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Identification of geothermal anomalies from Landsat derived land surface temperature, Mount Meager Volcanic Complex, British Columbia, Canada

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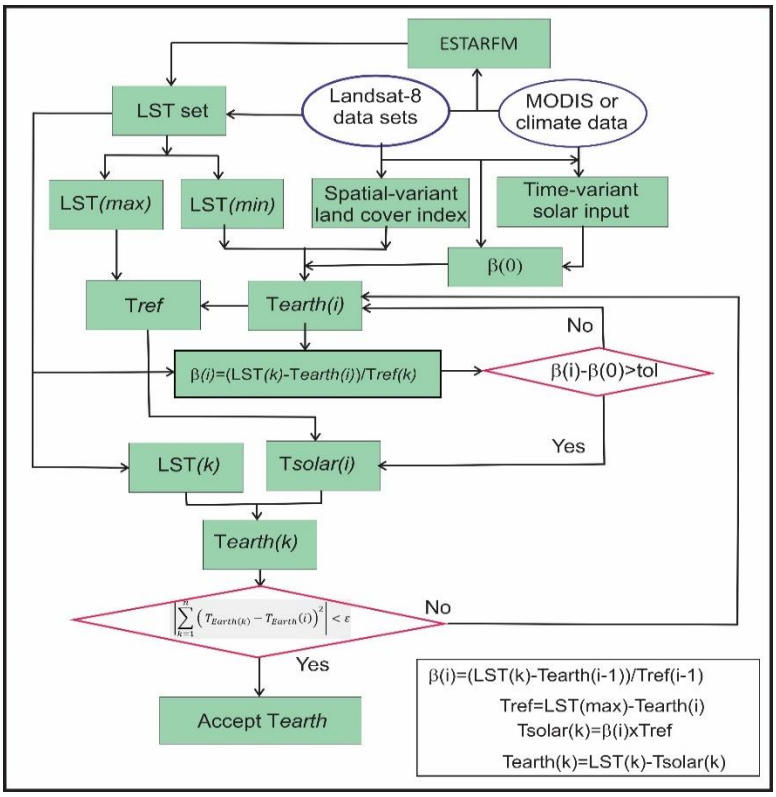
Summary

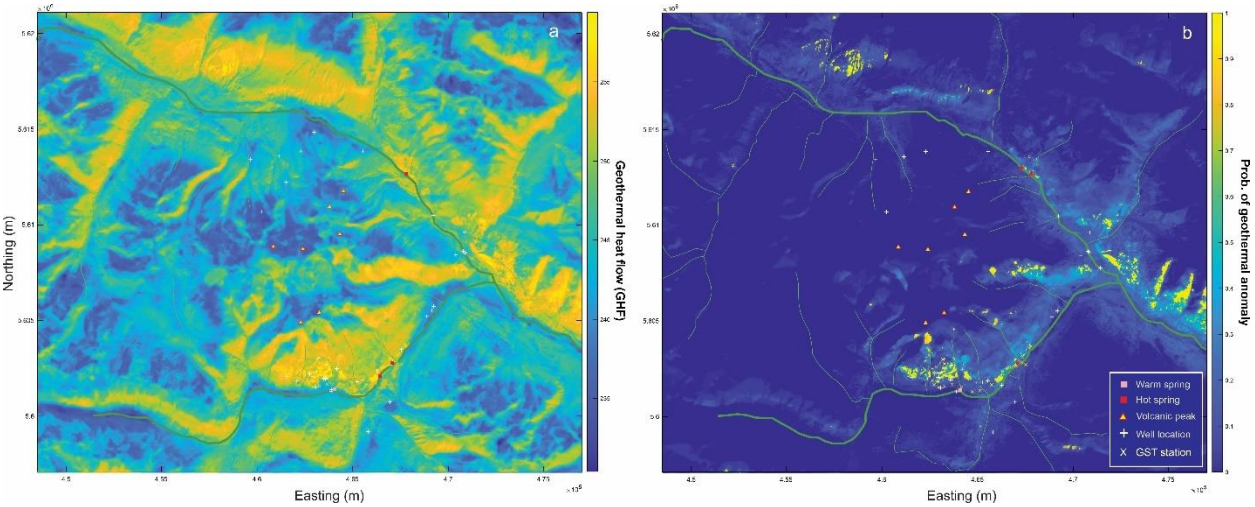
The Land surface temperature (LST) from satellite images contains meaningful signatures of geothermal heat flux (GHF) for geothermal exploration, but the signal is mixed with solar radiation dominated features, making identify GHF related LST anomaly difficult. Here we propose a novel method to tackle this problem by removal of the time variant solar component based on principles of energy balance through an iteration process of multiple LST maps from different seasons to reveal the temporal invariant GHF component. We tested this method by examining the Mount Meager Volcanic Complex area in British Columbia, Canada where data of known geothermal prospects are publicly accessible for validation. 72 Landsat-8 cloud-free LST maps acquired in the last 10 years, were employed to extract the GHF component. The proposed method provides an efficient way to extract non-solar sourced LST anomalies, adding a cost-effective tool for geothermal exploration, and environmental/geohazard monitoring.

Theory / Method / Workflow



Results, Observations, Conclusions

A novel method is proposed to highlight temperature anomalies associated with geothermal heat flux from Landsat TIR converted LSTs. Four major areas of high anomalies were identified in this study. The proposed approach adds a potential tool for geothermal prospect screening in resource reconnaissance, and appliable to geohazard and environmental monitoring.



Acknowledgements

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Etc.