The Abdus Salam
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Advanced Workshop on Evaluating, Monitoring and Communicating Volcanic and Seismic Hazards in East Africa

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The seismic cycle 2. Inter-seismic and post-seismic deformation

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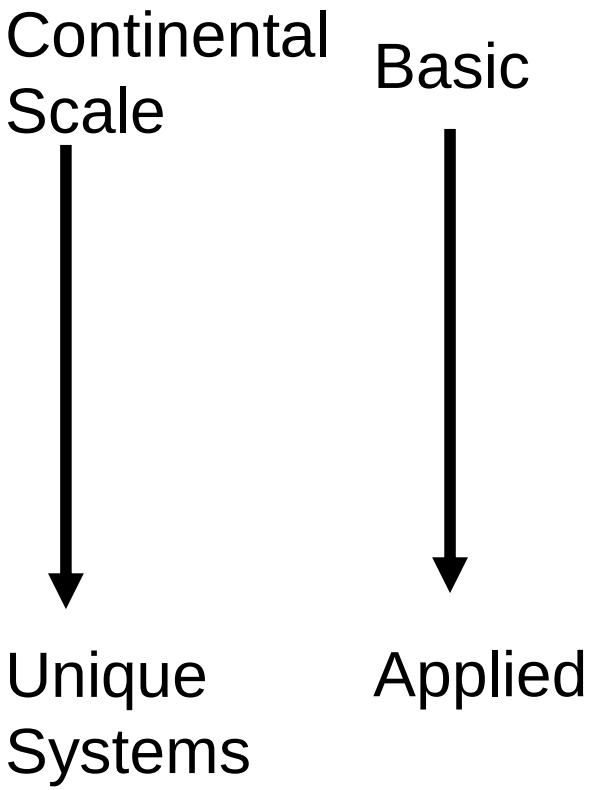
Top Science Question:
4- Dimensional Evolution of Pan-African Lithosphere



1. Continental Breakup
2. Rift Variability
3. Processes on different time and space scales
4. Implications for Hazard and Resources

1. Continental Break-up

- Cause and timing of break-up
- Role and Origin of Magmas.
- Relationship to interior of earth and superplume (chemical and physical properties and heterogeneities of mantle).
- Cycles of supercontinent formation and breakup
- Africa is unique: active continental breakup; surrounded by spreading centers. Ideal laboratory site.

e.g. What conditions are required for continental breakup - GPE stresses, role of melts and fluids

2. Rift Variability: Seismicity, rifting mechanisms, melt production

- Between rift segments; along and across axis.
  - Relationship to rift evolution + propagation.
  - Relationship to local environment, inherited structures, mantle structure and composition
  - e.g. will western branch ever look like Afar?
- Asymmetry.
  - Between branches (west v east branch);
  - Of individual rifts;
  - Plume obliquity.

3. Rifting processes on different time and spatial scales

- Contribution of active and geologically recorded processes to rift evolution and continental breakup?
- Changes through time - continuous or episodic activity [rates of faulting/rifting and magma production rates].
- Requires spatio-temporal mapping (e.g. present day strain and seismicity, dating volcanic rocks, historical earthquake records, geomorphology/geochronology, geology).
  - e.g how is extension accommodated (faults v dikes)? how do faults grow and link? how are melts generated and do magma chambers form?

4. Implications for Hazard and Resource

- Volcanic
  - -recurrence intervals of eruptions (dating,mapping)
  - -eruption styles and individual volcano petrology, chemistry, and precursory geophysical and chemical signals, hazard maps
  - -NEED BASELINE DATA TO FORECAST ERUPTIONS
- Seismic
  - -historical and pre-historical seismic assessment (paleoseismicity for recurrence intervals)
  - -Identification of active faults and slip rates.
  - => hazard maps
- Triggered hazards: Landslides, lahars, tsunamis

Resources

-Mineral -making data available to government agencies; implications of research findings for mineralization

-Geothermal -identifying, characterizing and quantifying geothermal resources

-Groundwater -basin identification and characterization, water usage and river flow, drought and agriculture, climate

-Protection of resources from hazards

Discussion Comments

- Timing and significance of uplift, climate history
- Integrated science - extend in geochronology, geochemisty, paleoseismology etc.
- Role of magma in southern extension of rift.
- Role of Science in Africa:
  - Philosophy of Pure Science vs Hazard Science,
  - High-impact focus sites vs continental-scale hazard mapping.