



# *Near-Surface Soil Moisture Assessment and its Influence on Regional Scale Heat Fluxes*

Hawi Abate

a PhD research project (2007-2010)

supervised by:

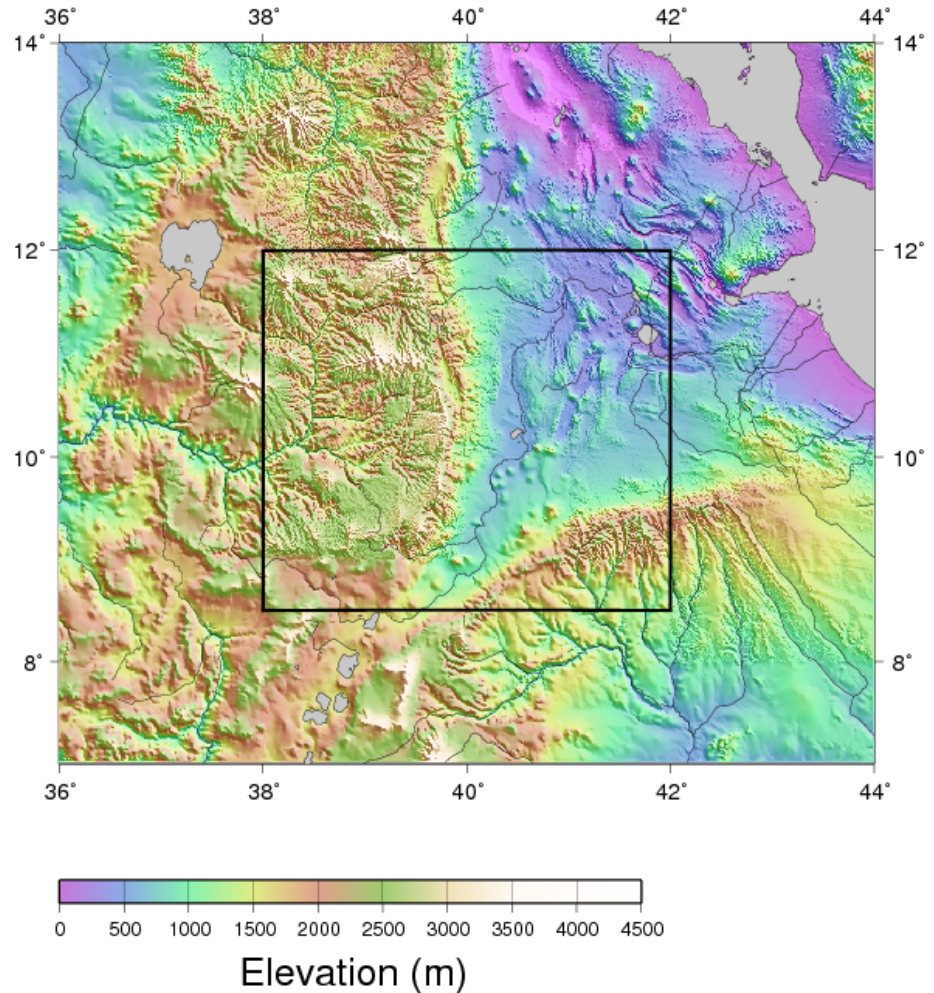
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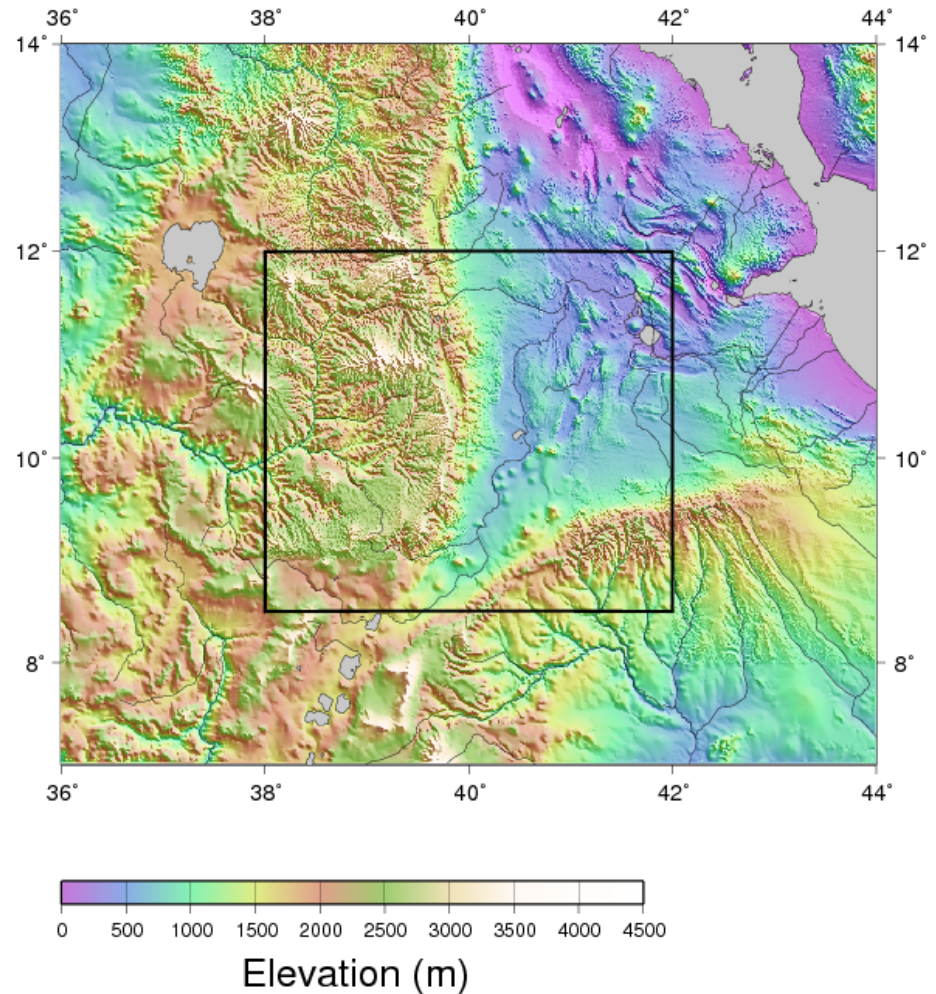
# Study Area

- Location =  $8^{\circ}30'N$  -  $12^{\circ}N$  &  $38^{\circ}E$ - $42^{\circ}E$
- total land area of  $110,000 \text{ km}^2$
- Elevation varies b/n  $3000\text{m}$ - $250\text{m}$



# Study Area

- High spatial and temporal rainfall variability
- Very high evapotranspiration
- Low groundwater recharge
- Low vegetative production
- Expanding deforestation
- Increase of water demand



# General Objective

- Assess the spatial and temporal pattern of near surface soil moisture condition in the Upper and Middle Awash basins
- Assess the influence of soil moisture on regional scale heat fluxes in the region
- Estimation of the spatial and temporal recharge in the region

# Justification

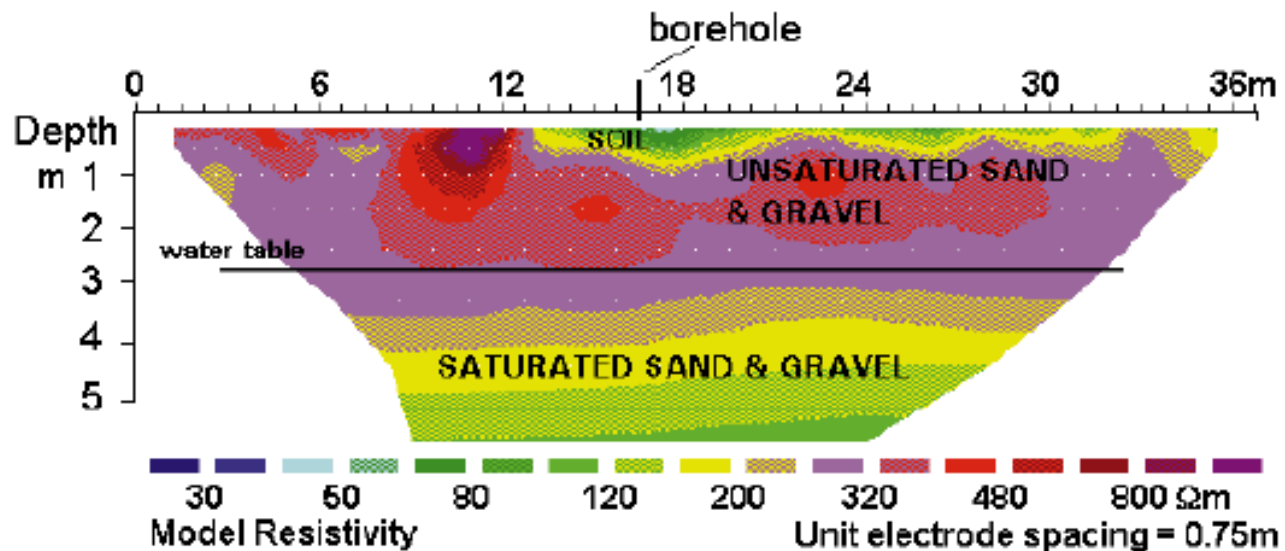
- soil moisture is one of the most crucial components driving the surface hydrological processes
- is a critical storage parameter, which controls partitioning of energy related to evapotranspiration (Georgakakos, 1996), (Hanson et al., 1999).
- plays a significant role in partitioning of the precipitation into runoff and infiltration
- Can also help in assessing spatial recharge

# General Approaches

- Remote Sensing ( Optical and Microwave)  
(studies have successfully established the use of passive microwave remote sensing to measure the surface wetness (Engman and Gurney, 1991; Jackson, 1993; Njoku and Entekhabi, 1995; Jackson et al., 1999))
- SVAT model (not yet selected)

# General Approaches

- Geophysical methods (Electrical Resistivity Tomography (ERT) ) for field scale validation



(Barker and Moore, 1998)

# General Approaches

- Groundwater recharge monitoring

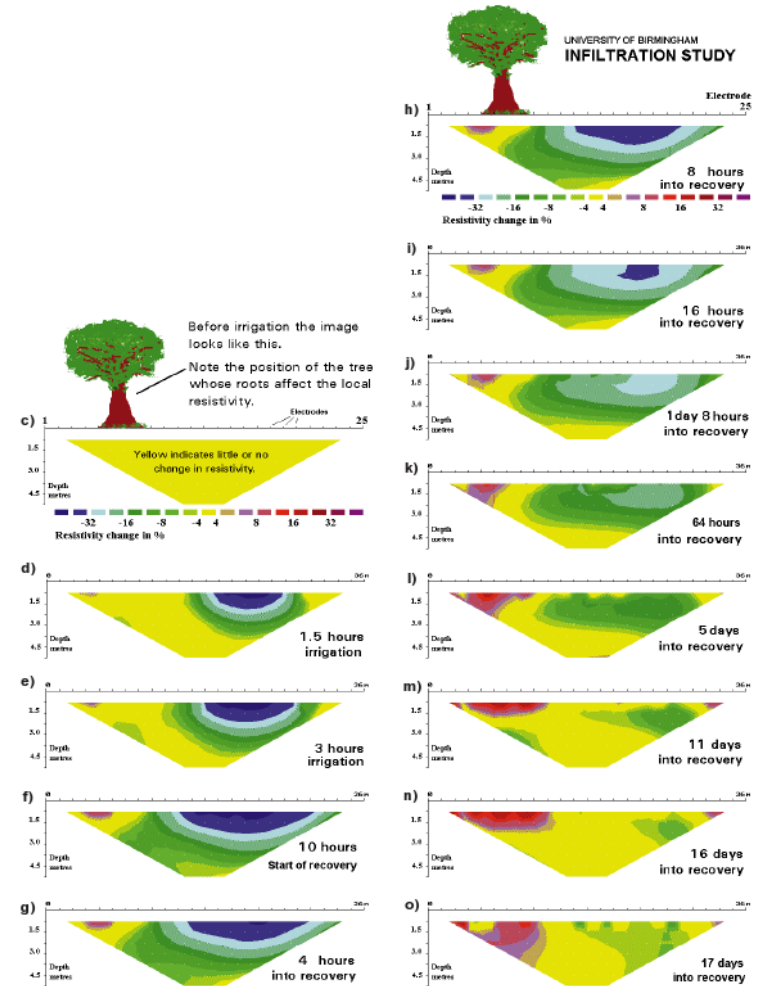


Figure 2. (a) Apparent resistivity pseudosection measured over sand and gravel with electrode spacing of 1.5 m; (b) resistivity produced from the inversion of (a); (c)-(o) difference images measured during infiltration and recovery phases of the study.

(Barker and Moore, 1998)

# General Approaches

- Correlation function between remote sensing data, geophysics and in situ data at test sites  
*First priority is the area of study of Andarge Ytbarek and Wakgari Furi (PhD also starting) where hydrological data will be available.*
- Extrapolation at the basin scale

# Data acquisition from RCMRD

- Some Landsat Scenes
- Envisat MERIS scenes
- ASTER and Terra MODIS scenes have been obtained
- Other lists of scenes are submitted and we are waiting for response

*Thank you*