

SASAS 2019



CLIMATE MEETS AGRICULTURE  
"THE INTERPLAY"

35th Annual Conference of the  
South African Society for Atmospheric Sciences

# Climate Meets Agriculture – *The Interplay*

**8-9 October 2019**  
Riverside Sun, Vanderbijlpark

## Programme



# Sponsors:



## SASAS-2019: Day 1, 8th October, 2019

|                    |  |   |  |  |
|--------------------|--|---|--|--|
| 08:00-08:45        | Registration   |   |  |  |
| <b>Time</b>        | <b>Session A1, Heron &amp; Sunbird, Plenary Session Chairperson: SASAS President</b> |   |  |  |
| 08:45-09:00        | Welcome  | <b>Chair SASAS-2019 Organizing Committee</b>  |  |  |
| 09:00-09:30        | Keynote Address 1  | Prof G Hoogenboom   | Crop Modeling as a Tool for Research, Outreach, and Policy Making for Food Security and Environmental Sustainability |  |
| 09:30-10:00        | Invited Speaker  | Prof AE Nesamvuni   | Vulnerability Assessment and Adaptive Response for Smallholder Livestock Sector to the Changing Climate              |  |
| 10:00-10:10        | Sponsors   | UNEP and Campbell Scientific  |  |  |
| <b>10:10-10:30</b> | <b>Tea break</b>   | <b>Poster Viewing</b>   | <b>Tea break</b>   | <b>Poster Viewing</b>  |
|                    | <b>Session A2, Heron: Agrometeorology, Chair: Prof Sue Walker</b>                    |   | <b>Session A3, Bishop: Air quality and aerosols, Chair : Ms M Mahomed</b>  |  |
| 10:30-10:45        | Johnston   | From small scale to commercial maize farming in South Africa: meeting the climatic (and other) challenges   | Garland  | Quantifying the impact of ozone on four major crops in Mpumalanga, South Africa  |
| 10:45-11:00        | Malherbe   | 2019 versus 2016: Improved yield potential for late planted maize in a warming climate  | Mbatha   | Stratospheric Ozone time series prediction and forecasting using LSTM and Hybrid ARIMA-ANN approach                              |
| 11:00-11:15        | Mbhamali*  | Time series analysis of climate impacts on sugarcane yield in south-eastern Africa  | Mkhize*  | Time series analysis of tropospheric carbon dioxide over uMhlabuyalingana, KwaZulu-Natal, South Africa, using remote sensing     |
| 11:15-11:30        | Moeletsi   | Trends in growing degree days for maize in the eastern Free State   | Mkololo  | Day-time and night-time Ozone increase at Cape Point GAW Station as observed by ground based instruments                         |
| 11:30-11:45        | Serumaga-Zake*   | The impact of rainfall variability on subsistence farmers in the North West Province, South Africa  | Maduna*  | Using different health-based metrics to assess ambient surface-ozone concentrations in South Africa                              |
| 11:45-12:00        | Landman  | How costly are poor seasonal forecasts?   | Mohlala*   | A critical evaluation of air quality management at a local sphere of government: the case of Gauteng metropolitan municipalities |
| 12:00-12:15        | Rusere*  | Integrating a crop model with a greenhouse gas calculator to identify low carbon agricultural intensification options for smallholder farmers in rural South Africa | Kekana*  | Investigating the correlation between surface ultraviolet radiation and Aerosol Optical Depth over Pretoria, South Africa        |
| 12:15-12:30        | Myeni*   | Evaluation of three models for estimating daily net radiation within the FAO Penman-Monteith method in southern Africa  | Mogale*  | Distribution of photosynthetically active radiation (PAR) and carbon dioxide flux in grain sorghum/cowpea intercropping system   |

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| <b>12:30-13:30</b> | <b>Lunch</b>  |   |   |  |
|                    |   |   |   |  |
|                    | <b>Session A4, Heron &amp; Sunbird</b>  |   |   |  |
| <b>13:30-14:30</b> | <b>Speed talks*</b>   | <b>Chairperson: Cecilia Njenga</b>  |   |  |
| 1                  | Makatu  | Sensitivity of the South African climate to aerosol forcing   |   |  |
| 2                  | Mmelesi   | Performance of the HAILCAST hail model in simulated a severe hail event over the South-eastern District of Botswana in October 2016   |   |  |
| 3                  | Nemaungane  | The potential impacts of offshore oil and gas explorations on air quality in South African coastal cities   |   |  |
| 4                  | Mkiva   | Heatwave trends and underlying physical processes: A case of 2015/16 summer season in North West Province, South Africa   |   |  |
| 5                  | Dzvene  | Radiation use efficiency and biomass production in maize-bean intercropping under in-field rainwater harvesting   |   |  |
| 6                  | Hulley  | The micro-climatic influences of the spring grove dam in Rosetta, KwaZulu-Natal   |   |  |
| 7                  | Xulu  | Impact of spatio-temporal variability of the Mascarene High on weather and climate over southern Africa   |   |  |
| 8                  | van Wyk   | The impact of ENSO patterns on maize production in South Africa   |   |  |
| 9                  | Muofhe  | Characteristics of deep moist convection and rainfall in cut-off lows over South Africa   |   |  |
|                    |   |   |   |  |
|                    | <b>Session A5, Heron: Instruments and data collection, Chair: Dr H Chikoore</b> |   | <b>Session A6, Bishop: Remote sensing applications Chair: Dr J Malherbe</b>               |  |
| 14:30-14:45        | Feig  | The Expanded Freshwater and Terrestrial Environmental Observation Network: a long-term environmental observation platform for South African terrestrial ecosystems research | Zvarevashe*   | Use of satellite-based NDVI time series to detect Sugarcane response to climate variability                            |
| 14:45-15:00        | Shabalala*  | Development of a patching tool on recorded daily climate data   | Maake*  | The Umlindi Newsletter: disseminating climate-related information for agriculture and natural disaster in South Africa |
| 15:00-15:15        | Havenga*  | The novel integration of instruments to measure Tornadic Supercells, field notes from TORUS19   | Seymour*  | Temperature and chlorophyll response to spatial variability in upwelling favourable winds in False Bay                 |
| 15:15-15:30        | Krug  | Spatial variability in coastal winds over the Cape Peninsula region from synthetic aperture radar observations  | Zwane*  | The application of remote sensing to estimate Moringa leaf water content in agro-climatic zones of Limpopo Province    |
| 15:30-15:45        | <b>Tea break</b>  | <b>Poster Viewing</b>   | <b>Tea break</b>  | <b>Poster Viewing</b>  |
|                    | <b>Session A7, Heron: Climate change and agriculture, Chair: Mr O Phahlane</b>  |   | <b>Session A8, Bishop: Impacts of climate variability and change, Chair: Ms Z Dlamini</b> |  |
| 15:45-16:00        | Engbrecht F   | Ice and fire at the southern tip of Africa under 8 °C of Global Warming   | De Wet  | Rainfall trends in Free State province: preliminary results  |
| 16:00-16:15        | Mangani*  | Modelled impacts of extreme weather events (heat and drought) on maize yield in South Africa  | Shivambu*   | Influence of the variability of hydro-meteorological parameters on dam levels in the Western Cape Province             |

|                   |   |  |           |   |
|-------------------|---|--|-----------|---|
| 16:15-16:30       | Thavhana*   | Farmers' perception on climate change: A case study in the Maluti-A-Phofung Municipality, Free State Province  | Ncube*    | Rainfall variability and change in South Africa (1976-2065)   |
| 16:30-16:45       | Ezekannagha*  | Modelling underutilized crop suitability to future climate projections in Segou and Sikasso Regions, Mali: A case of Bambara groundnut ( <i>Vigna subterranea</i> (L.) Verdc.) | Makondo*  | Influence of climate on the spatiotemporal distribution of malaria at Thulamela municipality, Limpopo |
| 16:45-17:00       | Masemola*   | Assessment of vulnerability of livestock farming to climate variability and change in South Africa: Cattle   | Makgoale  | Climate Elasticity analysis of streamflow: A case study over three South African provinces            |
| 17:00-17:15       | Egbebiyi*   | Assessing the impact of climate departure from historical variability on crop suitability and planting season over West Africa: using the concept of crop-climate departure    | Maluleke* | Seasonal effects of rainfall on rangelands in the Limpopo Province                                    |
| 17:15-17:30       | <b>Session A9, Heron and corridor: Poster Viewing</b> |  |           |   |
| 17:30-18:30       | <b>SASAS Board meeting: Bishop</b>                    |  |           |   |
| <b>18:45-late</b> | <b>Gala Dinner</b>                                    | <b>Heron &amp; Sunbird</b>   |           |   |

## SASAS-2019: Day 2: 9th October, 2019

| Time               | <b>Session B1, Heron &amp; Sunbird, Plenary Session Chairperson: Dr M Tongwane</b>               |   |  |  |
|--------------------|--|---|--|--|
| 08:30-09:00        | Keynote Address 2  | Prof M Tsubo  | Historical Relationship between Climate and Crop Yield: A Case of Maize  |  |
| 09:00-09:30        | Invited Speaker  | Prof S Liphadzi   | Utilizing Innovations to Build Farmers and Community Resilience towards Climate Change: A Water Security Perspective |  |
| 09:30-09:45        | Sponsors   | WRC, SAWS, and ARC  |  |  |
| 09:45-10:00        | Invited talks  | Francois Engelbrecht  | Unprecedented climate change in southern Africa during the 21st century  |  |
| 10:00-10:15        | Invited talks  | Landman   | Tailoring forecasts through co-production and co-learning  |  |
| 10:15-10:30        | Invited talks  | Walker  | Agricultural climate services  |  |
| <b>10:30-10:45</b> | <b>Tea break</b>   | <b>Poster Viewing</b>   | <b>Tea break</b>   | <b>Poster Viewing</b>  |
|                    | <b>Session B2, Heron: Weather forecasting &amp; climate modelling, Chair: Prof F Engelbrecht</b> |   | <b>Session B3, Bishop: Climate research and extremes, Chair: Ms M Thavhana</b>                                       |  |
| 10:45-11:00        | Rouault  | The annual cycle of turbulent latent heat flux in the Agulhas current system  | Chikoore   | Meteorological structure of extreme rainfall in Thohoyandou, South Africa: 13 February 2019                                    |
| 11:00-11:15        | Engelbrecht C  | Seasonal cycle attributes of S2S predictive skill over the westerly and easterly weather regime regions of southern Africa                                      | Dube   | Potential Impact of 2018/2019 Extreme Weather events on meeting of Sustainable Development Goals 2, 3 and 6 in the SADC region |
| 11:15-11:30        | de Lange*  | Verification of meteorological variables simulated using different Planetary Boundary Layer (PBL) schemes in the WRF-ARW Model                                  | Mazibuko*  | Rainfall variability in relation to the frequency of dry and wet years in the Luvuvhu River Catchment Area, Limpopo Province   |
| 11:30-11:45        | Rammopo*   | Investigating the role of non-quasigeostrophic forcing during Cut-off low onsets over South Africa  | Masupha*   | Agricultural drought preparedness and system in South Africa: A review   |
| 11:45-12:00        | Webster  | Africanes, often unidentified but never to be underestimated: <i>A closer look at how often these synoptic scale weather systems occur over southern Africa</i> | Tongwane   | Variability of diffuse solar fraction and its relationship with atmospheric water vapour pressure deficit in South Africa      |
| 12:00-12:15        | Abubakar*  | The added value of high-resolution in climate model simulations over the Enkangala escarpment of eastern South Africa   | Wiese*   | Projected changes of wildfire risks in South Africa under climate change scenarios and temperature thresholds                  |
| 12:15-12:30        | Wolski   | Exploring synoptic-scale drivers of inter-annual rainfall variability over Africa   | Letshwiti  | Investigation of spatio-temporal changes of drought in the Eastern Cape Province   |

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|-------------|--|--|--|--|
| 12:30-13:30 | Lunch  |  |  |  |
|             |  |  |  |  |
|             | <b>Session B4, Heron: Climate services, Chair Dr R Garland</b> |  | <b>Session B5, Bishop: Modelling and Climate extremes, Chair Ms L De Wet</b> |  |
| 13:30-13:45 | Burger   | The potential for cloud seeding in South Africa  | Ndarana  | Intra-annual variations of ridging high pressure systems over South Africa   |
| 13:45-14:00 | Phahlane   | AgriCloud Application as a decision support tool in agriculture  | Masango*   | Sensitivity analysis of the SPI to statistical distribution functions: A case study of the Western Cape Province ( <i>climate extremes</i> )       |
| 14:00-14:15 | Chabata  | Role of media in disseminating impending hazardous weather warnings  | Lekoloane  | Investigating the role of near-surface atmospheric boundary layer moisture flux in supercellular tornado genesis over Gauteng during December 2017 |
| 14:15-14:30 | Van der Merwe  | Using weather data to build a decision support system for the management of South African citrus thrips ( <i>Scirtothrips aurantii</i> )           | De Wit   | Towards implementing a mesoscale hydrological model at SAWS: Initial results   |
| 14:30-14:45 | Mahomed*   | The development of a near real-time environmental early warning system towards increasing climate resilience and adaptive capacity in South Africa | Sithole  | Evaluating the wet bulb globe temperature Index at Irene Weather Office  |
| 14:45-15:00 | <b>Tea break</b>   | <b>Poster Viewing</b>  | <b>Tea break</b>   | <b>Poster Viewing</b>  |
| 15:00-15:30 | <b>Session B6, Heron: Awards and closing ceremony</b>          |  |  |  |
| 15:30-17:00 | <b>Session B7, Heron: SASAS - AGM</b>                          |  |  |  |

## Poster Presentations

| Author     | Affiliation | Title  | Student | Poster No. |
|------------|-------------|--|---------|------------|
| Ajilogba   | NWU         | Impact of biofertilizer on drought-tolerant crop: Bambara groundnut  |         | 1          |
| Ravuluma   | UFS         | Maize-Beans intercropped productivity under in-field rainwater harvesting from two soil forms in Thaba-Nchu                                      | *       | 2          |
| Chambers   | UCT         | Potential impacts of urban trees on thermal comfort in two South African cities  | *       | 3          |
| Dlamini    | ARC         | Access to agrometeorological data in rural areas of South Africa for climate variability adaptation  | *       | 4          |
| Donkin     | UCT         | The Influence of Sea Surface Temperature on the Characteristics of Tropical Cyclone Idai   | *       | 5          |
| du Preez   | UP          | The long-range transport of the Puyehue-Cordon Caulle volcanic eruption over the Southern Hemisphere   | *       | 6          |
| Dzvene     | UFS         | Radiation use efficiency and biomass production in maize-bean intercropping under in-field rainwater harvesting                                  | *       | 7          |
| Piqeras    | CSIR        | Quantifying the impact of ozone on four major crops in Mpumalanga, South Africa  |         | 8          |
| Hlongwane  | UZ          | Time Series Analysis of the Southern Hemisphere Total Column Ozone Measured by Dobson Spectrometers: Latitudinal Variation                       | *       | 9          |
| Hulley     | UCT         | The Micro-Climatic Influences of the Spring Grove Dam in Rosetta, Kwa-Zulu Natal   | *       | 10         |
| Joshi      | UCT         | The Impact of drought on maize yields, North West province, South Africa   | *       | 11         |
| Makatu     | Univen      | Sensitivity of the South African climate to aerosol forcing  | *       | 12         |
| Maphugwi   | UP          | Evaluation of different configurations of the Unified Model over South Africa using nested domains   | *       | 13         |
| Mkiva      | NWU         | Heatwave trends and underlying physical processes: A case of 2015/16 summer season in North West Province, South Africa                          | *       | 14         |
| Mkuhlani   | UCT         | Decision-making process based on integration of seasonal forecast information and crop models in South Africa                                    | *       | 15         |
| Mmelesi    | UP          | Performance of the HAILCAST hail model in simulated a severe hail event over the South-eastern District of Botswana in October 2016              | *       | 16         |
| Mngomezulu | UniZulu     | Time series analysis of Sulfur dioxide (SO <sub>2</sub> ) and Nitrogen oxides (NO <sub>x</sub> ) concentration in industrial towns at Mpumalanga | *       | 17         |
| Morupisi   | UP          | The synoptic decomposition of heat waves over Botswana   | *       | 18         |
| Moyo       | UP          | A pilot study on Africane genesis over southern Africa: January 2016 vs January 2017   | *       | 19         |
| Mthalane   | UZ          | The Utility of Sentinel-1 in Monitoring Natural and Cropping Systems: The Case Study of KwaZulu-Natal, South Africa                              | *       | 20         |
| Mugure     | Univen      | Application of tailored seasonal climate forecasts in agricultural management  | *       | 21         |



|            |          |  |   |    |
|------------|----------|--|---|----|
| Muofhe     | Univen   | Characteristics of deep moist convection and rainfall in cut-off lows over South Africa  | * | 22 |
| Muzamwese  | UFH      | Application of Sentinel Platforms in assessing chlorophyll-a distribution in Algoa Bay   | * | 23 |
| Ndalammbi  | UV       | Impacts of Antarctic sea ice and Southern Ocean Sea Surface Temperature (SST) anomalies on climate variability over southern Africa. | * | 24 |
| Nemaungane | UCT      | The potential impacts of offshore oil and gas explorations on air quality in South African coastal cities                            | * | 25 |
| Nembilwi   | UV       | Simulation of Mid Latitude storm tracks over the Southern Ocean  | * | 26 |
| Randall    | UP       | Statistical Monthly Malaria Prediction for Limpopo, South Africa   | * | 27 |
| Raymond    | UCT      | Weatherproofing for a smarter, resilient and more sustainable agri-sector  | * | 28 |
| Romain     | DR Congo | Forecast of Agricultural Calendar for Maize (Zea Mays) from Global Circulation Model in the Ruzizi Area                              |   | 29 |
| Singo      | UV       | Climate change and fire regimes in Limpopo grasslands  | * | 30 |
| van Aarde  | UP       | Evaluation of two planetary boundary layer schemes in the WRF Model when simulating meteorological variables over Irene              |   | 31 |
| van Wyk    | UCT      | The impact of ENSO patterns on maize production in South Africa  | * | 32 |
| Xulu       | UniZulu  | Impact of spatio-temporal variability of the Mascarene High on weather and climate over southern Africa                              | * | 33 |
| Govender   | UKZN     | Combining data mining and MODIS fire data for characterisation of fires in the Richards Bay area                                     |   | 34 |
| Govender   | UKZN     | Investigating the effect of solar radiation components on surface evaporation  |   | 35 |