

Recent Seismicity and Potential Earthquake Risk in Major Ethiopian Cities

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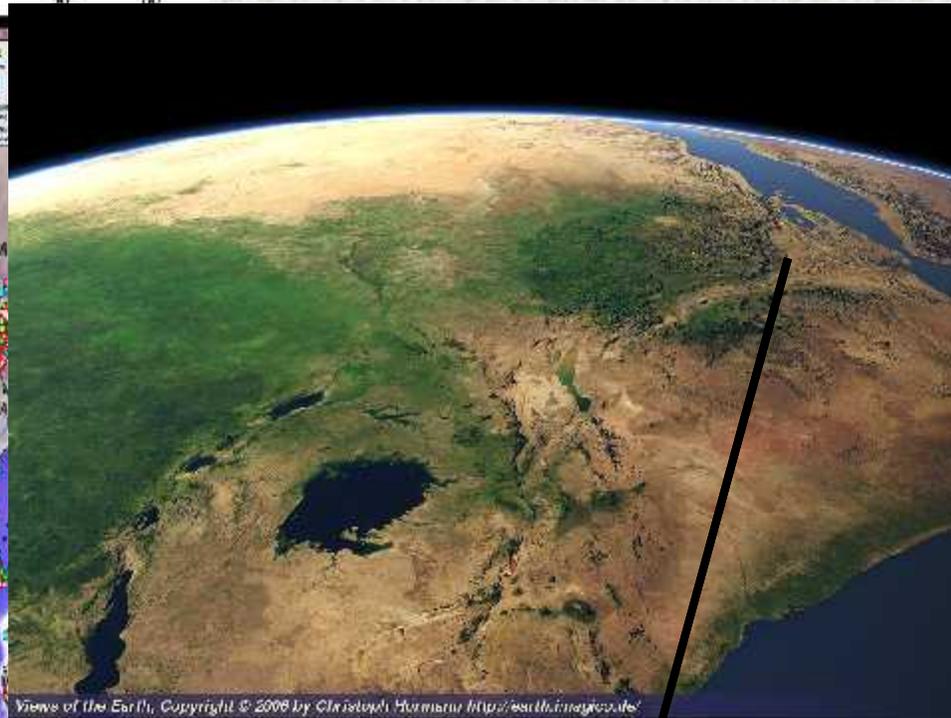
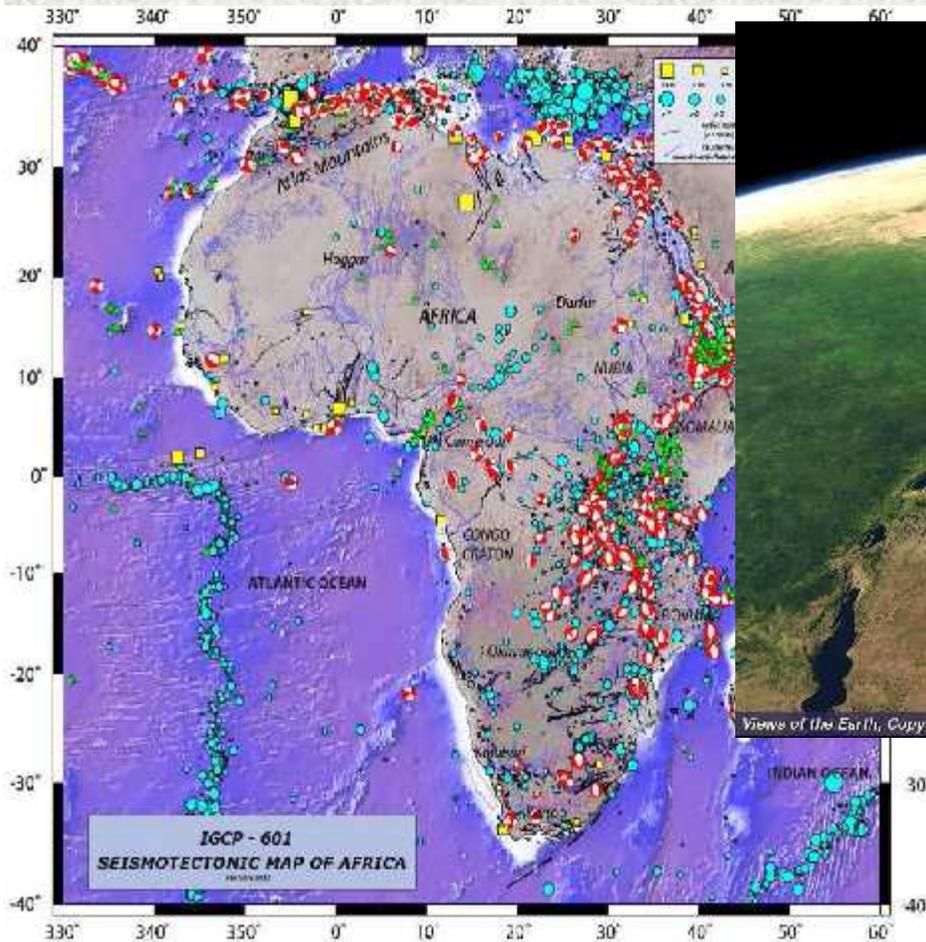
Mitigating the Impact of Natural Risks in Africa, 23-26 October 2017, Cairo (Egypt)



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- Current status of Ethiopian Seismic Station Network
- Recent seismicity and experiences in rapid response
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- Conclusions

Backgrounds



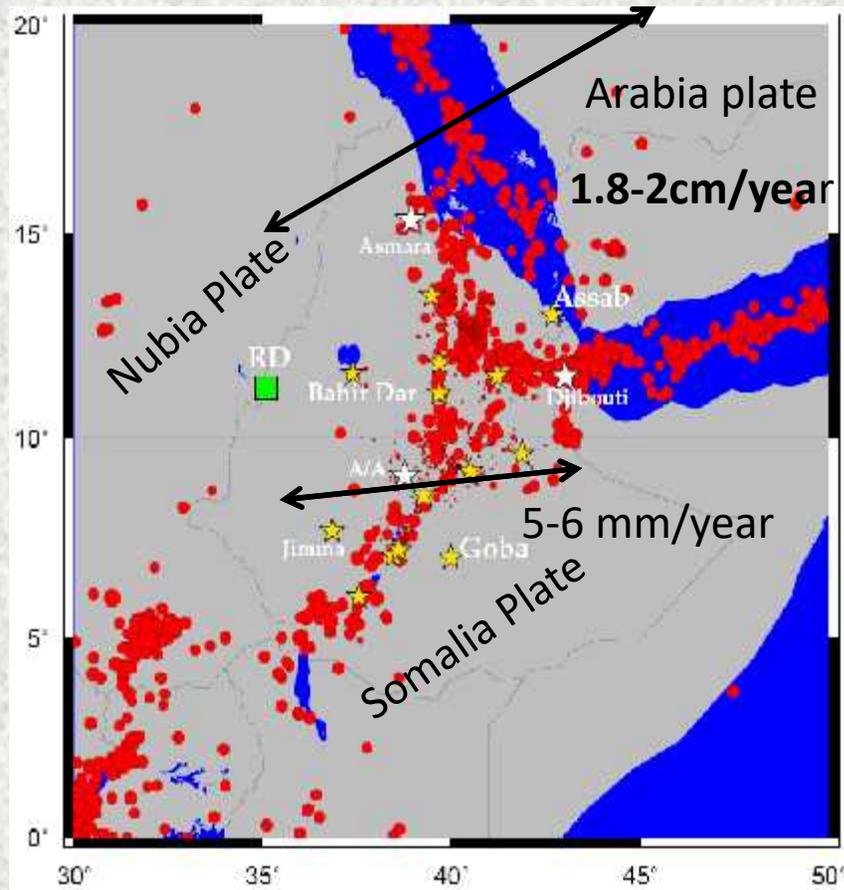
The most evolved part of EARS
Prototype Ultra slow spreading
oceanic ridge

Meghraoui et al., 2016

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Backgrounds ...

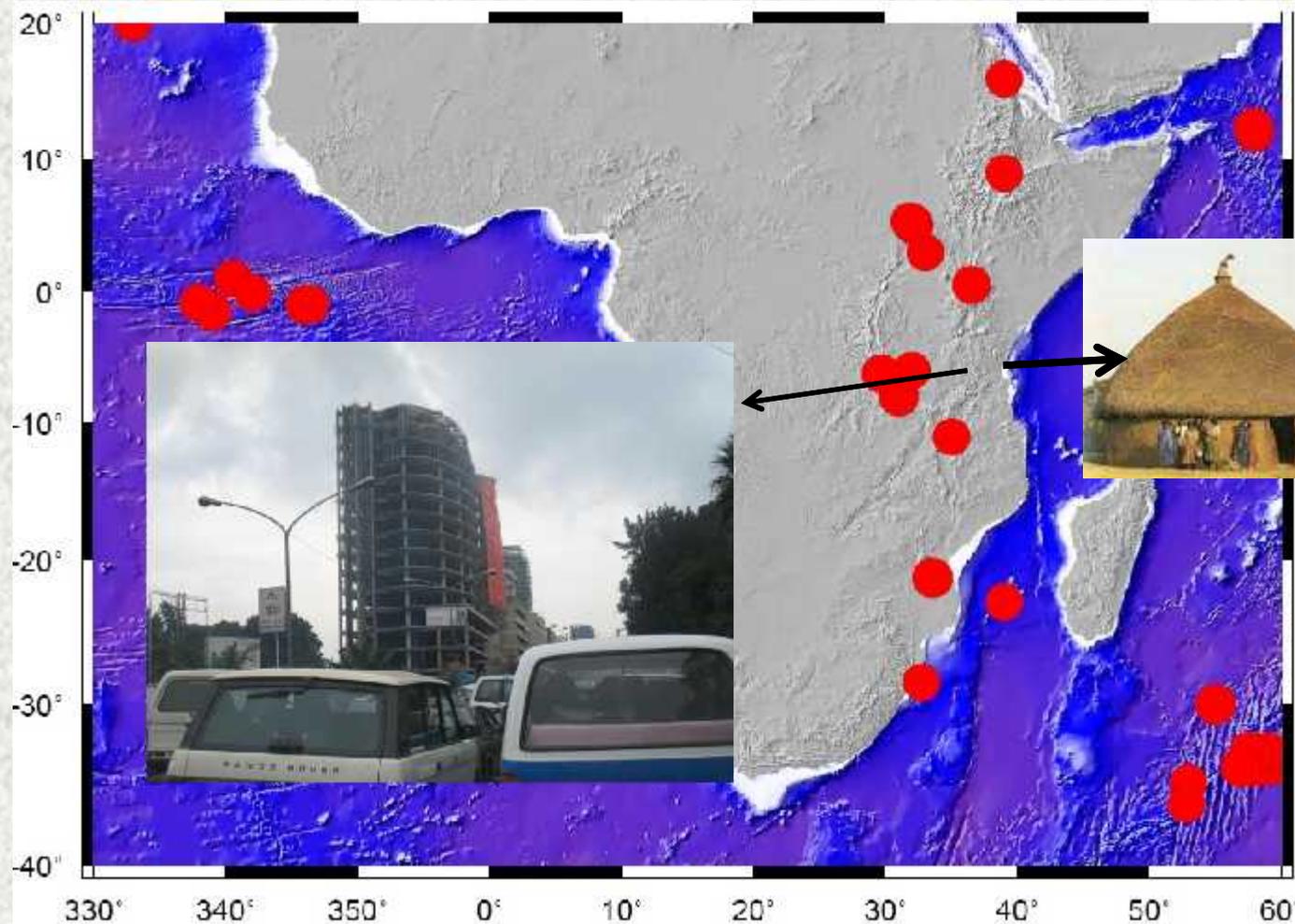


- Red dots represent earthquake epicenters with magnitude being proportional to the size of the circle
- White stars represent capital cities
- yellow stars show major towns in Ethiopia



Farming and animal herding and hence settlement more favorable around the rift

Backgrounds ...

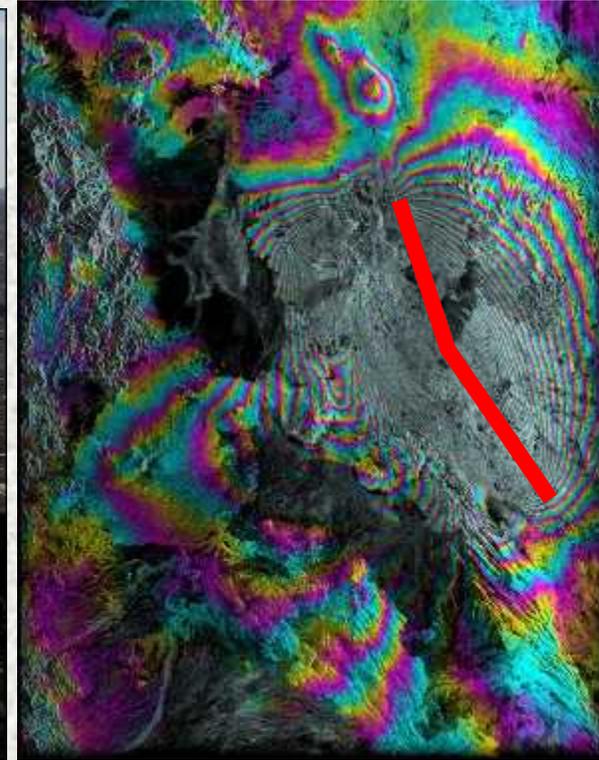


Risk is growing with less awareness

Backgrounds ...



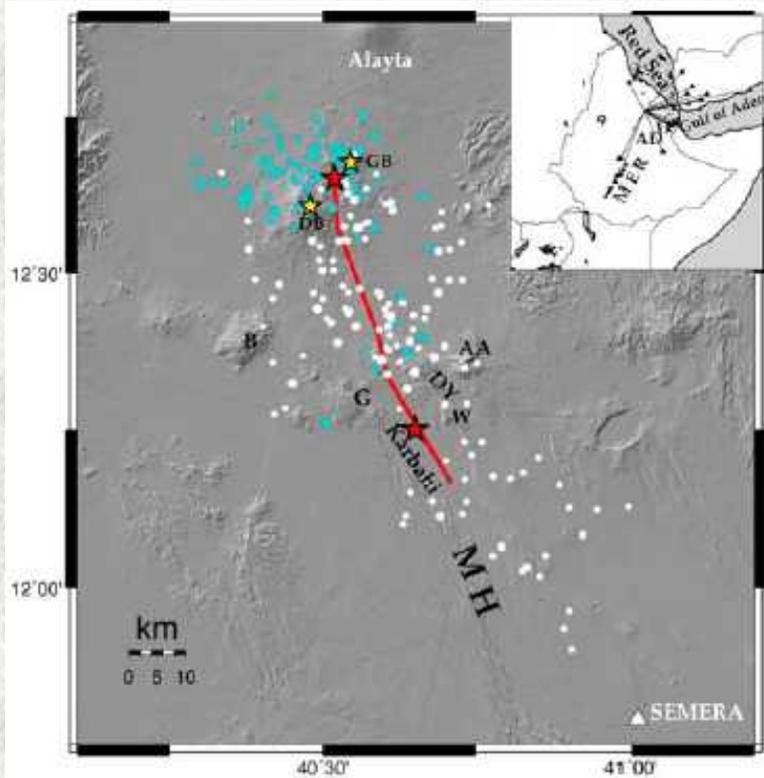
Afar



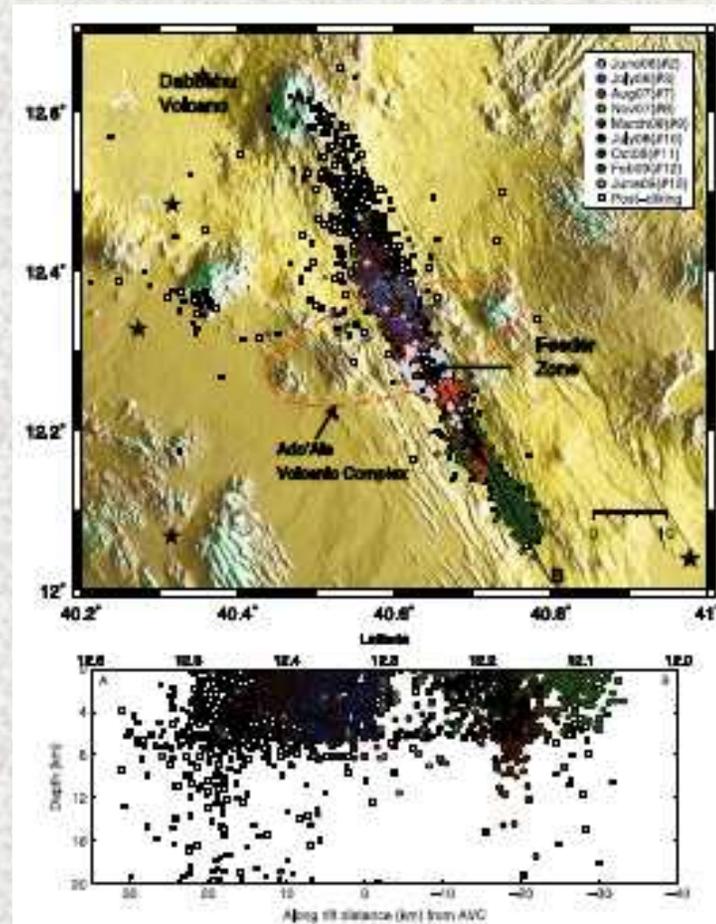
Wright et al., 2006

Exotic basic science research with overseas researchers

Backgrounds ...

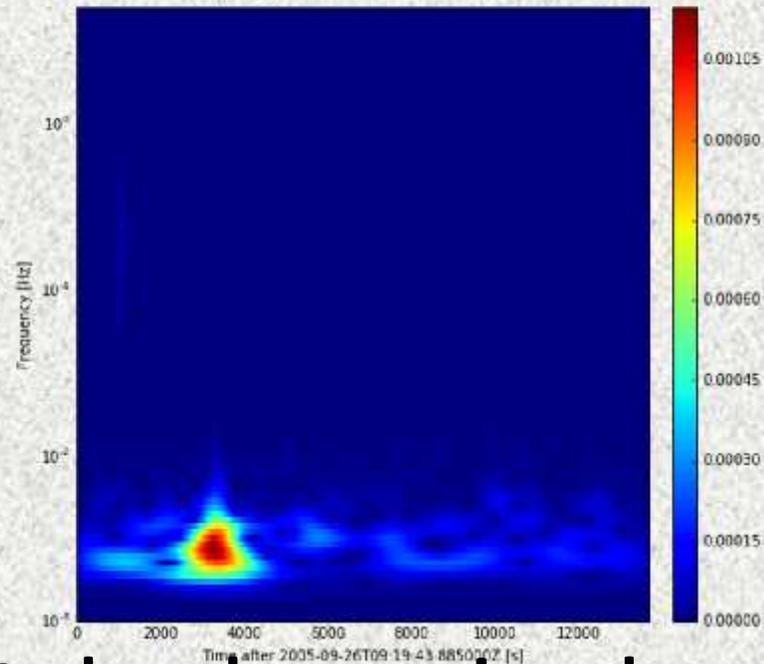
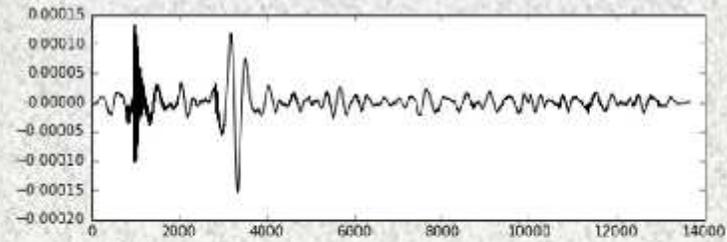
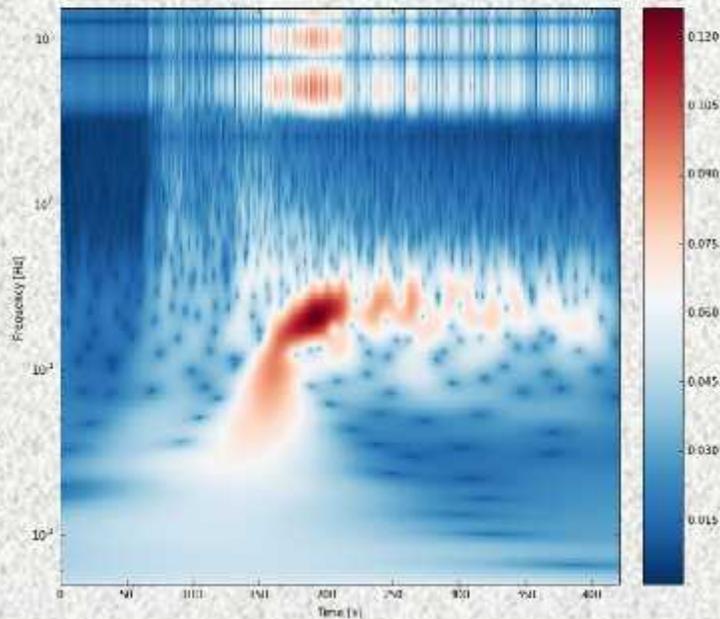
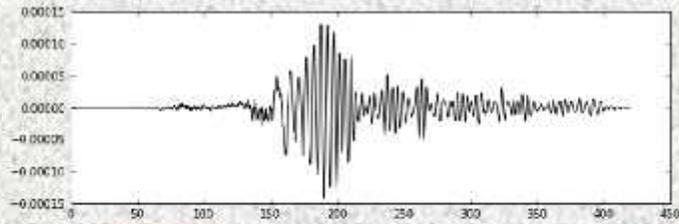


Ayele et al., 2009



Belachew et al., 2011

Backgrounds ...



Afar is an ideal place to study volcano seismology

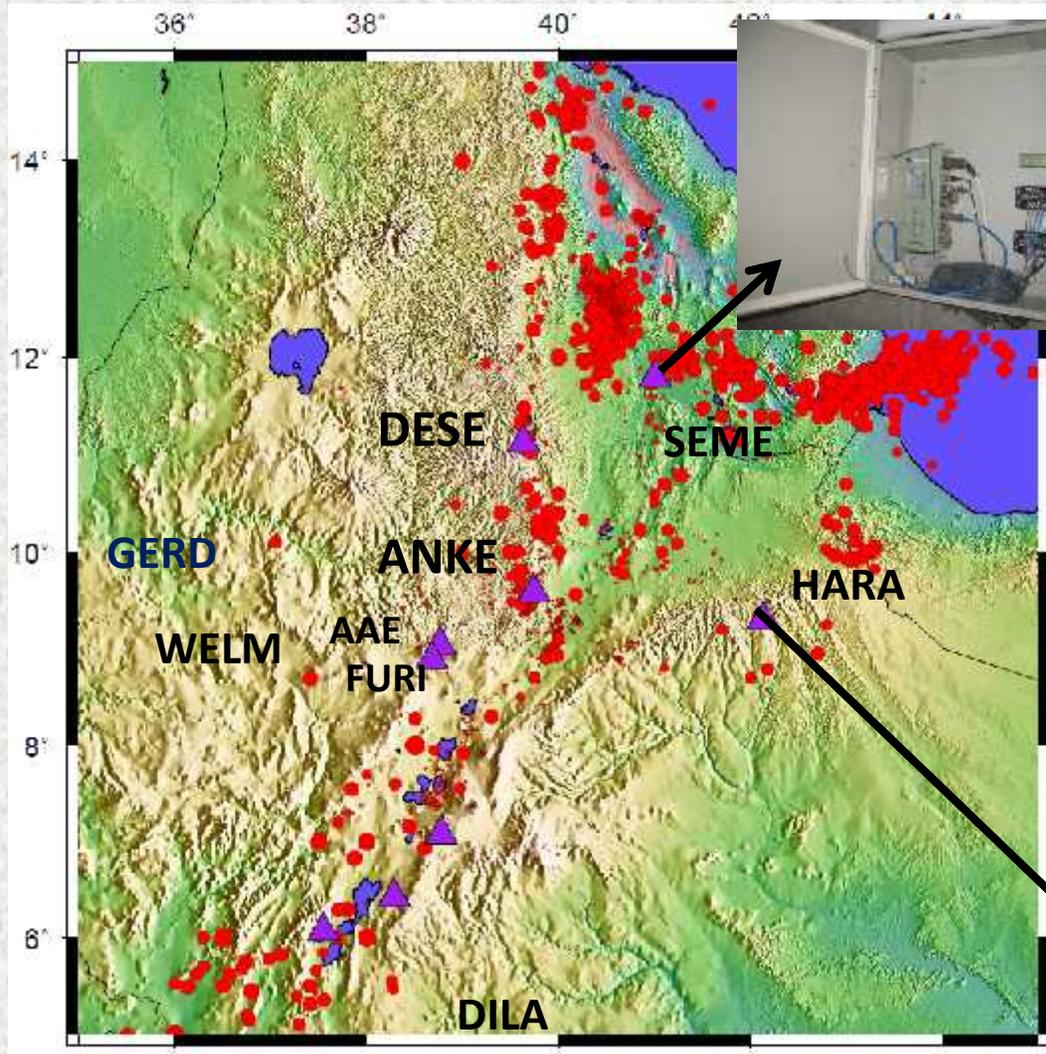
Current seismic station network



- Seismic monitoring in Ethiopia started in 1959
- AAE remained as one of the world best stations in data quality and continuity of operation

Inauguration of AAE in 1962 as one of the WWSSN station and dignitaries and engineers were from AAU, USGS and the US embassy in Addis Ababa

Current seismic Station Network ...



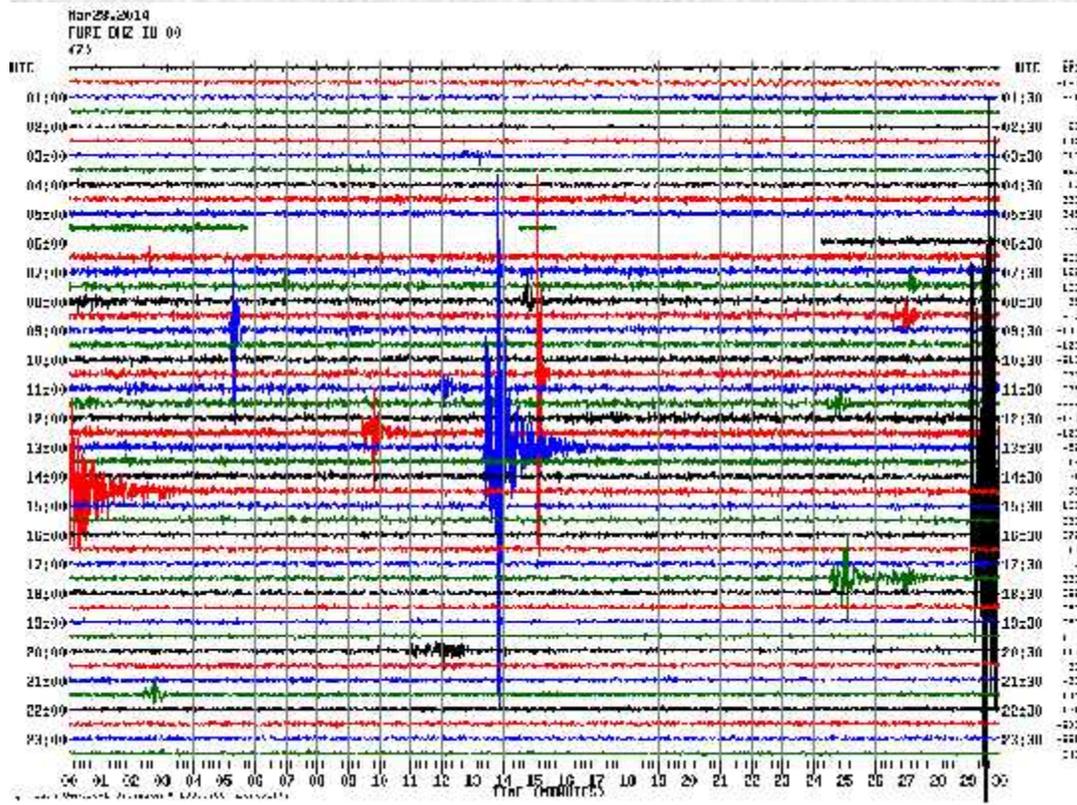
A total of 9 stations

**GERD
WELM**

Two more standby stations



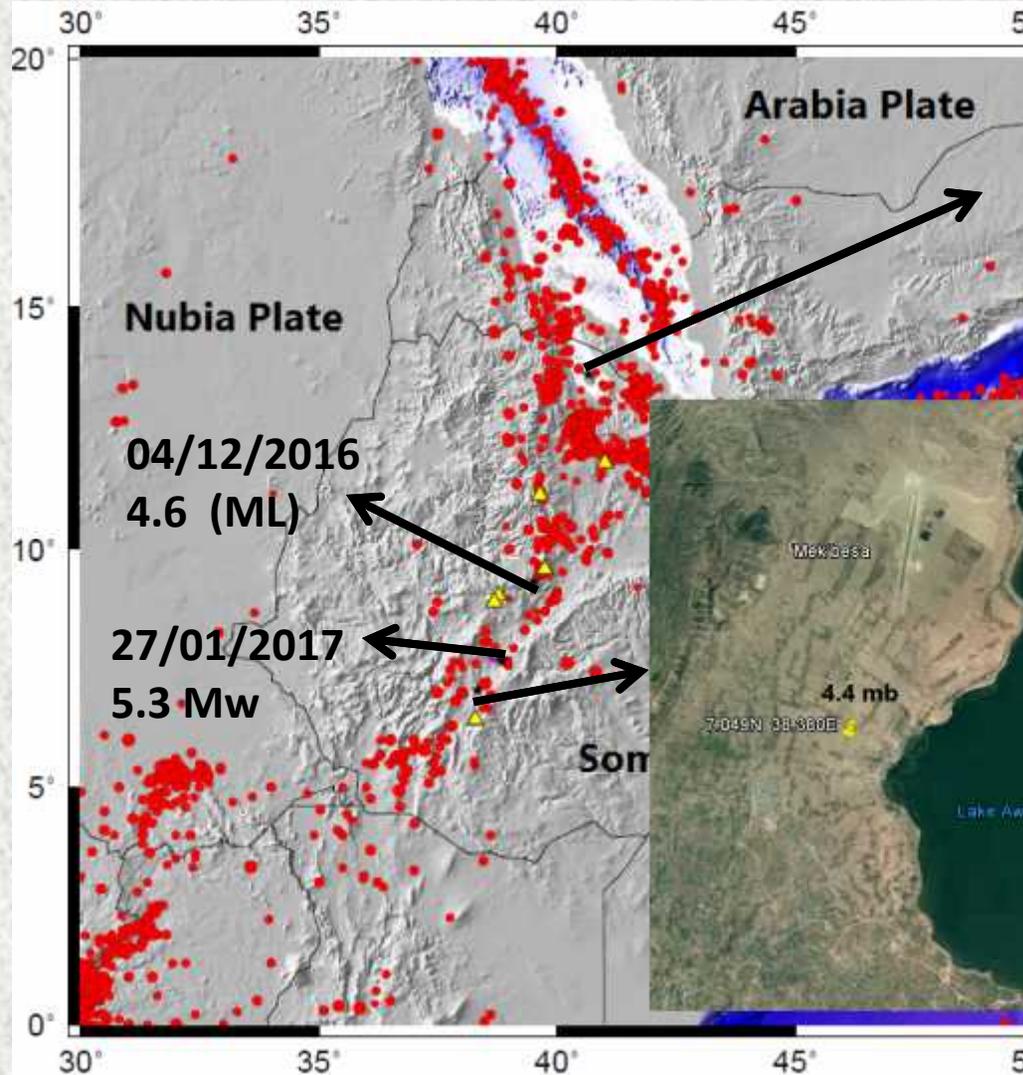
Current seismic station network



- FURI (Ethiopia)
- AAE (Ethiopia)
- DESE (Ethiopia)
- HARA (Ethiopia)
- ANKE (Ethiopia)
- BEKJ (RiftVolk project)
- MBAR (Uganda)
- ATD (Djibouti)
- KMBO (Kenya)
- LODK (Kenya)

All these stations generate helicorders on daily basis

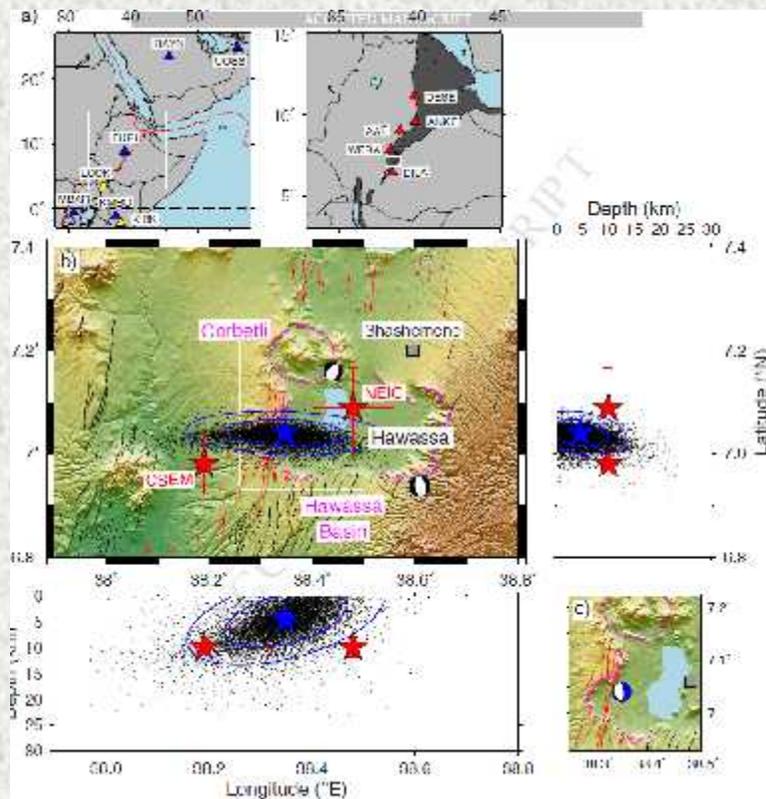
Recent seismicity & rapid response



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Recent seismicity & rapid response



- The most reported on the media
- There was panic and death due to lack of awareness on how to behave during earthquake crisis

Wilks et al., 2017)

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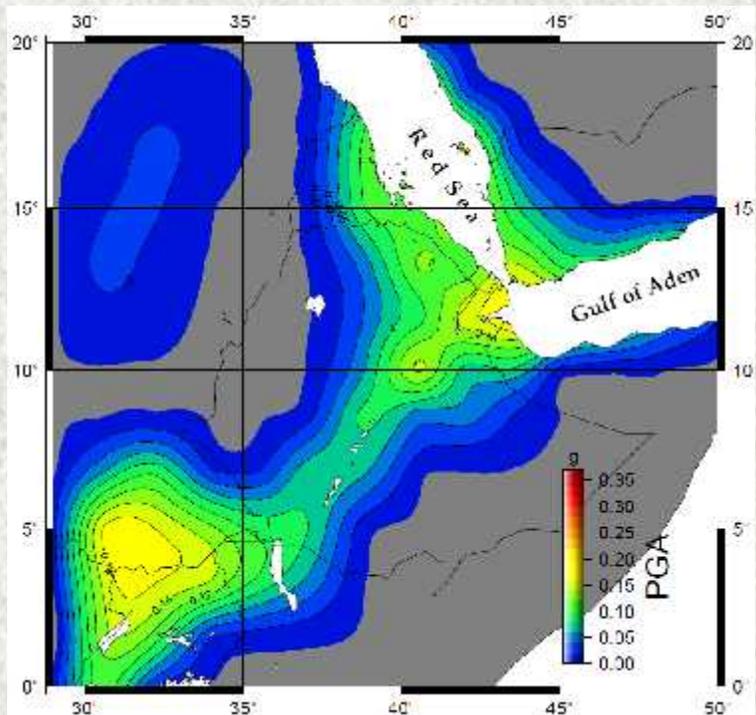
Recent seismicity & rapid response



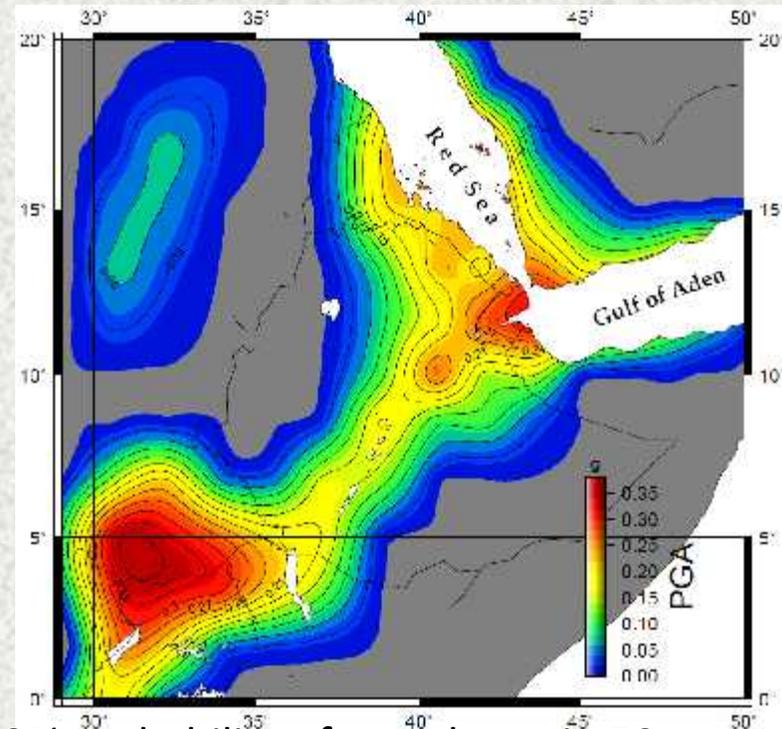
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Challenges



10% probability of exceedance in 50 years



2% probability of exceedance in 50 years

Ayele (2017)

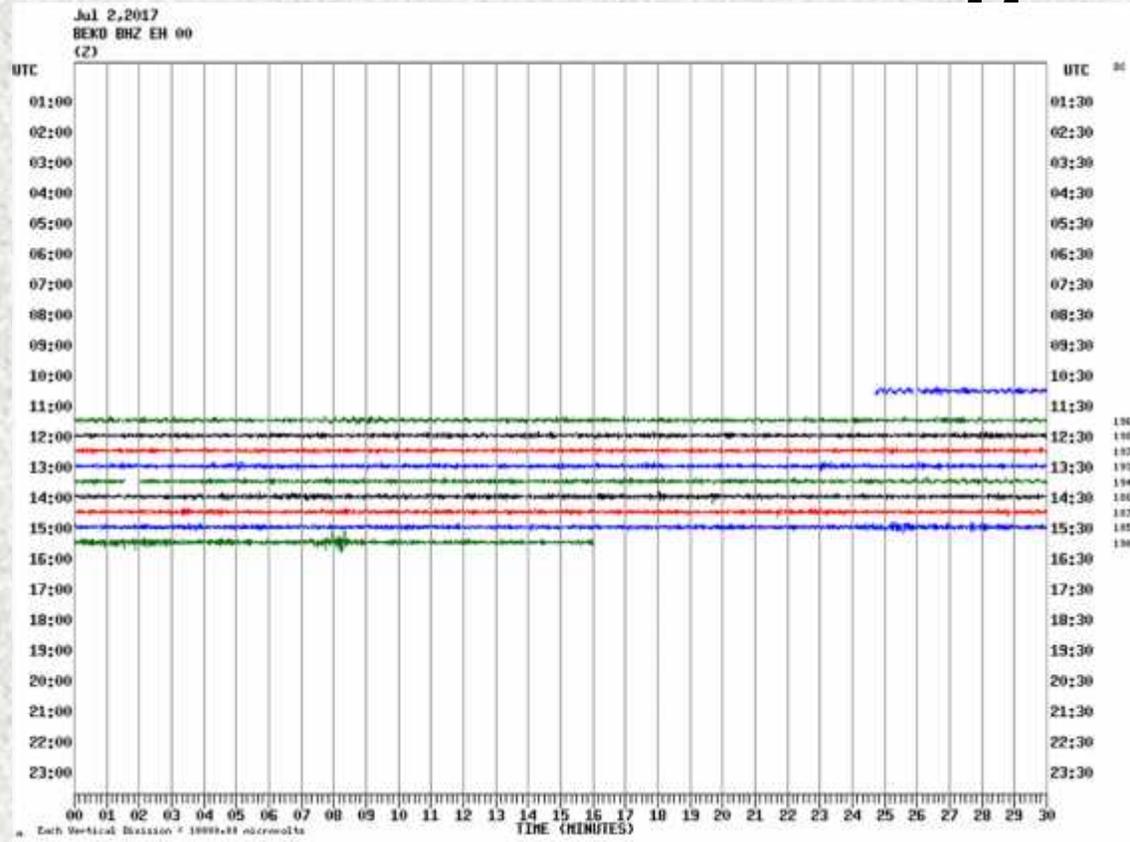
BUT

- historical catalogue
- **Instrumental catalogue**
- active Fault Mapping/earthquake geology
- Strain Rate
- **GMPE etc**

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Challenges ...



Bekoji station

Frequent power and connectivity failure

Challenges ...

- Government manages crisis instead of risk
 - Capacity building
 - outreach
- Episodic international collaborations for naturally episodic activities
- We are missing science b/se of lack of funding for rapid response

Conclusions

- Update the seismic hazard map and the building code from the most we can get out of the data
- Enforce the code by legislation
- Build capacity in real-time monitoring & communicate results to the concerned when necessary
- Establish a reliable civil protection authority in the country
- **There is no sustainable support from African governments**