



### **Review of endogenous hazards in Southern Ethiopia**

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- Seismic hazards:
  - Past earthquakes (magnitude, location)
  - Tectonic structures (faults) and their age
  - Lithologies with potential to amplify seismic effects
- Ground cracks (fissures)
- Volcanic hazards:
  - Type of volcano
  - Character, composition, style and volume of past eruptions (extent, thickness)
  - Time since last eruption and frequency



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- Specific features: swarms, volcanic seismicity
- Earthquakes over magnitude 6
- Weak localization
- Sediments amplification of seismic efects
- Constructions in areas under seismic risk





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### Aluto Volcano

- active hydrothermal system
- both lava and pumice eruptions
- bimodal distribution of winds during year (10-5 from NE; 6-9 from SW) – strong effect on tephra distribution





















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Golba crater – source vent of the 9 ka Česká geologická služba | Czech Ge phreatomagmatic tuff

### Aluto Volcano

- phreatomagmatic tuff 9 ka (unpublished theses reviewed by T. Chernet) – mostly to SW
- pumice eruption 50 BC (Gianelli &Teklemariam 1993) – mostly to NE
- obsidian lavas even younger (no data)







Fike Volcano

### Fike Volcano

- post-dating Shalla and Corbetti ignimbrite eruptions
- widespread phreatomagmatic AL-rich tuff and small ignimbrite (to the N)



Acretionarry lapilli -rich lapilli-stone to lapilli tuff building up the cone of Fike Volcano



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### Fike Volcano

- AL-rich tuff around
  Shashemene might be also linked to Fike (more research needed)
- no analytical data about

Soil-pit exposing 6 m thick layer of AL-rich phreatomagmatic tuff near Shashemene



AL-rich phreatomagmatic tuff near Shashemene



Sellers dug in the AL-rich phreatomagmatic tuff near Shashemene



- active hydrothermal system (related to tectonic structures)
- volcano itself seems extinct
- W part of the lake is not part of the caldera but of tectonic origin







### Corbetti Caldera

- in NW corner of ancestor Hawasa caldera (ignimbrites 1.3 Ma, post-ignimbrite domes ca 1 Ma, K-Ar)
- Corbetti: ignimbrites, 0.7 and 0.2 Ma
- Chabi and Wendo Koshe Volcanoes post-date caldera forming eruption



### Vendo Koshe pumice and obsidians

- Standard

Chabi obsidians

7°10'0"N



# Corbetti Caldera

- Wendo Koshe Crater source of widespread pumice
- Soil burried by the WK pumice dated 400 BC (<sup>14</sup>C)



Wendo Koshe crater in the Corbetti Caldera



400 BC WK pumice reaches thickness of 2 m near the road Hawasa Shashemene



0 5 10 km

Isopach scetch-map for the 400 BC WK pumice fall (in m), distribution to the E due to winds blowing mostly from W – see wind-rose diagram on next slide





























400 BC WK pumice dominated by fall, but locally also flow deposits occur



#### older phreatomagmatic activity

Close to Wedo Koshe, the 400BC WK pumice (> 3 m thick) overlay older pumice (1 m thick, no age data) and phreatomagmatic deposits (6 m). Pre-400BC deposits cannot be traced out of caldera.

400 BC

#### **CHABI - obsidian shield volcano inside the Corbetti Caldera**



4 obsidian lavas from Chabi post-date the 400BC WK pumice. The obsidians and pumice from both Chabi and Wendo Koshe have very uniform composition except of the oldest obsidians. Geological map at 1:50.000 scale has been completed (next slide).



## Duguna Fango

- no signs of holocene volcanic activity
- fumaroles and hot springs

obsidians strongly altered around fumarole on the S slope of DF



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# Duguna Fango





- layered and laminated phreatomagmatric pumice deposits
- Can be source of whitish tuff interbedded within soil around Alaba Kulito and Dimtu





# not accessed (military training camp – Special Forces)

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## Korke Seluwa

- fresh crystal-rich obsidians not covered with soil
- U/Th-series disequilibria dating not successful
- we expect age of X00 years

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# Butajira VF

- 80 km long row of scoria cones and maars
- few geochronological data
- some cones up to 1 Ma





- Map of
  distribution of
  Shetan deposits
  nearly
  completed
- some scoriae younger, some older than Shetan



Acording to morphology and light-reflection (in satellite images), Debes Quoto seems to be the youngest cone of the Butajira VF.



Geysir was born in the BVF in the night of April 30th 2014 after Chinese drilling for irrigation water.





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## East Ziway VF

- numerous scoria cones, E, S, and on the Lake Ziway (also around Aluto)
- geochronological data with big error



Most of the cones covered by 50 BC Aluto pumice



### Bilate VF

- 3 maars strongly affected by erosion
- several older (0.6 Ma) scoria cones





## Shalla-Hawasa VF

- several basaltic scoria- and tuffcones around Shalla and Hawasa
- all covered with 400 BC WK pumice, K-Ar data pending







# Humbo (syn. Hamasa) VF

- numerous scoria cones N of Lake Abaya
- difficult accessibility, no geochronological data, composition: basalt, trachybasalt
- hot springs









Bobicho thermal spring with travertines.

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- several scoria cones in N part of Lake Chamo and on NechSar Plains
- post-date Tosa Sucha volcanic activity (0.7 Ma, George & Rogers 1999), most K-Ar data about 0.5 Ma
- composition: basalt trachyte
- frequently with basal phreatomagmatic layer







#### **Strombolian phase**

#### **Initial phreatomagmatic phase**

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# Thank you

# for attention