GeoConvention 2015
GEOSCIENCE
new horizons
Telus Convention Centre • 4-8 May 2015 • Calgary, AB Canada

Recent Updates to the Bedrock Topography Model of Alberta

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Summary

The Alberta Geological Survey recently updated their bedrock topography surface of Alberta to incorporate additional data sources and provide an enhanced geostatistical evaluation and interpolation of the data, as well as to provide a model for the north-central portion of the province which was not previously included in AGS Map 550 by Atkinson and Lyster (2010).

Introduction

The bedrock topography of Alberta is the surface between the top of Upper Cretaceous and Paleogene bedrock and the modern land surface. It contains geomorphic features created by Paleogene to Recent river systems as well as the advance and retreat of the Laurentide and Cordilleran ice sheets during the Quaternary glaciation, resulting in a complex and highly variable topography. The bedrock topography is an important surface that has significant implications on aggregate resource assessments, groundwater studies, and land-use applications. The AGS has access to a significant amount of information identifying the top of bedrock interface; however the quality of this data is extremely variable. It was determined that a new bedrock topography surface should be developed to include a data-quality weighting mechanism and prediction assessments to facilitate communication of model uncertainty with our stakeholders.

Method

Bedrock elevation data were collected from a variety of sources throughout the province, and some of these data were determined to be from more reliable sources than others. The majority of the bedrock elevation data were from lower quality data sources; therefore it was important to perform quality filter assessments prior to geostatistical evaluation and interpolation of the bedrock topography surface. The objective of filtering data based on quality is to increase the influence of the high quality data, and reduce the impact of lower quality data on the interpolation results. The applied quality weighting method was able to constrain the negative impacts of the lower quality data on the model output while still utilizing these data to constrain the model in areas where high quality data were unavailable.

Conclusions

The Alberta Geological Survey's bedrock topography model was updated to include a geostatistical evaluation of the data using a quality-weighted approach and now seamlessly covers the entire province of Alberta. This model includes maps of data quality, data density, model uncertainty, and topographic

variability to facilitate communication of potential uncertainty in the model predictions with people looking to utilize this surface.

Acknowledgements

The Authors would like to thank our colleagues at the Alberta Geological Survey and especially John Pawlowicz, Laurence Andriashek, Glen Prior, and Dan Utting for their contributions and advice. We would also like to thank Kirk McKay for his cartographic expertise preparing the visual representations of the modelled surface.

References

Atkinson, N. and Lyster, S. (2010) Bedrock topography of Alberta, Canada; Energy Resources Conservation Board, ERCB/AGS Map 550, scale 1:1 500 000.