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Interactive comment on
**“3-D-geomechanical-numerical model of the
contemporary crustal stress state in the Alberta
Basin” by K. Reiter and O. Heidbach**

Anonymous Referee #2

Received and published: 23 September 2014

This is a well-written manuscript which does an excellent job of summarizing the state-of-the-art in predicting the stress tensor at the basin scale. The authors correctly identify the need and utility of predicting/evaluating the stress tensor away from boreholes (where direct stress measurements are possible, to some degree). After an excellent summary of the methodologies used to estimate various components of the stress tensor, the authors present the modeling results for the Alberta Basin, which, given the large amount of stress data collected in the basin, is an ideal location for constraining 3-D models of the stress field. A few issues could have been addressed in greater detail to strengthen this contribution: 1) Which finite element code was used for the modeling? 2) The importance of a high-fidelity geologic framework model (GFM)

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that captures the geologic variation in the subsurface cannot be under-emphasized – some discussion of the methodology and/or software used to create the GFM used for the model would be useful; 3) A topic of great interest is the cross-over at which the well-understood plate-scale stress field (1000+ km wavelength) is modulated at the basin-scale (10-100km wavelength) and where local geology (faults, property heterogeneities, etc) exert a greater influence on the stress field. Some discussion of this cross over using the results of the model presented in this manuscript would have been insightful and of great interest. Finally, 4) some discussion of the uncertainties in the stress field prediction would be of interest – perhaps a bit more rigorous quantification of how much local structure and faults influence the predicted stress field. These suggestions aside, the manuscript is an excellent contribution and indeed provides a well-constrained estimate of the first-order stress field that is useful for geothermal development and/or petroleum extraction.

Interactive comment on Solid Earth Discuss., 6, 2423, 2014.

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6, C999–C1000, 2014

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