

# Understanding Climate Variability and Change in the Rufiji River Basin of Tanzania

## Approach to work WP1

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# Presentation Outline

- Introduction
  - Climate change in Tanzania
- Work plan

# AIM OF THE WORK PACKAGE1

- To use HIRHAM to produce dynamically downscaled climate change information for hydrological and agricultural components of the project.

# Definitions

## Climate Change

Climate Change refers to a change in state of the climate that can be identified (e.g. by using statistical tests) by changes in the mean and/or the variability of its properties, that persists for an extended period, typically decades or longer.

Climate change may be due to natural internal processes or external forcings, or persistent anthropogenic changes in the composition of the atmosphere or in land use.

# How can we detect climate change

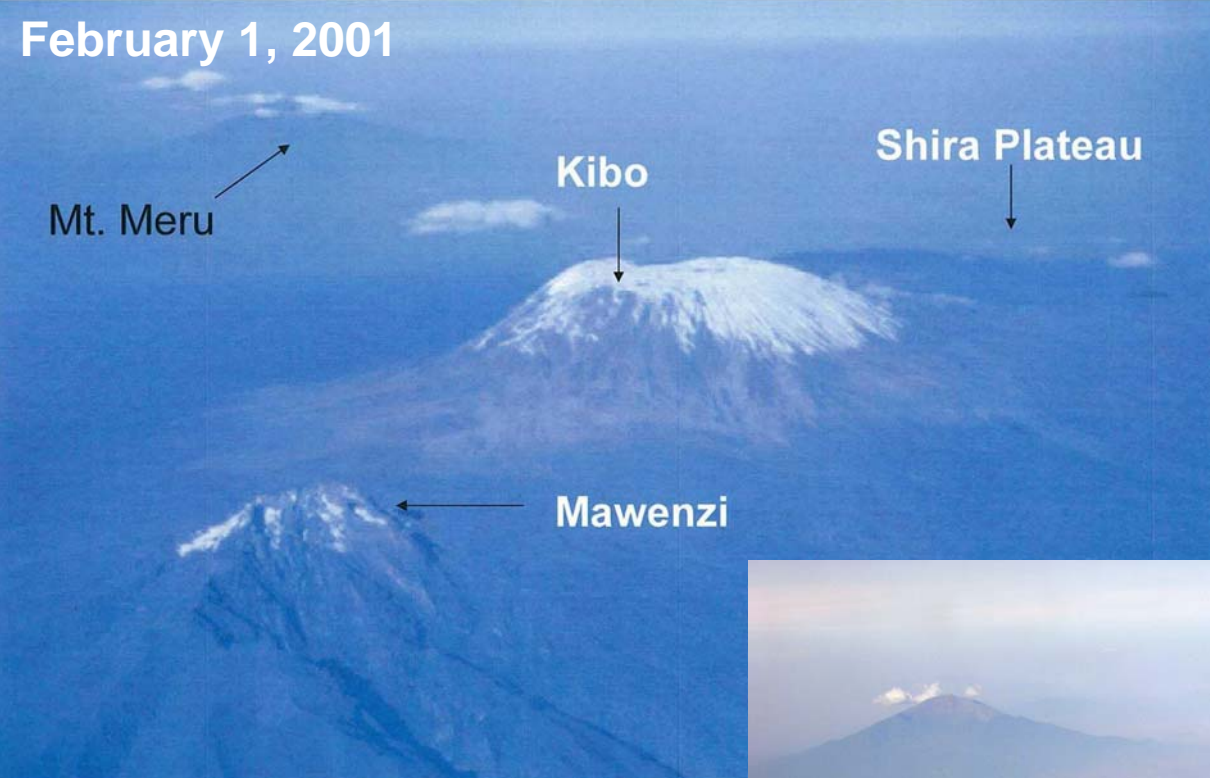
In order to detect climate change at a place rigorous statistical analysis and tests should be performed on climatological variables; such analysis should include:

trend, long term mean change in a climatic variable, changes in frequency and severity of extreme events, temporal distribution of climatic events (e.g. rainfall onset and cessation dates, including shift in seasons), etc.

# Observed Impacts Possibly Linked to CC

- Steady increase in temperature for the past 30 years in Tanzania
- Severe and recurrent droughts experienced in Tanzania in the recent past
- Extreme drop of water levels of Lake Victoria, Tanganyika, and Jipe, and the dramatic recession of 7 km of Lake Rukwa in about 50 years
- Eighty percent of the glacier on Mount Kilimanjaro has been lost since 1912

February 1, 2001



2000

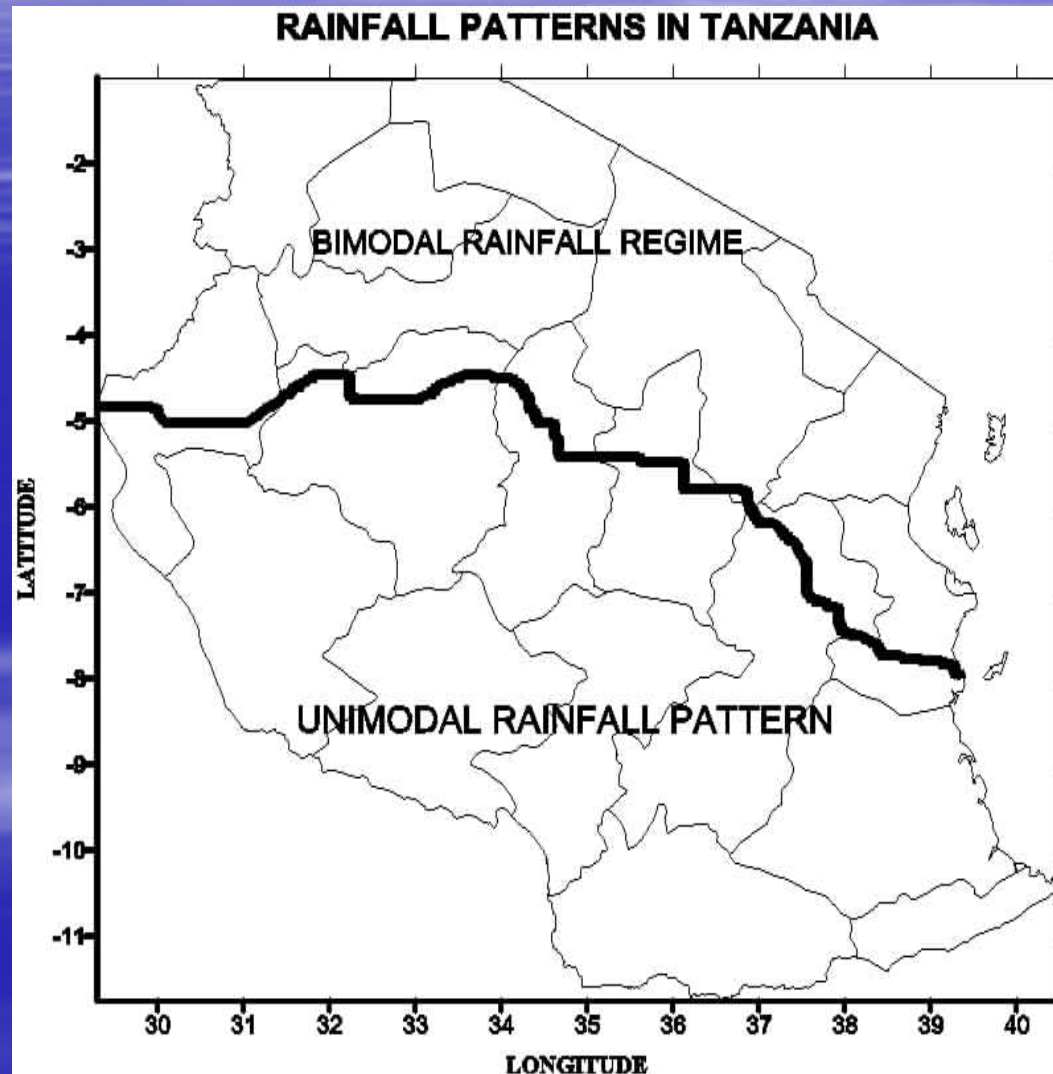


January 12, 2009  
(thanks Simon)

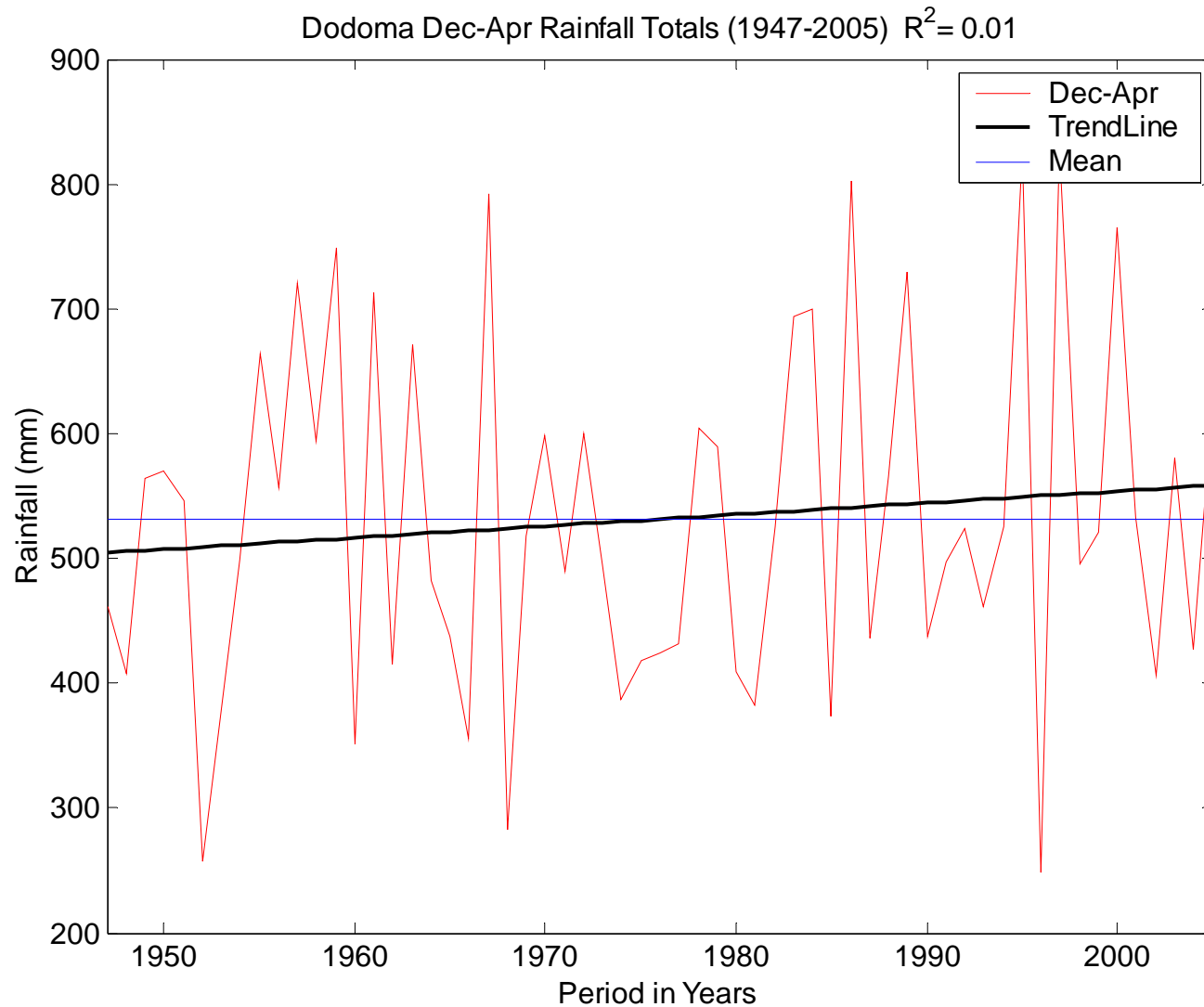
# Observed Impacts Possibly Linked to CC

- The intrusion of sea water into wells along the coast of Bagamoyo town and the inundation of Maziwe island in Pangani District, off the Indian Ocean shores
- Observation of malaria cases in highland areas previously not malaria prone

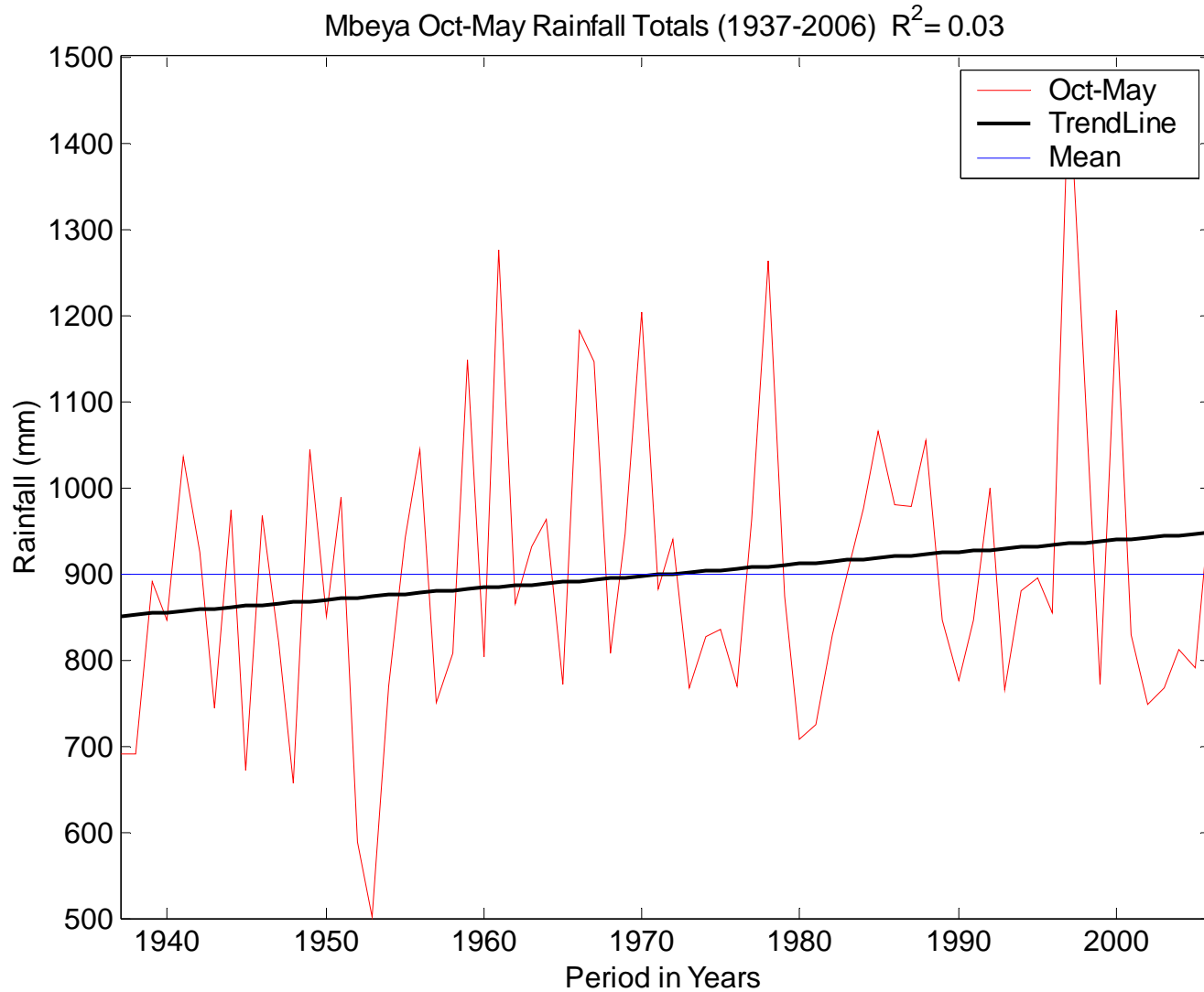
# RAINFALL PATTERNS IN TANZANIA



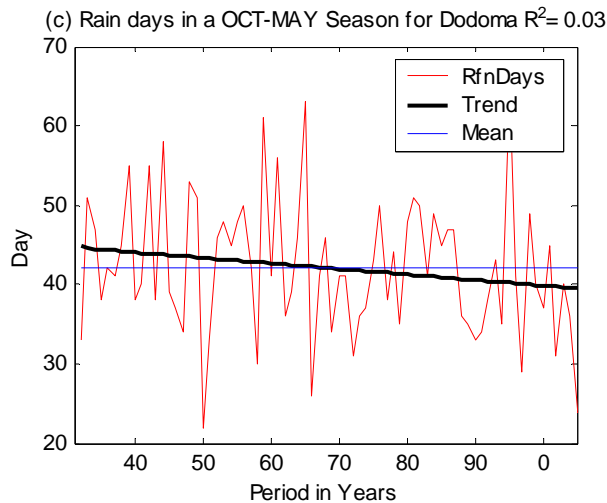
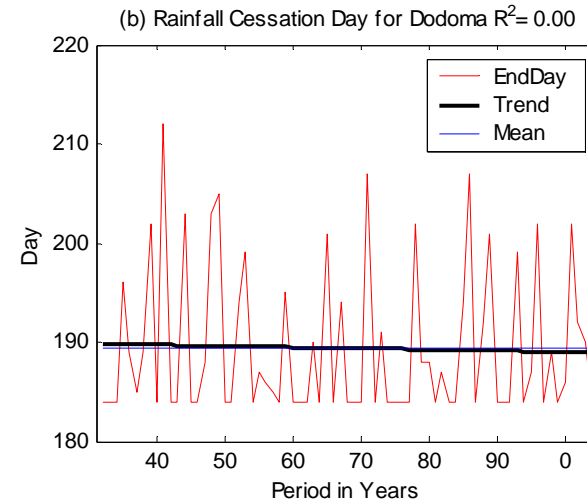
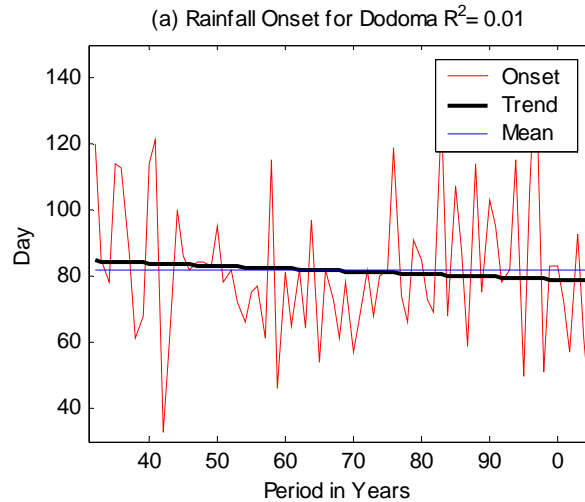
# Rainfall patterns in the recent Past



# Rainfall patterns in the recent Past



# Rainfall patterns in the recent Past

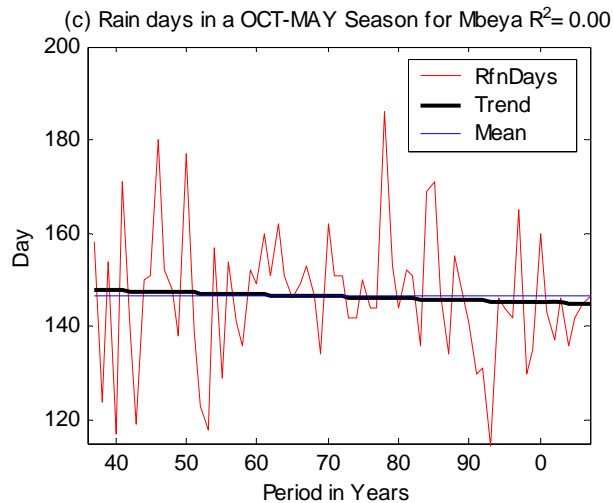
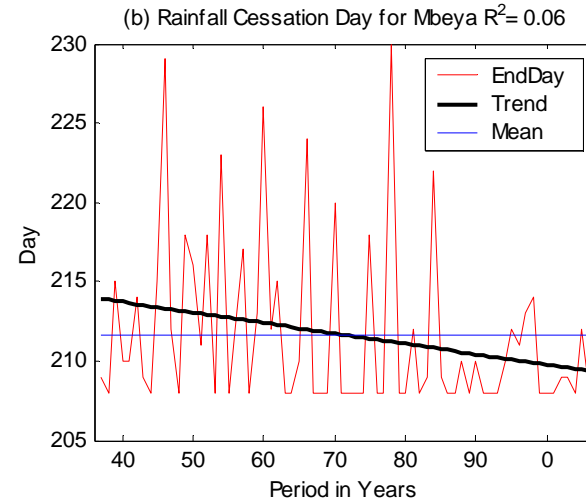
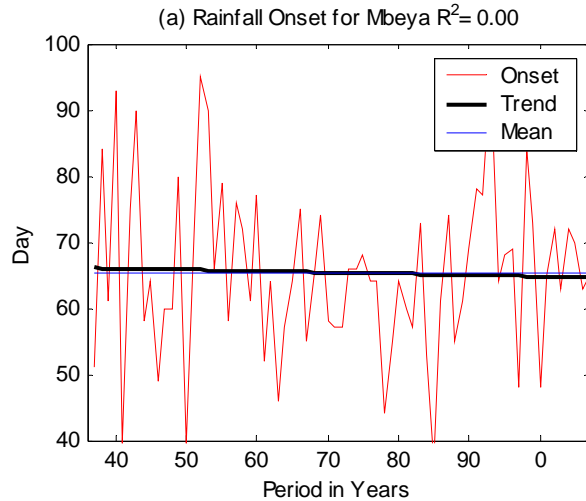


(a): Rainfall Onset day is calculated from 1st October

(b): and similarly cessation day is calculated from 1st October

(c): Total number of rain days in a OCT-MAY Season  
PERIOD OF ANALYSIS (1932-2007)

# Rainfall patterns in the recent Past

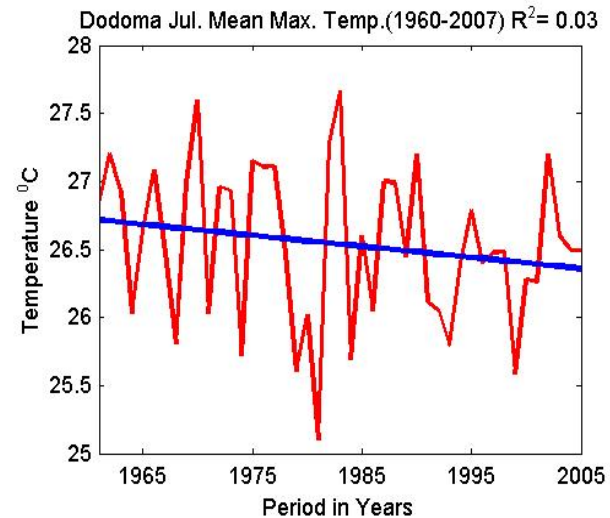
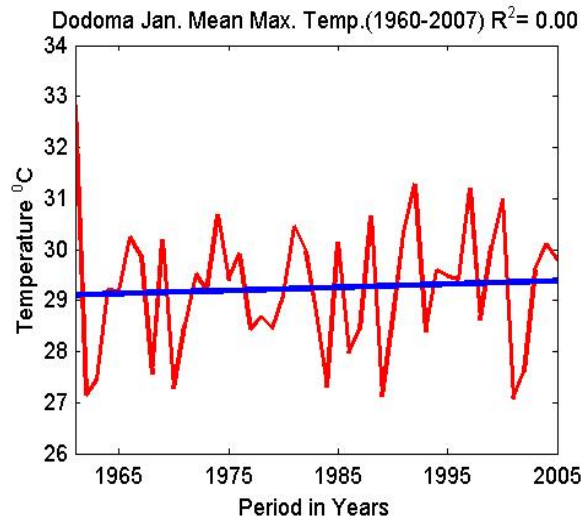
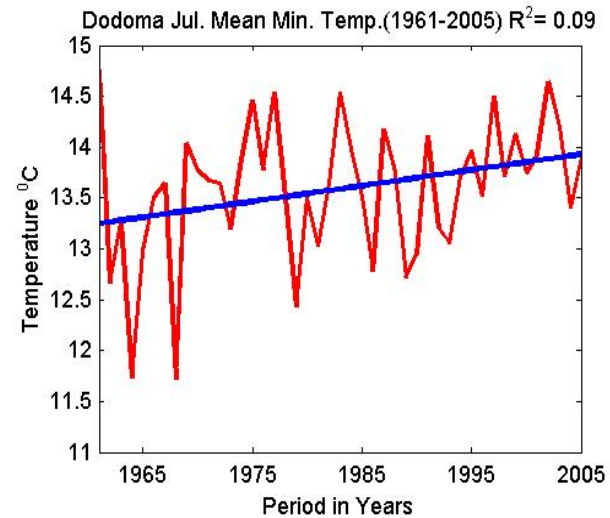
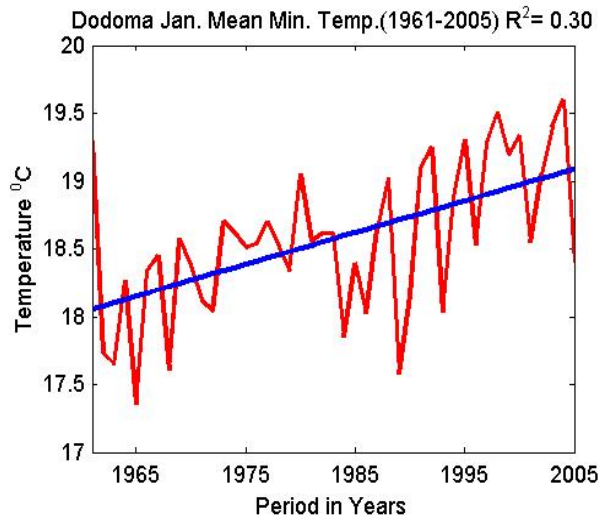


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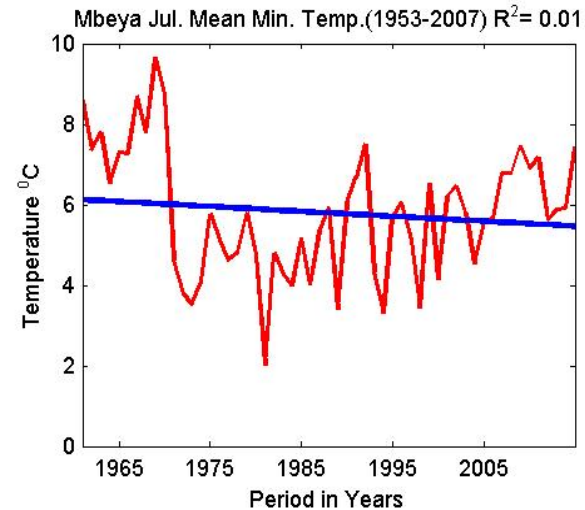
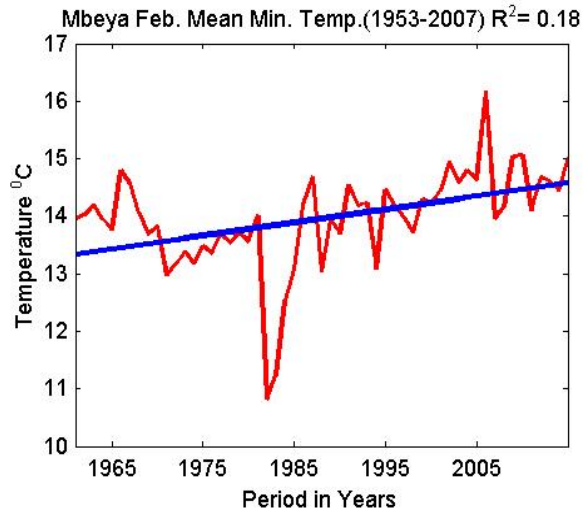
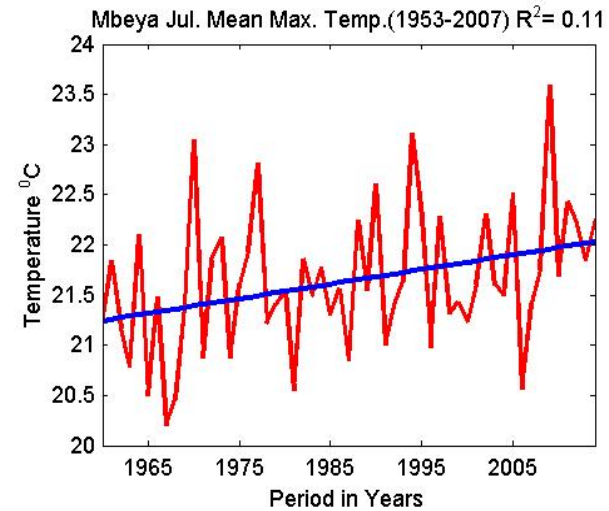
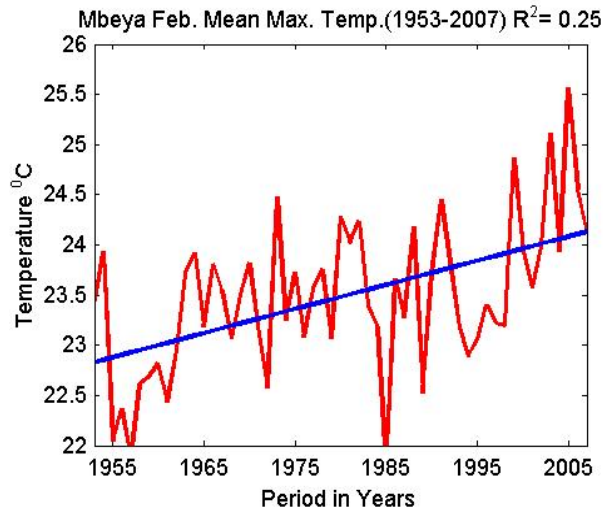
(b): and similarly cessation day is calculated from 1st October

(c): Total number of rain days in a OCT-MAY Season  
PERIOD OF ANALYSIS (1937-2007)

# Temperature patterns in the recent Past



# Temperature patterns in the recent Past



# DO WE HAVE CLIMATE CHANGE IN TANZANIA?

- IPCC AR4 reports that there will be an increase of rainfall in East Africa. (But not the whole East Africa will experience this increase), so need to deal with localized areas;
- As for temperature there is a general indication that temperatures over Tanzania are increasing

# RECOMMENDATION

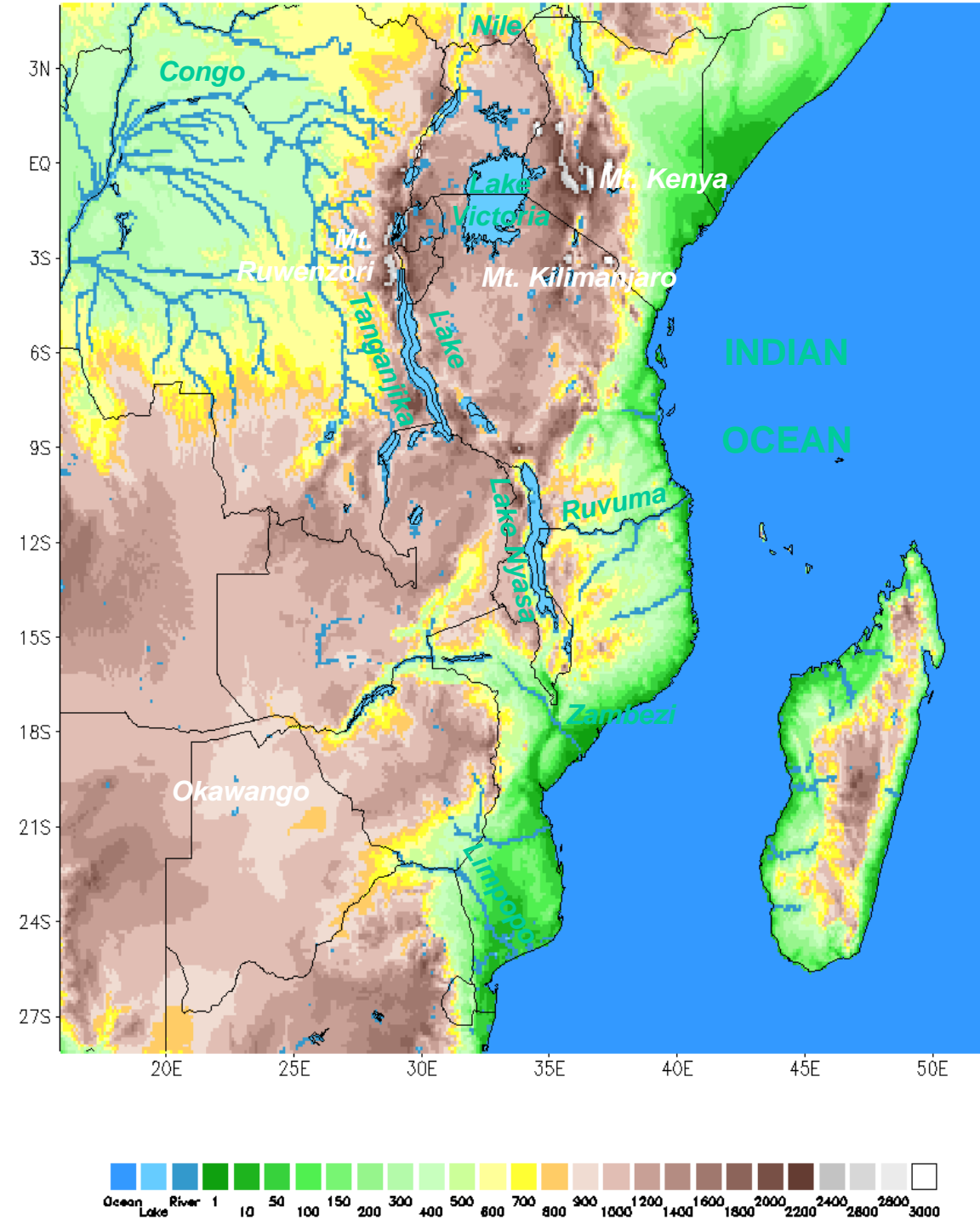
- We need to fully understand the dynamics of Climate Variability and Change (CVC) in Tanzania
- Create CVC awareness
- Find how various sectors will respond to the possible CC and Propose strategic adaptation and mitigation measure to CVC

# WORK PLAN 1

- 1. Registration of PhD and Msc Students**
2. Historical climate data collection
3. Quality Control of historical climate data
4. Analysis of historical climatological data
5. Configuration of HIRHAM5 for the Tanzania domain

# Proposed East African model domain

- 362 x 332 grid points
- Grid distance 10 km, anticipated timestep 10 minutes
- Covering Tanzania, Zambia, Botswana, Mozambique
- 38 grid points with elevation above 3000m (Kilimanjaro: 4300 m)
- ECHAM5 forced by observed concentrations of CO<sub>2</sub> etc. 1950-2000
- A1B projection 2000-2050 or 2100
- If time permits, hindcast 1958-2002 or (preferably) 1989-present with ERA (Interim)
- Expected duration: 1-1.5 months wallclock time per 10 years on ~500 processors





## WORK PLAN 2

6. Conduction of the transient climate simulation for past, present and future period
7. Validation and evaluation
8. Post processing for all the work packages

THANK YOU FOR YOUR  
ATTENTION

# High Resolution Climate Modelling in East Africa

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