



**UNIVERSITY OF
KWAZULU-NATAL**

**INYUVESI
YAKWAZULU-NATALI**

**Ozone climatology and variability from space-borne and in situ
observations over Irene (25.5°S, 28.1°E), South Africa**

By

Jeremiah Ogunniyi

jerryogunniyi@yahoo.com

Supervisor: Professor Venkataraman Sivakumar

Introduction

- Why Ozone?
- Ozone Formation
- Tropospheric Ozone
- Stratospheric Ozone
- Total Column Ozone
- Instruments
- Irene

Results

- Tropospheric Ozone over Irene
- Stratospheric Ozone over Irene
- Total Column Ozone over Irene
- Ozone Variability over South Africa
- Summary

Why Ozone?

Ozone is an allotrope of oxygen, i.e., it has three covalently bonded oxygen atoms to form oxygen molecule. Ozone freezes at -251.2°C and condenses at -112°C to a dark blue liquid .

Gases	Percentage Volume
Nitrogen	78.084%
Oxygen	20.95%
Argon	0.934%
Carbon dioxide	0.036%
Neon	0.0018%
Helium	0.0005%
Methane	0.00017%
Hydrogen	0.00005%
Nitrous oxide	0.00003%
Ozone	0.000004%

Types of Ozone

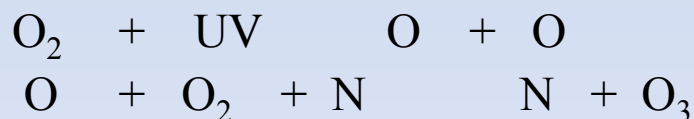
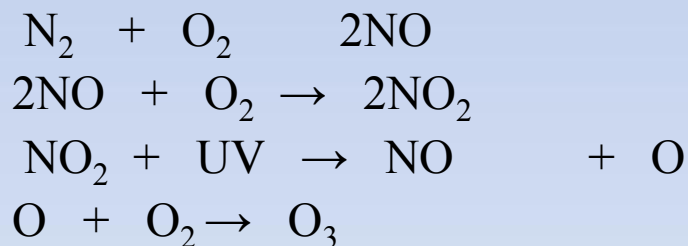
Tropospheric Ozone :this is found between 0 and $\sim 14\text{km}$ depending on the region (Ozone found in the troposphere). This type of ozone has harmful effect on the ecological system such as eye and skin cancer in man and animal,

cataracts, weakening of human immune system, degradation of wood, fabrics, plastics

Stratospheric Ozone: Stratospheric ozone absorbs ultraviolet radiations and prevents its dangerous effects on the biological systems

Total Column Ozone: . Total column ozone is the thickness of the ozone layer at standard atmospheric temperature and pressure. One DU is equivalent to $2.69 \times 10^{16} \text{mol/cm}^2$. At STP, average ozone concentration corresponds to 300U, about 3mm

Ozone Formation



Why Irene?

- Located between two highly industrialised cities
- Has high and low latitudinal influences attributed to transport processes
- Its an area affected by subtropical jet stream

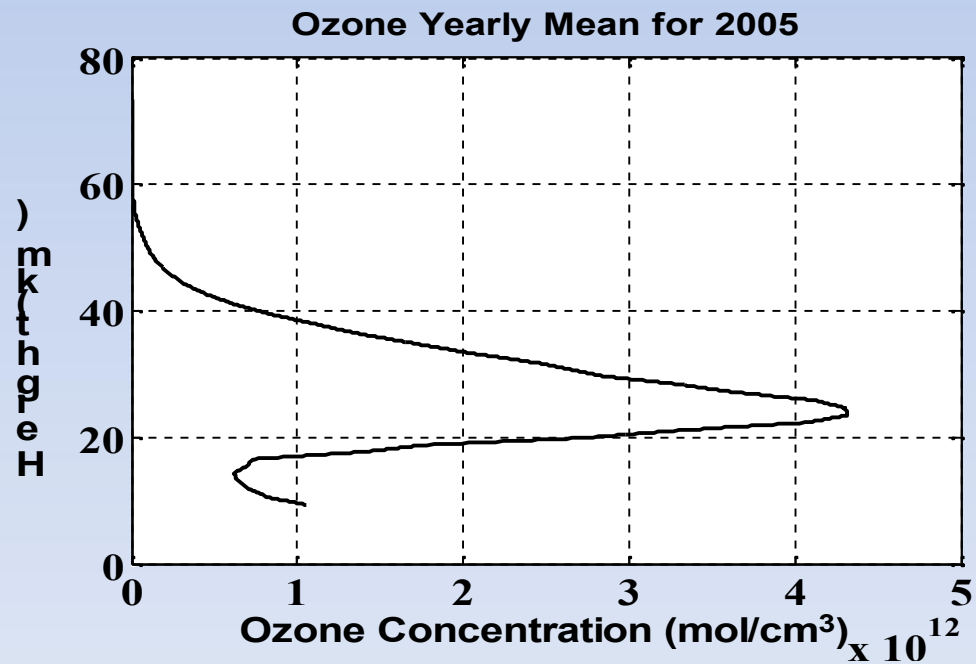
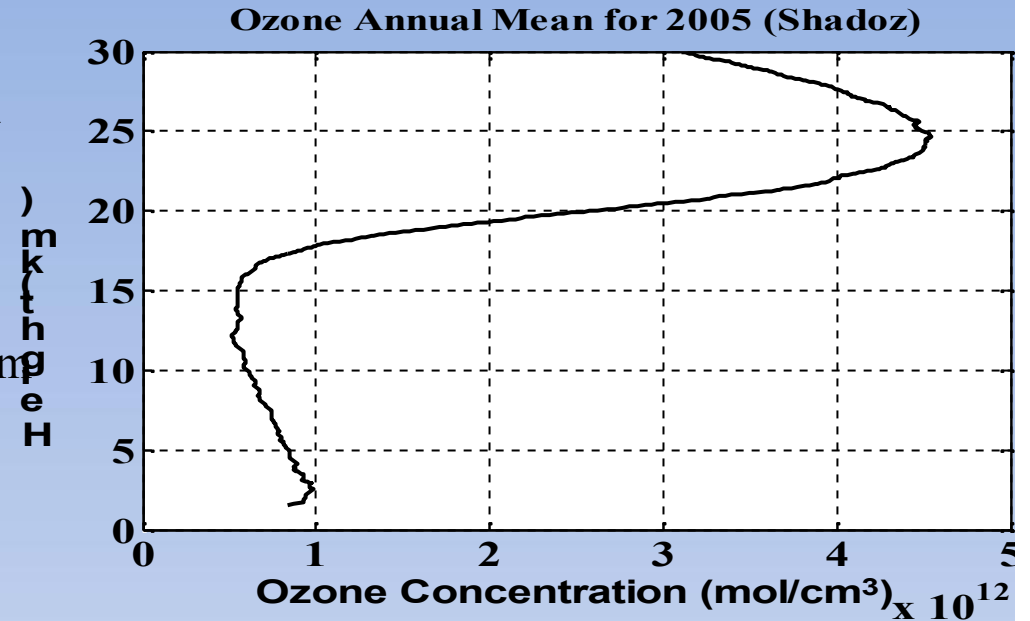
Data used

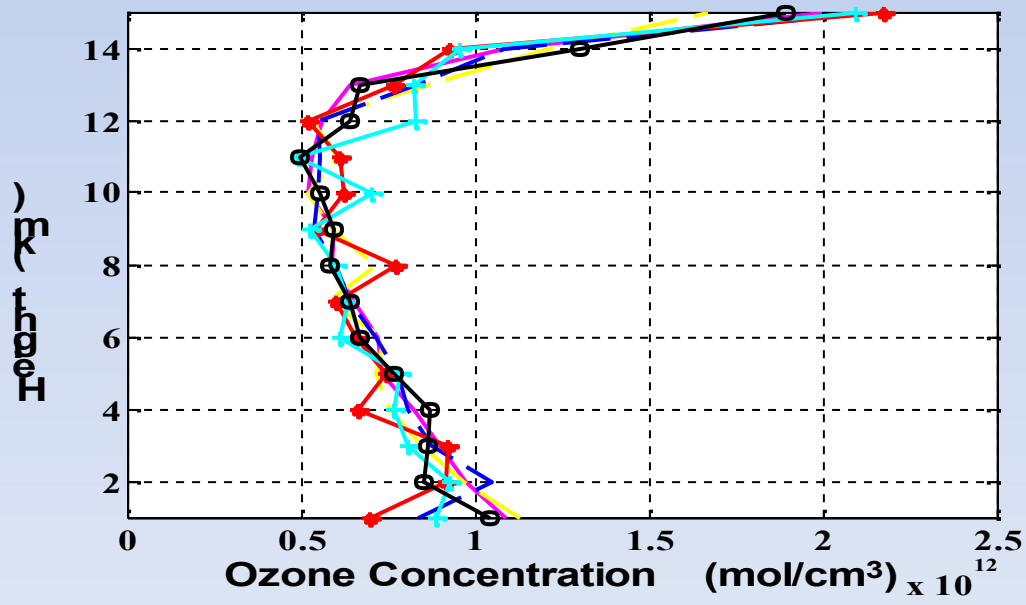
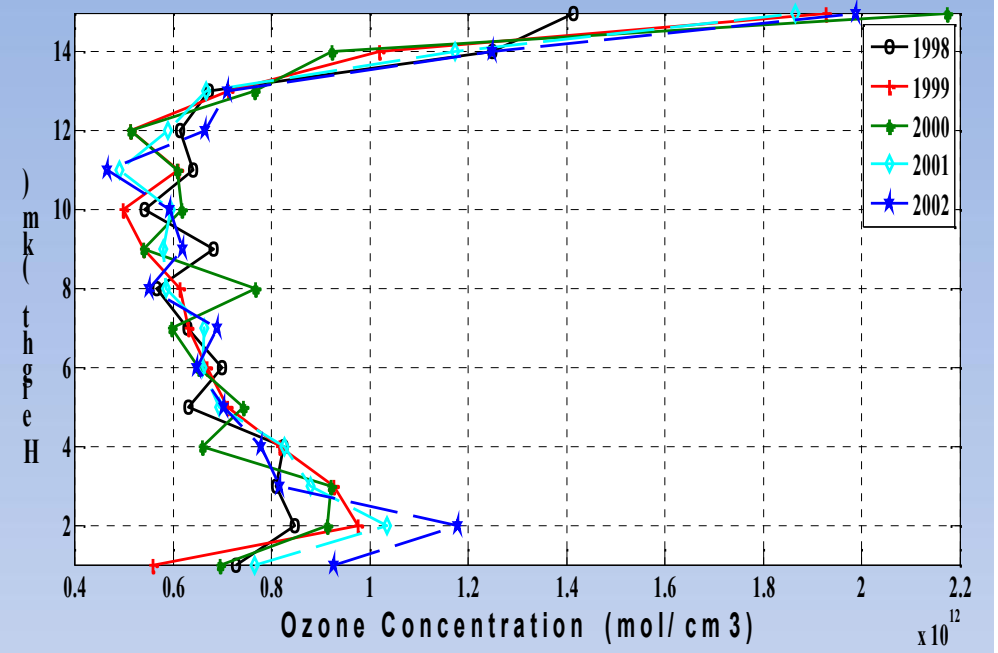
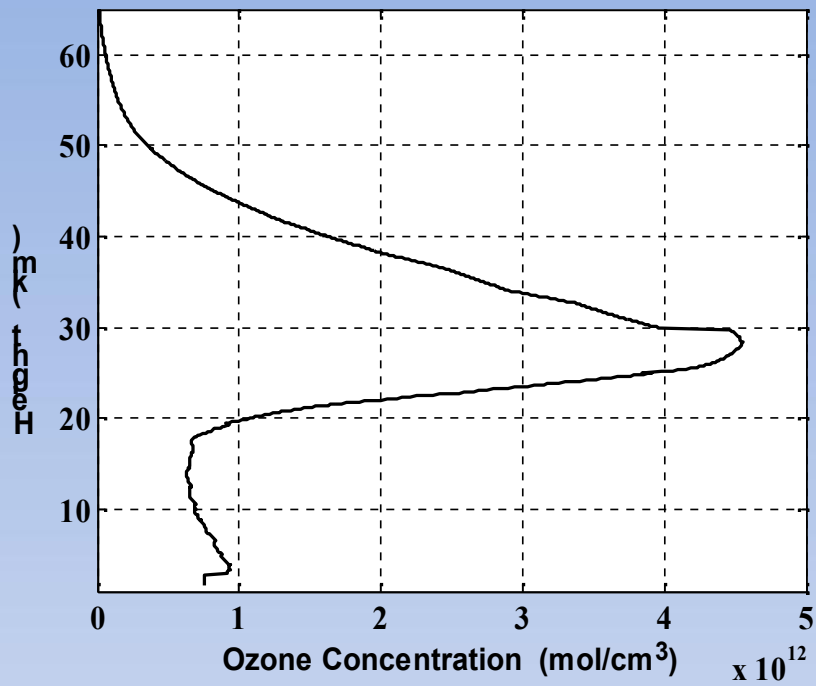
Ground based measurements

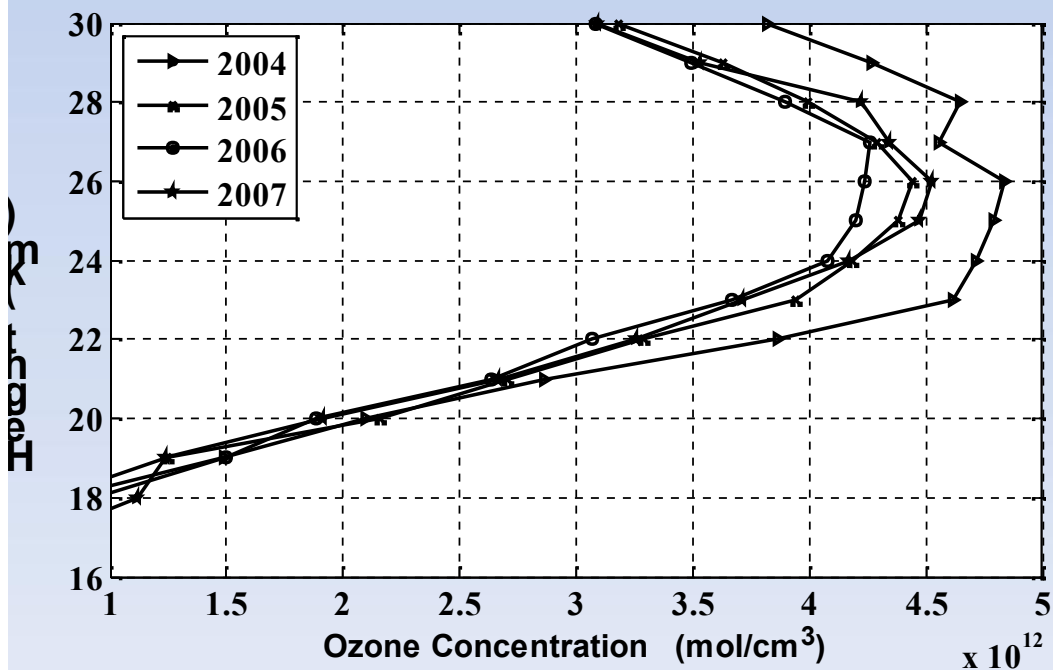
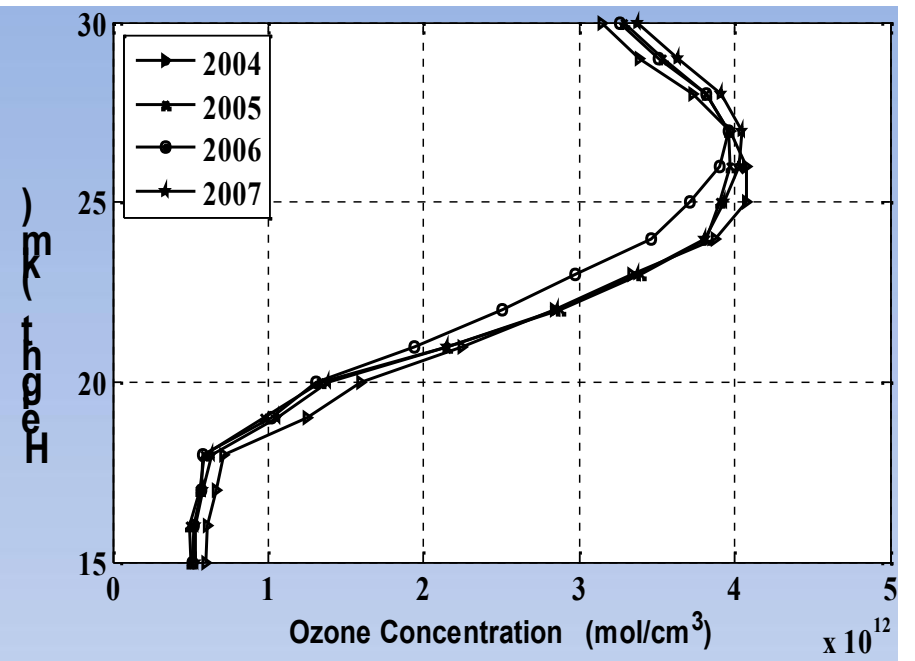
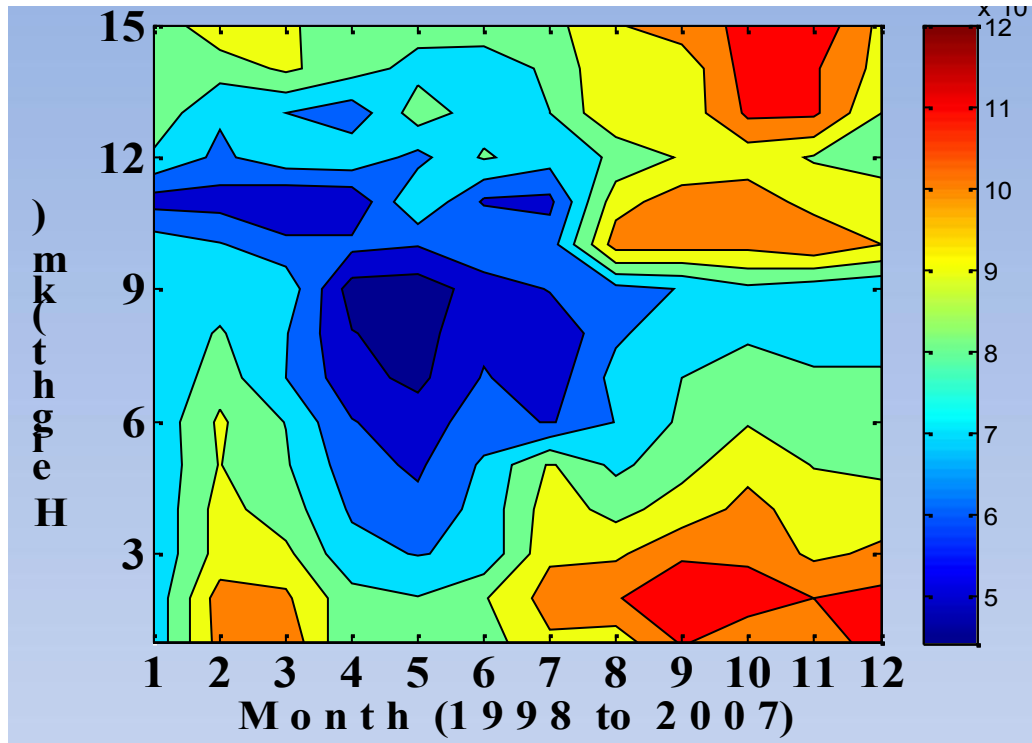
- Ozonesonde
- Dobson

Satellite measurements

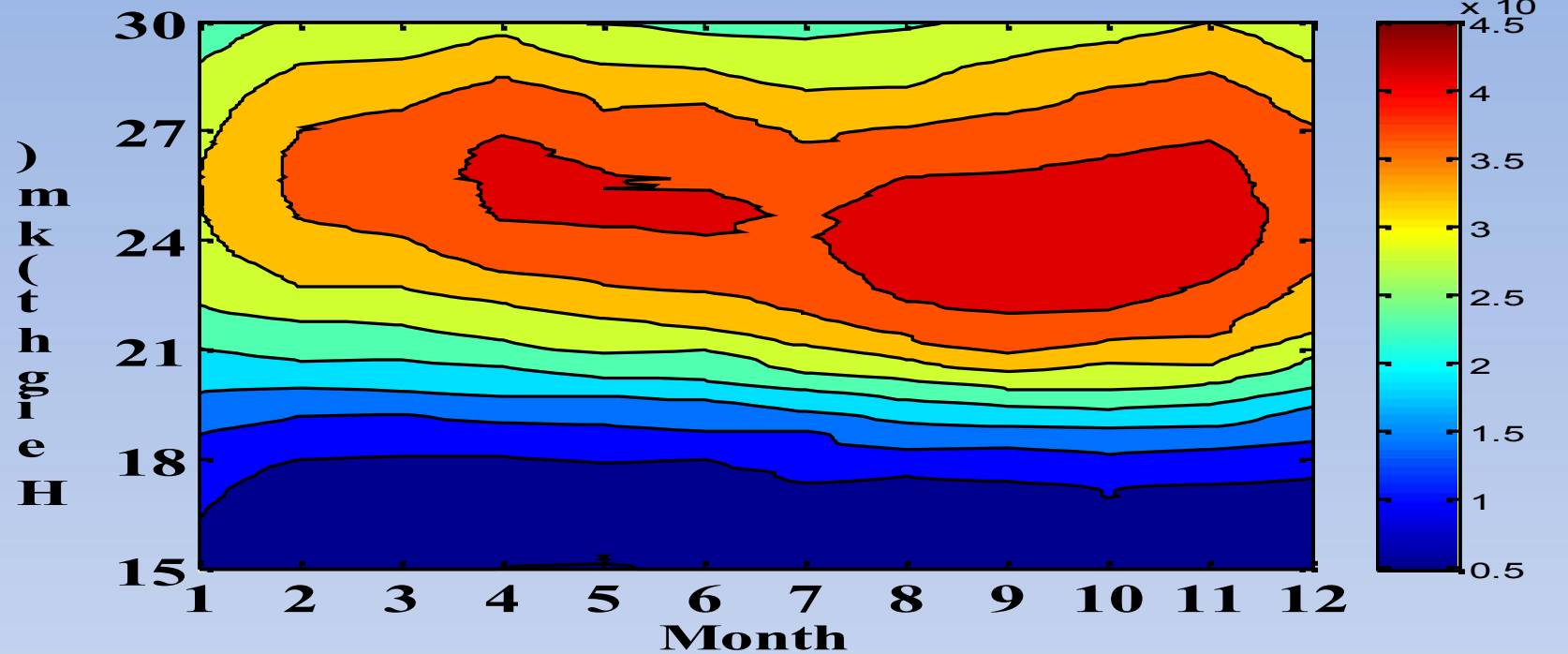
- TOMS
- EPTOMS
- GOME-1
- GOME-2
- OMI
- TOMS
- IASI







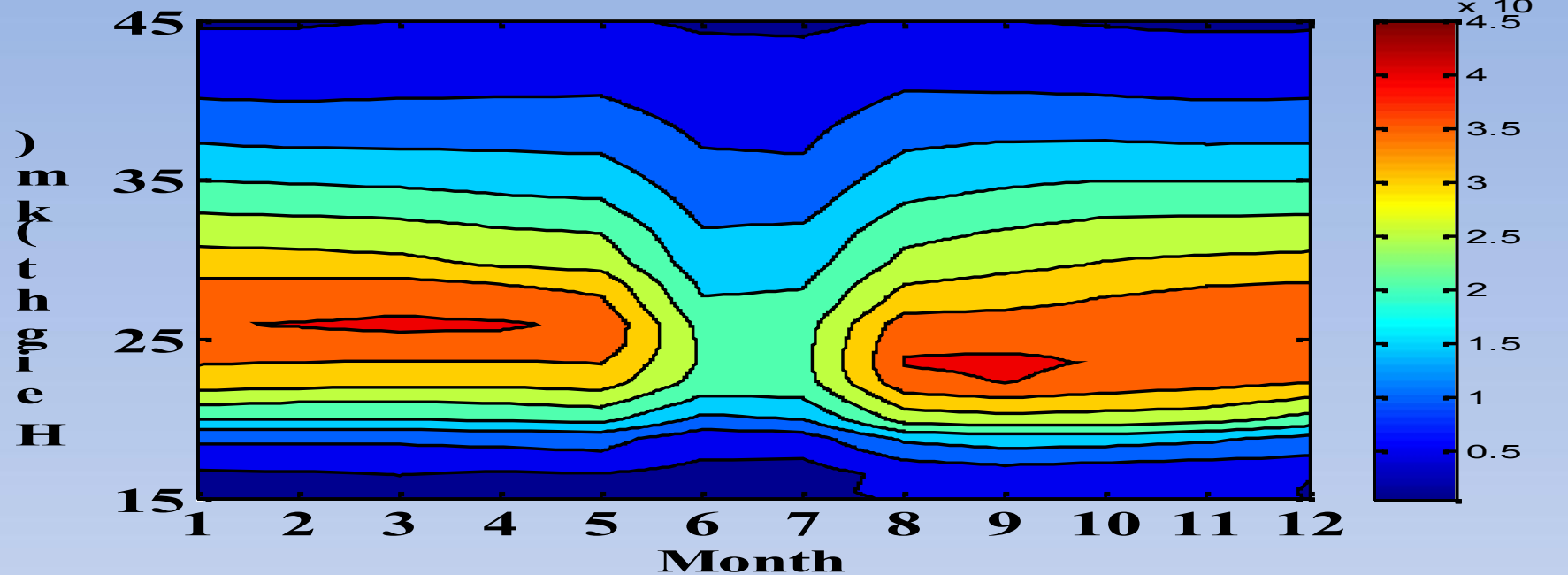
Ozone Concentration



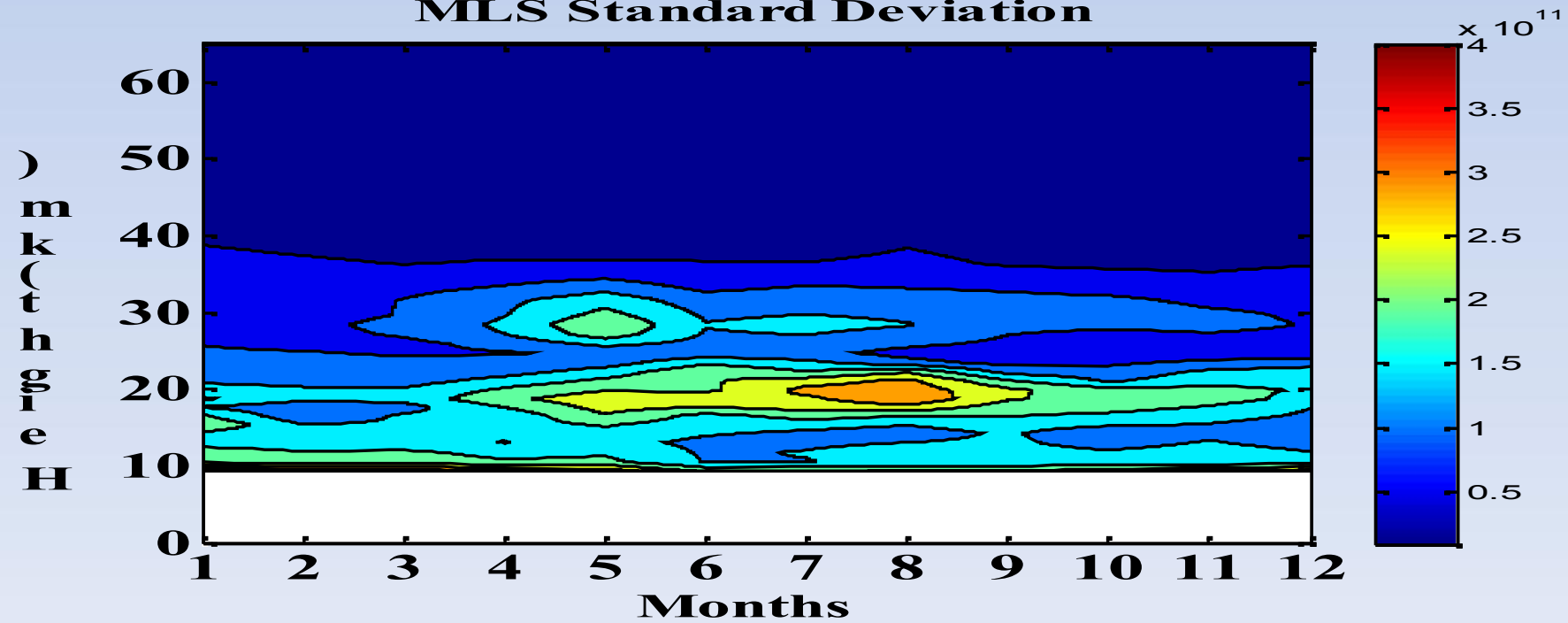
Ozonesondes std

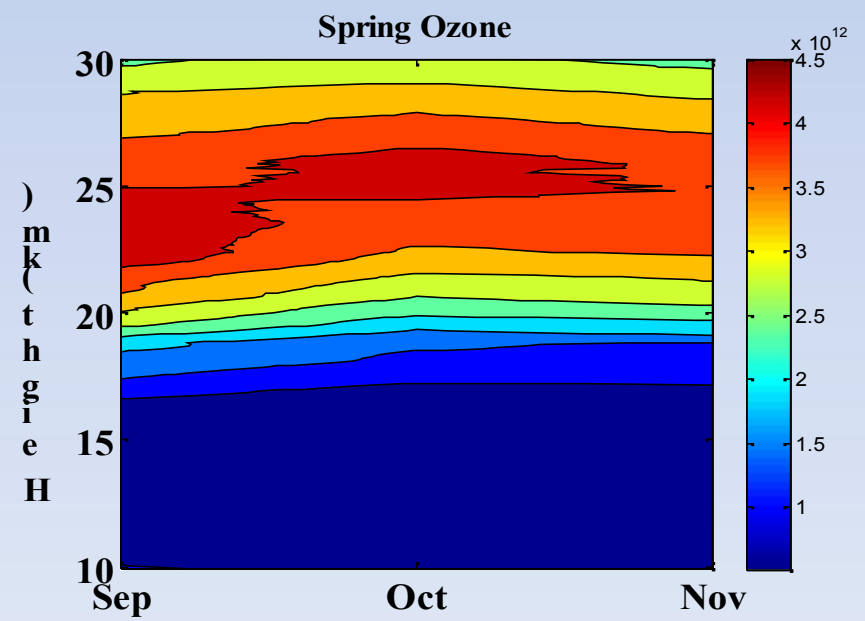
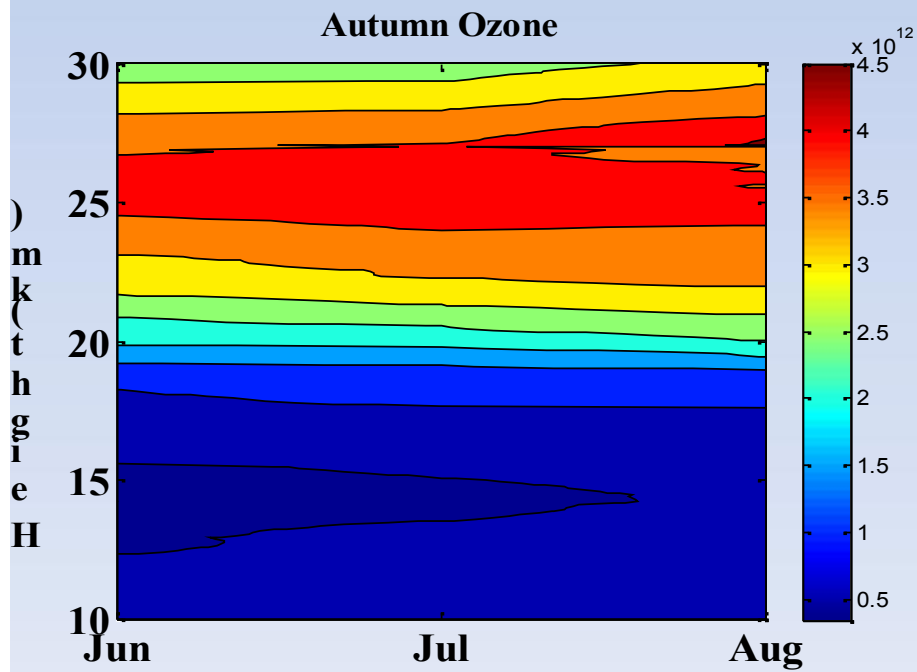
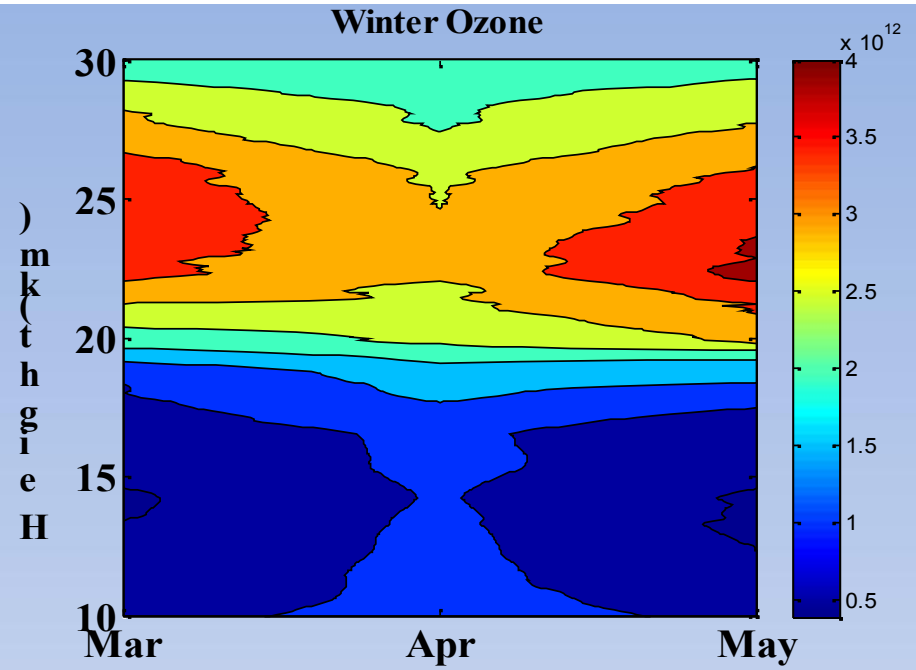
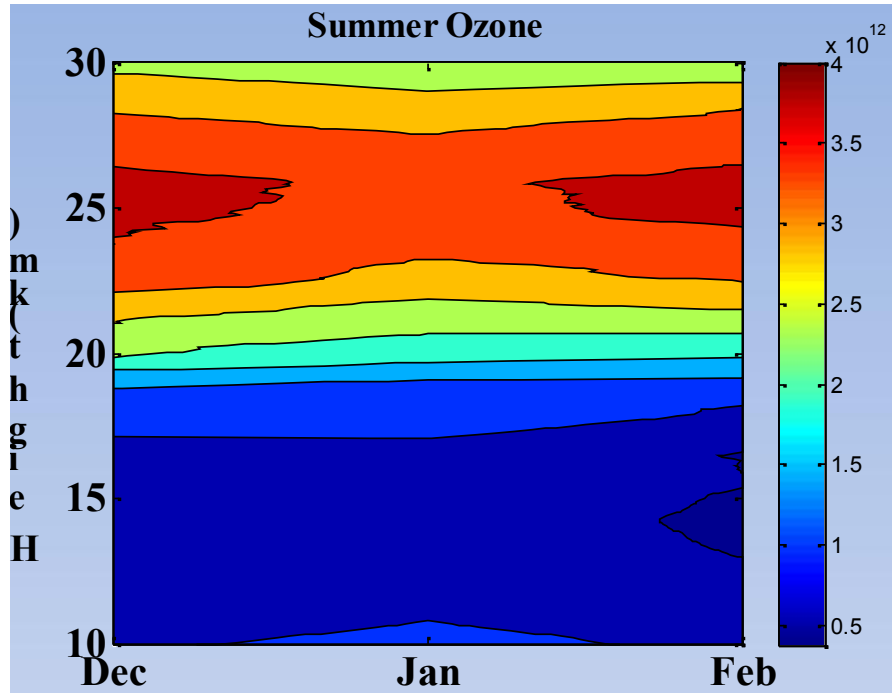


Ozone Concentration

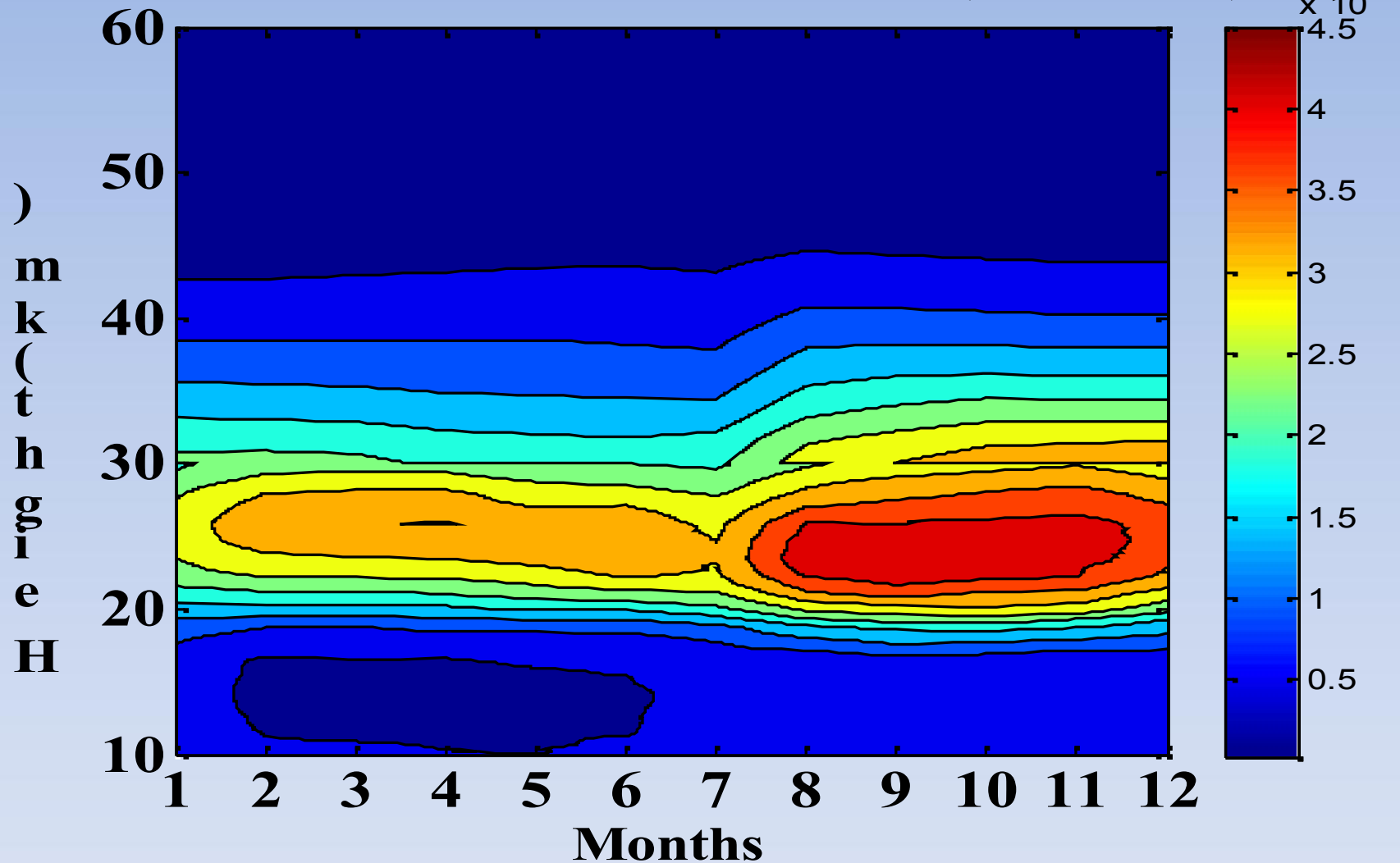


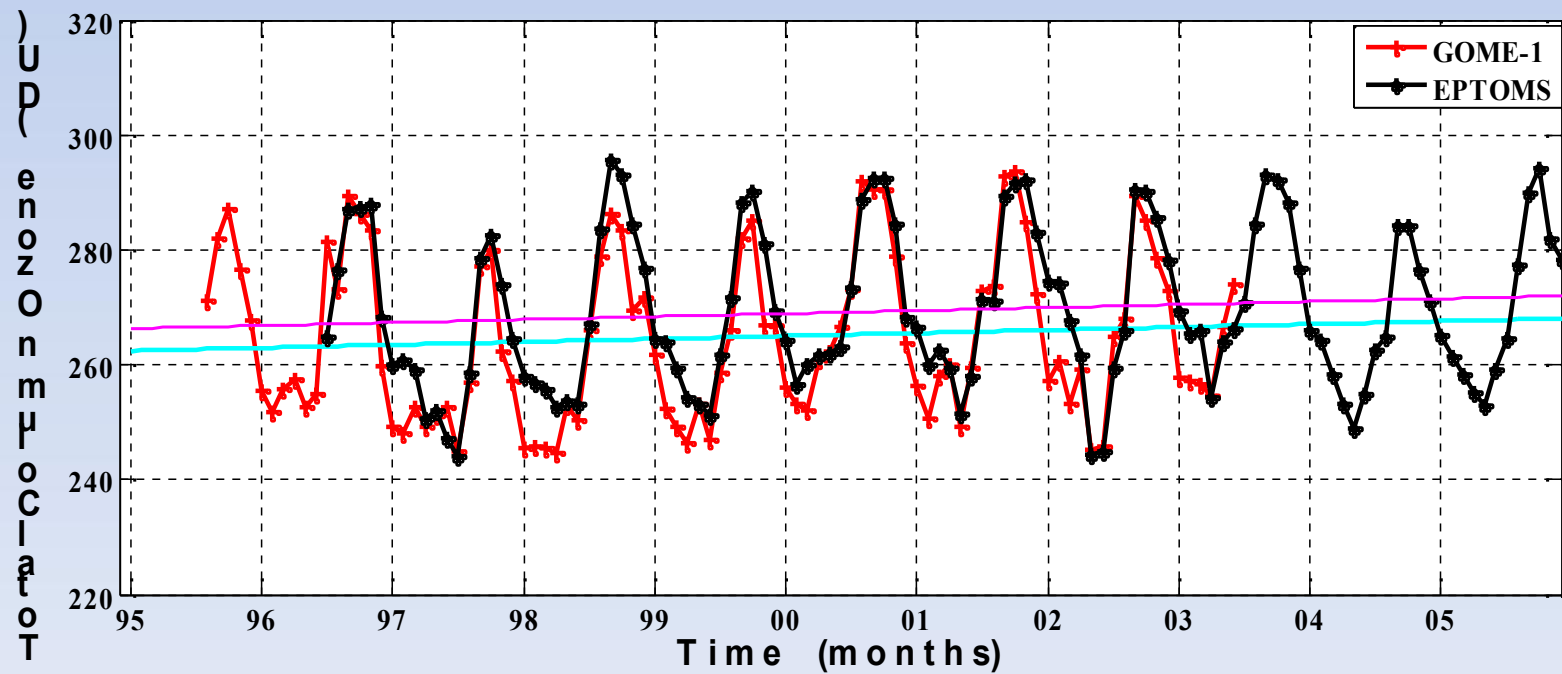
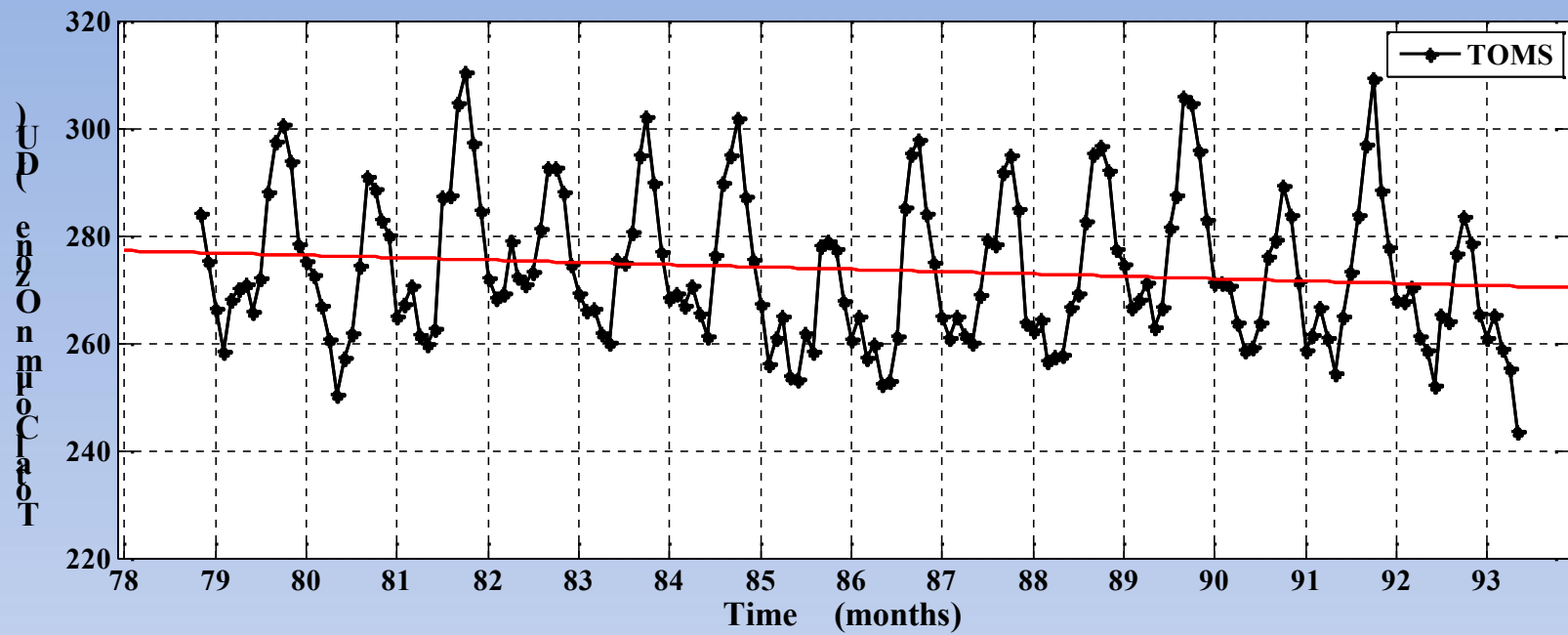
MLS Standard Deviation

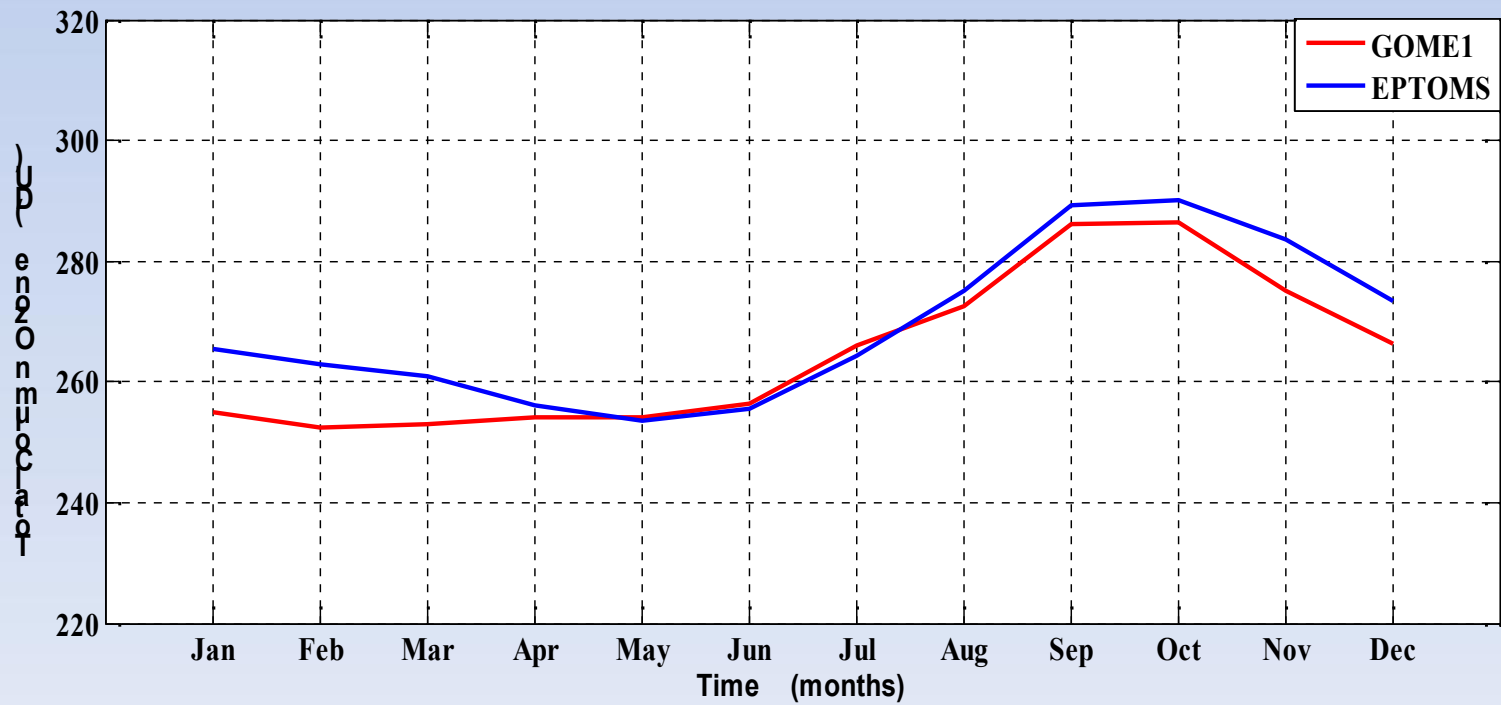
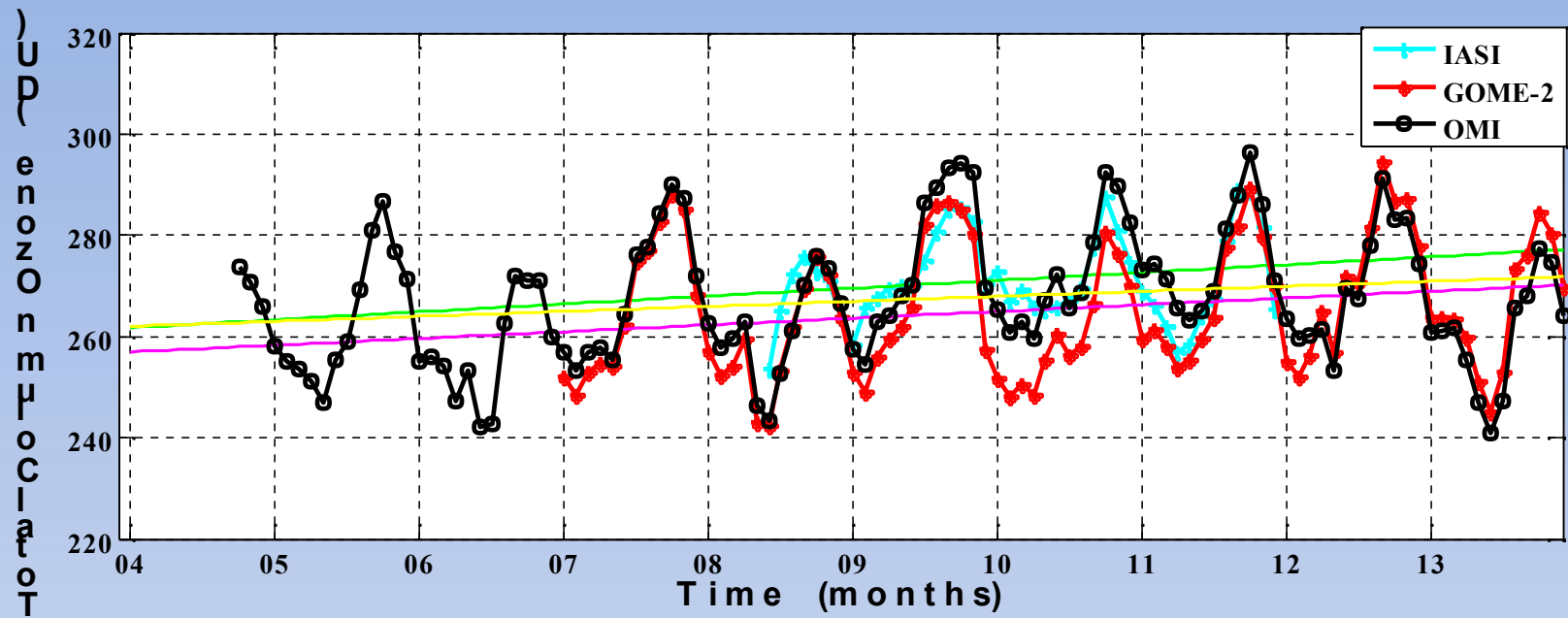


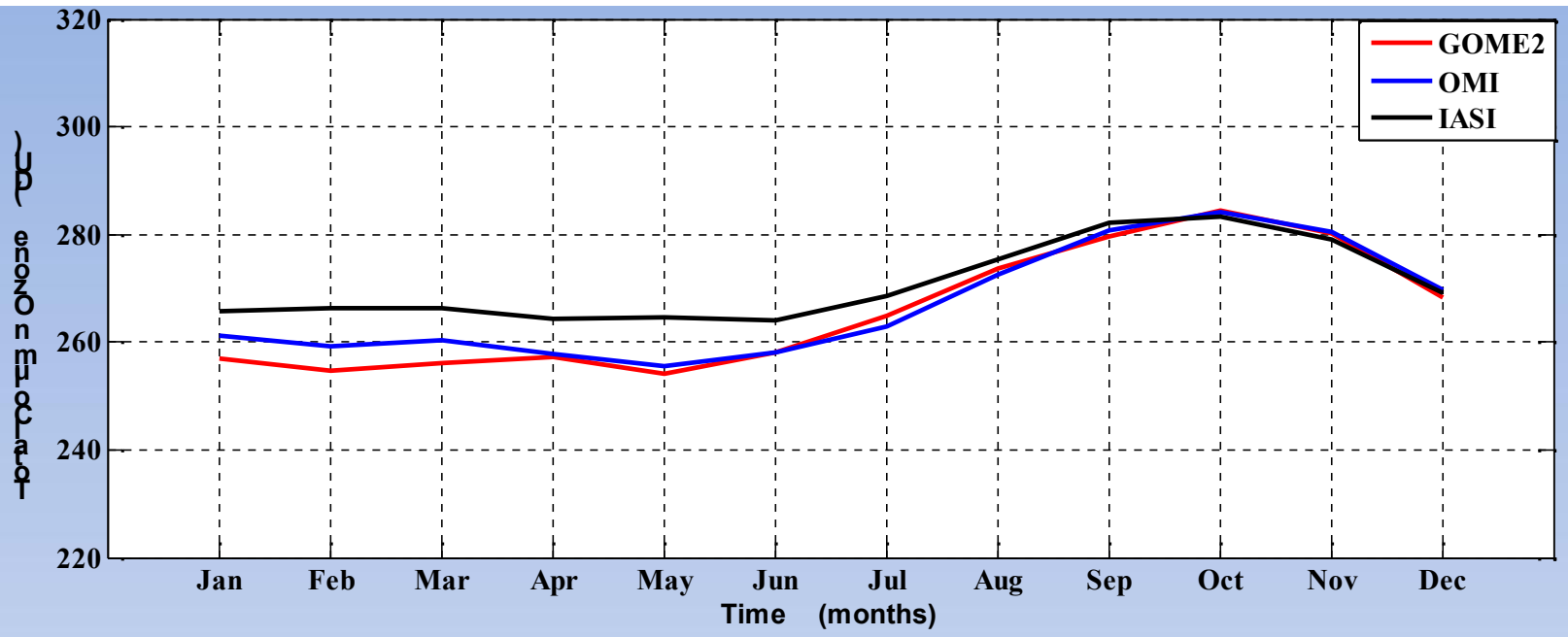


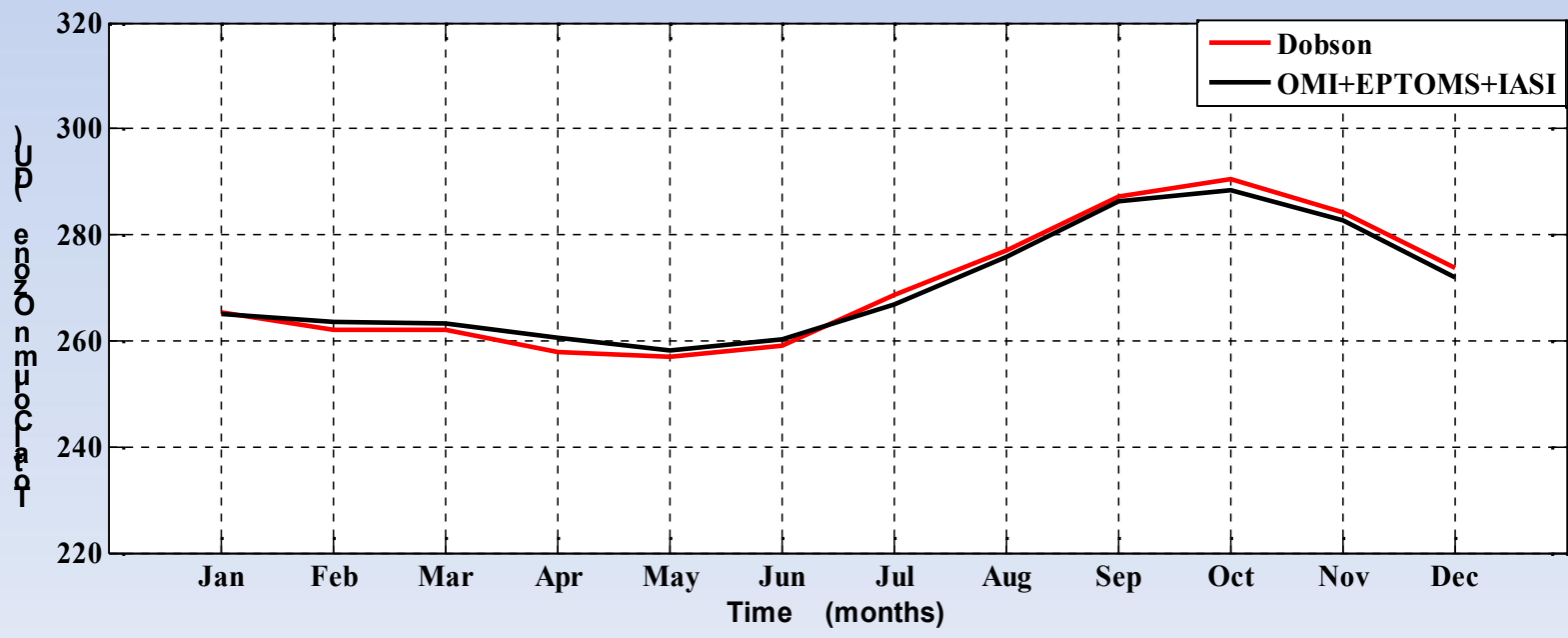
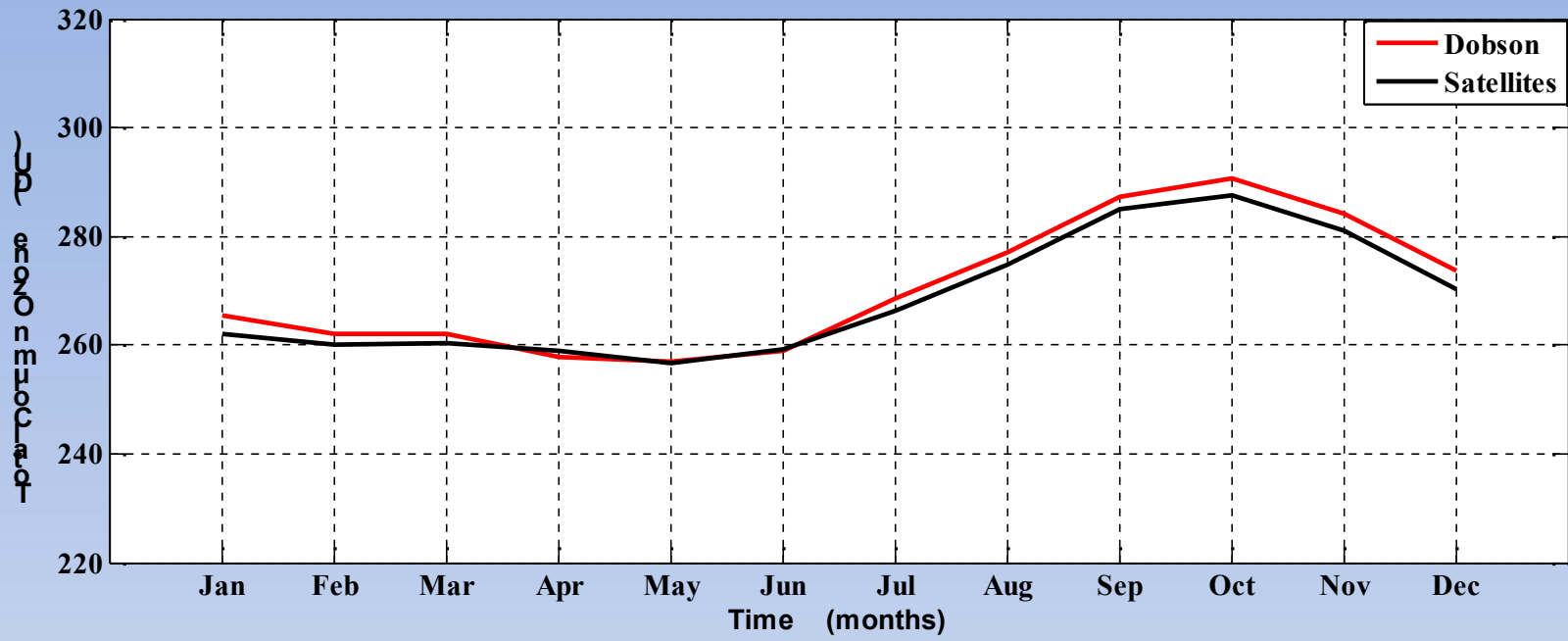
Ozone Concentration for MLS Ozonesonde (2004 to 2007)

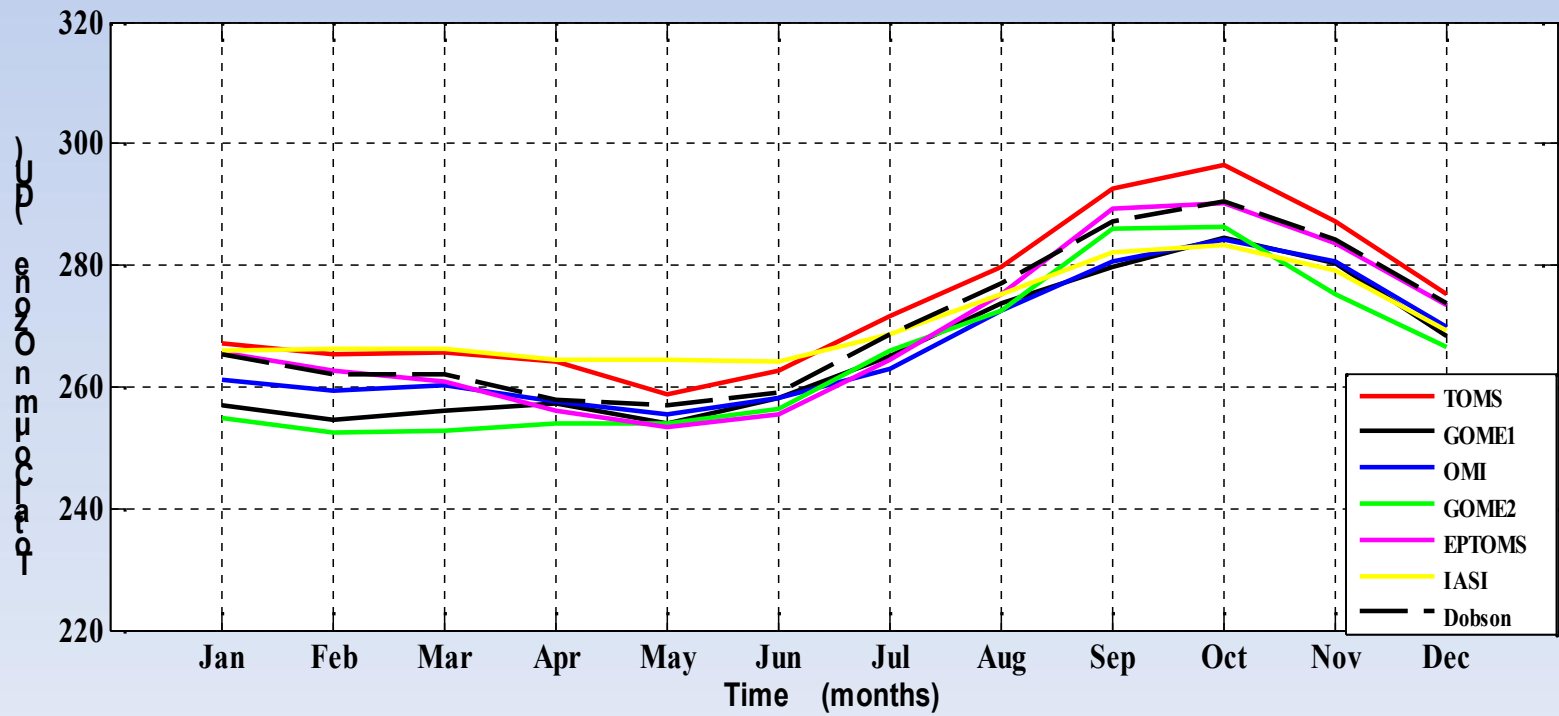
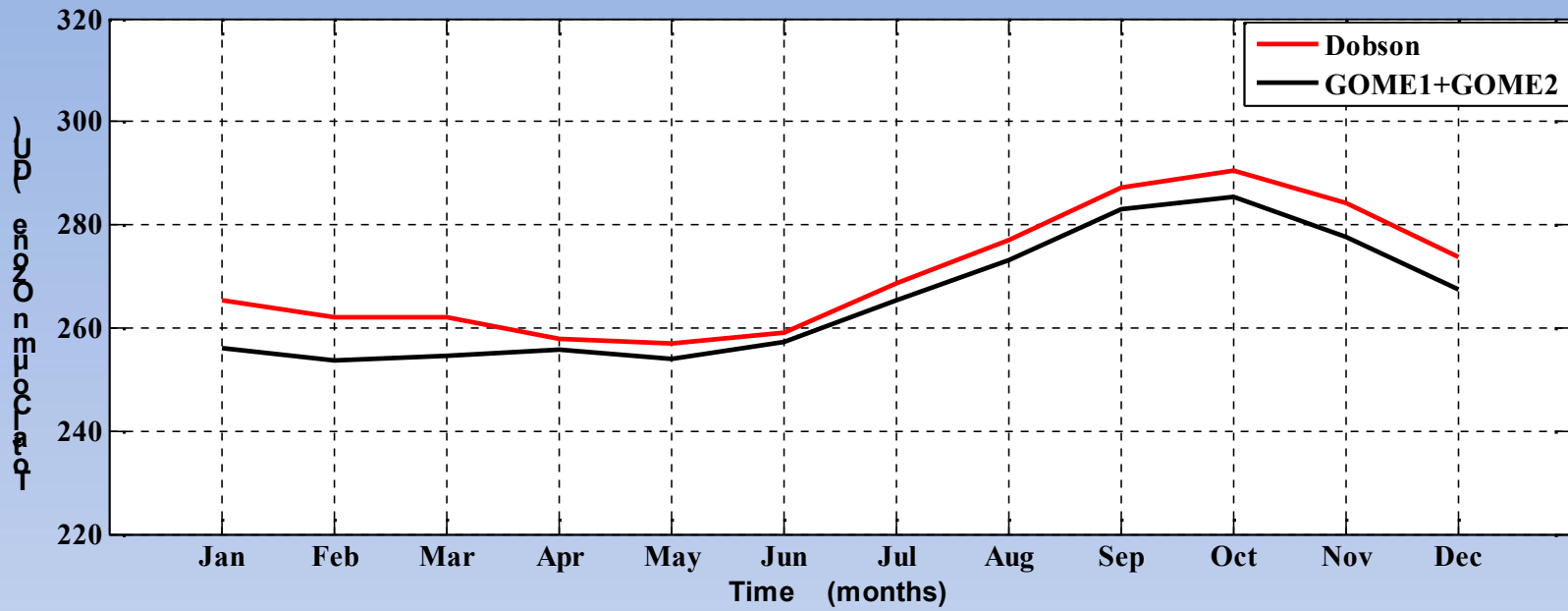




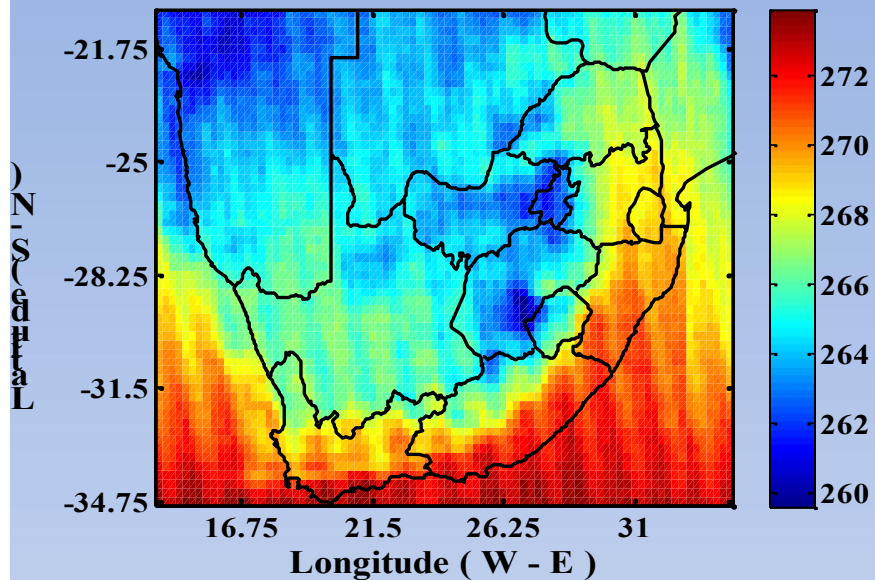




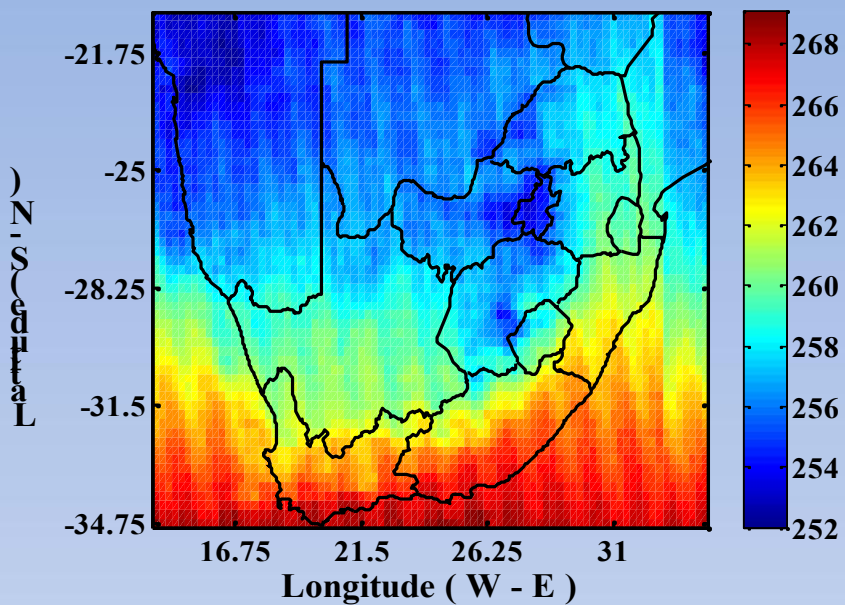




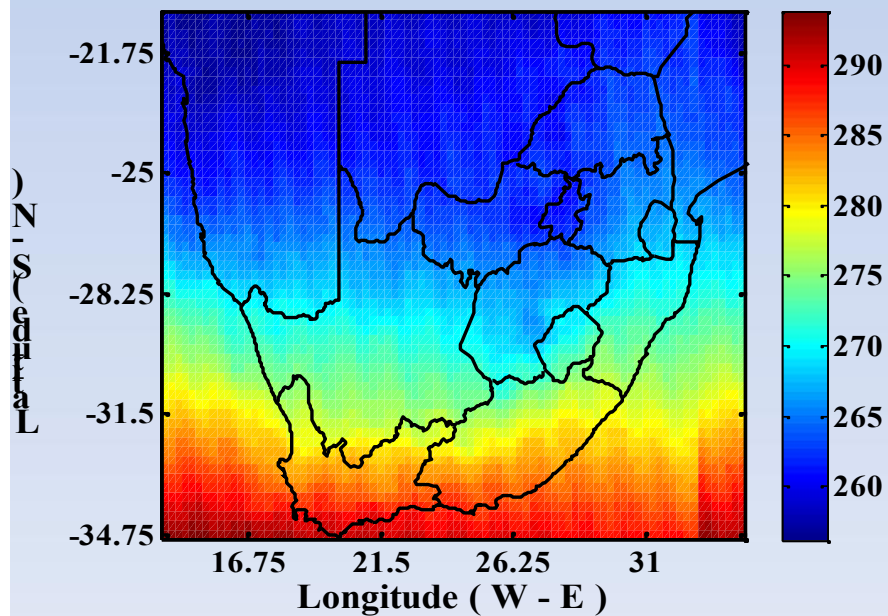
Summer



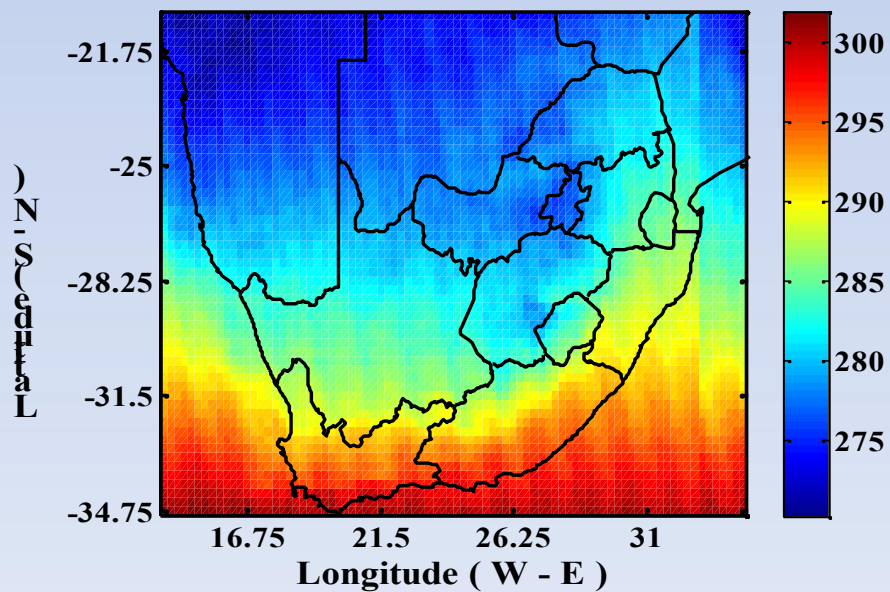
Autumn

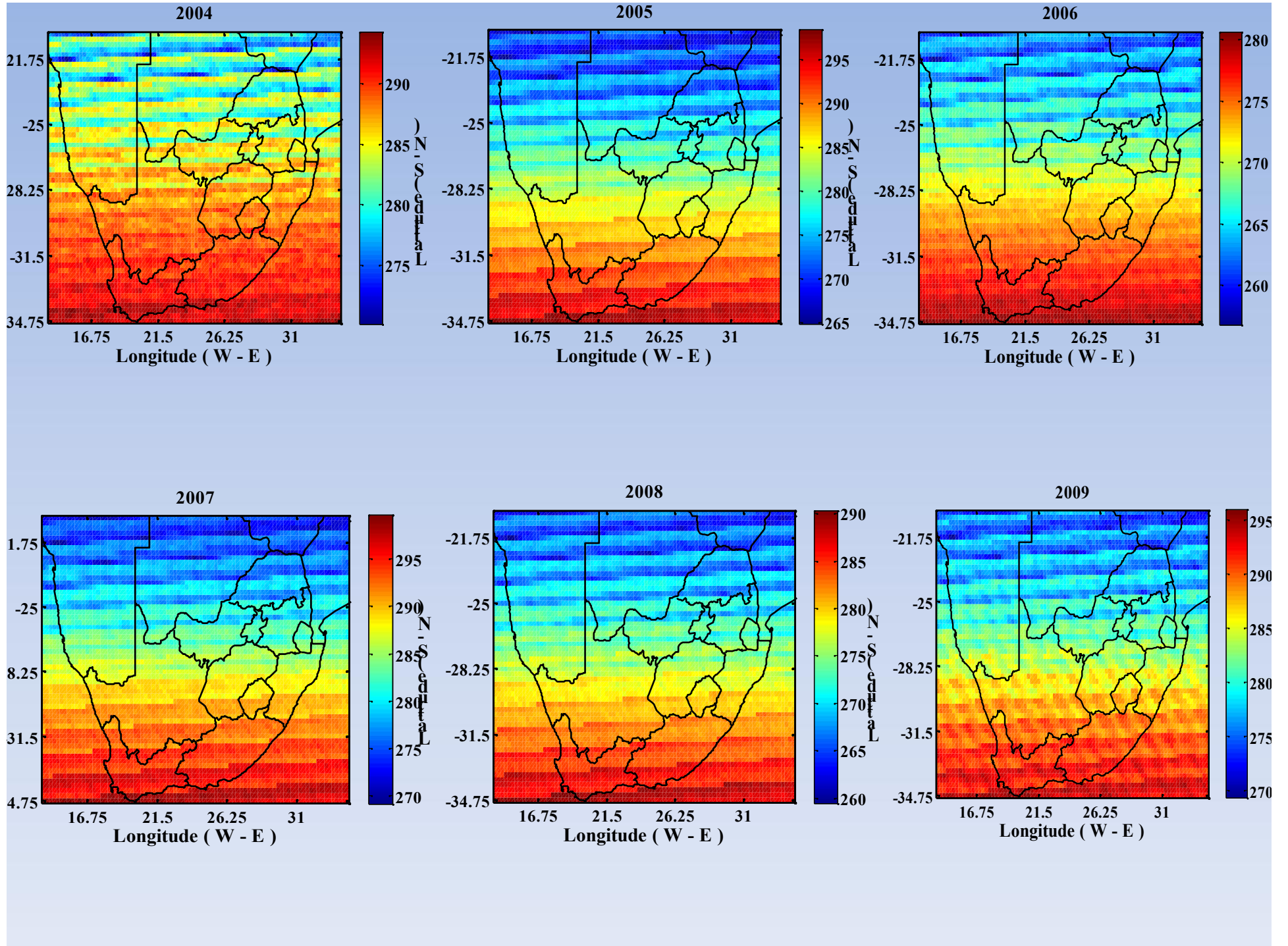


Winter

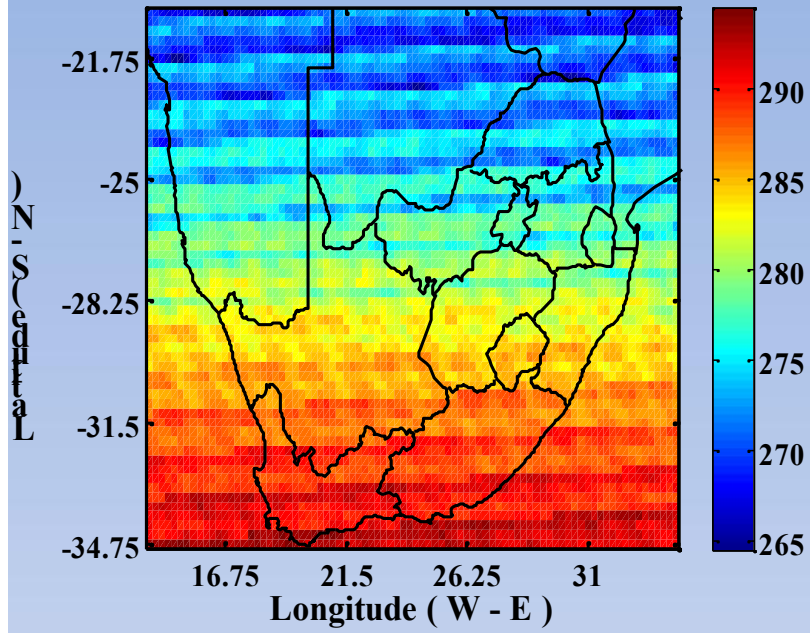


Spring

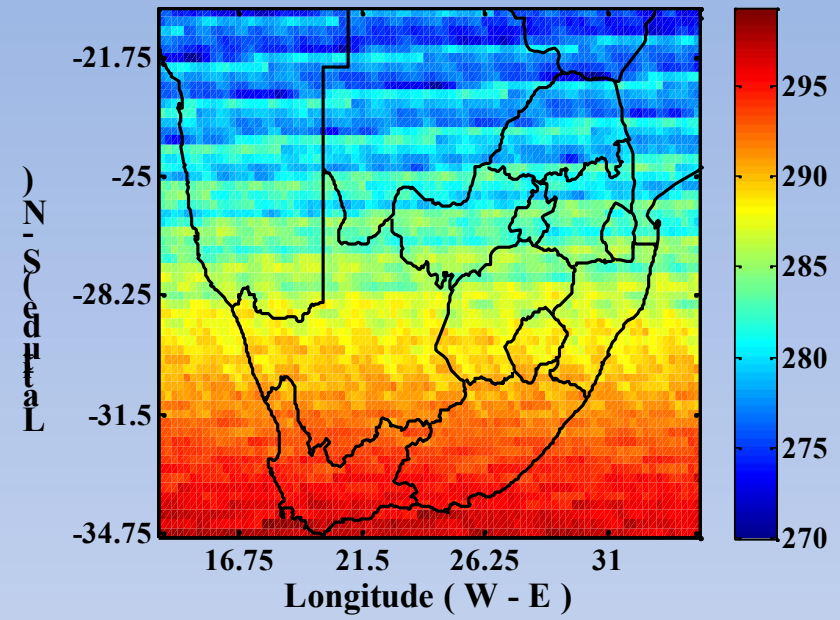




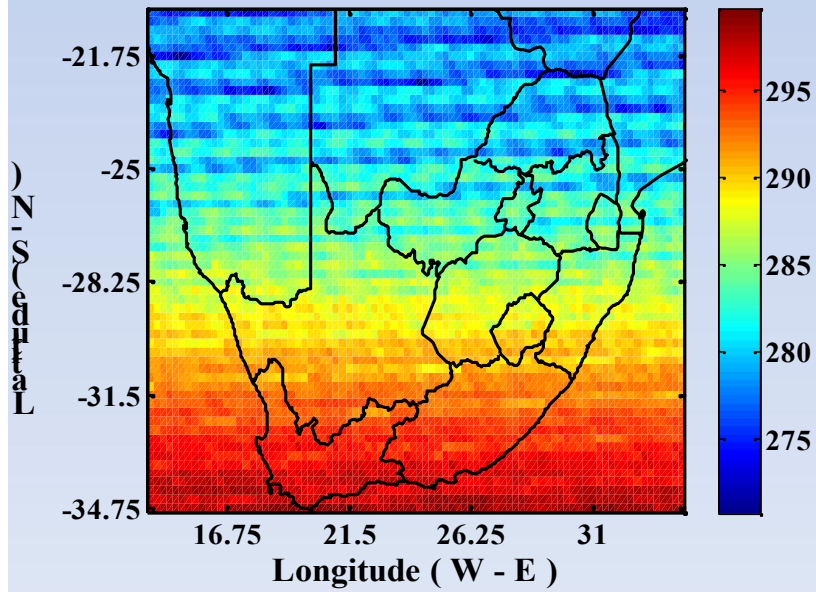
2010



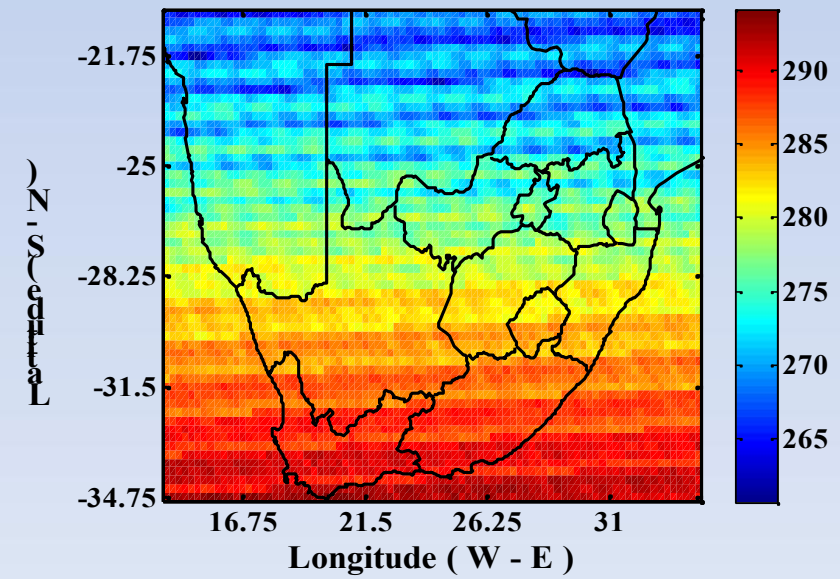
2011



2012



2013





**UNIVERSITY OF
KWAZULU-NATAL**

**INYUVESI
YAKWAZULU-NATALI**

Thank You