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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 #3

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The paper provides an interesting case study for geomechanical modeling on the scale of a large sedimentary basin. While the geomechanical-numerical approach used is not new and already well established, the particular value of the paper lies in the large data base of stress measurements which was available for this study. This allowed for interesting parameter studies and a statistical calibration procedure which usually is not possible due to lack of stress data.

The paper is well written and explains the modeling approach as well as the different stress measurement techniques and modeling results in great detail. My only concerns refer to the dimensions of the numerical model and the boundary conditions selected. As it is stated by the authors themselves in section 3.1.1 the Alberta Basin results

from lithospheric loading and isostatic flexure. However, none of these processes is reflected in the boundary conditions: the base of the model is fixed in vertical direction without any consideration of isostatic rebound forces and only horizontal displacements act on the sides of the model. The other discrepancy refers to the vertical model dimensions of 80 km as observed stress data are only available for the uppermost 5 km. This in turn excludes the incorporation of a mechanical stratigraphy and results in a rather poor resolution (= large element size) for the depth range of interest. I suggest that the authors add a paragraph in the conclusions section and address the limitations of their particular modeling scenario, especially concerning the boundary conditions selected.

In summary, I recommend publication after minor revision honouring the two points mentioned above. And as final remark, it may be helpful for some readers not familiar with all the sedimentary basins worldwide if the title is slightly modified: ... Alberta Basin / Canada.

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