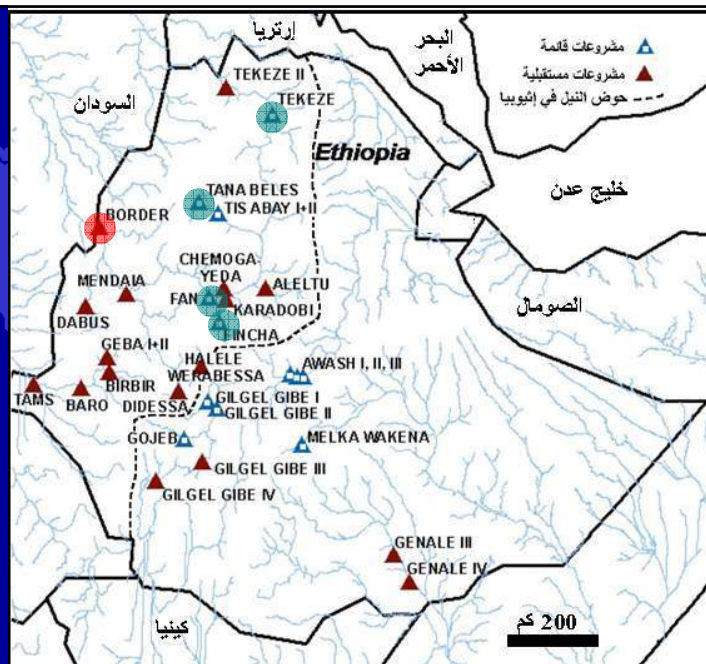
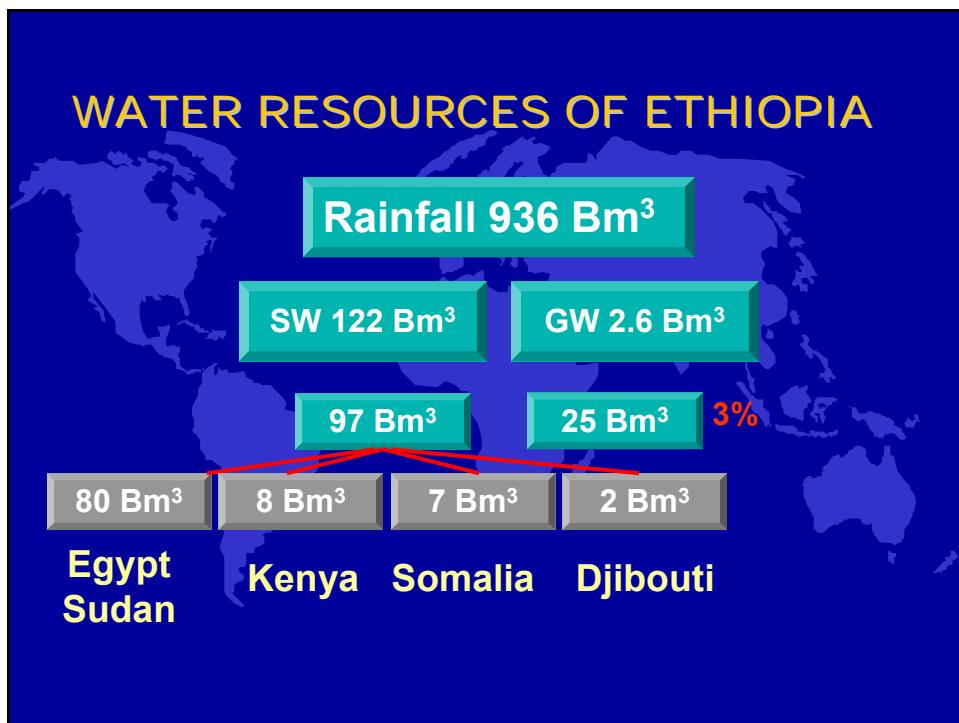


Ethiopian Renaissance Dam

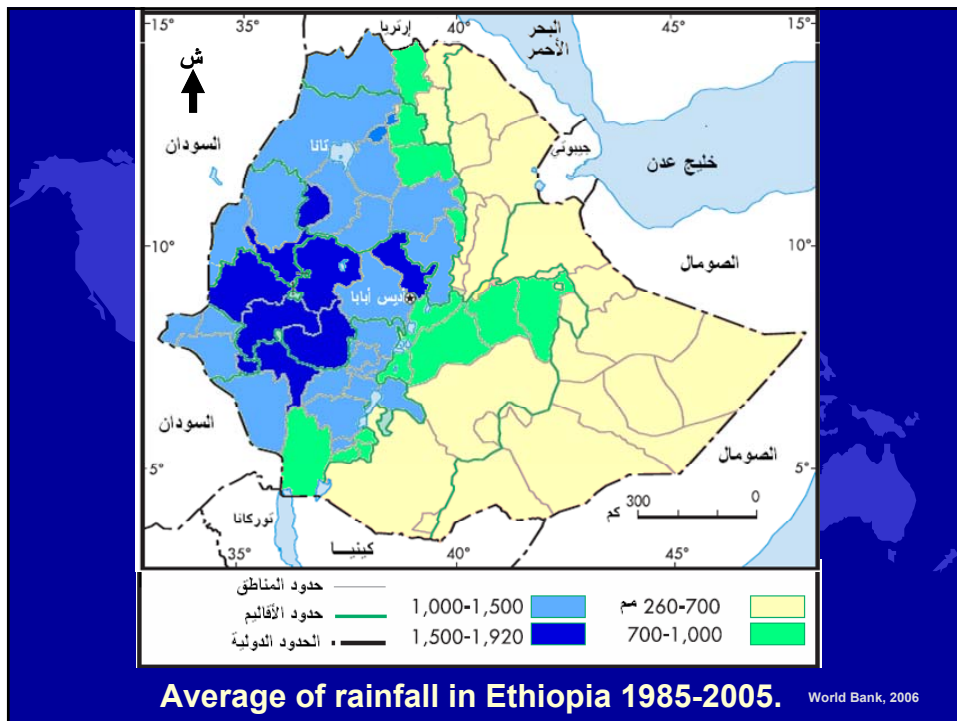
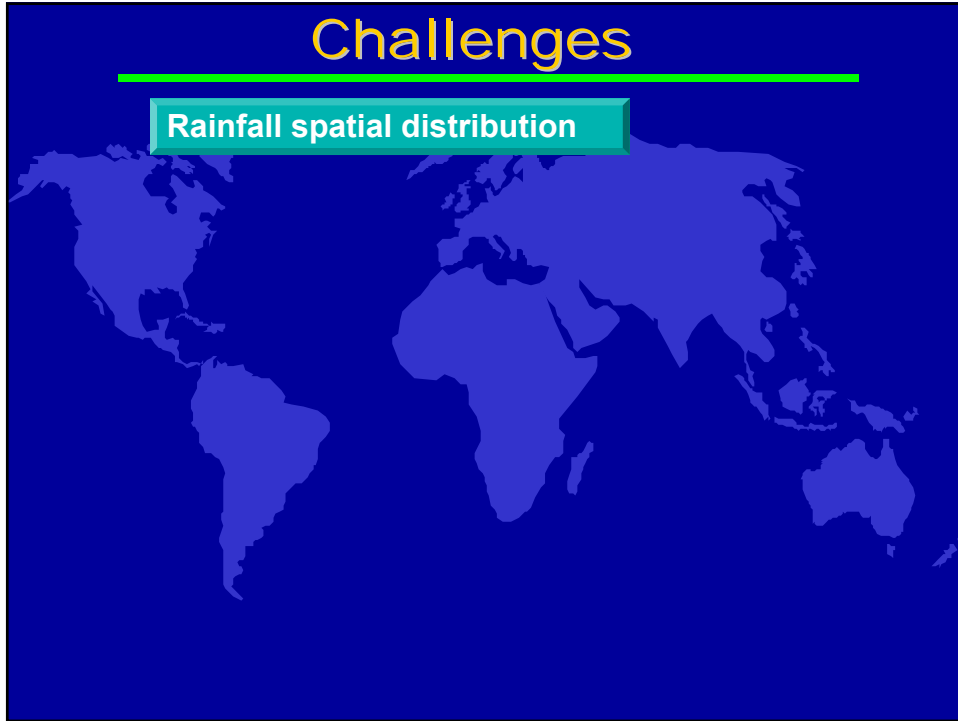


Water projects in Ethiopia (Block and Strzepek, 2010)



Challenges

Rainfall spatial distribution

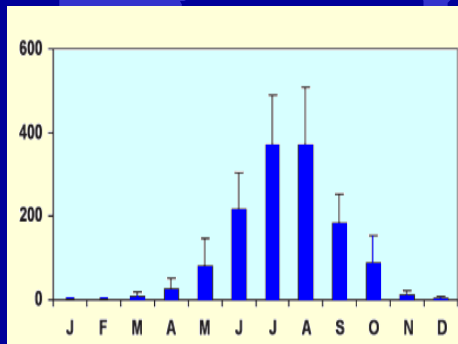


Challenges

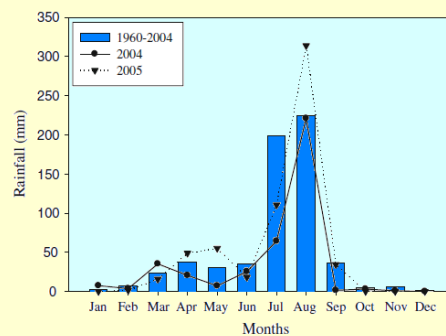
1 Rainfall Spatial distribution

2 Rainfall temporal distribution

Short season



Mean rainfall (1992–2002) at Tana Lake (Wondie et al., 2007)



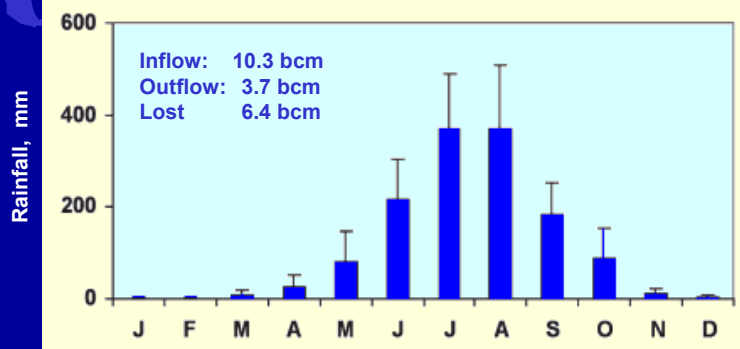
Monthly precipitation at Quiha (Tigray), Northern Ethiopia

Challenges

1 Spatial distribution

2 Temporal distribution

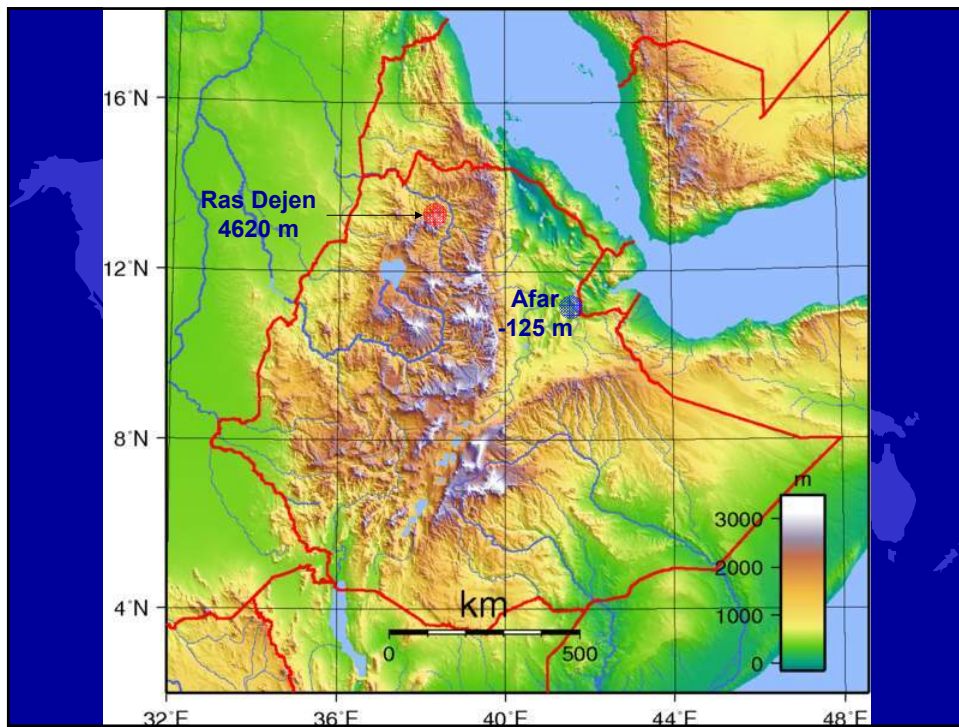
3 Evaporation



Mean rainfall (1992–2002) at Tana Lake (Wondie et al., 2007)

Challenges

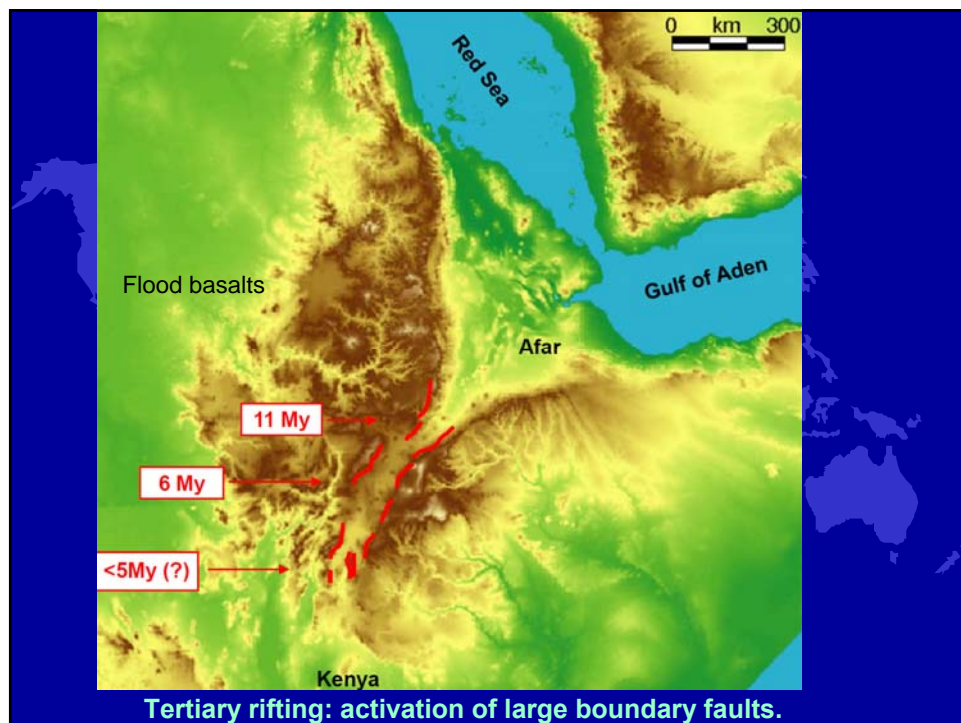
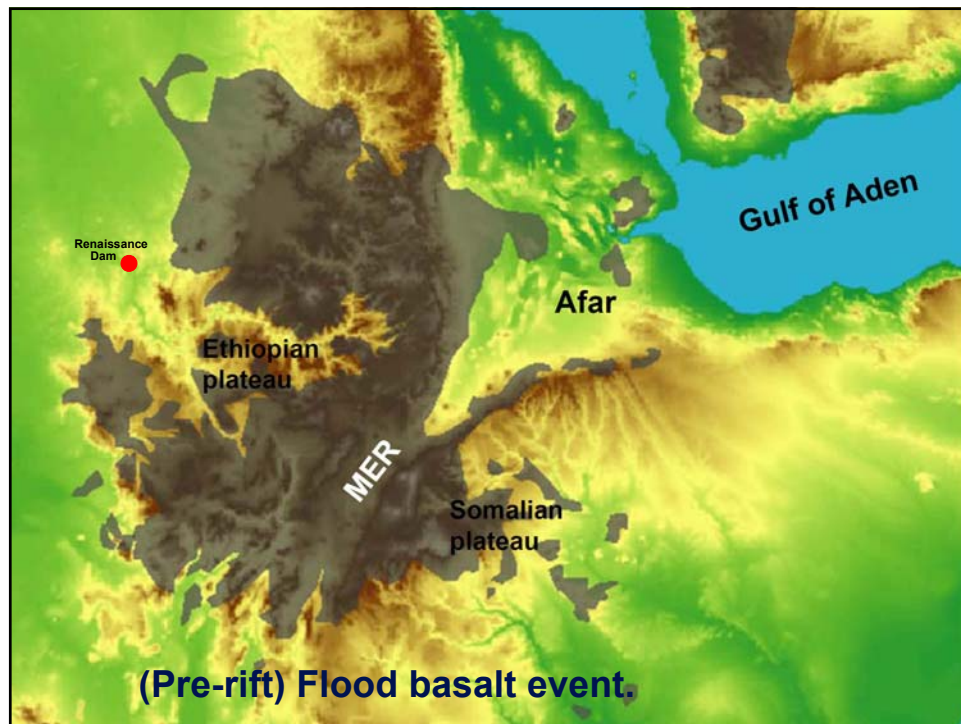
- 1 Spatial distribution
- 2 Temporal distribution
- 3 Evaporation
- 4 Topography

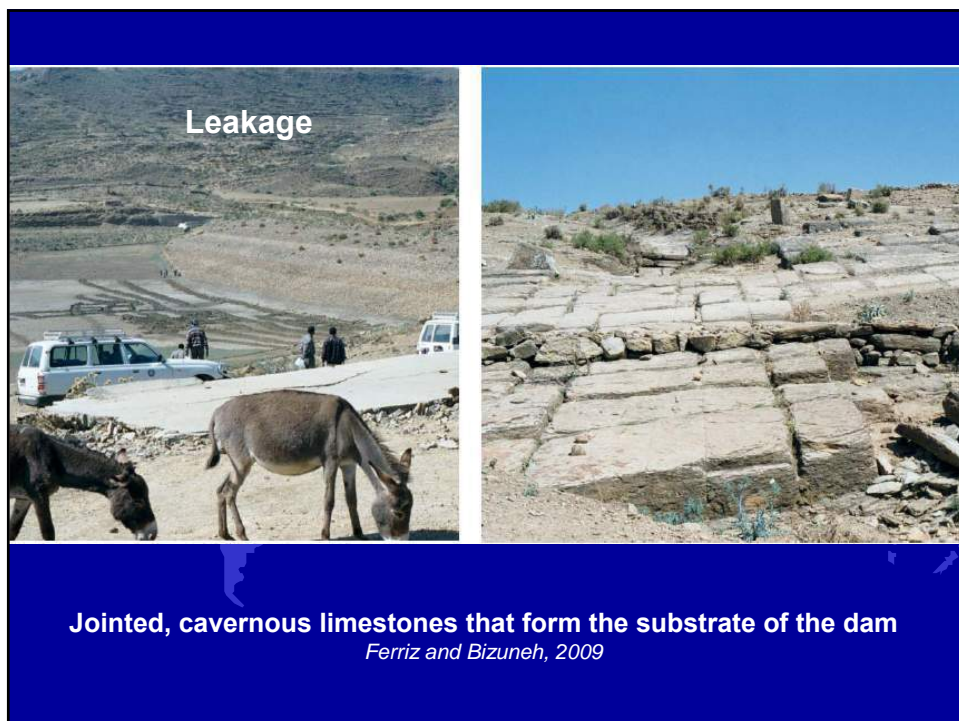
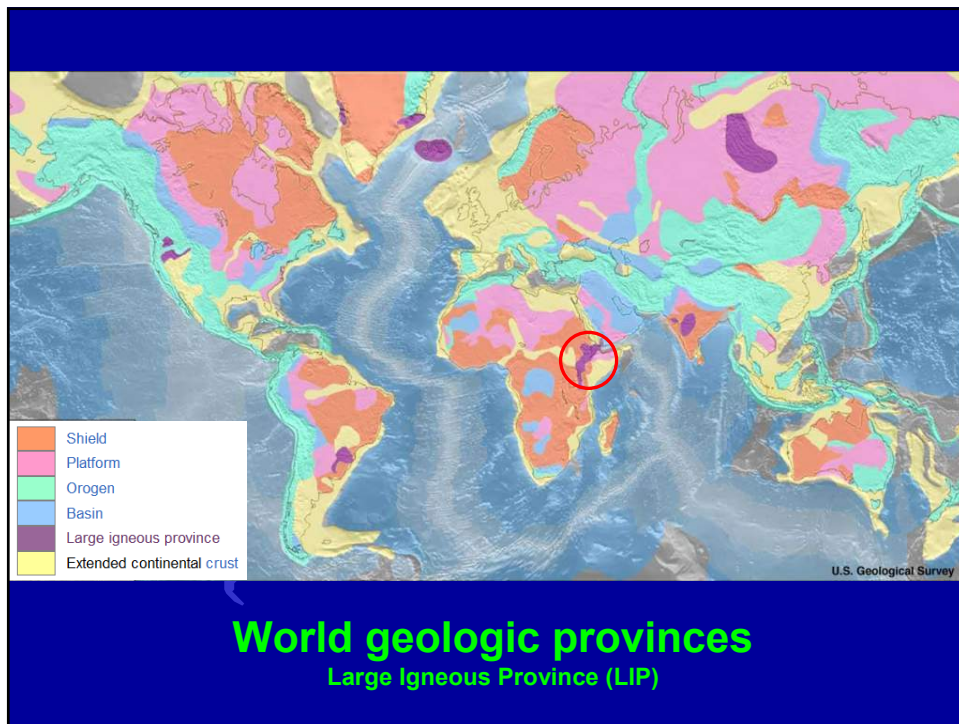




Challenges

- 1 Spatial distribution
- 2 Temporal distribution
- 3 Evaporation
- 4 Topography
- 5 Type of rocks

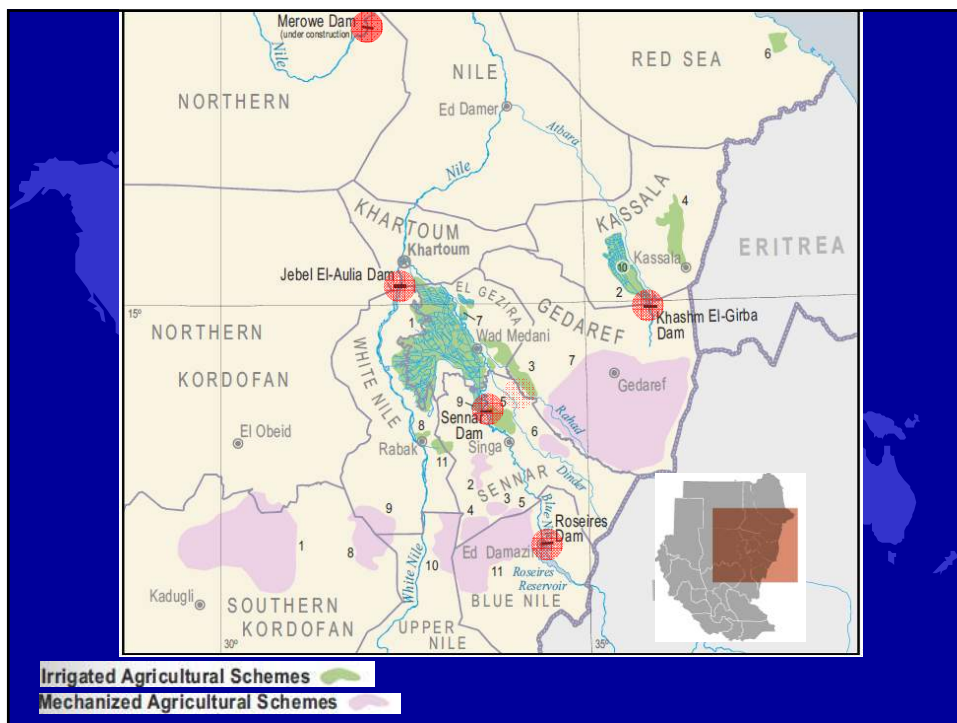




Challenges

- 1 Spatial distribution
- 2 Temporal distribution
- 3 Evaporation
- 4 Topography
- 5 Rock Types
- 6 Erosion and Siltation

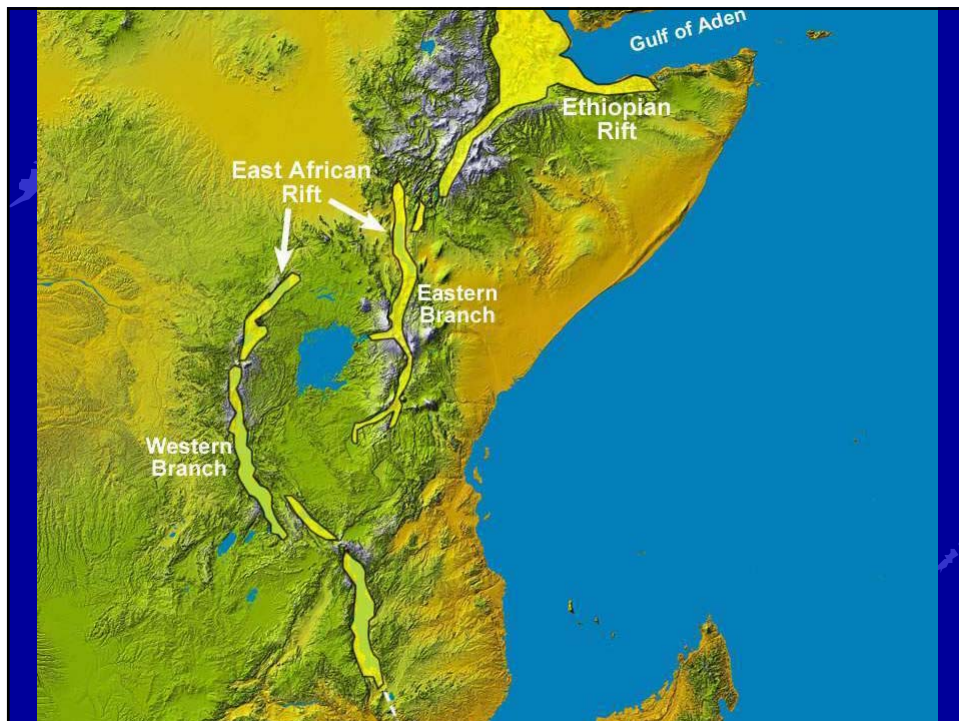
- Blue River & Atbara 525 top soil MCM/yr
- 100 m accumulated sediments in Tana Lake.
- 80% of cultivated lands suffers from soil degradation .

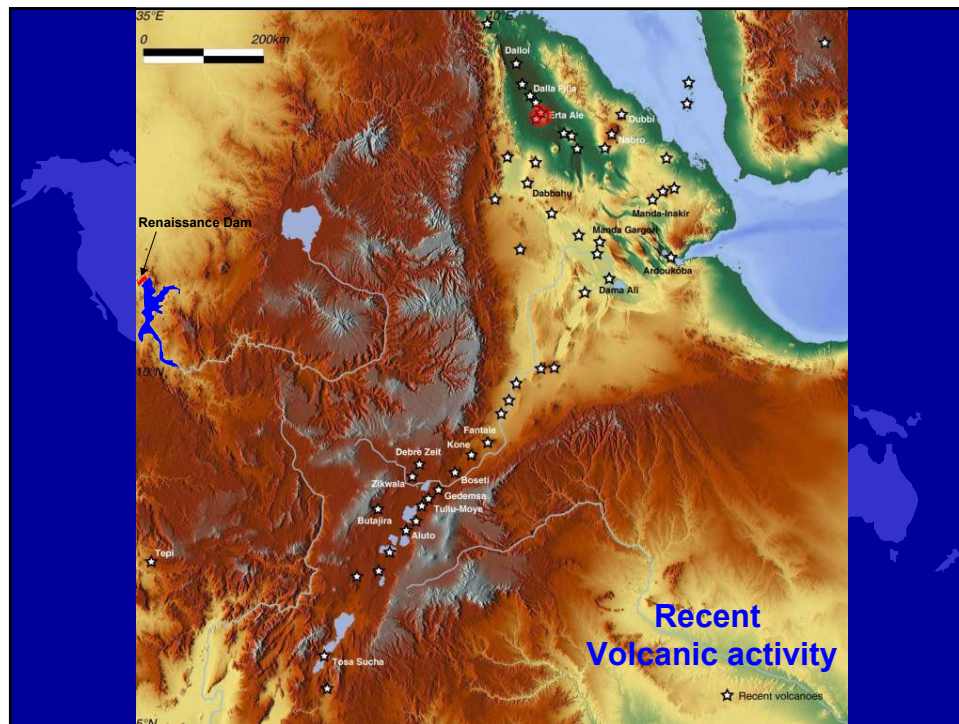


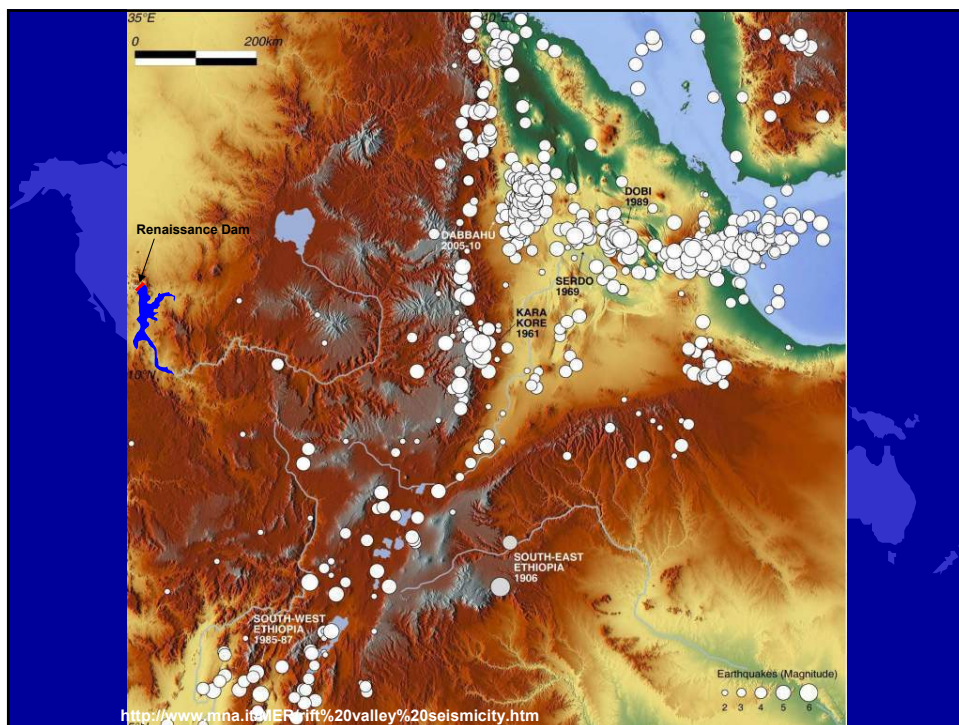
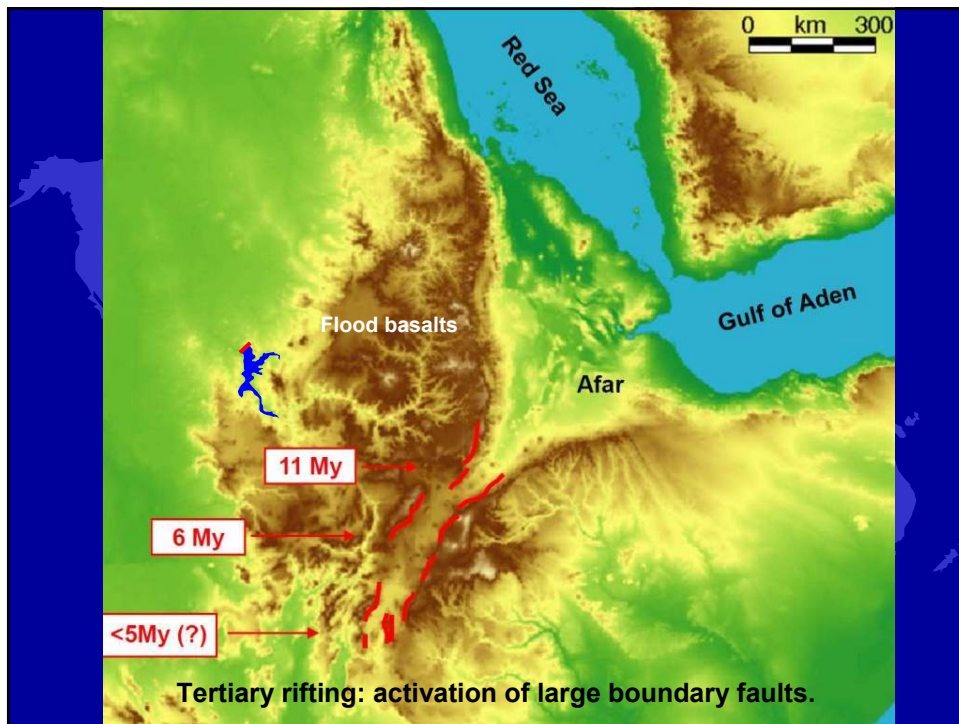
Challenges

- 1 Spatial distribution
- 2 Temporal distribution
- 3 Evaporation
- 4 Topography
- 5 Rock Types
- 6 Erosion and Silt Load
- 7 Tectonics & Earthquakes

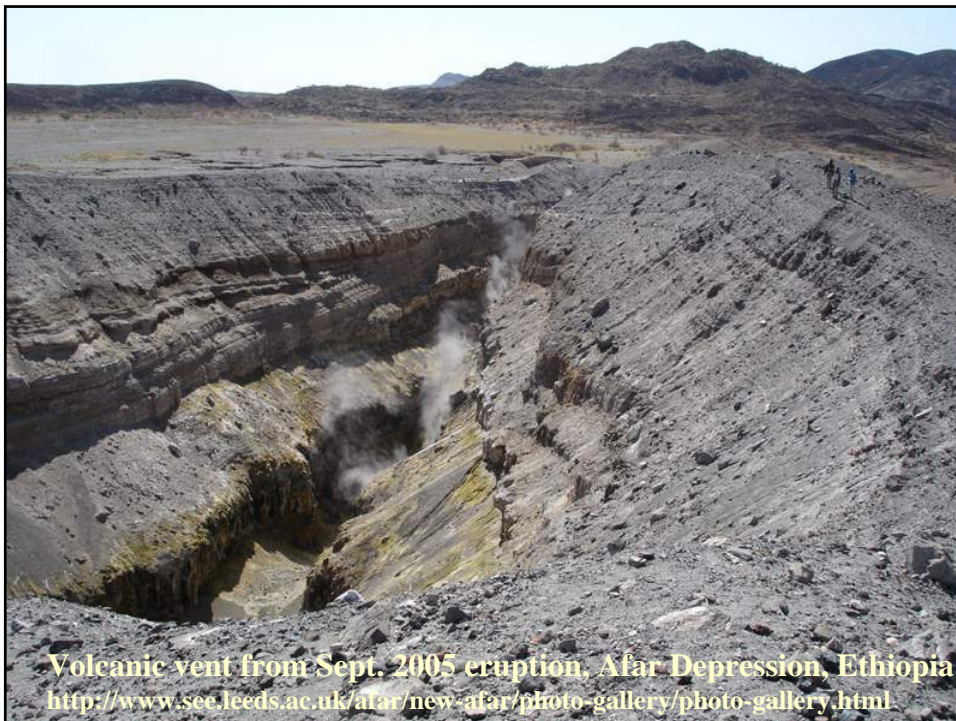
Buildings, Bridges, Dams and Water Supply Networks are at Risk.



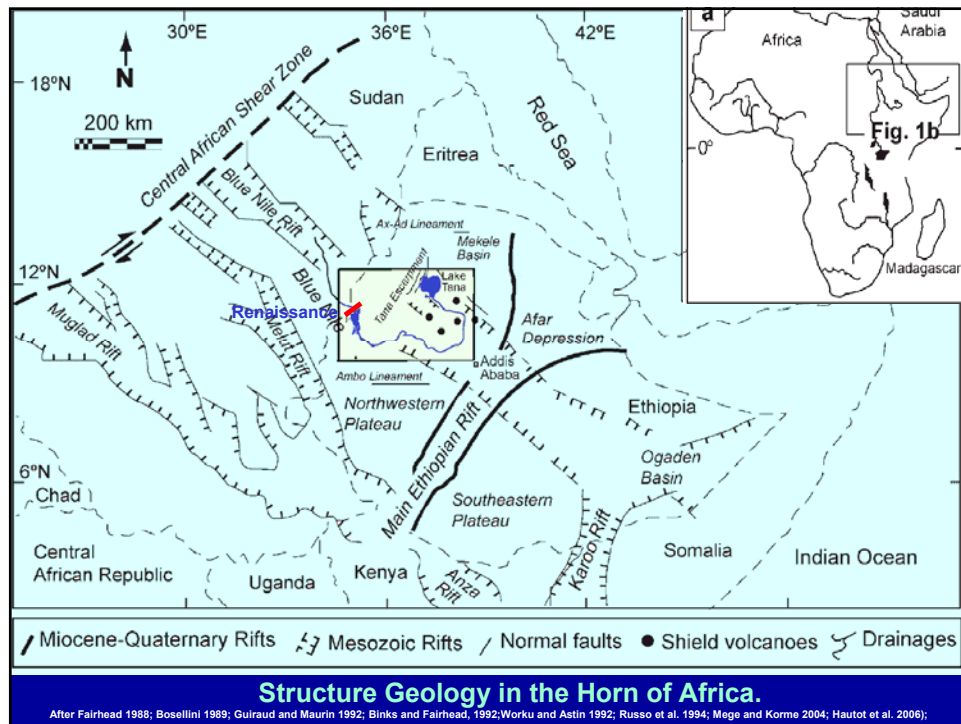




A ground rupture created during the September 2005 the sun rifting event in the Dabbahu segment in the Afar rift.



Volcanic vent from Sept. 2005 eruption, Afar Depression, Ethiopia
<http://www.sce.leeds.ac.uk/afar/new-afar/photo-gallery/photo-gallery.html>



Challenges

- 1 Spatial distribution
- 2 Temporal distribution
- 3 Evaporation
- 4 Topography
- 5 Rock Types
- 6 Erosion and Siltation
- 7 Tectonics-Earthquakes
- 8 Landslides

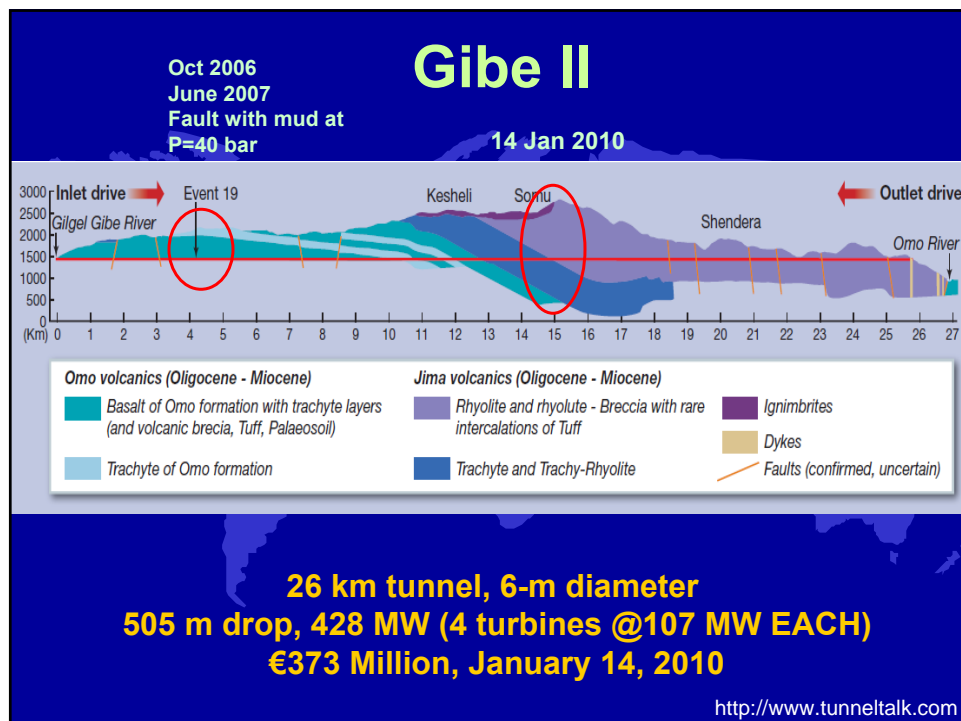
Rock falls, Debris slides and avalanches,
debris flows and mudflows



Gibe II

15 m section of its headrace 26-km tunnel collapsed after 10 days.
Jan 13, 2010

<http://www.tunneltalk.com>





Challenges

- 1 PPT. Spatial dist.
- 2 PPT. Temporal dist.
- 3 Evaporation
- 4 Topography
- 5 Rock Types
- 6 Erosion and Siltation
- 7 Tectonics
- 8 Landslides