Himalayan Evolution in the Sands of Time: Geochemical Analysis of Siwalik Garnets (Nepal)

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1. Introduction

- Sandstone samples from the Surai Khola unit in the Himalayan mountain range's Siwaliks
- Different populations of detrital garnets showing differences in the elements Mn, Mg, Ca, and Fe from rim to rim.
- Greater Himalaya profiles in garnets from the Siwaliks middle section
- Transition zone at unit SK-11
- Lesser Himalaya profile in the upper Siwaliks.

Method

Extract Garnet from Siwalik sediment

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Generate Garnet Compositions

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Evaluate Garnet Zoning for Provenance

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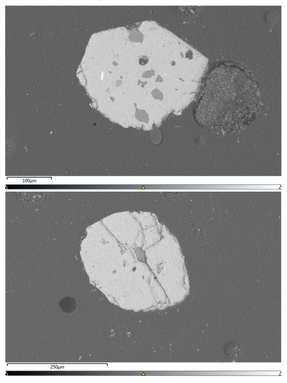
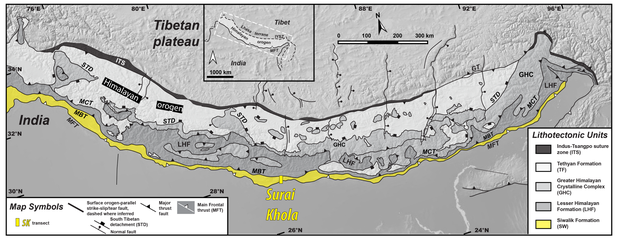
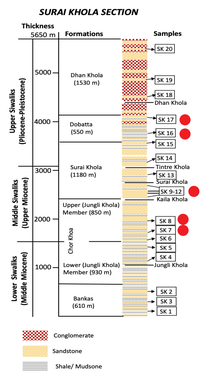
Use Garnet to Estimate P-T Conditions

Garnet grains from SK-11

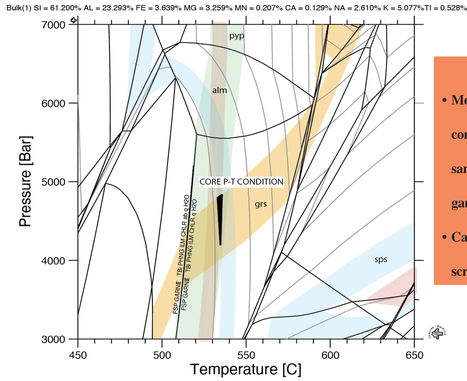


2. Sedimentary units at the base of the Himalayan mountain range





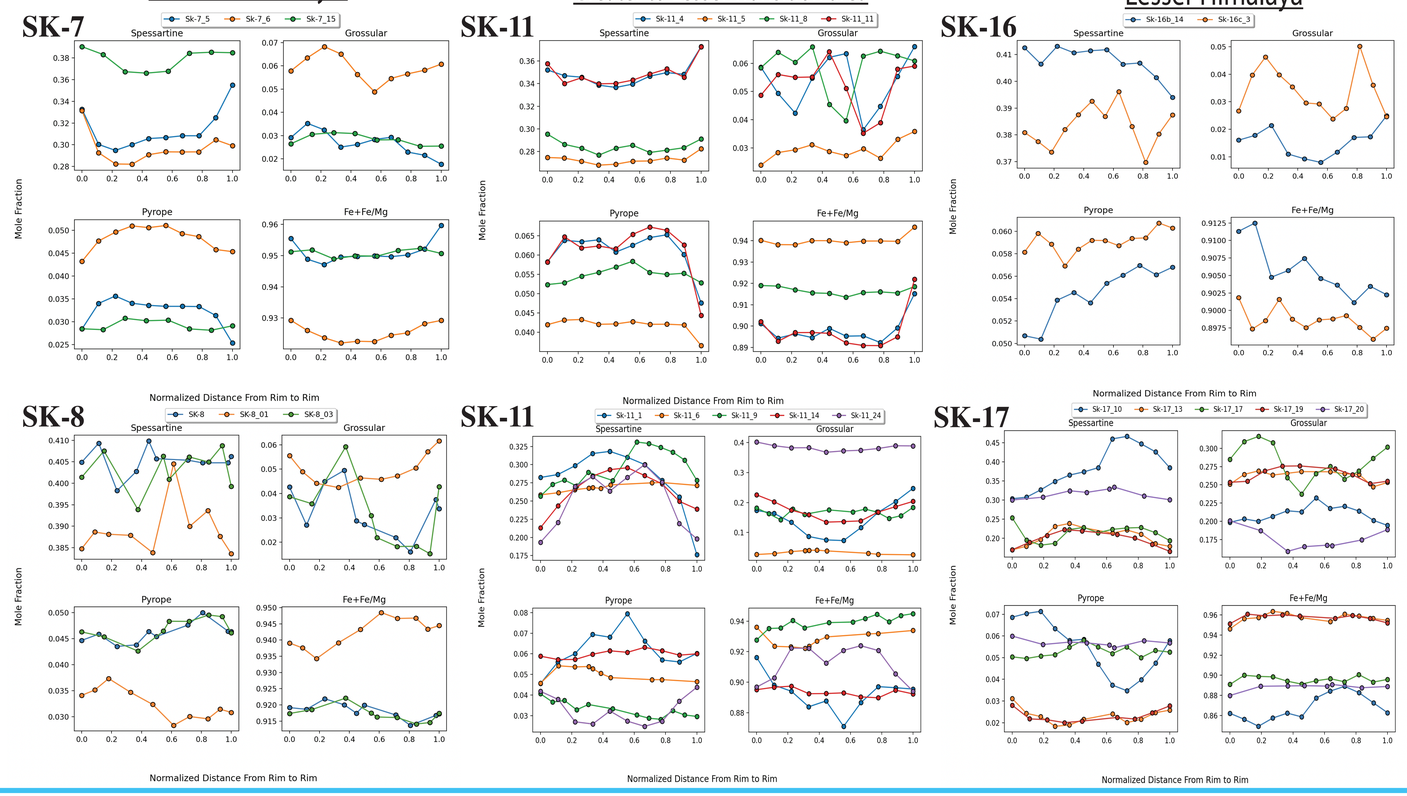
4. Modeled P-T Condition



Model Notes

- Model is designed using bulk rock compositions of Lesser Himalaya samples and a core from an SK-11 garnet
- Calculated using Theriak Domino scripts

3. Results for Compositional Diagram



5. Notes and Discussions

- Samples are sandstones from middle-Miocene through Pleistocene
- Chemically distinct zoning from the garnets show history of formation.
- Modeled bulk composition of host rock shows potential P-T conditions for core formation
- Lower Siwalik Sediment is not used because there are no garnets

Spessartine rim to rim trend

Bell shaped Curvature	Flatter Convex Curve
Samples: SK-11, SK-16, SK-17	Samples: SK-7, SK-8, SK-11
Lesser Himalayas	Greater Himalayas

6. Conclusions

- Sedimentary layers in the Siwaliks preserve garnet grains with distinct compositions at different periods of Himalayan Tectonics
- The compositions can be used to indicate uplift and erosional history

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