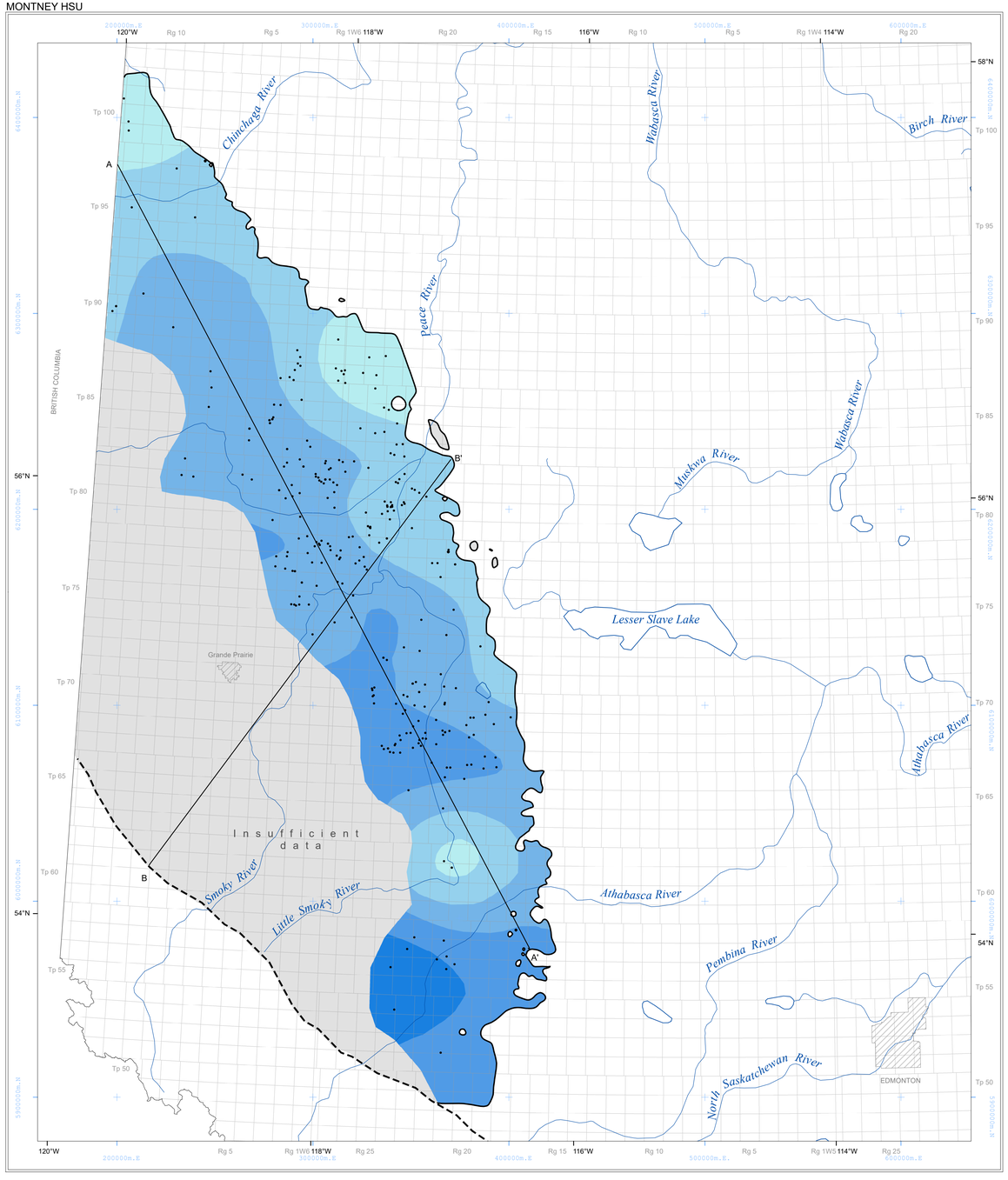
HYDRAULIC HEAD
MONTNEY HSU



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Map 614

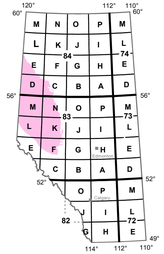
Distribution of Hydraulic Head in the Montney Hydrostratigraphic Unit

Hydrogeology by: J. Brinsky

Scale 1:1 250 000

25 12.5 0 25 50 75 100 kilometres
20 10 0 20 40 miles

Projection: 10 Degree Transverse Mercator
Datum: North American Datum, 1983



SYMBOL LEGEND

Hydaulic Head (m asl)
- 450 - 500
- 501 - 550
- 551 - 600
- 601 - 650
- 651 - 682

Well data point
Hydrostratigraphic unit extent
Eastern limit of main Cordilleran deformation
Cross-section line A — A'
Insufficient data

This map depicts the distribution of hydraulic head in the Montney hydrostratigraphic unit (HSU). The horizontal and vertical extent of the unit was adopted from the 3D Provincial Geological Framework Model of Alberta, Version 2 (Alberta Geological Survey, 2019a). The relationship of the Montney HSU with the units above and below as well as its geometry can be seen in Figures 1 and 2.

Methodology

The hydraulic head distribution map is a result of an ordinary kriging technique using publicly available pressure data from 300 drillstem tests from oil and gas wells. A screening process modified from Jensen et al. (2013) was used to ensure that only representative pressures were used to calculate equivalent freshwater hydraulic heads. The final gridded map surface was clipped based on the spatial distribution of representative data. Residual values are plotted at each location (Figure 3) to indicate where underprediction or overprediction occurs compared to the measured hydraulic head values.

Using the methodology of Singh et al. (2017) the Cumulative Interference Index (CII) technique was applied to identify and remove tests that have been influenced by production or injection. The CII process determined that no influences were visible for the Montney HSU at the formation scale. Additional formation-scale hydrogeological maps of the Montney HSU are presented in Figures 4 and 5. Figure 4 shows the distribution of total dissolved solids in the Montney HSU. Figure 5 shows the water driving force vector map (WDF) for the Montney HSU. The WDF vector map allows identification of areas where the buoyancy effect of formation water density has the potential to change the inferred magnitude and direction of groundwater flow (Singh et al., 2017). Buoyancy appears to have some influence in the western and southern portion of the mapped Montney HSU.

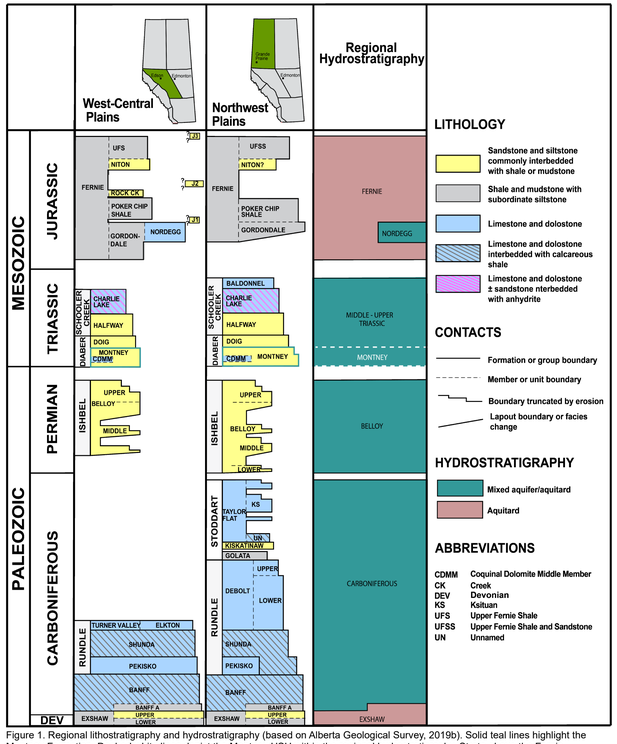


Figure 1. Regional lithostratigraphy and hydrostratigraphy (based on Alberta Geological Survey, 2019b). Solid teal lines highlight the Montney Formation. Dashed white lines depict the Montney HSU within the regional hydrostratigraphy. Strata above the Fernie Formation are not shown.

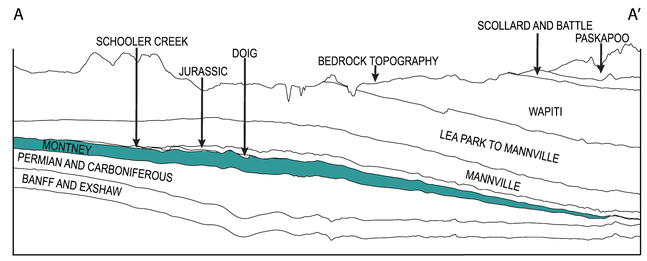


Figure 2. Schematic cross-sections identifying the geometry and variable thickness of the Montney HSU (not to scale). Permian and Carboniferous strata, excluding the Banff and Exshaw, are not subdivided at the scale of these cross-sections. Strata below the Exshaw formation are not shown.

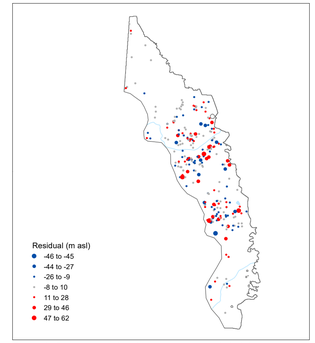


Figure 3. Calculated residuals between the modelled distribution of hydraulic head and measured values. Symbol classes are based on the standard deviation of the calculated residuals.

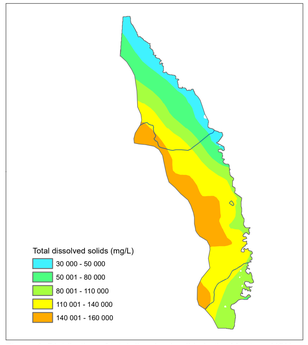


Figure 4. Distribution of total dissolved solids in the Montney HSU (Brinsky, 2021). The map extent is based on the spatial distribution of TDS data and differs from the extent of the main map.

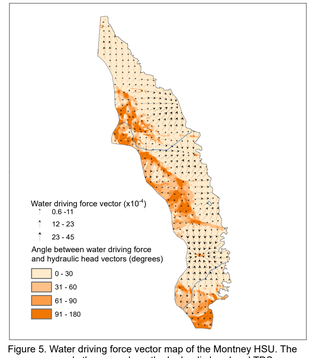


Figure 5. Water driving force vector map of the Montney HSU. The map covers only the area where the hydraulic head and TDS gridded surfaces overlap.

References

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Brinsky, J. (2021): Distribution of total dissolved solids in the Montney hydrostratigraphic unit; Alberta Energy Regulator / Alberta Geological Survey, AER/AGS Map 615, scale 1:1 250 000.

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Acknowledgements

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Recommended Reference Format

Brinsky, J. (2021): Distribution of hydraulic head in the Montney hydrostratigraphic unit; Alberta Energy Regulator / Alberta Geological Survey, AER/AGS Map 614, scale 1:1 250 000.

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