Earthquake hazard and risk in Africa: assessment and mitigation needs

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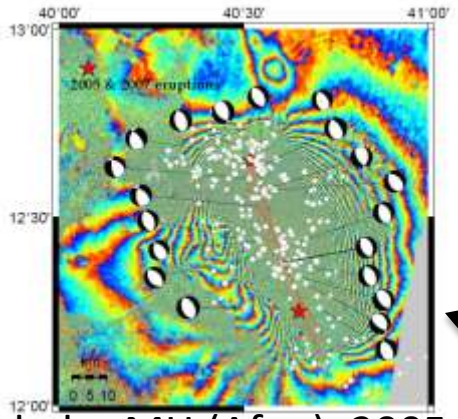
Introduction

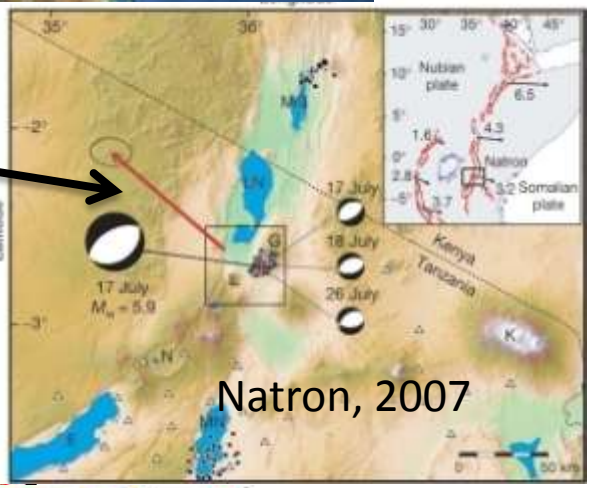


Dabbahu MH (Afar), 2005

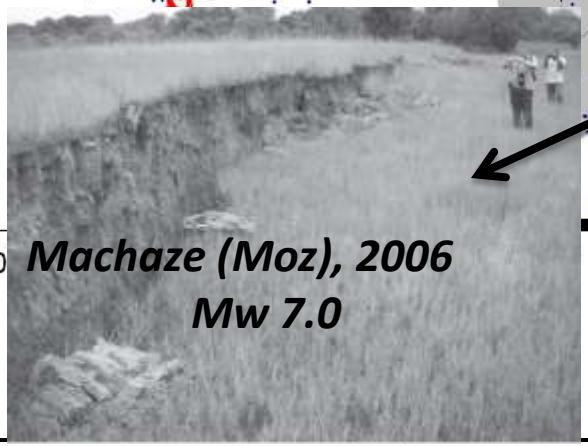
Nabro 2011

November, 2010

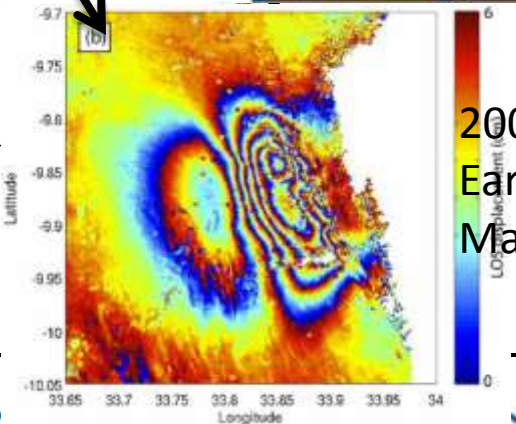
Nyiragongo , 2002



Natron, 2007



Machaze (Moz), 2006
Mw 7.0



2009 Karonga Earthquake (north Malawi)

Do earthquake and volcano hazards exist in Africa?

- 25 % of the city of Goma destroyed
- ~ 500,000 people evacuated
- Earthquakes affected Ethiopia, Mozambique, Botswana, Malawi and Madagascar in the last decade while volcanic eruptions occurred in Afar, Tanzania, Congo, Yemen and Eritrea

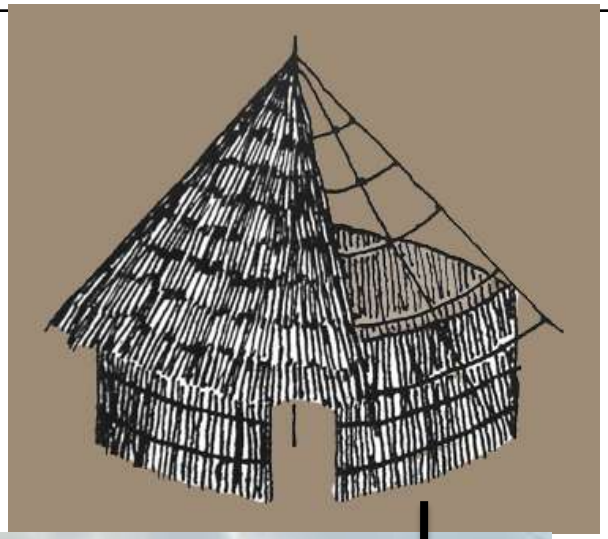
Understanding the level of the risk by African governments is minimal (a lesson to learn from Haiti)

The December 2009 Karonga (Malawi) earthquake crisis

Damaging earthquakes in SSA

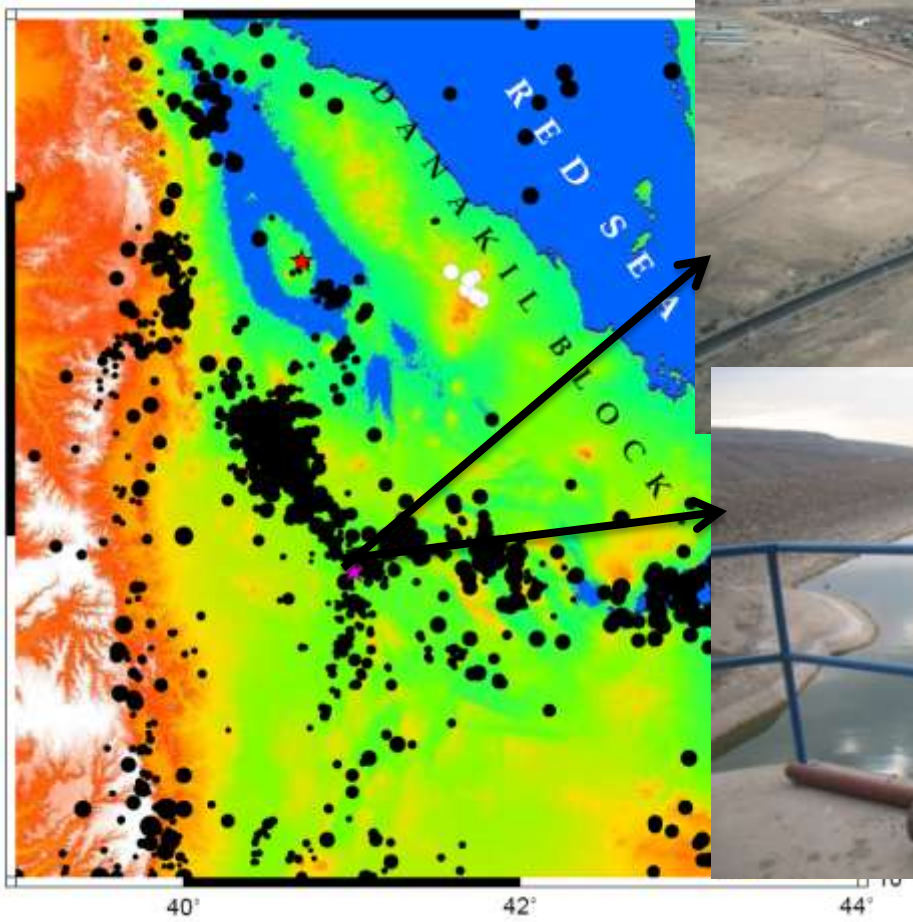
Major Earthquakes in EARS	Magnitude (Ms)	Damage (Deaths)
August 25, 1906 earthquake in MER, Ethiopia	6.8	None
The December 13, 1910 Rukwa earthquake in the then Tanganyika	7.4	None
The January 6, 1928 Subukia Valley earthquake (Kenya)	6.9	None
The Toro earthquake of March 20, 1966 (Uganda)	6.1	150
May 20 &24, 1990, Southern Sudan	7.1 & 7.2	20
February 23, 2006, Mozambique	7.0 (Mw)	4

What costs us in this leap of the CI in SSA?



There is little understanding in what costs us in this transformation

Example



Emerging town at a triple junction

Irrigation dam with over 100,000 people at risk (downstream)

Challenges

- **Mega cities of rapid population and economic growth are emerging close to active rift margins in SSA with least awareness on eminent earthquake and volcanic hazard**

- **sub-Saharan Africa is unprepared to face earthquake threats and national development could be crippled by a large earthquake of say Mw > 7.0 which is potentially possible.**

- **Leaders in SSA give priority to other issues (food security)**

Challenges

- **There is no institutional network in place in many African countries for mitigation purpose in time of crisis**

- **Monitoring facilities and capacity of research institutes are poorly equipped in SSA and yet much expected from the regional experts in time of crisis**

- **As information age is booming (local people in remote villages know what is happening in the rest of the world via mainly cable TV), proper outreach and awareness must be considered**

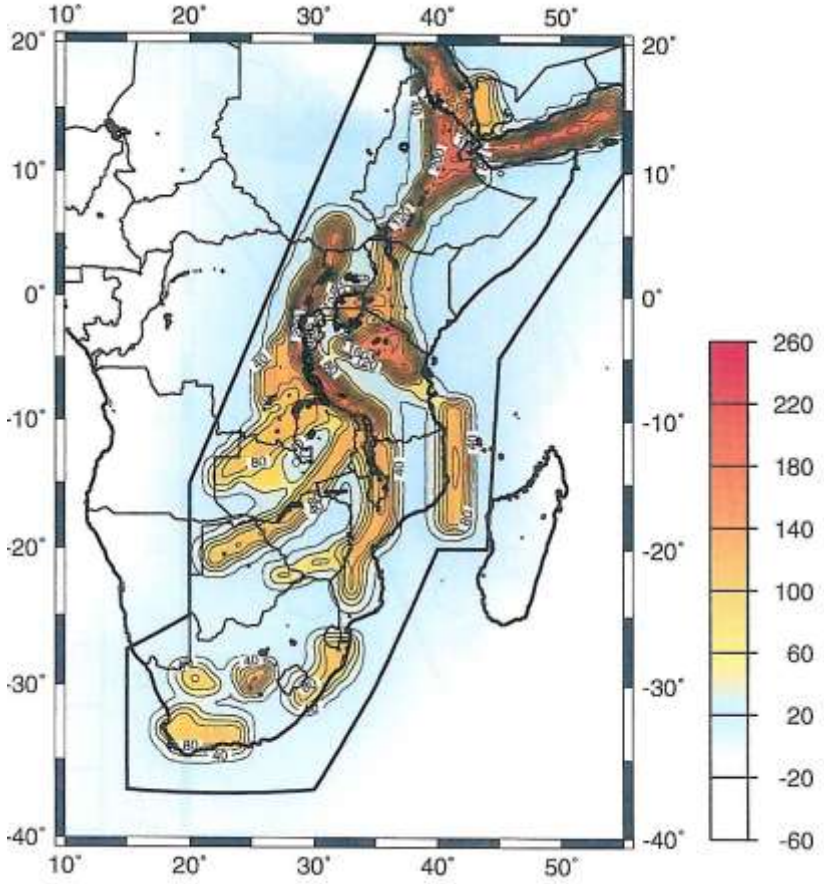
The way forward

- Investigate the existing data to better map the hazard and mitigate the risk

- Build capacity to reliably archive the current and future earth activities (earthquakes and volcanoes) on real-time basis

Investigate and model existing data

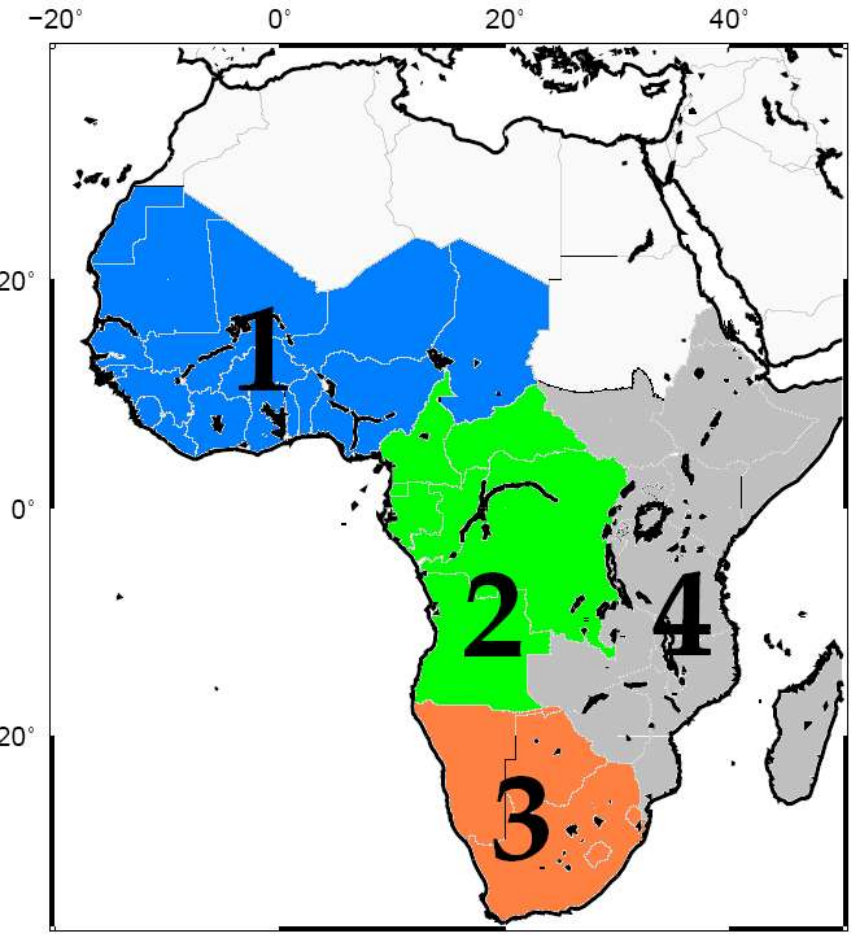
Updating seismic hazard map of Africa is long overdue



GSHAP results underestimates the hazard and even that result is not applied for code revisions in many African countries

GSHAP → GEM

GEM sub-Saharan Africa



1. Northwest Africa
2. Central Africa
3. Southern Africa
4. Eastern Africa

Hazard Global/Regional components

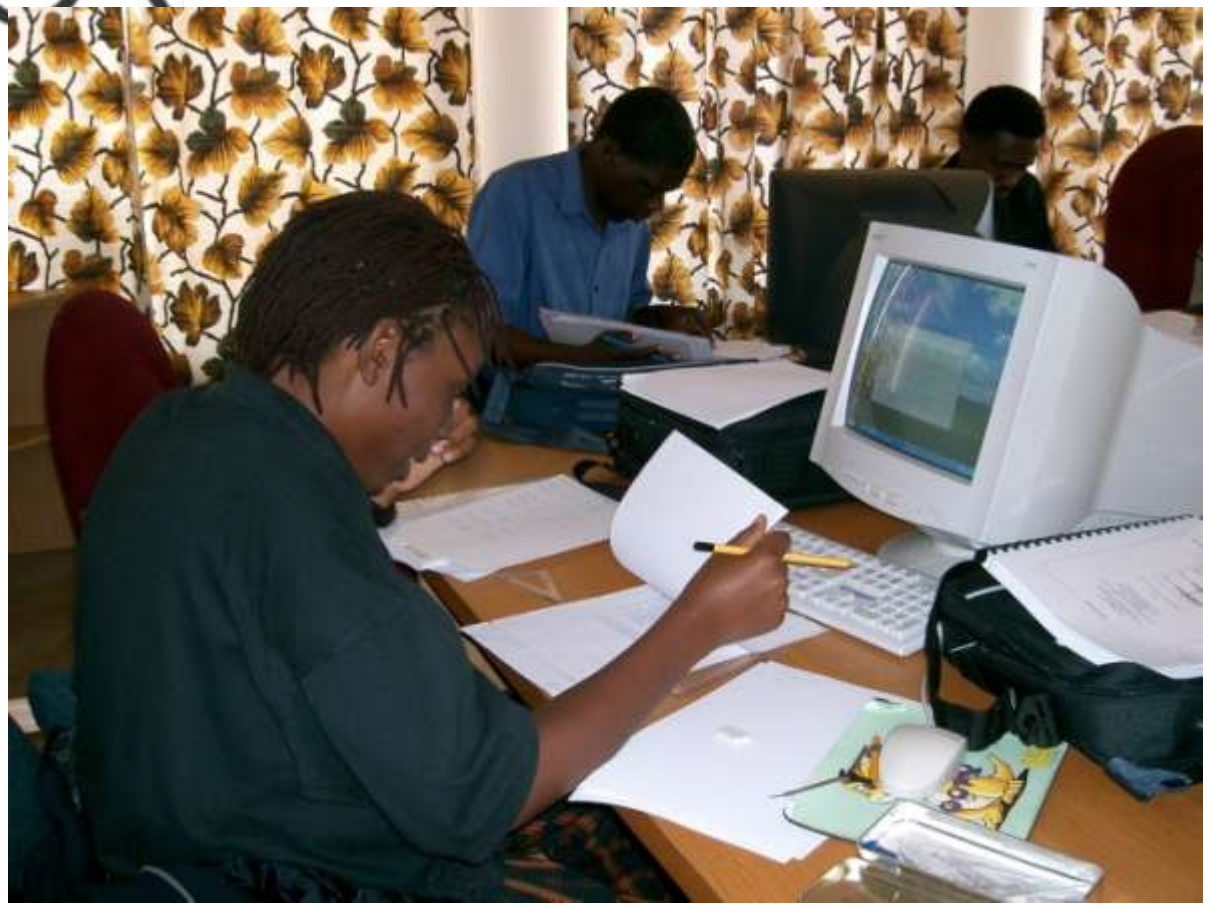
1. Earthquake catalogue
2. Active fault and source database
3. GMPEs
4. Geodetic Strain rate model

FUNDING ??

What to do now for the future?

- Equip the monitoring facilities in Africa with state of the art equipments
- Training personnel
  - Scientist (MSc and PhD)
  - Technicians (field engineers and analysts)
- Boost research activity and participation in conferences
- Sensitize SSA governments to maintain/sustain the built capacity

Capacity building



Data analyst workshop conducted in Bulawayo, Zimbabwe (2005)

Capacity building