

Tectonic Subsidence Variations in the Jurassic of West-central Alberta

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Summary

Tectonic subsidence curves were generated for over 200 wells in west-central Alberta to study the initiation of the foreland basin, as recorded in the Jurassic sediments in this area. A customized methodology for performing the calculations was used to facilitate a more detailed examination of the tectonic subsidence. This study reveals spatial and temporal variations in tectonic subsidence within the basin.

Study Area

The tectonic subsidence curves were generated using subsurface well data extending from Township 30 Range 1W5 in the southeast to Township 71 Range 13W6 in the northwest, bounded to the west by the eastern limit of deformation and to the east by the Jurassic subcrop edge (Figure 1). The foreland basin extends to the west, into the fold and thrust belt, however wells from the fold and thrust belt have not been included here due to the complexity of generating subsidence curves through thrust-faulted layers.

Methodology

The volume and spatial distribution of subsidence curves associated with this study is at least an order of magnitude greater than typical subsidence studies, thus this approach required a customized methodology. The lithologies and their thicknesses were determined using well logs and exported to an excel spreadsheet. Macros were written to perform the decompaction and 1D backstripping needed to graph the tectonic subsidence versus age, using the equations described by Allen and Allen (2005). The calculated tectonic subsidence for the selected units was mapped in west-central Alberta.

Results

Tectonic subsidence maps show a zone of increased tectonic subsidence in the southern part of the study area near the town of Edson. This zone is present throughout deposition of the Nordegg, Poker Chip and Rock Creek Members of the Fernie Formation but begins to disappear during deposition of the Upper Fernie. Whether these variations are due to local or regional tectonics is under investigation at the time of writing this abstract.

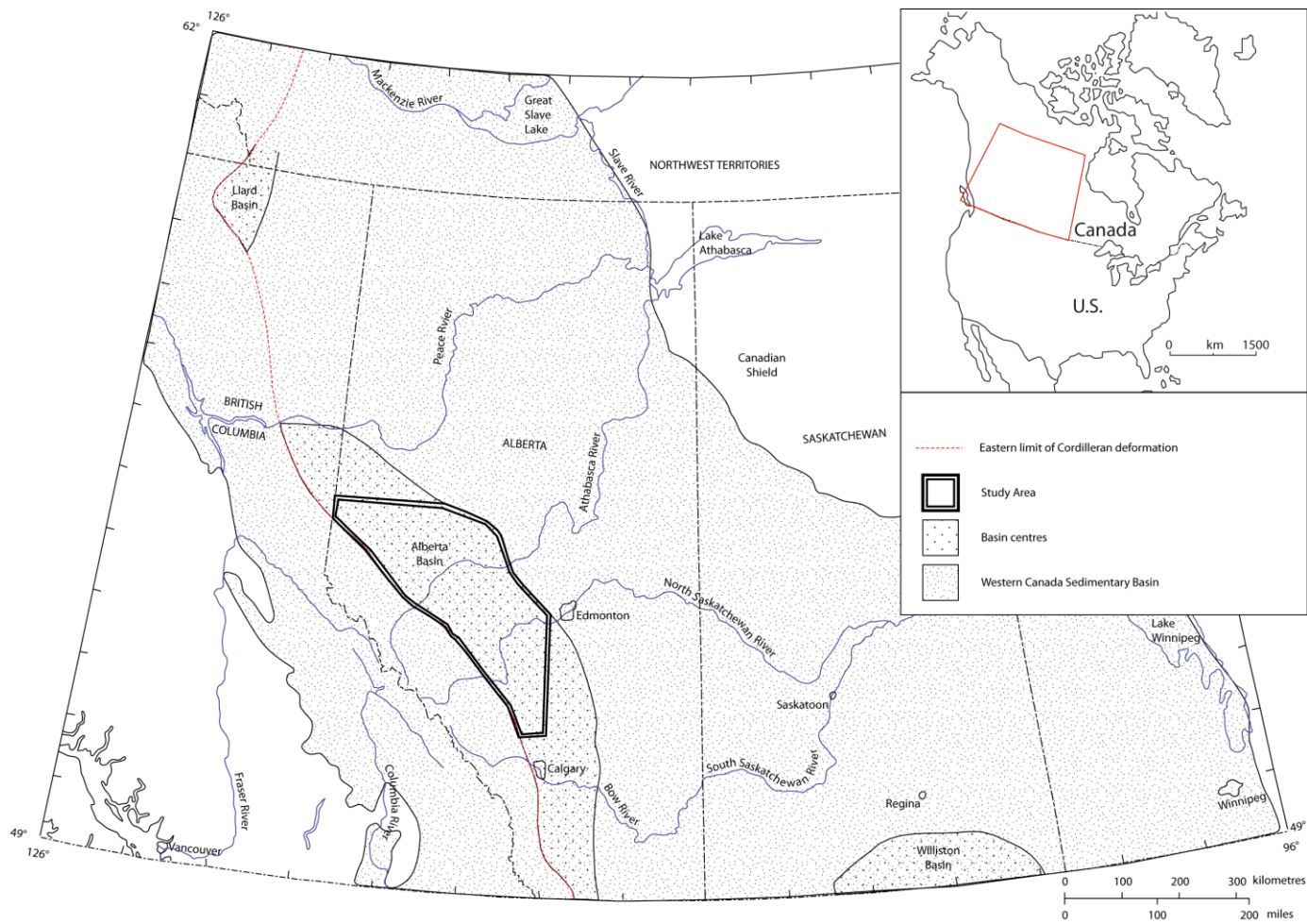


Figure 1: Map of the Western Canada Sedimentary Basin, showing the Alberta portion of the Alberta Foreland Basin and the study area. Structures and basin boundaries from Geological Atlas of the Western Canadian Sedimentary Basin (Wright et al. 1994)

Acknowledgements

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References

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