STATUS AND PRIORITY NEEDS OF MONITORING AND PREDICTING CLIMATE ANOMALIES AND EXTREMES IN TANZANIA

BY

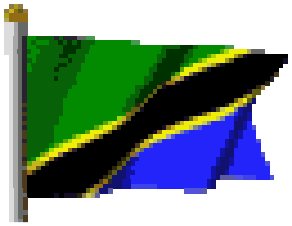
Wilbert Timiza

Tanzania Meteorological Agency (TMA)

Email: timizaw@met.go.tz

Website: www.meteo.go.tz

Regional workshop on Climate Monitoring and Analysis on Climate Variability, 15th-18th April 2013. Pretoria, South Africa.



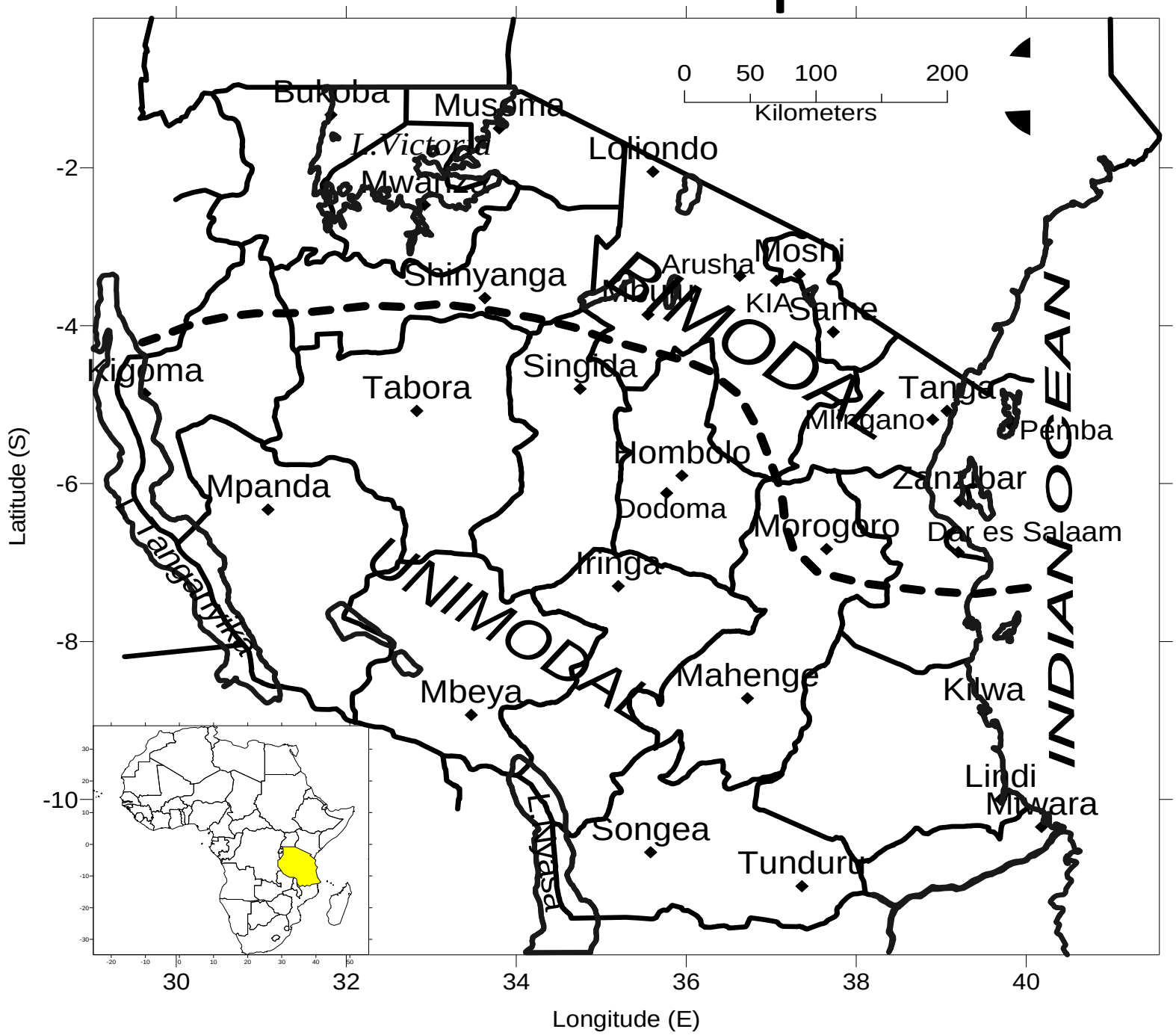
OUTLINE

- TANZANIA METETEOROLOGICAL AGENCY (TMA) BACKROUND
- CLIMATE DATA, OBSERVATIONS AND CLIMATE MONITORING
- LONG RANGE FORECASTING
- PRIORITY NEEDS OF MONITORING AND PREDICTING CLIMATE ANOMALIES AND EXTREMES
- USER INTERFACE

TANZANIA METETEOROLOGICAL AGENCY (TMA) BACKROUND INFORMATION

Location of Tanzania in Africa

Tanzania: Rainfall patterns



Introduction

1.1 Background

- National Meteorological Services were provided under the Directorate of Meteorology (DoM) established by Act No. 6 of 1978 after the defuct of East African Meteorological Department.
- Tanzania Meteorological Agency (TMA) was formed by the Executive Agency Act no. 30 of 1997 under the Ministry of Transport.
- The Agency came into being on 3rd December 1999.

Mission and Vision

Vision statement

"To stand out as the center of excellence in accelerating the National Development Vision through provision of world class meteorological services by the year 2015".

Mission statement

To provide quality, reliable, and cost effective weather and climate services to stakeholders' expectations, thus contributing to the protection of life, property and environment and poverty reduction".

Functions Tanzania Meteorological Agency

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To provide weather, climate services and warnings (*e.g. floods or droughts*) for the safety of life and property to the general public;

Functions cont…

To provide weather and climate services to various users including agriculture and food security;

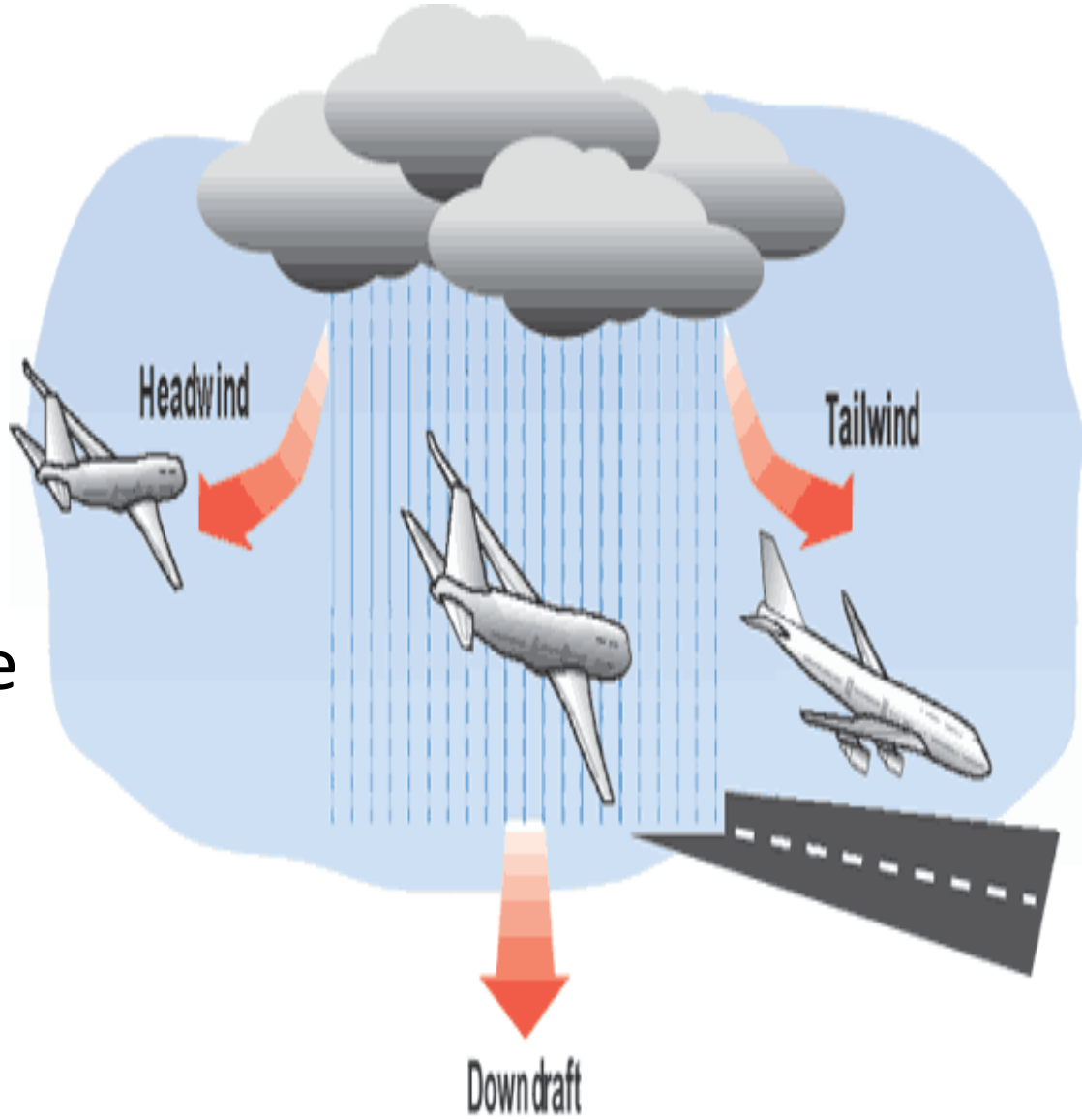
Functions cont…

To provide weather and climate services to various users including surface transport.

Effects of Weather Hazards to Railway infrastructures eg. Kilosa Floods

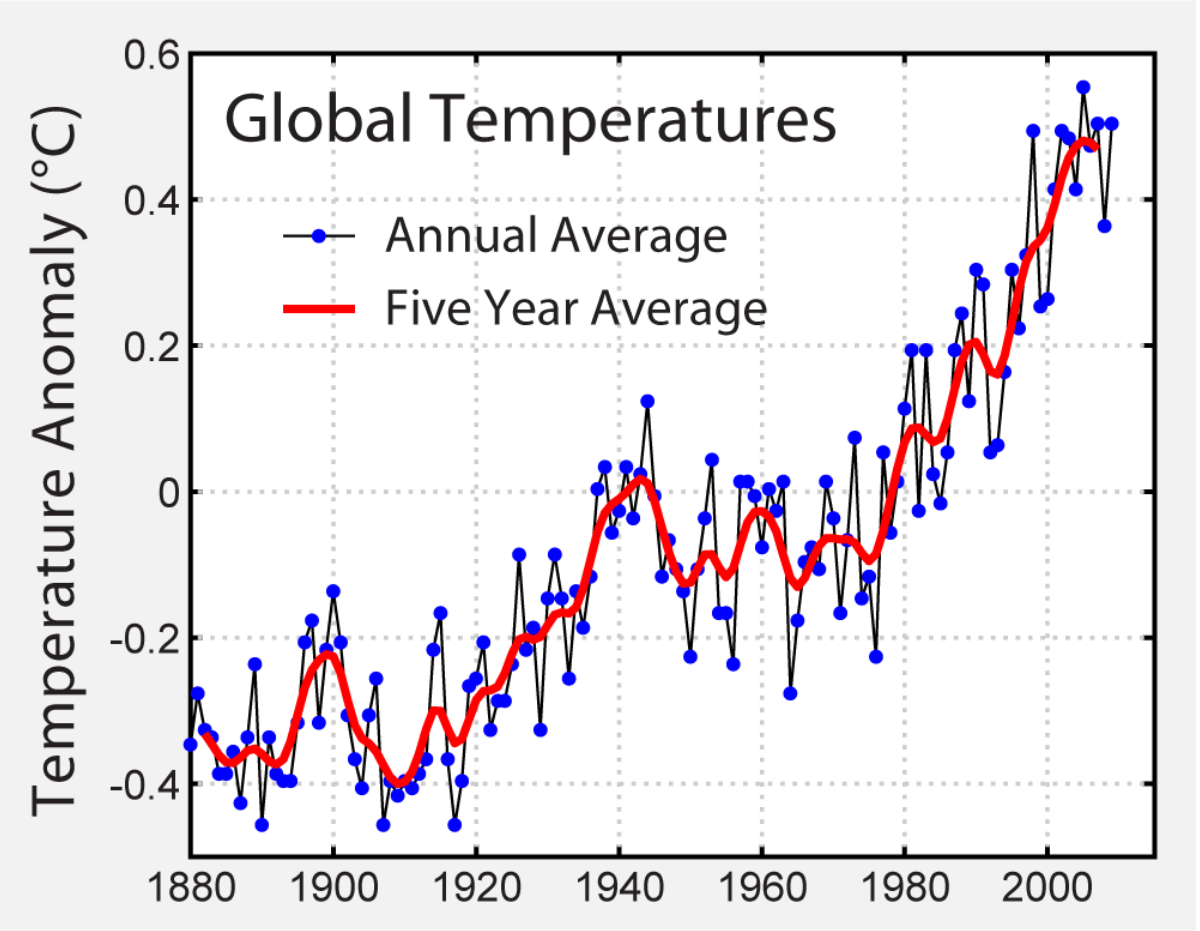
Functions cont…

To provide meteorological services for local and international air navigation on behalf of the United Republic of Tanzania as designated meteorological authority and according to Technical Regulations of the World Meteorological Organization Doc. ([C.31] 2.1.4) and Annex 3 (2.1.4) of the International Civil Aviation Organization;



Functions cont…

To take part in global exchange of meteorological and related data and products for the safety of humankind and to enhance the understanding of the global atmosphere;



Source: NASA (Mean Temp. from 1961-1990)

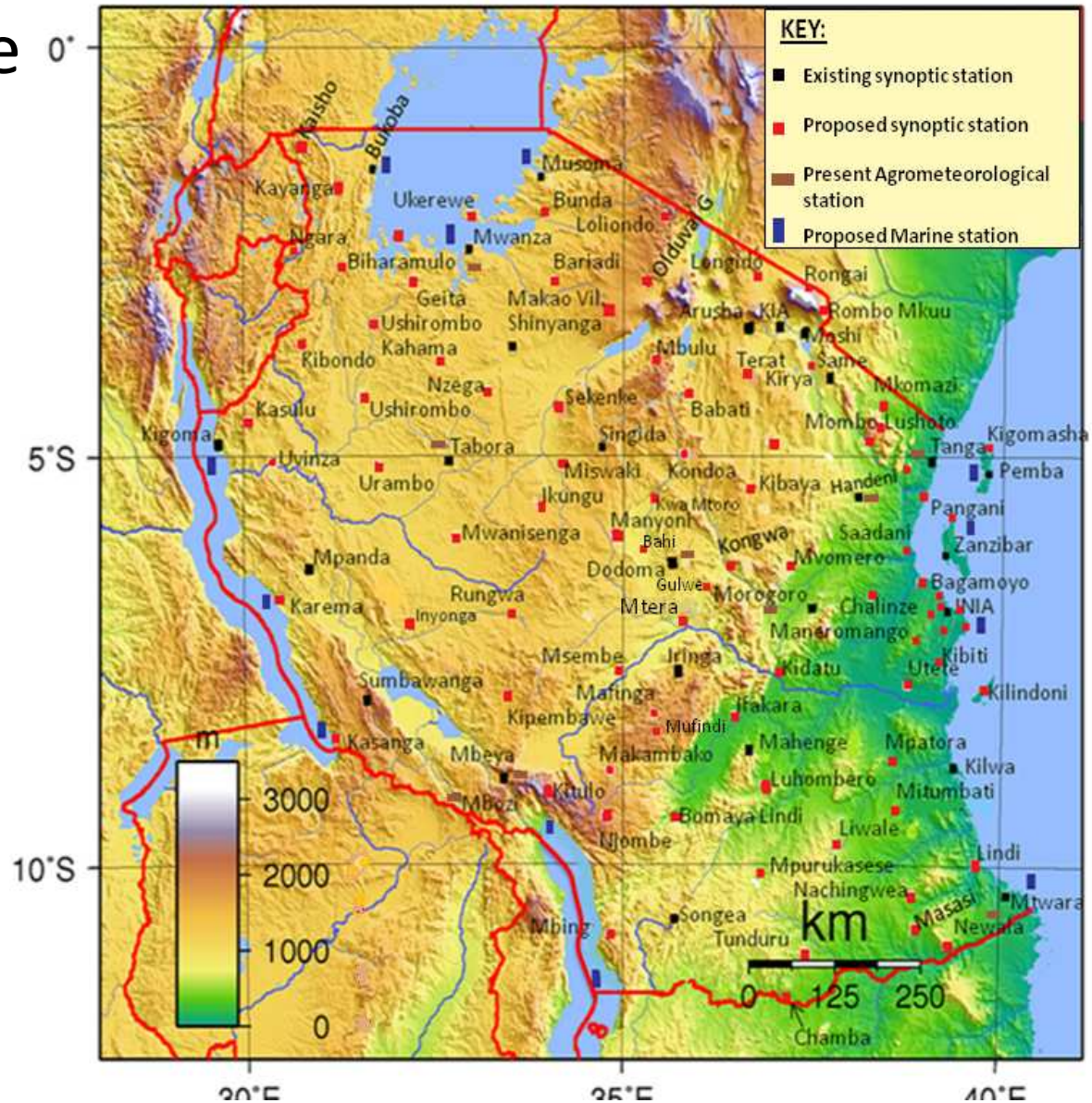
CLIMATE DATA, OBSERVATIONS AND CLIMATE MONITORING

Climate data…

- TMA is a custodian of climate data for Tanzania
- 26 synoptic stations
- More than 30 years series (Rainfall, Temp., RH, Wind etc.)
- Archived in paper forms and digital forms
- CLIDATA is the current DBMS

Plan on Expansion and Modernization of Observation Network

TMA has developed a Five year plan to modernize and expand the existing surface and upper air observation network stations necessary to capture accurate records of the weather and climatic conditions of the United Republic of Tanzania for meaningful address of changing climate;

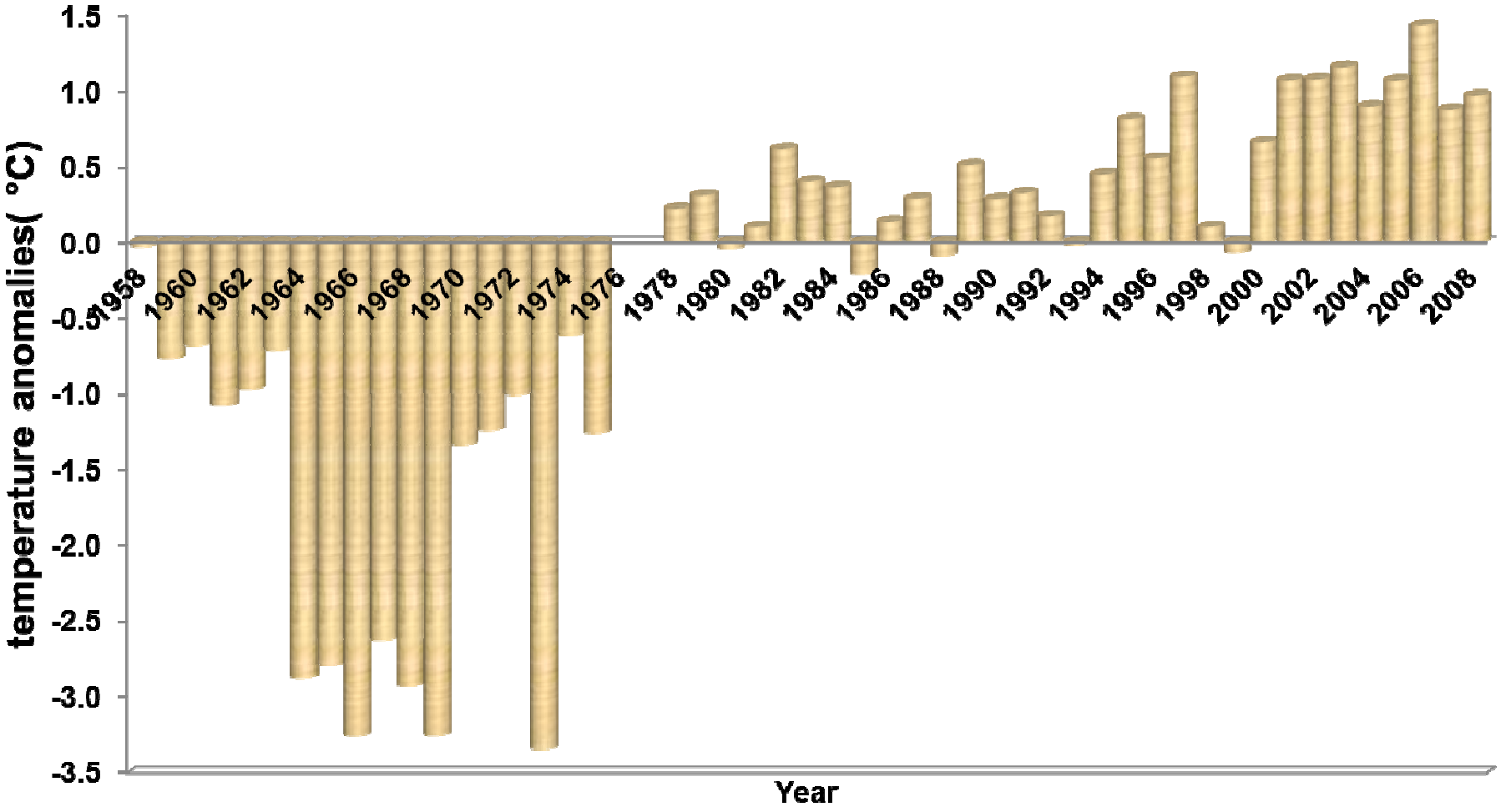


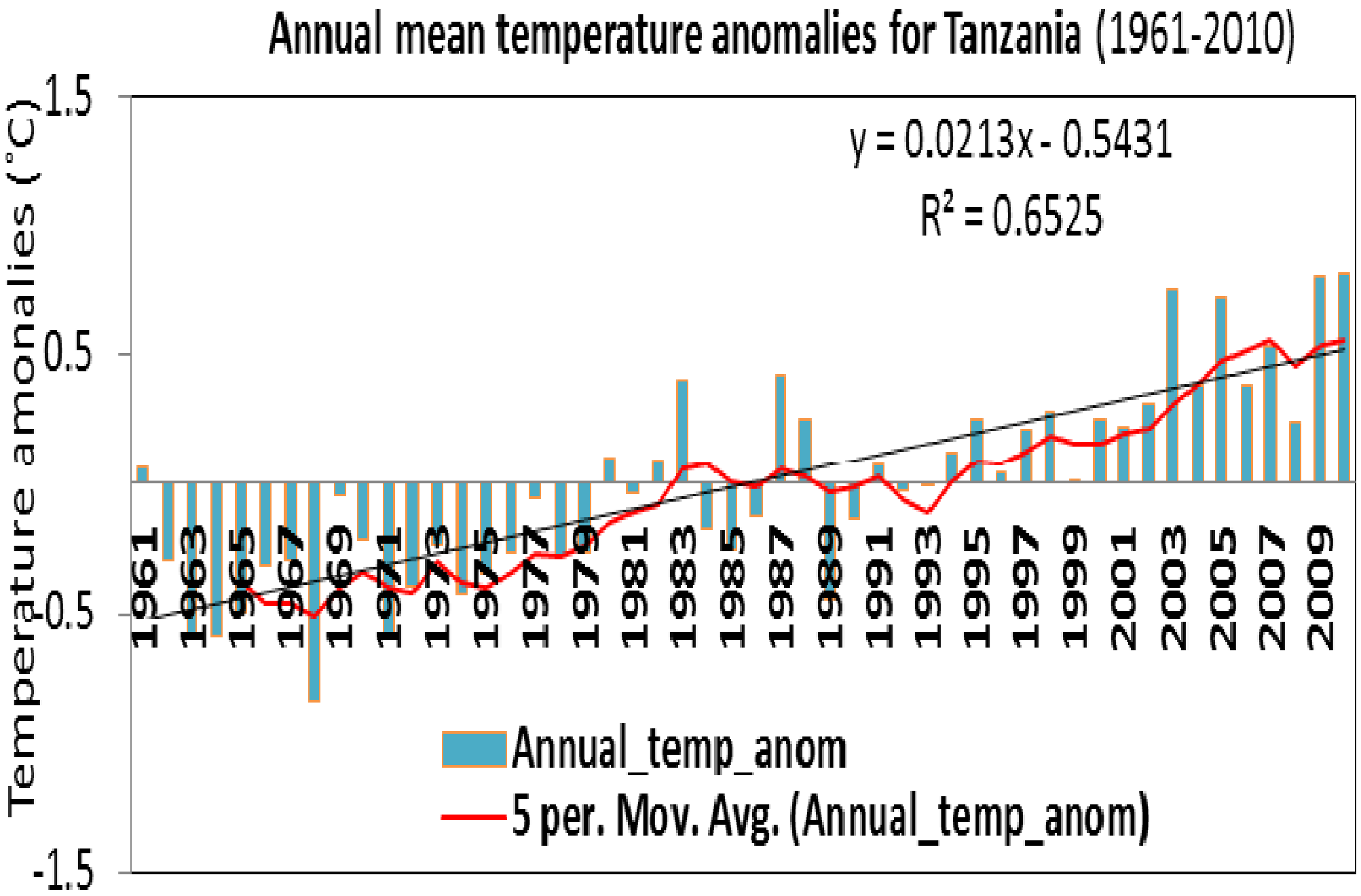
New station at Songwe Airport

Table 1: Present and required meteorological observational stations network

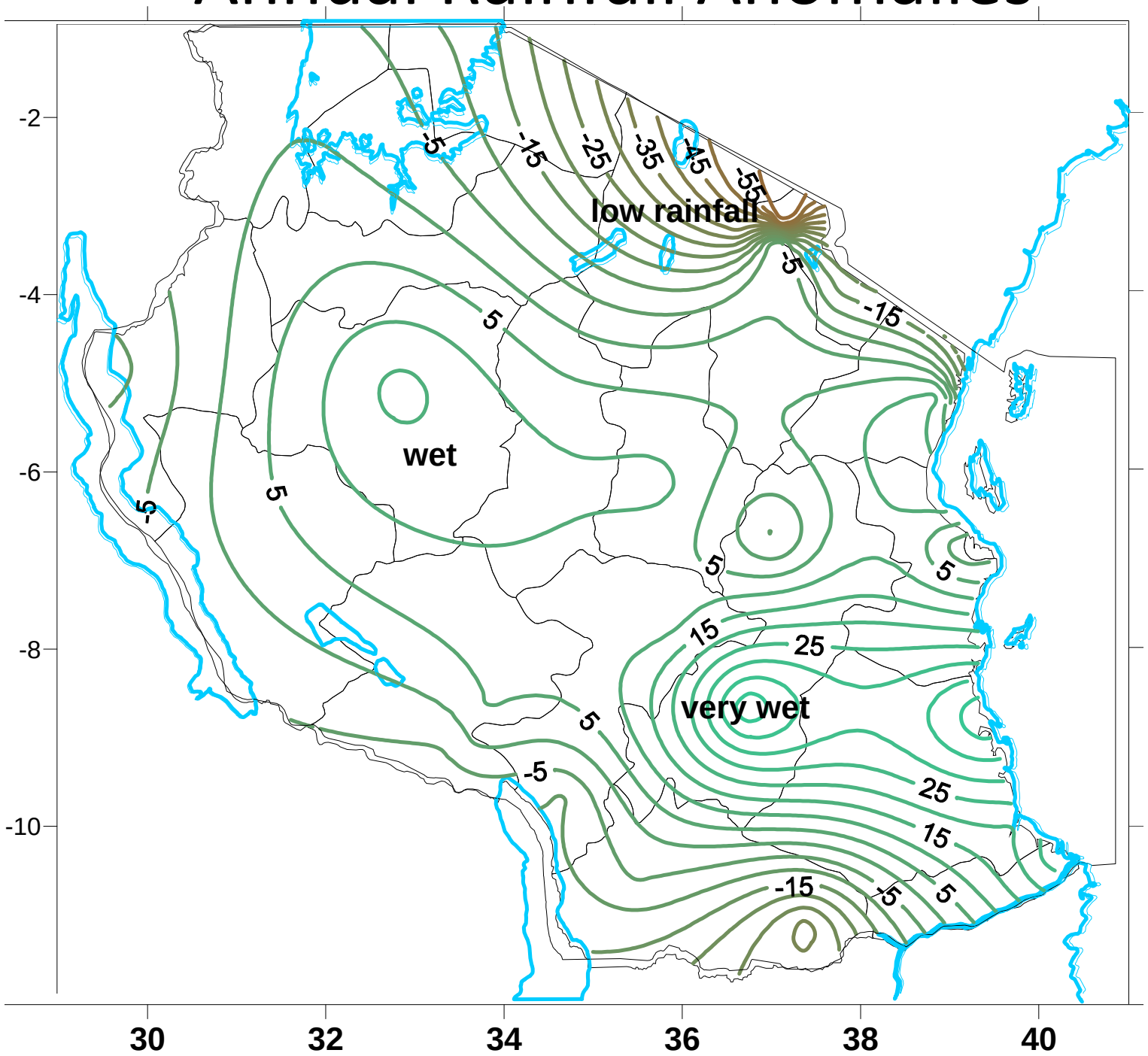
Description	Number of stations			
	Current	Operational	Needed	Shortage
Conventional Surface synoptic stations	26	26	32	6
AWS Surface synoptic stations	14	5	113	108
Agrometeorological stations	15	15	20	5
Ordinary climate stations	150	60	250	100
Rainfall stations	2056	500	1000	500
Automatic Rainfall stations			2500	2500
Marine weather station	0	0	12	12
Upper air stations	1	1	4	3
Pilot Balloon	1	-	5	5
Weather Radar	1	0	7	6
Lightning	0	0	10	10
Orbiting satellite receiver			1	1

Zanzibar:
Mean Minimum Temperature - December-February




Annual mean temperature anomalies for Tanzania (1961-2010)
y = 0.0213x - 0.5431
R² = 0.6525
Temperature amonalies (°C)
1.5
0.5
-0.5
-1.5
1961
1963
1965
1967
1969
1971
1973
1975
1977
1979
1981
1983
1985
1987
1989
1991
1993
1995
1997
1999
2001
2003
2005
2007
2009
Annual_temp_anom
5 per. Mov. Avg. (Annual_temp_anom)

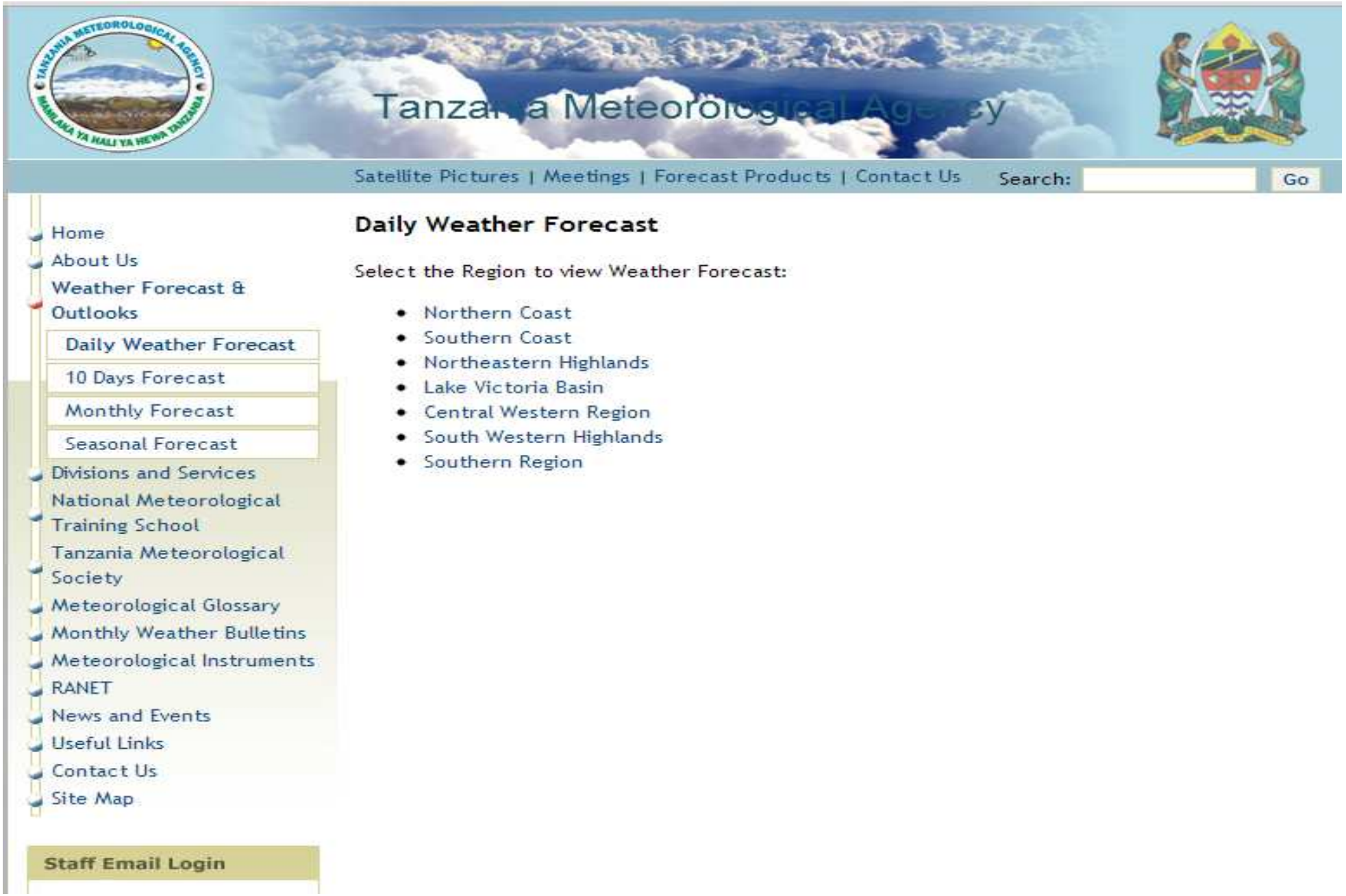
Annual Rainfall Anomalies



Short and Medium Range Forecasting

- Severe desk was established focus on L. Victoria
- Short and medium range forecasts

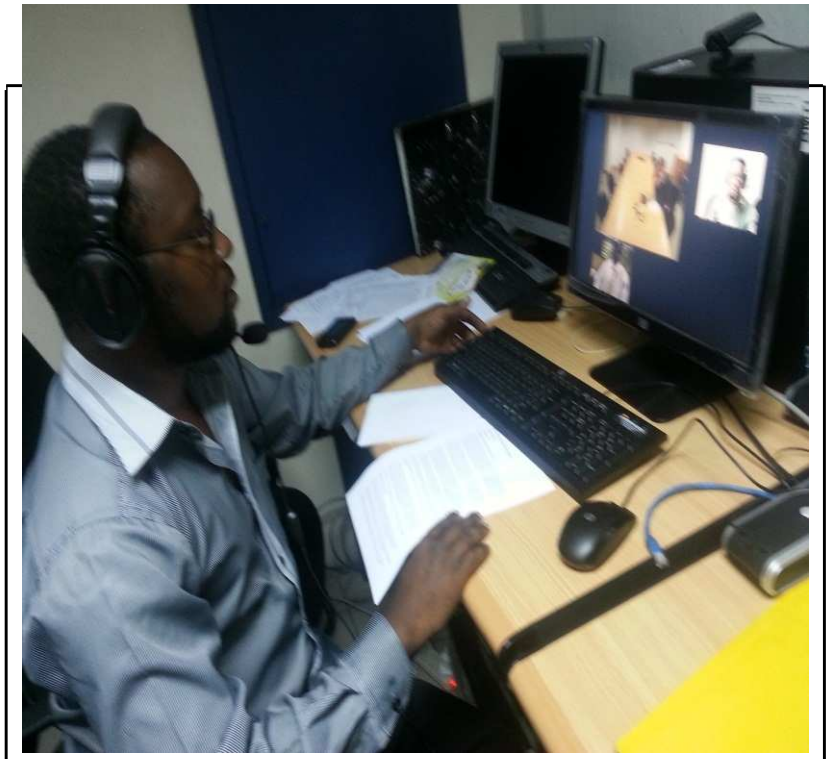
Short and Medium Range Forecasting



Severe Weather Forecasting

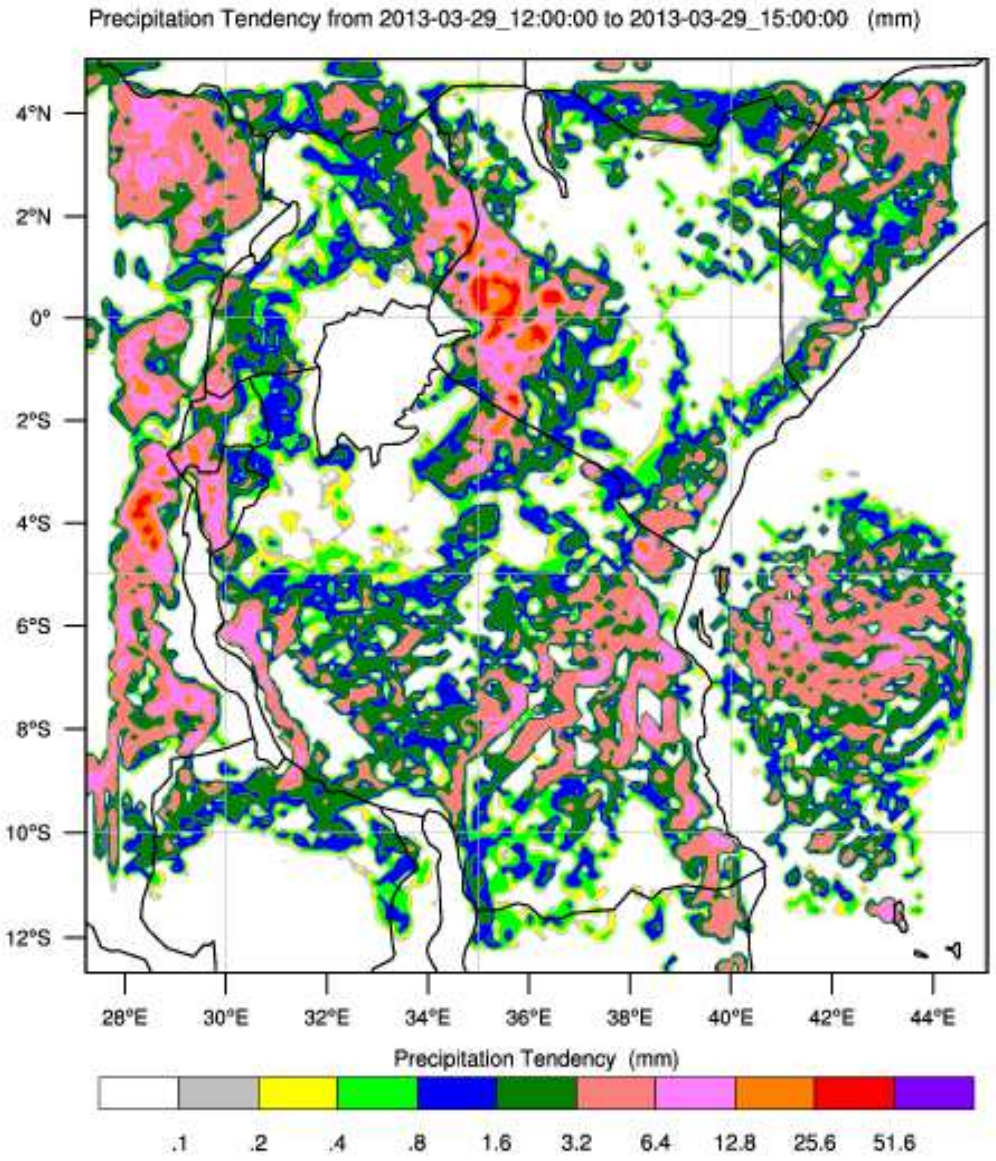
- Severe weather for mobile phone users; Starfish mobile through Vodacom-Tanzania na mFarmer through Tigo-Tanzania (on test phase)

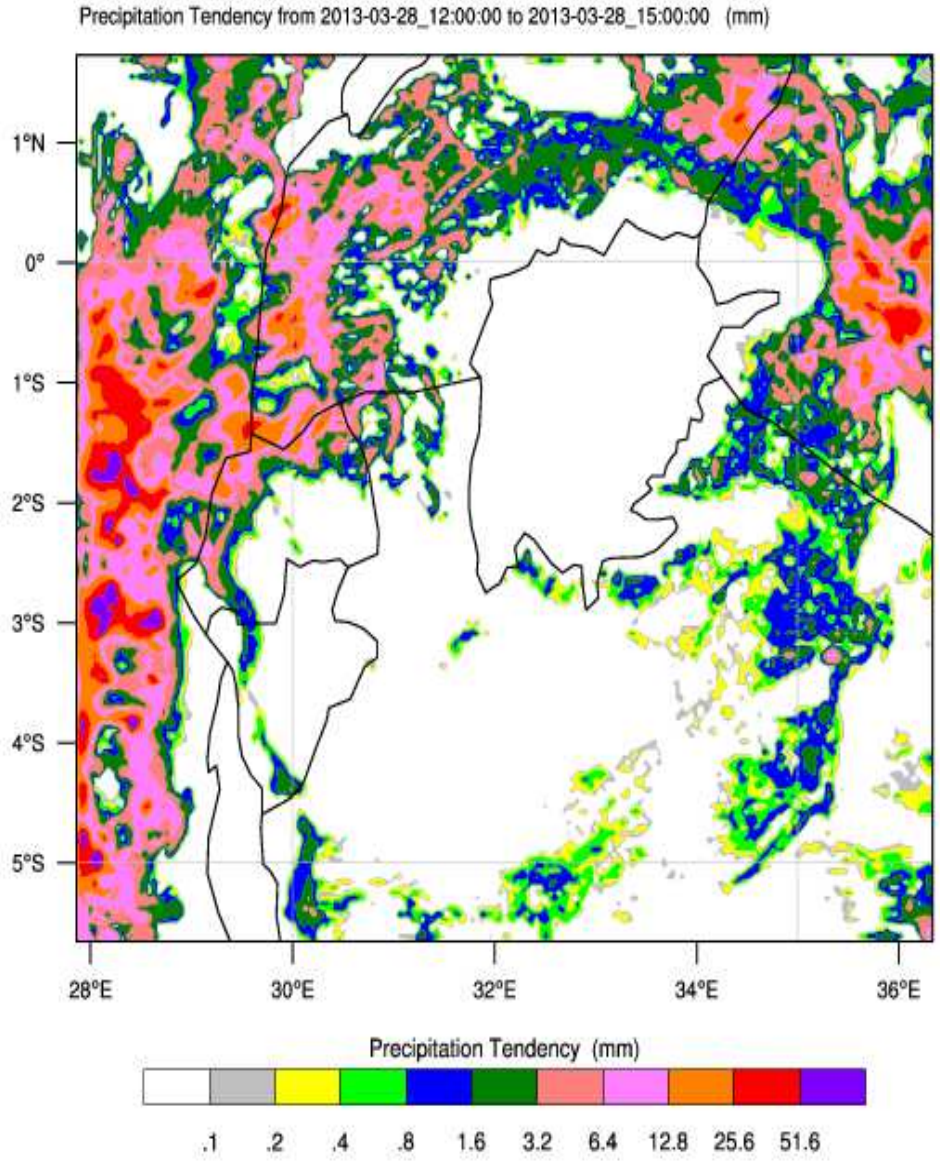
•Severe Weather and Medium Range Weather Forecast (SEMERAWF) desk in collaboration with RSMC-Nairobi and UKMET OFFICE through SWFDP-EA project has started weather analysis using "audio-visual telecomference"



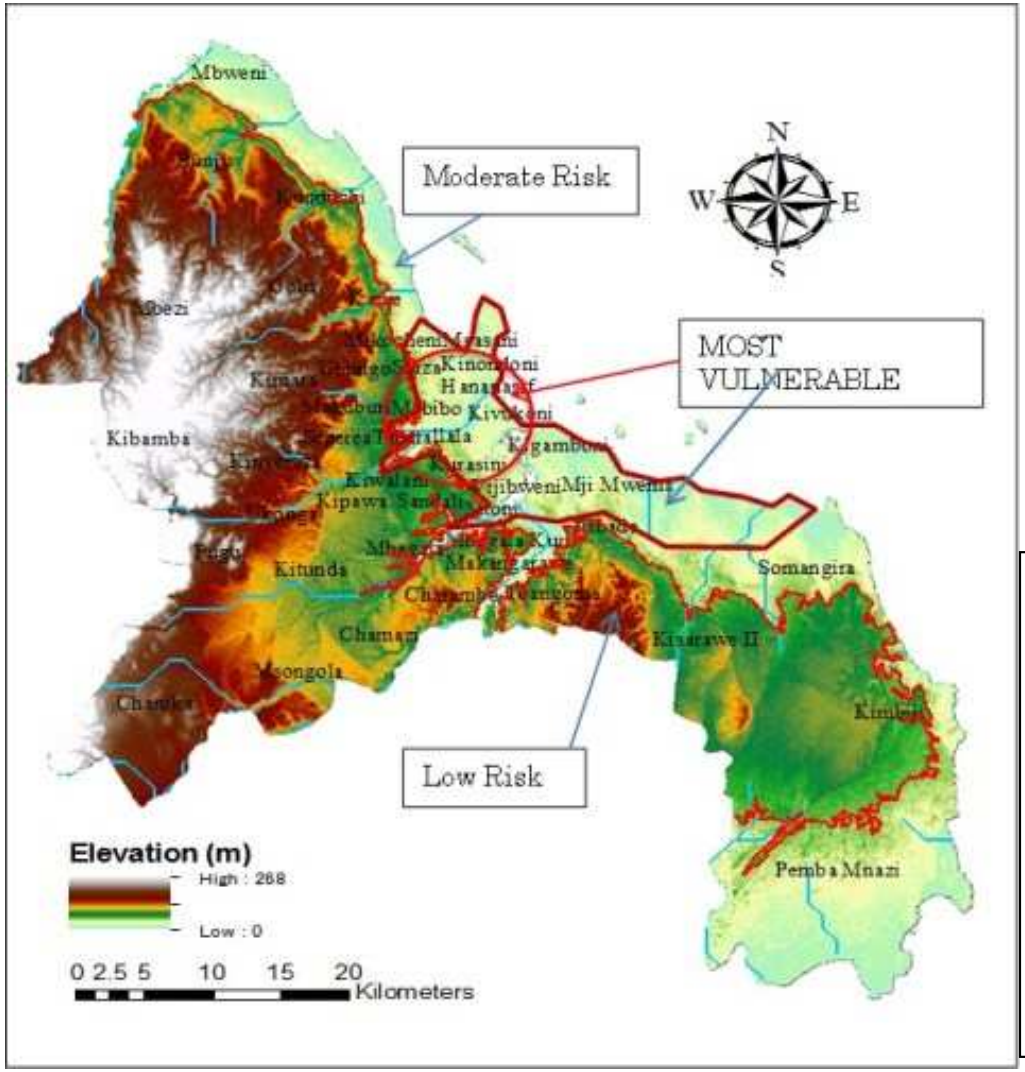
TMA Meteorologist on "audio-visual conference" with RSMC Nairobi and UKMET office

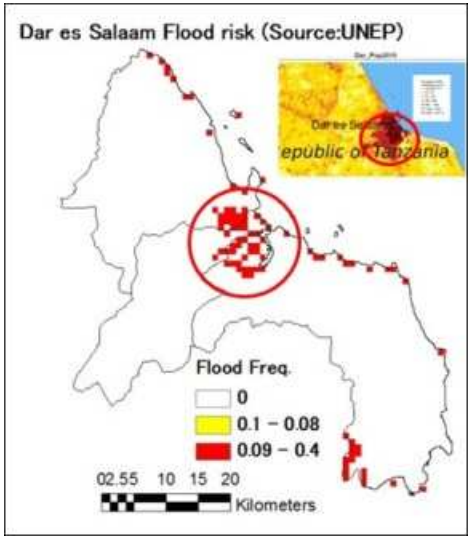
WRF: Rainfall forecast





Flood risk mapping for early warning in Dar





- Figure shows the flood vulnerability for Dar es Salaam, light red color indicates the 30m level contour.
- Red circle encloses an area with the highest flood risk, characterized either by high population density, poor and unmanaged drainage infrastructures, unplanned settlement or the passage of the lower section of Msimbazi river.

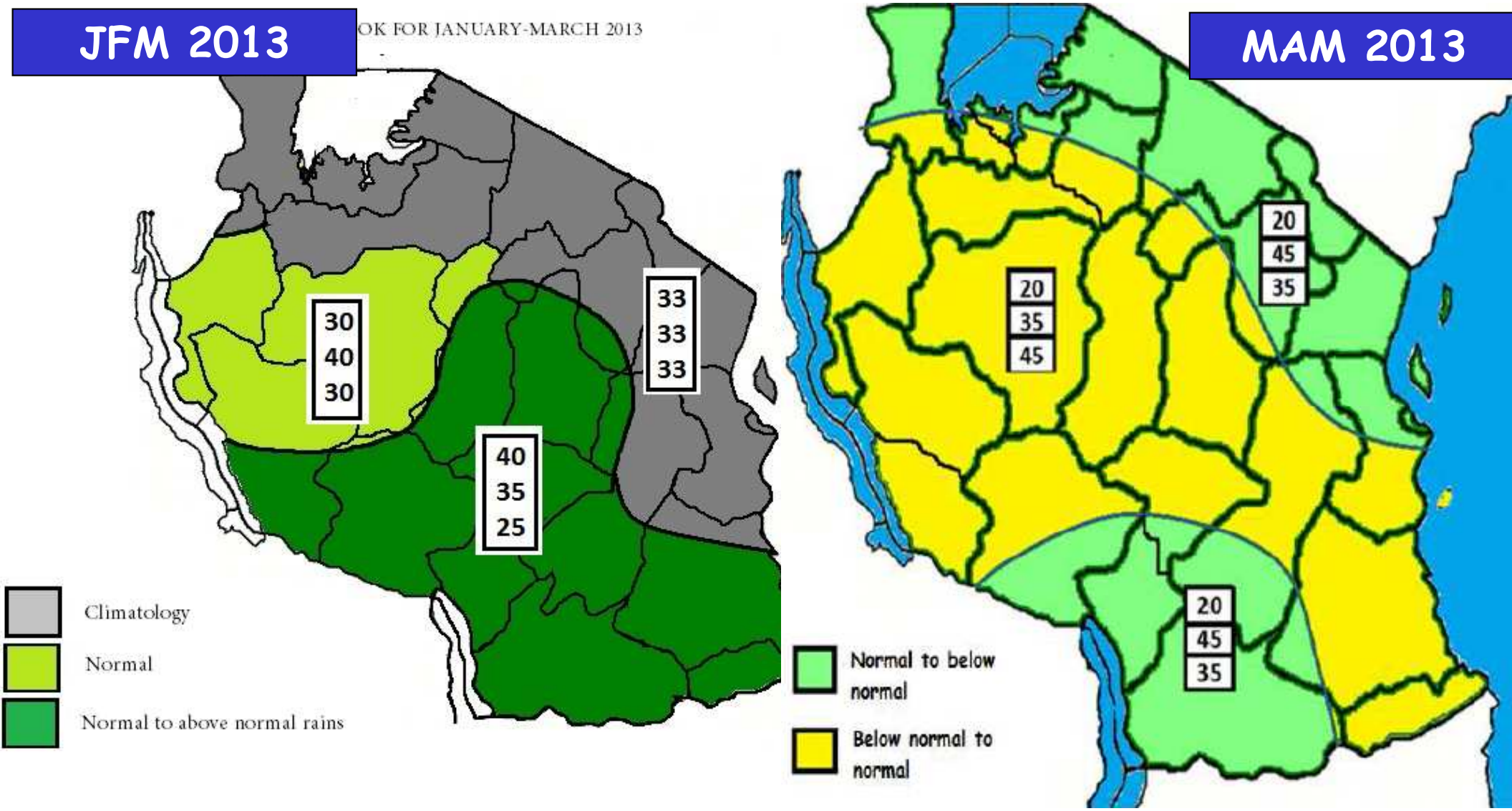
LONG RANGE FORECASTING

- In collaboration with Regional Centres ICPAC, CSC-SADC the following Methods are used:
- 1)Statistical
- 2)Dynamical
- 3) Indigenous Knowledge
- 4)Analogous years-(Global Oceans and Atmospheric condition. (e.g SSTs and Winds)

LONG RANGE FORECASTING (2)

- Three phases to the development of seasonal climate outlook in Tanzania.
- First phase, TMA scientists seat for some days to develop a preliminary seasonal climate outlook for the country.
- Second phase involves regional Climate Outlook Fora (COF) based in SADC and IGAD regional centers,
- Third phase involves downscaling of regional seasonal climate outlook to national level by TMA scientists taking into consideration the results from the preliminary forecast and micro-climatic features in various climatological zones.

Seasonal forecasts



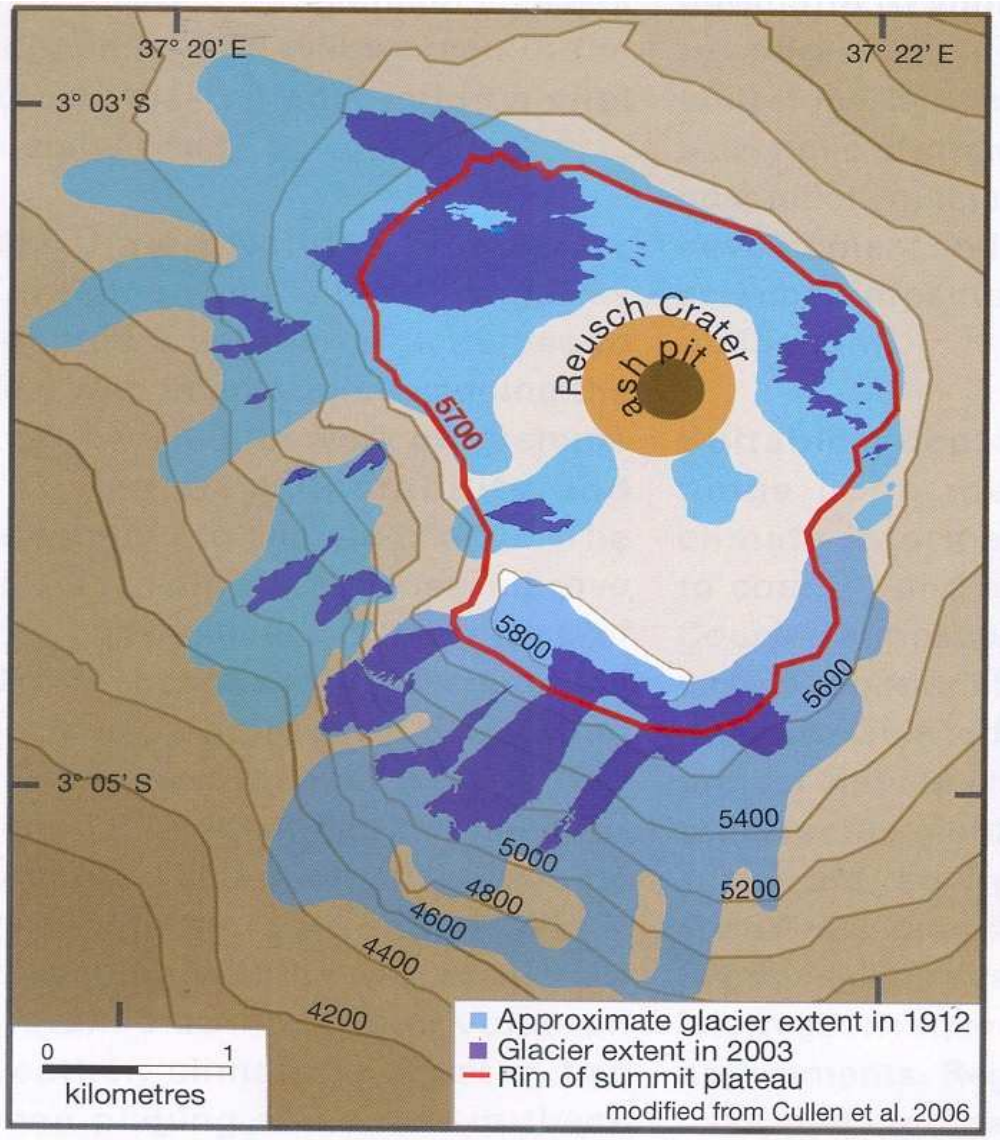
Climate and climate change research

- In recognition of the important role of Numerical Weather Predictions (NWP) in predicting severe Weather and extreme events in the context of Climate change, TMA established a NWP unit
- Computer cluster has bee procured and about to start working; will help in Climate forecasting.
- However there is a need of capacity building)
- For effective research in climate change and variability, TMA through the climatological and climate change section, is trying to digitize and archive the long term climatological data in paper form.

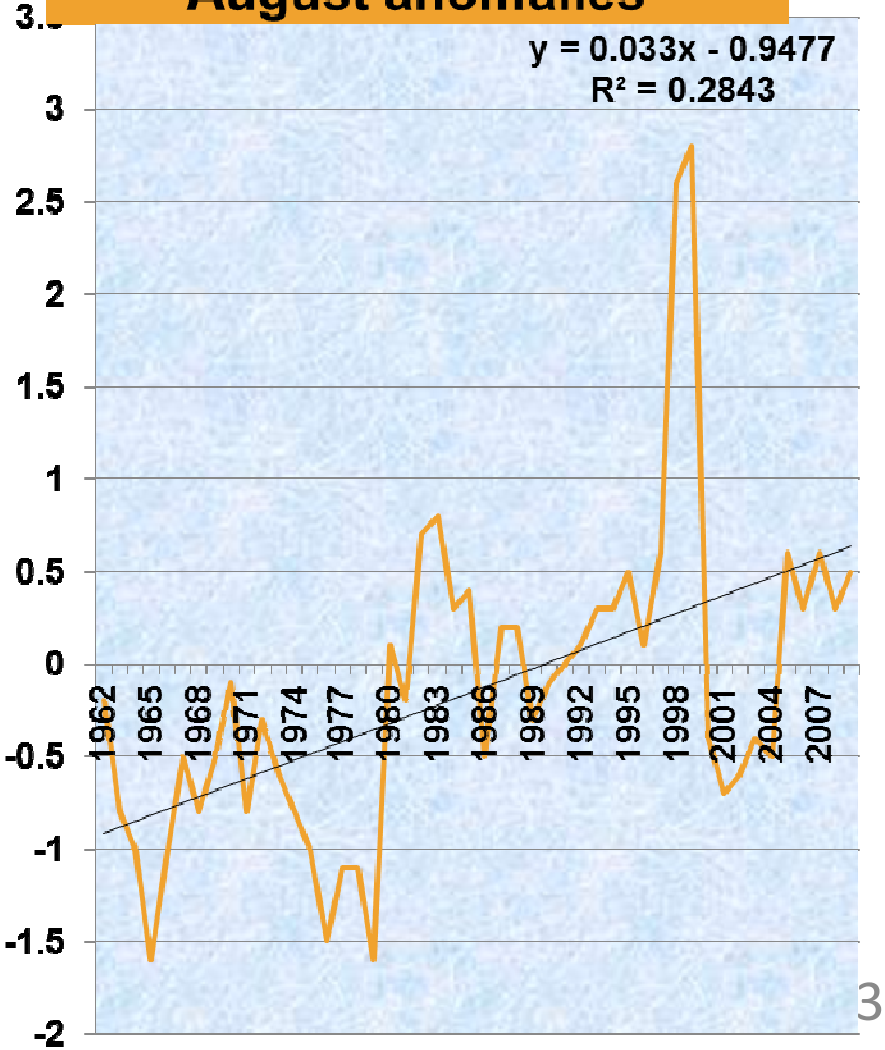
Climate and climate change research

- TMA collaborate with other research Institutions in the country and Internationally, Such as Sokoine University of Agriculture (SUA), University of Dar es Salaam (UDSM) , Ardhi University (in Tanzania) and some Universities in Norway, South Africa in doing climate change and variability research.

Depleted Glaciers on Mt Kilimanjaro



Lyamungo, Kilimanjaro (2500m, asml)
Minimum temperature: June-August anomalies



User Interface

- TMA has been in a forefront to raise climate change and variability awareness to both policy makers, Students and public.
- After the final forecast is produced, TMA interact with various socio-economic sectors in the country including water, health and agriculture, tourism, disaster reduction, energy and media among others.

User Interface (2)

- TMA uses Television, Redio, Blogs, Newspapers, journals, mobile phones and social networks such as facebook, tweeter and youtube to reach the society. (www.facebook.com/tmaservices), (www.twitter.com/tma_services) (www.youtube/tanzaniametagency)
- Example of advisories given on: www.meteo.go.tz and www.wamis.org
- Feedback from clients shows that 75% are satisfied with TMA services.

Weather Bulletins

TANZANIA METEOROLOGICAL AGENCY

DEKADAL WEATHER REVIEW

No: 20 Cropping Season 2012/13 March 11- 20, 2013

HIGHLIGHTS

- Favorable soil moisture conditions during the period enhanced crop growth and development over unimodal areas, while planting and emergence of crops were pronounced over the bimodal regions
- Pastures and water availability for livestock and wildlife over much of the country was generally good

SYNOPTIC SUMMARY

During the second dekad of March, 2013, the southern

TANZANIA METEOROLOGICAL AGENCY

SEASONAL WEATHER FORECAST

No. 6 Special Issue: March – May 2012 Season Issued on 5th March 2012

Summary

The Bulletin contains a brief review of the performance of September to December 2011 rainfall season, and evolution of the climate systems, and outlook for the March to May 2012 (MAM) rainfall season, and advisories on the likely impacts. *Outlook for March to May (MAM), 2012 rainfall season indicates that the Lake Victoria basin, northeastern highlands, northern coast, western (Kigoma and parts of Rukwa regions, central (much of Dodoma region) are expected to receive normal to above normal rains while Shinyanga, Tabora, Singida, Mbeya, northern Iringa central Morogoro , and much of Lindi are expected to receive mainly normal rainfall. Southern and parts of southern coast are expected to experience normal to below normal rainfall. It should be noted that heavy and short duration episodic events are common even in below normal rainfall conditions.*

RAINFALL PERFORMANCE

October to December 2011 Rainfall Season

The performance of the October to December 2011 short rains (*Vuli*) faired well over most parts of the country. However, both temporal and spatial distribution was not good in some areas. Towards the end of the season in December some areas received heavy rainfall that caused catastrophic disasters

Indian Ocean is projected to persist through March, 2012 leading to weak easterlies towards East African coast.

The northern subtropical systems are projected to be relatively weaker than the southern systems that suggest the possibility of fast retreat of the Inter Tropical Convergence Zone (ITCZ) from south to north. Due to projected slight warming over South-western Indian Ocean and due to the likelihood of factors favoring the development of tropical storms, the number of tropical storms is projected to increase and this may have impact on the MAM seasonal rains.

PWS


HABARIKITAIFA

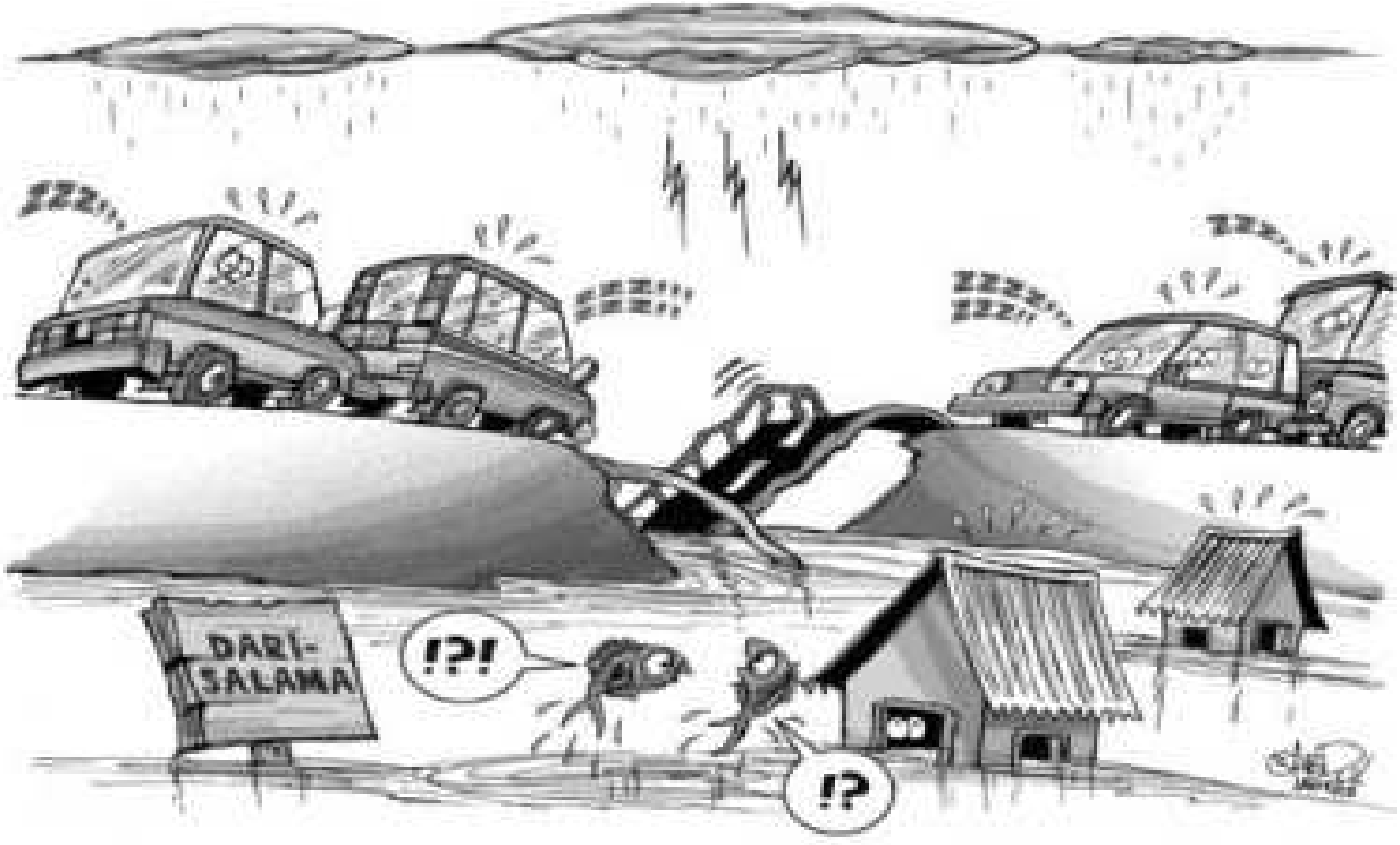
Mvua yaua Bahi, 136 hawana makazi

Na Peter Mkwavila, Bahi

Social Networks

TMA Director General holding a Weather briefing session with journalists from various media.

User Interface



Source: ipp media

RIORITY NEEDS

- Inadequate stations network
- Modernization of Instruments owned by TMA
- However, most modern meteorological equipment s and instruments are very expensive.
- Inadequate funds to conduct research in climate change and other related areas
- Link between IK and conventional Wx Forecasting to cover the entire country.
- Transferring of AWS data to the central database
- Training on AWS data handling

RIORITY NEEDS *cont…*

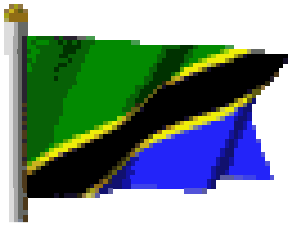
- Funds for training of staff
- To Increase number of staff in various operational areas
- Need for own building for TMA headquarters and Central Forecast Office which can host Met. Instruments and other operations.
- Funds to rescue and digitize historical climatic data in deteriorating paper forms

RIORITY NEEDS *cont…*

- Dissemination of our products which include raising awareness to users in various levels (up to lowest) and decision makers.

CONCLUSION

- Despite the challenges, TMA is striving to achieve the highest quality of services to local and International community.
- This workshop is yet another great opportunity within an existing WMO and RCC cooperation to curb the risks caused by climate change and variability.



THANK YOU FOR LISTENING

ASANTE SANA