

## The Manyberries Astrobleme: A Complete Geophysical Analysis

*Amanda K. Obodovsky*

*Divestco*

### Summary

The Manyberries astrobleme is a buried impact crater located in southern Alberta. This event impacted into the Mississippian surface and was discovered when seismic data was acquired for the area. Using 4 2D lines that cut through the buried astrobleme, along with well data for the area, a complete geophysical analysis of the area and the astrobleme has been conducted. The goals are to create a pseudo 3D map of the structure, defining the size and shape of the structure, along with using geological information to define the age of the impact.

### Introduction

Throughout Earth's history the surface has been impacted by objects from our solar system creating impact craters, otherwise known as astroblemes. In time some of these astroblemes become filled in with sediment and buried underground. One such object impacted in Alberta a long time ago creating the impact structure in the Manyberries area. The structure created is about 1km in size and created a significant effect upon Cretaceous and Paleozoic stratigraphic layers.

Seismic data for this region was acquired in 1978-1979. Four lines were acquired that cut through the circular astroblemes structure at different angles, which allows for azimuthal mapping of the circular structure. One of the goals of this project is to use the azimuthal information to create a pseudo 3D map of the overall structure. Figure 1 shows a map of the lines and an approximate outline of the buried crater.

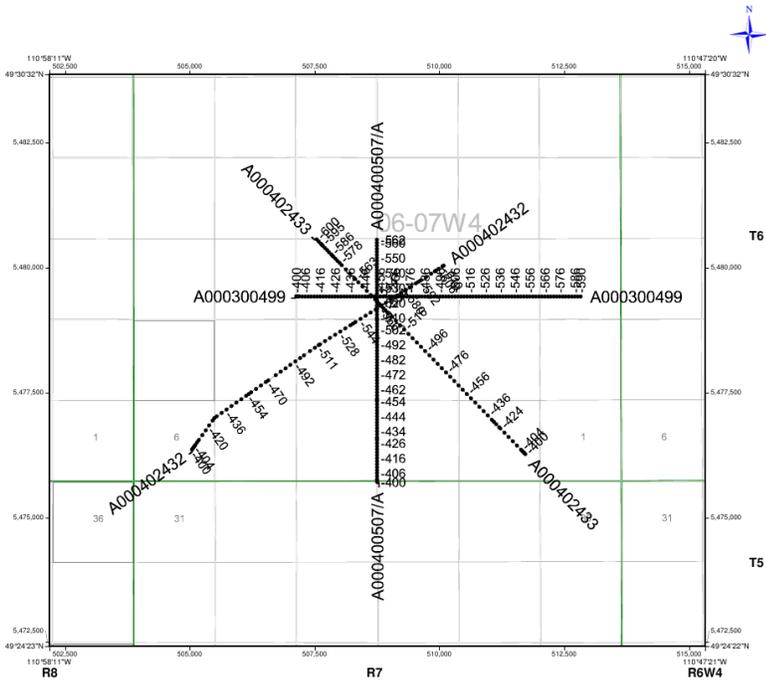


Figure 1. A map showing the location of the 4 2D seismic lines used to interpret the structure of the buried astrobleme.

### Theory and/or Method

For the seismic data processing, an advanced AVO friendly processing flow was done to all of the 2D lines. New techniques, specifically Divestco's next generation imaging 6D interpolation and Diffraction Imaging were also applied to the data to see if more information about the impact structure could be obtained. Figure 2 shows an image of one of the seismic data lines, highlighting the impact structure.

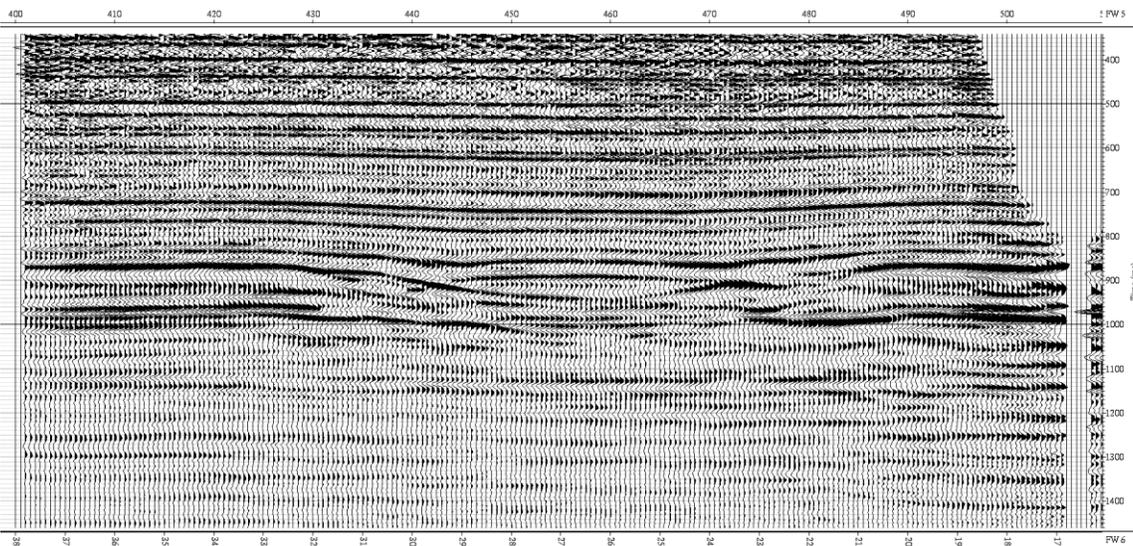


Figure 2. A post stack migration of line A000300499 showing the impact structure. Note the distinctive bowl shape of the simple crater and the layers of sediment that has filled in the structure after the impact event occurred.

Well logs in the area of the 2D data were also used to tie the seismic data and gather insights on the geology of the area the impact structure occurred in.

## **Conclusions**

There are many impact structures that can be seen below the surface. As each one is studied we gain a better understanding of the geological events that occurred to create the structures that we see, as well as gain a better understanding on how these structures can help the oil and gas industry. The study of the Manyberries astrobleme has given us valuable insight into the geology and geophysics of the area in which this event occurred.

## **Acknowledgements**

Thanks to Pulse Seismic for allowing me to use their seismic data of the Manyberries astrobleme. Special thanks to George Fairs for his help, to Carter Edie for encouraging me to pursue this project, and to Divestco for their support.