met.1449.
55. Malherbe, J., Engelbrecht, F.A. and Landman, W.A. (2013). Projected changes in tropical cyclone climatology and landfall in the southwest Indian Ocean region under enhanced anthropogenic forcing. Climate Dynamics, 40, 2867-2886. DOI 10.1007/s00382-012-1635-2.
56. Malherbe, J., Engelbrecht, F.A. and Landman, W.A. (2014). Response of the Southern Annular Mode to tidal forcing and the bidecadal rainfall cycle over subtropical southern Africa. Journal of Geophysical Research: Atmospheres, 119, 2032-2049. DOI: 10.1002/2013JD021138.
57. Malherbe, J., Landman, W.A. and Engelbrecht, F.A. (2014). The bi-decadal rainfall cycle, Southern Annular Mode and tropical cyclones over the Limpopo river basin, southern Africa. Climate Dynamics, 42, 3121-3138, DOI 10.1007/s00382-013-2027-y.

58. Malherbe, J., Engelbrecht, F.A., Landman, W.A., and Engelbrecht, C.J. (2012). Tropical systems from the southwest Indian Ocean making landfall over the Limpopo River Basin, southern Africa: a historic perspective. International Journal of Climatology, 32, 1018-1032, DOI: 10.1002/joc.2320.
59. Malherbe, J., Landman, W.A., Olivier, C., Sakuma, H. and Luo, J.-J. (2014). Seasonal forecasts of the SINTEX-F coupled model applied to maize yield and streamflow estimates over north-eastern South Africa. Meteorological Applications, 21, 733-742, DOI: 10.1002/met.1402.
60. Maluleke, P. Landman, W.A., Malherbe, J. and Archer, E. (2018). Seasonal forecasts for the Limpopo Province in estimating deviations from grazing capacity. Theoretical and Applied Climatology, 137(3-4), 1693-1702, DOI:10.1007/s00704-018-2696-x.
61. Mason, S.J., Ferro, C.A.T., Landman, W.A. (2021). Forecasts of "normal". Quarterly Journal of the Royal Meteorological Society, 147 (735), 1225-1236, doi: 10.1002/qj.3968.
62. Mathole, K., Ndarana, T., Beraki, A. and Landman, W.A. (2014). Impact of lower stratospheric ozone on seasonal prediction systems. South African Journal of Science, 110, 69-76.
63. Moeletsi, M.E., Walker, S. and Landman, W.A. (2011). ENSO and implications on rainfall characteristics with reference to maize production in the Free State Province of South Africa. Physics and Chemistry of the Earth, 36, 715-726.
64. Muchuru, S., Landman, W.A. and DeWitt, D. (2016). Prediction of inflows into Lake Kariba using a combination of physical and empirical models. International Journal of Climatology, 36, 2570–2581, DOI: 10.1002/joc.4513.
65. Muchuru, S., Landman, W.A., DeWitt, D. and Lötter, D. (2014). Seasonal rainfall predictability over the Lake Kariba catchment area. Water SA, 40 (3), 461-469. http://dx.doi.org/10.4314/wsa.v40i3.9
66. Muchuru, S., Botai, J.O., Botai, C.M., Landman, W.A. and Adeola, A.M. (2016). Variability of rainfall over Lake Kariba catchment area in the Zambezi river basin, Zimbabwe. Theoretical and Applied Climatology, 124(1), 325-338, DOI 10.1007/s00704-015-1422-1.
67. Muchuru, S., Landman, W.A., Midgley, G., Engelbrecht, F. and Van der Merwe, J. (2015). Future climate change challenges to sustainable forest management in the Zambezi Basin. Nature and Faune, 29(2), 45-49.
68. Nikraftar, Z., Mbuvha, R., Sadegh, M. and Landman, W. A. (2024). Impact-based skill evaluation of seasonal precipitation forecasts. Earth's Future, 12, e2024EF004936. https://doi.org/10.1029/2024EF004936.
69. Nilsson, P., Uvo, C.B., Landman, W.A. and Nguyen, T.D. (2008). Downscaling of GCM forecasts to streamflow over Scandinavia. Hydrology Research, 39.1, 17-26.
70. Phakula, S., Landman, W.A. and Beraki, A. (2018). Forecasting seasonal rainfall characteristics and onset months over South Africa. International Journal of Climatology, 38 (Suppl. 1), e889-e900, DOI: 10.1002/joc.5417.
71. Phakula, S., Landman, W.A., Engelbrecht, C.J. and Makgoale, T. (2020). Forecast skill of minimum and maximum temperatures on sub-seasonal timescales over South Africa. Earth and Space Science, 7, e2019EA000697. doi: 10.1029/2019EA000697.
72. Phakula, S., Landman, W.A. and Engelbrecht, C.J. (2024). Literature survey of subseasonal-to-seasonal predictions in the Southern Hemisphere. Meteorological Applications, 31(1), e2170. https://doi.org/10.1002/met.2170.
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74. Ramotubei, T.S., Landman, W.A., Mateyisi, M.J., Nangombe, S.S. and Beraki, A.F. (2025). Response of the global ITCZ to ENSO and how the ITCZ determined from maximum precipitation compares with the surface tropical wind convergence,

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80. Shein, K.A and 96 co-authors. State of the climate in 2005. Bulletin of the American Meteorological Society, 87(6), Supplement, S1-S102.
81. Shirvani, A. and Landman, W.A. (2016). Seasonal precipitation forecast skill over Iran. International Journal of Climatology, 36, 1887–1900, DOI: 10.1002/joc.4467.
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6.2 Books and/or chapters in books

Archer, E., Engelbrecht, F., Landman, W., and others. (2010). South African Risk and Vulnerability Atlas. Pretoria: Department of Science and Technology. ISBN 978-0-620-45659-3. 54 pp.

Archer, E., Engelbrecht, F., Hänsler, A., Landman, W.A., Tadross, M. and Helmschrot, J. (2018). Seasonal prediction and regional climate projections for southern Africa. In: Revermann, R., Krewenka, K.M., Schmiedel, U., Olwoch, J.M., Helmschrot, J. & Jürgens, N. (eds.), Climate change and adaptive landmanagement in southern Africa – assessments, changes, challenges, and solutions, pp. 14–21, Biodiversity & Ecology, 6, Klaus Hess Publishers, Göttingen & Windhoek.

Cobon, D.H., Baethgen, W.E., Landman, W., Williams, A., Archer van Garderen, E., Johnston, P., Malherbe, J., Maluleke, P., Kgakatsi, I.B., Davis, P. (2017). Agroclimatology in Grasslands. In: Hatfield, J.L., Sivakumar, M.V.K., Prueger, J.H., Editors, Agroclimatology: Linking Agriculture to Climate, Agronomy Monographs 60. ASA, CSSA, and SSSA, Madison, WI. doi:10.2134/agronmonogr60.2016.0013.

Landman, W.A., Tadross, M., Engelbrecht, F., Archer van Garderen, E. and Joubert, A. (2011). Seasonal forecasts: Communicating current climate variability in southern Africa. pp 23-27. SARVA Climate Risk and Vulnerability: A handbook for southern Africa. Chapter 2. Ed. C. Davis. CSIR. ISBN 978-0-620-50627-4.

6.3 Published full-length conference papers/keynote addresses

Beraki, A., Landman, W.A., and DeWitt, D. (2012). Southern hemisphere climate variability as represented by an ocean-atmosphere coupled model. SASAS, 26-27 September 2012, pp 14-15.

Bopape, M.M., Engelbrecht, F., Randall, D., and Landman, W. (2012). Simulating moist convection with a quasi-elastic sigma coordinate model. SASAS, 26-27 September 2012, pp 65-66.

Engelbrecht, C.J. and Landman, W.A. (2015): Seasonal forecasting of synoptic type variability: potential intraseasonal predictability relevant to the Cape south coast of South Africa. Peer reviewed abstracts, 31st Annual conference of the South African Society for Atmospheric Science, Pretoria, 21-22 September 2015, pp 104-107 ISBN 978-0-620-67825-4

Engelbrecht, C.J., Landman, W.A., and Engelbrecht, F.A. (2012). The all-year rainfall region of South Africa: Satellite rainfall-estimate perspective. SASAS, 26-27 September 2012, pp 30-31.

Erasmus, M., Landman, W.A. and Engelbrecht, C.J. (2016). Tropical temperate troughs over southern Africa as simulated by a fully coupled model. Peer reviewed abstracts, 32nd Annual conference of the South African Society for Atmospheric Science, Cape Town, 31 October to 1 November 2016, pp 36-39. ISBN 978-0-620-

72974-1.

Hinze, S.H. and Landman, W.A. (2017). Determining the efficiency of empirical downscaling against raw model seasonal forecasts for the Zambezi and Okavango catchment areas. Peer reviewed abstracts, 33rd Annual conference of the South African Society for Atmospheric Science, Polokwane, 21-22 September 2017, pp 31-34. ISBN 978-0-620-77401-7.

John, J., Garland, R.M. and Landman, W.A. (2015). Understanding of extreme temperature events by environmental health stakeholders in South Africa. Peer reviewed abstracts, 31st Annual conference of the South African Society for Atmospheric Science, Pretoria, 21-22 September 2015, pp 162-165. ISBN 978-0-620-67825-4.

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Landman, W.A., Archer, E. and Tadross, M. (2019). How costly are poor seasonal forecasts? Peer reviewed abstracts, 35th Annual conference of the South African Society for Atmospheric Science, Vanderbijlpark, 8 to 9 October 2019, pp 60-63. ISBN 978-0-6398442-0-6.

Landman, W.A., Barnston, A.G. and Vogel, C. (2015). Ranking seasonal rainfall forecast skill of emerging and developing economies. Peer reviewed abstracts, 31st Annual conference of the South African Society for Atmospheric Science, Pretoria, 21-22 September 2015, pp 112-116. ISBN 978-0-620-67825-4

Landman, W.A., Graham, R., Knight, J., Engelbrecht, C., and Olivier, C. (2012). Assessment of GloSea4 seasonal forecasts for SADC and the global oceans. SASAS, 26-27 September 2012, pp 102-103.

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Mkhwanazi. M., Landman, W.A. Engelbrecht, F.A. and Olivier, C. (2015). Downscaled climate change projections over northeastern South Africa: Implications for streamflow. Peer review abstracts, 31st Annual conference of the South African Society for Atmospheric Science, Pretoria, 21-22 September 2015, pp 93-96.

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Mpheshea, L.E. and Landman, W.A. (2015). Predicting the extreme 2015/16 El Nino event. Peer review abstracts, 31st Annual conference of the South African Society for Atmospheric Science, Pretoria, 21-22 September 2015, pp 108-111. ISBN 978-0-620-67825-4

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6.4 Non-refereed publications or popular articles

Landman, W.A. (2007). The influence of ENSO on operational rainfall forecast skill for South Africa. CLIVAR Exchanges, 12, 26-28.

Landman, W.A., DeWitt, D., and Beraki, A. (2011). South African mid-summer seasonal rainfall prediction performance by a coupled ocean-atmosphere model. CLIVAR Exchanges, 16, 3-6.

Reason, C.J.C., Landman, W.A., Tadross, M., Tennant, W., and Kgatuke M.–J. (2004). Seasonal to decadal predictability and prediction of southern African climate. CLIVAR Exchanges, 9, 21-23.

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Landman, W.A., Engelbrecht, F.A. and Park, R. (2012). Predicting the evolution of Tropical Cyclone Funso with the conformal-cubic atmospheric model. South African Society for Atmospheric Sciences

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Landman, W.A., Tadross M., Engelbrecht F.A., Archer van Garderen E. and Joubert A. (2011). Seasonal forecasts: Communicating current climate variability in southern Africa. SARVA Climate Risk and Vulnerability: A handbook for southern Africa. Chapter 2.

Rodrigues, J., Thurlow, J., Landman, W., Ringler, C., Robertson, R. and Zhu, T. (2016). The economic value of seasonal forecasts stochastic economywide analysis for East Africa. IFPRI Discussion Paper 1546. Washington, D.C.: International Food Policy Research Institute (IFPRI). http://ebrary.ifpri.org/cdm/ref/collection/p15738coll2/id/130497.

Vincent, K., Cull, T., Archer van Garderen, E., Conway, D., Dalin, C., Deryng, D., Dorling, S., Fallon, A. and Landman, W. (2016). Improving effective use of seasonal forecasts in South Africa. SAWHEWS Project Note 1. Washington, D.C.: International Food Policy Research Institute (IFPRI). http://ebrary.ifpri.org/cdm/ref/collection/p15738coll2/id/130333.

6.5 Patents

Provide full details of provisional or full patents

None

6.6 Technical reports

Beraki, A., Landman, W.A., DeWitt, D.G., Olivier, C., Mathole, K. and Ndarana, T. (2013). Modelled sea-surface temperature scenario considerations and southern African seasonal rainfall and temperature predictability. Water Research Commission Report No. No.2257/1/15, pp. 127.

Engelbrecht, C.J. and Landman, W.A. (2016). Dynamics of weather and climate variability over the all-year rainfall region of South Africa. Water Research Commission Report No. 2163/1/15, pp. 57.

Engelbrecht, F., Ndarana, T., Landman, W.A., Van der Merwe, J., Ngwana, I. and Muthige, M. (2015). Radiative forcing of southern African climate variability and change. Water Research Commission Report No. 2163/1/15, pp. 45.

Engelbrecht, F., Beraki, A., Landman, W., Dedekind, Z. and Mpheshea, L. (2019). Refinement of weather and climate forecasts. Chapter 3 in Vol.2: Lumsden T., Morris F. and Crespo O. (Editors), Seamless forecasting of rainfall and temperature for adaptation of farming practices to climate variability - seasonal forecasts and sugarcane, WRC Report No 2496/1/19, isbn:9780639200576.

Landman, W. (2019). Seasonal forecasts of the storage in Goedertrouw Dam. Chapter 7 in Vol.2: Lumsden T., Morris F. and Crespo O. (Editors), Seamless forecasting of rainfall and temperature for

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Landman, W.A. (2000). Downscaling GCM simulations to rainfall and runoff using a regional climate model: a first approach. ESKOM Research Report RES/F1/00/10713. 31 pp.

Landman, W.A., Mason, S.J. and Tennant, W.J. (1999). Downscaling GCM simulations to streamflow: a statistical approach. ESKOM Research Report RES/RR/99/00144. 34 pp.

Landman, W.A., Seth, A. and Camargo, S.J. (2002). The effect of regional climate model domain choice on the simulation of tropical cyclone-like vortices in the southwestern Indian Ocean. IRI Technical Report No. 02-06. 31 pp.

Landman, W.A., Archer, E., Gosiame, P. and Nkala, B. (2023). Research base assessment of integrated approaches to nature-based solutions (RAINSOLUTION) - Tailoring Seasonal Forecasts Towards Hydrological Applications for the Vaal Dam. Water Research Commission Report, No TT 900/22, ISBN 978-0-6392-0241-9. 35 pp.

Landman, W.A., Kgatuke, M. M., Mbedzi, M., Beraki, A., Bartman, A., and du Piesanie, A. (2006). Skill comparison of some dynamical and empirical downscaling methods for southern Africa from a seasonal climate modelling perspective. Water Research Commission Report, No 1334/1/06. 86 pp.

Landman, W.A., Engelbrecht, F., Beraki, A., Engelbrecht, C., Mbedzi, M., Gill, T. and Ntsangwane, L. (2009). Model output statistics applied to multi-model ensemble long-range forecasts over South Africa. Water Research Commission Report, No 1492/1/08. 56 pp.

Landman, W.A., Engelbrecht, F., Park, R., van der Merwe, J., Dedekind, Z., Beraki, A., Malherbe, J. and Mpheshea, L. (2015). Unifying weather and climate variability predictions – an operational seamless forecasting system for southern Africa at time scales from days to seasons. Water Research Commission Report, Water Research Commission Report No. 2050/1/14, ISBN 978-1-4312-0631-5, 152 pp.

Malherbe, J., Engelbrecht, F.A., Landman, W.A., Lumsden, T. and Theale, C. (2013). Tropical systems from the southwest Indian Ocean into southern Africa: Impacts, dynamics and projected changes. Water Research Commission Report No. 1847/1/12, ISBN 978-1-4312-0384-0, 152 pp.

Triegaardt, D.O. and Landman, W.A. (1992). Charts of the mean circulation over the Monsoon regions of the world. South African Weather Bureau Technical Paper No. 25. 32 pp.

Triegaardt, D.O. and Landman, W.A. (1995). The influence of atmospheric long-waves on summer rainfall in the Transvaal, Orange Free State and Natal. South African Weather Bureau Technical Paper No. 26. 75 pp.

7 OTHER SCHOLARLY RESEARCH-BASED CONTRIBUTIONS

7.1 Participation in conferences, workshops and short courses

1. Crespo O., Lumsden T., Landman W. (2016). Can crop forecasts improve food production preparedness to seasonal climate shocks? Oral presentation at the SANCID Symposium, Goudini Spa, Worcester, 11-13 October 2016.
2. Dalin, C., Conway, D., Landman, W. and Osborn, T. (2016). Climate risk in southern and eastern Africa's hydropower generation. American Geophysical Union, Fall General Assembly 2016, abstract #GC33E-08.
3. Engelbrecht, F.A., Landman, W.A., Engelbrecht, C.J., Landman, S., Bopape, M.M., Roux, B. McGregor, J.L. and Thatcher, M. (2011). Multi-scale climate modelling over southern Africa using a variable-resolution global model. COP 17 Side Event of SATREPS-Japan. Durban, 2 December 2011.
4. Garland, R.M., Matooane, M., Naidoo, M., Thambiran, T., Engelbrecht, F., Landman, W.A., Wright, C.Y. and Archer, E. (2011). Ties between air quality and climate change in southern Africa and their impact on human health. Climate Research Programme Open Source Conference. Dever Colorado, USA, October 2011.
5. Held G., Landman W. A. and Stephenson D. (2002). Seasonal Forecasting of Rainfall and Streamflow for the Electricity Utility in South Africa. Proceedings, XII Congresso Brasileiro de Meteorologia (CD ROM), SBMET, Foz de Iguaçu, 4-9 de agosto de 2002, Paper SO9_5, 1973-1984.
6. Landman W.A. (1995). A seasonal rainfall prediction scheme. Abstracts of the IGBP Global Environmental Change: Implications for Southern Africa, 24-26 April 1995, Pretoria, 86-88.
7. Landman W.A. (1995). Predicting South African seasonal rainfall by means of canonical correlation analysis. Proceedings of the Sixth International Meeting on Statistical Climatology. 19-23 June 1995, Galway, Ireland, 479-481.
8. Landman W.A (1995). The South African Long-Lead Forecast Forum. Abstracts of the International Symposium on African Drought. ICTP, Trieste, Italy, 31July-4 August 1995.
9. Landman, W.A. (1997). A study of the predictability of the equatorial Indian Ocean sea-surface temperatures. Proceedings of the Fifth International Conference on Southern Hemisphere Meteorology and Oceanography. Pretoria, 7-11 April 1997, 140-141.
10. Landman, W.A. (2013). WCRP-WWRP subseasonal to seasonal prediction. African Climate Conference, 15-18 October 2013, Arusha, Tanzania.
11. Landman, W.A. and Beraki, A. (2011). Operational seasonal forecast system development in South Africa. Summer School on Climate Impacts Modelling for Developing Countries: Water, Agriculture and Health. The Abdus Salam International Centre for Theoretical Physics. Trieste, Italy, 5-16 September 2011.
12. Landman, W.A. and Engelbrecht. F.A. (2010). Atmospheric Modelling. Water, Winds and Fires. UNDP Knowledge Fair on Disaster Risk Reduction. 25-26 March 2010.
13. Landman, W.A. and Goddard, L. (2000). Downscaling GCM simulations over South Africa using model output statistics. 25th Climate Diagnostics and Prediction

Workshop. New York, USA. 23-27 October 2000, 185-188.
14. Landman, W.A. and Goddard, L. (2003). Model output statistics applied to multi-model ensemble forecasts for southern Africa. Proceedings of the Seventh International Conference on Southern Hemisphere Meteorology and Oceanography. Wellington, New Zealand. 24-28 March 2003, 249-250.
15. Landman, W.A. and Goddard, L. (2004). Predicting South African seasonal rainfall using a combination of MOS and perfect prognosis. Abstracts of the 9th International Meeting on Statistical Climatology. Cape Town, South Africa. 24-28 May 2004.
16. Landman, W.A. and Sakuma, H. (2013). Improvement of the South African climate early warning system. APL-SATREPS Symposium, Living on the Changing Planet: Future Earth designed by simulation. February 28, 2013 at Kokuyo Hall, Shinagawa, Japan.
17. Landman, W.A. and Tennant, W.J. (1999). The four tiers of seasonal prediction at the South African Weather Bureau. Proceedings of An Interdisciplinary International Conference on Integrated Drought Management: Lessons for Sub-Saharan Africa. Pretoria, 20-22 September 1999.
18. Landman, W.A., Beraki, A. and DeWitt, D. (2009). The impact of different sea-surface temperature prediction scenarios on southern African seasonal climate forecast skill. Symposium on Climate Variations in South Africa and Role of Subtropical Oceans. Tokyo, Japan. 2-6 December 2009.
19. Landman, W.A., Brookes, D.D.G. and Bartman, A.G. (1997). Different modes of evolutionary global-scale sea-surface temperature variability. Proceedings of the Fifth International Conference on Southern Hemisphere Meteorology and Oceanography. Pretoria, 7-11 April 1997, 81-82.
20. Landman, W.A., Engelbrecht, F. and Park, R. (2011). The CCAM as operational seasonal forecast system. SATREPS Symposium on Climate Prediction and its Application in the Southern African Region. The University of Tokyo, 20-21 October 2011.
21. Landman, W.A., Klopper, E. and Bartman, A.G. (1997). Rainfall predictions for South Africa.s neighbouring countries by means of CCA. Proceedings of the Fifth International Conference on Southern Hemisphere Meteorology and Oceanography. Pretoria, 7-11 April 1997, 83-84.
22. Landman, W.A., Baethgen, W., Barnston, A.G. and Barnes, M. (2022). Attributes of predicted rainfall patterns over Southern Africa and Southeast South America associated with the El Niño–Southern Oscillation. Thirteenth International Conference on Southern Hemisphere Meteorology and Oceanography. University of Canterbury, New Zeeland, 8-17 February 2022. https://confer.eventsair.com/icshmo-2022/presentations
23. Landman, W.A., Park, R., Landman, S. and Engelbrecht, F. (2011). I get all the news I need on the weather report. COP 17 Side Event of the Water Research Commission. Durban, 29 November 2011.
24. Landman W.A., Diaz, A., Montecinos, A., Engelbrecht, F. (2014). Climate change estimates of South American riverflow through statistical downscaling. WCRP conference for Latin America and Caribbean: Developing, linking and applying climate knowledge, Montevideo, Uruguay, 17-21 March 2014.
25. Landman, W.A., DeWitt, D., Lee, D.-E., Beraki, A. and Lötter, D. (2010). South African seasonal rainfall prediction performance by a coupled ocean-atmosphere model. SATREPS Symposium on Climate Prediction and Information for the Society. The University of Aizu, Japan. 16-18 December 2010.
26. Landman, W.A., Mason, S. J., Tyson, P.D. and Tennant, W.J. (2000). Downscaling GCM simulations to rainfall and stream flow. Proceedings of the Sixth International Conference on Southern Hemisphere Meteorology and Oceanography. Santiago,

Chile, 3-7 April 2000, 182-183.

27. Landman, W.A., Beraki, A., Kgatuke, M.M., Mbedzi, M. and Engelbrecht, F. (2007). Seasonal prediction activities at the South African Weather Service. WCRP Workshop on Seasonal Prediction, Barcelona, Spain, 4-7 June 2007. http://www.clivar.org/organization/wgsip/spw/spw_programme.php

7.2 Teamwork and collaboration with others:

Have published technical reports and papers that appeared in international peer reviewed journals with researchers from the University of the Witwatersrand, the University of California, San Diego, The University of Cape Town, the University of Lund, the IRI, and the South African Weather Service (SAWS), the Council for Scientific and Industrial Research (CSIR), JAMSTEC in Yokohama, Japan, Grantham Research Institute on Climate Change and the Environment London School of Economics and Political Science UK, the UK Met Office.

Currently collaborating with the South African Weather Service, the Universities of Cape Town, Wits and Venda, the Medical Research Council, SAWS, CSIR, and the IRI on national research projects.

International programmes through EU, Japanese modelling projects and the Belmont Forum.

Scientific Steering Committee for the 14th International Conference on Southern Hemisphere Meteorology and Oceanography (ICSHMO), Cape Town, South Africa from March 31 to April 4, 2025.

1. COMMUNITY SERVICE OR PROFESSIONAL SKILLS

10.1 Referee duties

Referee of papers submitted to scientific journals: South African Geographical Journal, South African Journal of Science, Water SA, EOS, Bulletin of the American Meteorological Society, Earth Perspectives, Geophysical Research Letters, Journal of Climate, Journal of Hydrometeorology, Journal of Applied Meteorology and Climatology, Climate Dynamics, Water Resources Research, International Journal of Climatology, Natural Hazards, Weather and Forecasting, Climate Research, Quarterly Journal of the Royal Meteorological Society.

Book reviews – Climate Change. Science, Strategies, and Solutions. (Ed. E. Claussen); Numerical Weather and Climate Prediction (T. Warner); Dynamics, Analysis and Forecasting and Synoptic-Dynamic Meteorology Lab Manual (Lackmann et al).

PhD theses – Universities of Cape Town and Free State.

MSc dissertations – Universities of Cape Town, University of the Free State, North-West University

Chapters of books review – Global Change and Africa, and Seasonal-to-Interannual Climate Prediction and its Benefits to Society.

Proposal reviews for the Water Research Commission

Proposal reviews for the Canadian Foundation for Climate and Atmospheric Sciences (CFCAS).

Reviewer of National Research Foundation (NRF) rating applications.

NRF Advisory Panel: Conservation and the Management of Ecosystems and Biodiversity.

NRF Advisory Panel: SA Research Chairs Initiative.

Natural Environment Research Council (NERC) strategic research grant proposal.

Proposals to the Comisión Nacional de Investigación Científica y Tecnológica.

2. AWARDS AND SCIENTIFIC/SCHOLARLY RECOGNITION

11.1 Evaluation status as scientist/scholar

NRF, B2

11.2 Research awards and prizes

Full details are required

Stanley Jackson Award in **2003** (lead author), **2014** and **2022** for the best published paper by a member of the South African Society for Atmospheric Sciences, that contributed to atmospheric and oceanic research in South Africa.

Exceptional Academic Achievers Award of UP, 2020.