

# *Quantifying Weather and Climate Impacts on Health in Developing Countries (QWeCI)*

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**Is the Northern Shift in Malaria in  
South Africa Climate Related? –  
Some Preliminary Results from  
LMM(2004)**

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# Outline

- Introduction
- Data
- Results
  - Spatial
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# Introduction

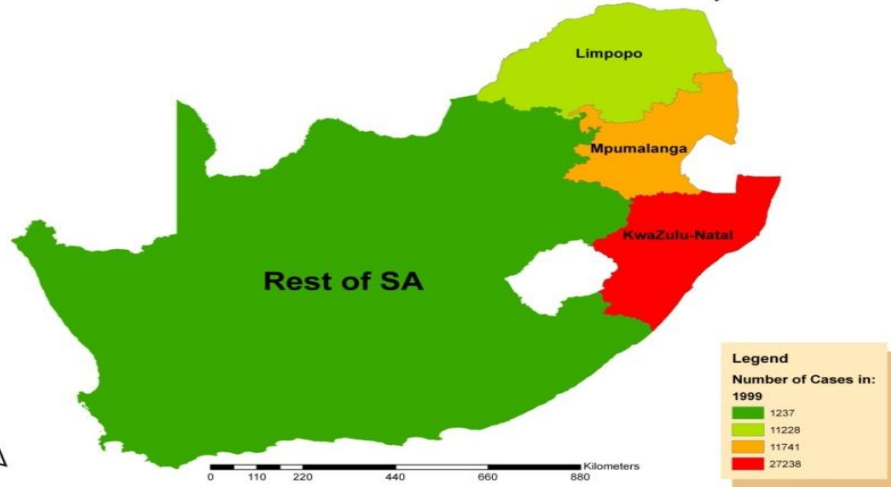
- Malaria is endemic in the low-altitude areas of the northern and eastern parts of South Africa with seasonal transmission.
- Malaria thrives in moist and high rainfall Positive for higher average maximum temperature.
- Temperature is the main driver to malaria transmission in Limpopo Province (Under Review - Komen *et al* 2013 )
- Malaria incidence and mortality in Limpopo Province for the seasons 1998–1999 to 2006–2007 is showing a northern shift over time
- *Could this be climate related?*
- Data: TRMM rainfall (satellite estimates) and ERAINTERIM (reanalysis) temperature data for the period 1999-2008.

## Data

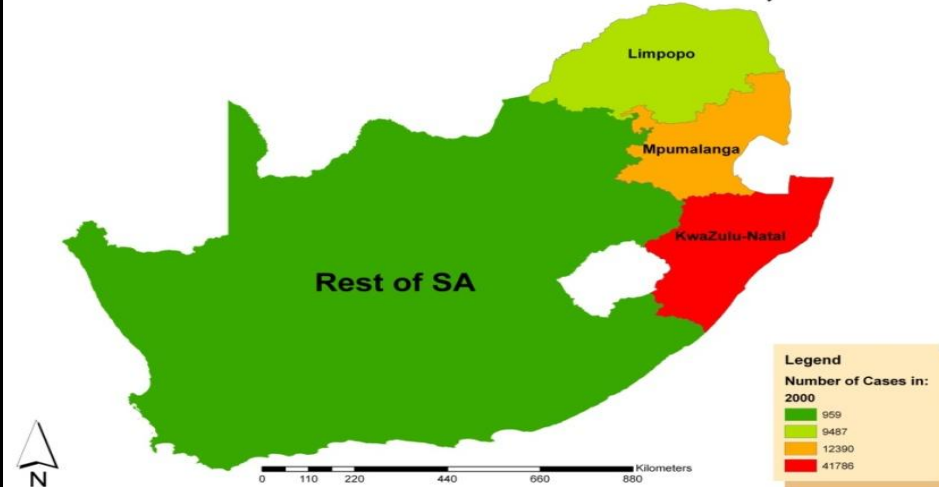
- TRMM rainfall (satellite estimates) and
- ERAINTERIM (reanalysis) temperature data for the period 1999-2008.
- Climate data - South Africa Weather Services. (daily station data of precipitation, minimum and maximum temperature from 1998 to 2007).
- Malaria data - South African Department of Health and from the Malaria control Centre in Tzaneen (Limpopo Province).

# Spatial

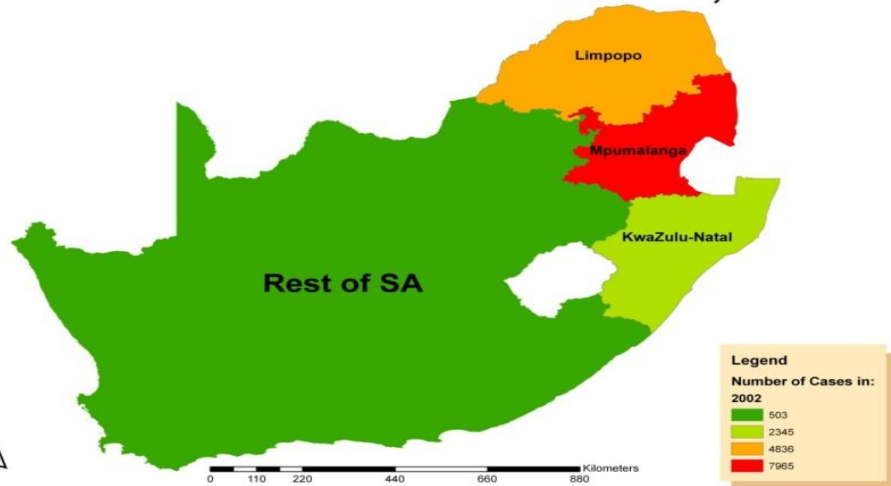
Malaria Distribution in South Africa, 1999



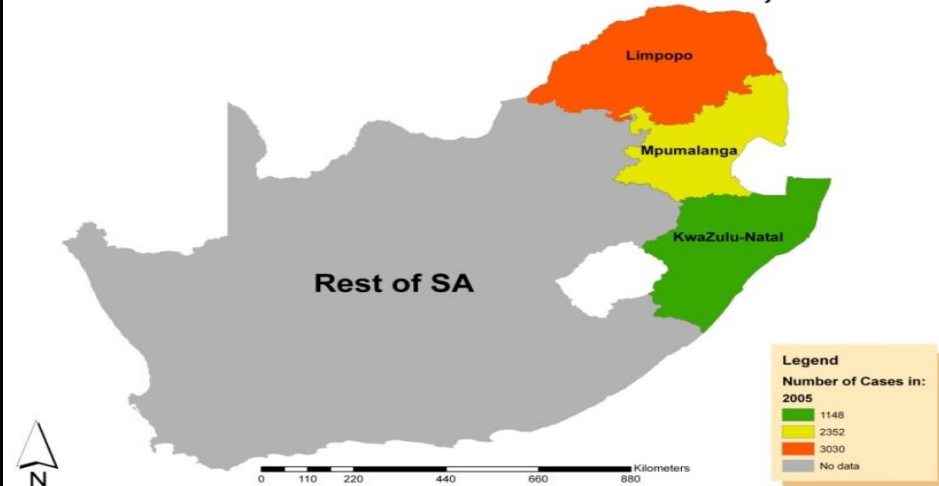
Malaria Distribution in South Africa, 2000



Malaria Distribution in South Africa, 2002



Malaria Distribution in South Africa, 2005

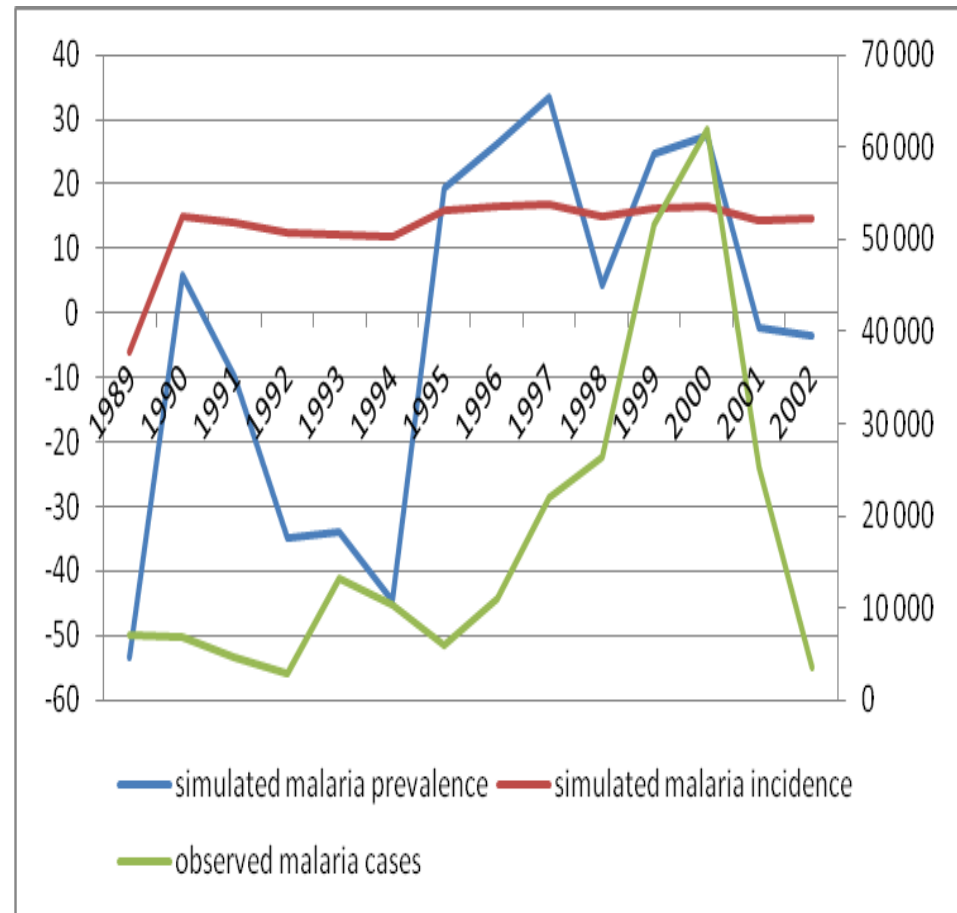
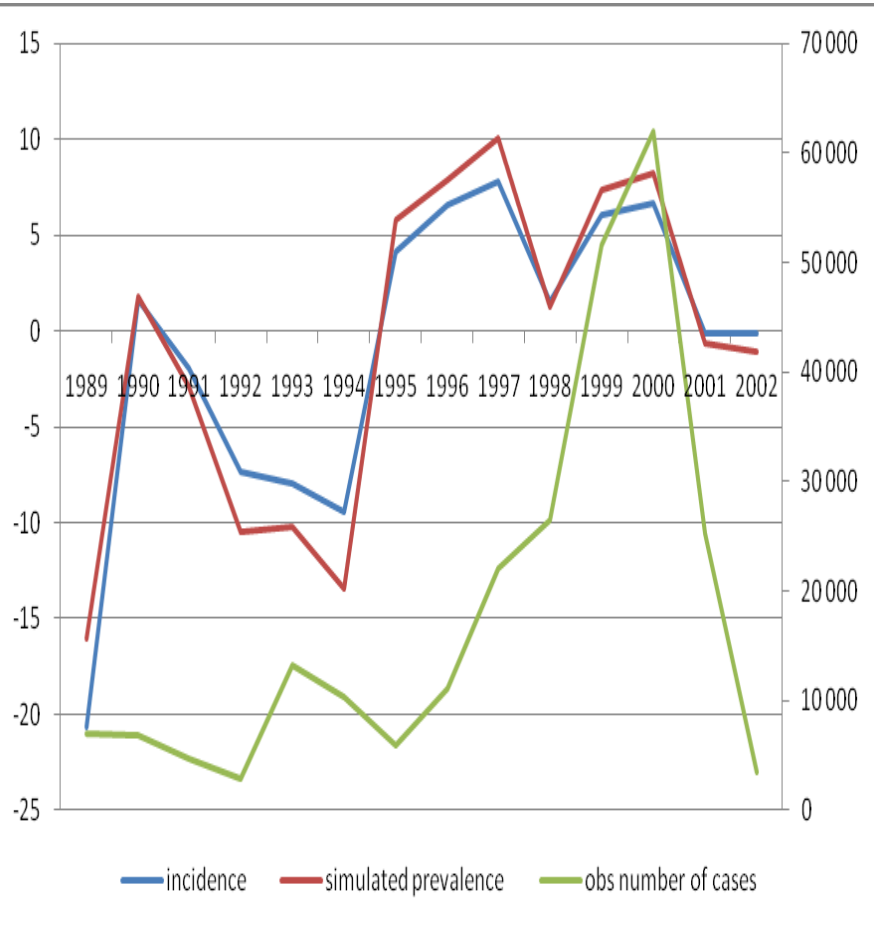


# SUMMARY TABLE: OBSERVED HIGH-LOW YEARS

			High					Low			
LIMPOPO PROVINCE	ERA_INTERIM	Prevalence	1999	2000	2006	2008		1998	2003	2004	2005
		Incidence	1999	2000	2006	2008		1998	2003	2004	2005
	TRMM	Prevalence	1999	2000	2006	2008		1998	2003	2005	2007
		Incidence	1999	2000	2006	2008		1998	2003	2005	2007
	Limpopo Malaria cases		1999	2000	2001	2003		1998	2002	2005	2007

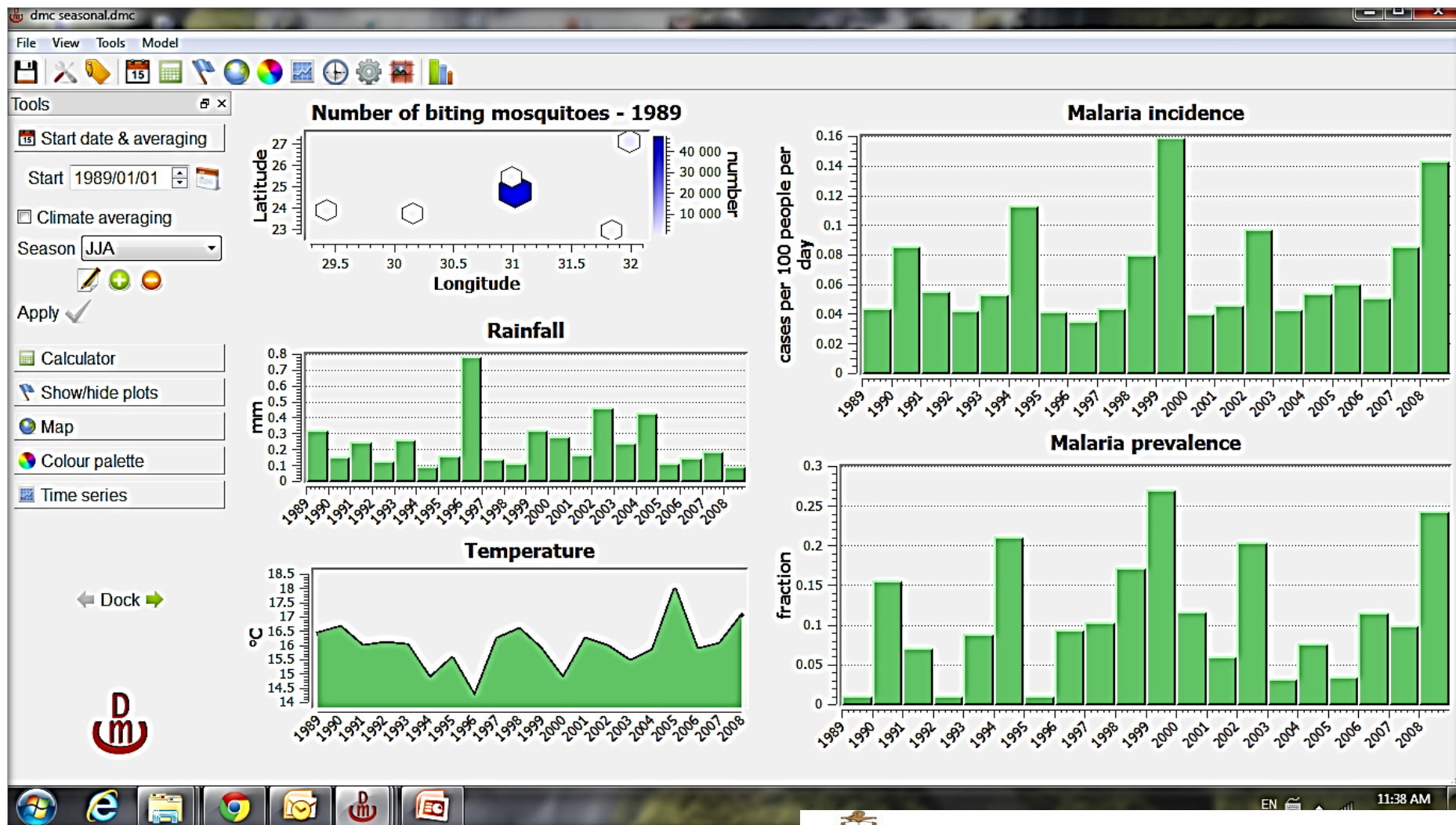
			High					Low			
KWAZULU NATAL PROVINCE	ERA_INTERIM	Prevalence	1999	2000	2001	2002		1989	1990	1992	1991
		Incidence	1996	1997	1999	2000		1989	1992	1993	1994
	TRMM	Prevalence	1990	1996	1998	1999		1989	1991	1993	2002
		Incidence	1996	1997	1999	2000		1989	1992	1993	1994
	National malaria cases		1998	1999	2000	2001		1991	1992	1995	2002

## Summary Of Simulated Malaria Prevalence and Incidence Versus Observed Malaria Cases





# Results: LMM (2004)

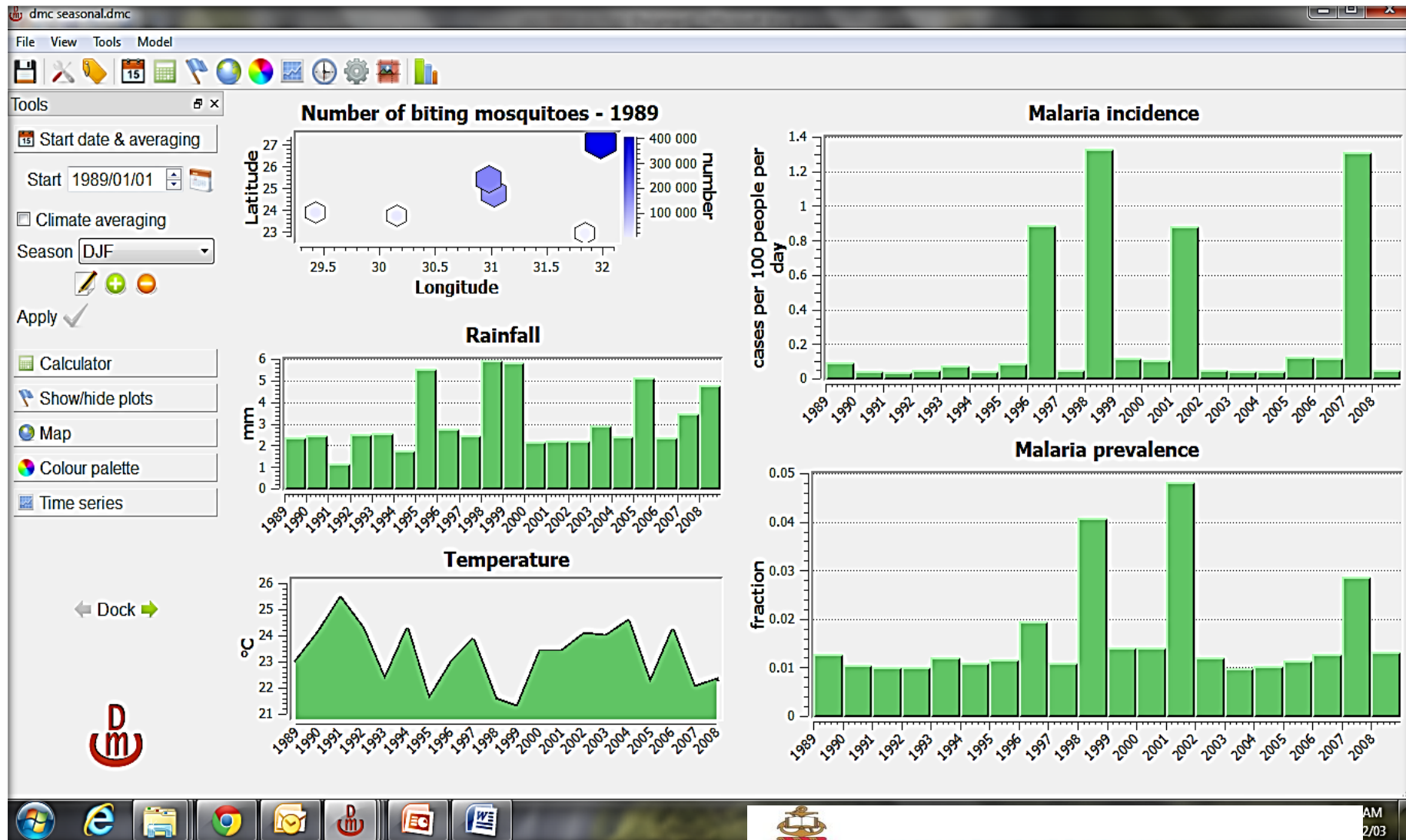




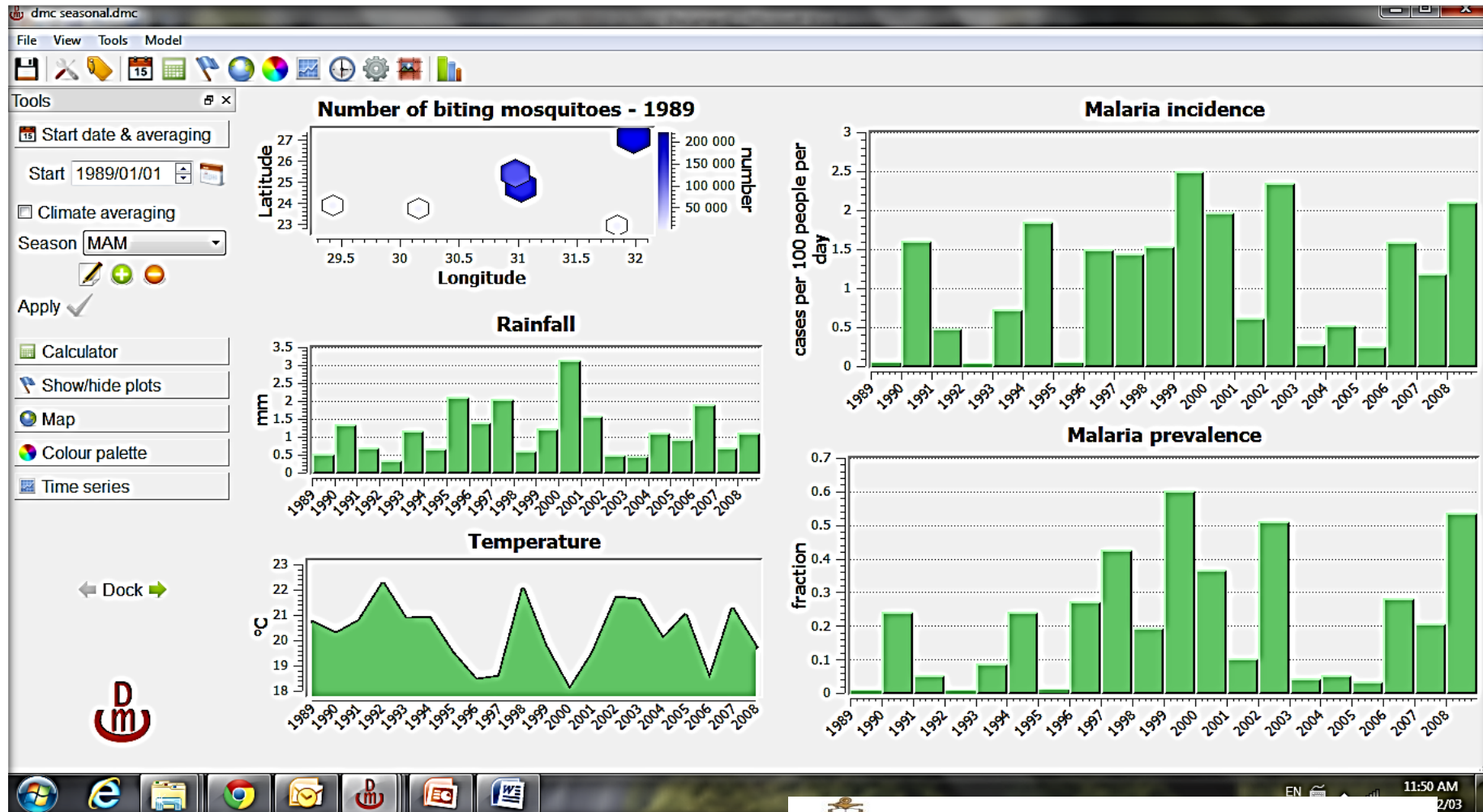
# Results: LMM (2004)



# Results: LMM (2004)



# Results: LMM (2004)



# Comments

- **Spatial results shows a Northern Shift in Malaria transmission in South Africa**
- **Both ERA INTERIM and TRMM Predict High and low malaria years, Incidence and Prevalence relatively well for Limpopo but for KZN it is ambiguous (National data used)**
- **LMM(2004) version shows that the DJF and MAM is Malaria season in South Africa (\*though we expect more malaria in SON\*)**