

I am a Senior Advisor Environmental and provide input into the development of research programmes in both air quality and climate change areas. My role extends to implementation of the research outcomes with Eskom line groups eg Generation, Corporate Services and Technology Strategy and Planning. I also manage research and demonstration projects according to time, cost and quality requirements.

I have been involved with research of the weather systems that caused heavy rainfall and snowfalls over the Eastern Cape Interior and the KwaZulu-Natal coast on the 15th to 20th July 2002. In addition the dynamical characteristics of the atmosphere responsible for the heavy rainfall along the KwaZulu Natal were analysed. The conclusion of the study found that the cut-off low pressure system and the Atlantic High pressure system moving south of the country caused onshore flow along the south-east and east coast and this was responsible for the heavy rainfall. The convergence of the south-east moisture flux gradient at 1000hPa did fairly well in identifying areas of heavy rain compared to the conventional moisture flux convergence. Firstly, the National Center for Environmental Prediction (NCEP) reanalysis data was used to investigate progression of the synoptic circulation of this event. The second data set used was the South African Weather Service daily rainfall. The third data set was the infrared satellite images obtained from the SAWS.

I am attending the course to expand my knowledge and expertise of climate change. Eskom power stations are currently utilising large amounts of water in daily operations and cooling at the wet-cooled coal fired power plants. Further, coal-fired power plants inherently release large amounts of carbon dioxide (CO₂) into the atmosphere from the combustion process and this is a significant driver for long-term energy diversification in Eskom. This diversification may include an increase in hydro electric capacity, both within South Africa and in neighbouring countries, making a sound knowledge of probable water availability crucial. The future availability of water will inevitably play a critical role in Eskom and, operations and strategic planning. Our understanding of climate change impacts on local scale is critical for future generation of power stations. It will be important to come out of the course with the practical solutions to our problems as industries.

I am currently involved with research project in adapting to the climate change impacts in the Waterberg area in Limpopo with Climate Systems Analysis Group at the University of Cape Town. The objective of the project is to assess the historical and future regional climate change of the Waterberg area by: 1 Contextualising the historical baseline conditions and current trend. 2 Projecting the future climate change envelope through empirical downscaling.

I will also be involved with the Hydrological modelling in the Waterberg Catchment Area and climate change impacts on water resources in the waterberg with the University of KwaZulu Natal. The objective of the project: To link downscaled climate model output at daily time steps from present and future climate scenarios to an appropriate daily time step hydrological model in order to assess projected future hydrological responses in four selected catchment in the Waterberg Area.

Daily values of critical climate variables from a minimum of five General Circulation Models (GCMs), downscaled to climate station level in the study area for present, intermediate future and more distant future climate scenarios, form the input to hydrological modelling for the Matlabas, Mokolo, Lephalala and Mogalakwena Catchments in the Waterberg area. The spatial

scale of hydrological modelling will be at Quinary Catchments level, which are a three-fold disaggregation of Quaternary Catchments into more homogeneous hydrological response zones. The downscaled GCM temperature and rainfall data are adjusted for altitude per Quinary Catchment. The feasibility of utilizing output from further GCMs will be investigated.

The hydrological simulations will be undertaken with the daily time step physical-conceptual ACRU modelling system, which has the facility to explicitly simulate, *inter alia*, daily stormflows, baseflows, total flows, reservoir levels, abstractions, inter-basin transfers, return flows and sediment yields for present and future climate scenarios and for reference and actual land use conditions, including proposed future dams and their abstractions. In regard to water quality, only sediment yield will be modelled.