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methane contoured isotopic values (h), topography under ethane contoured isotopic values (i), topography under propane contoured isotopic values (j), topography under n-butane contoured isotopic values (k), topography under i-butane contoured isotopic values (l), and topography under i-butane contoured isotopic values (m).

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Figure 38. Cross-plot of n-alkane ground migration (GM) gases isotopic composition from W3 (a), W4 (b), W5 (c), W6 (d), and BC (e).

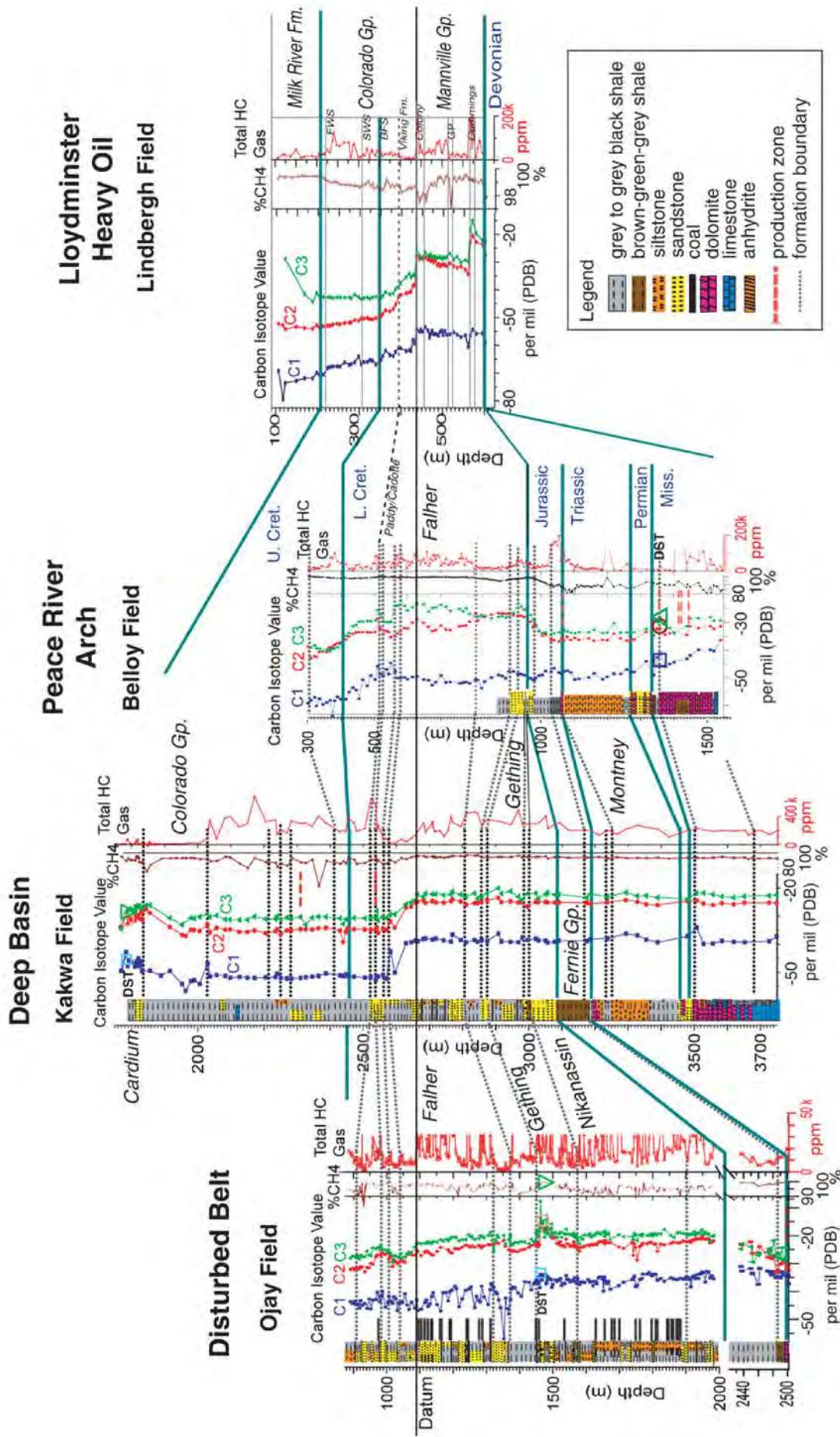


Fig. 1. Isotope depth profiles for four mudlogs across the Western Canada Sedimentary Basin showing (modified from Tilley and Muehlenbachs, 2006)



Fig. 2A. Map of Production wells Locations in the Western Canada Sedimentary Basin (WCSB)

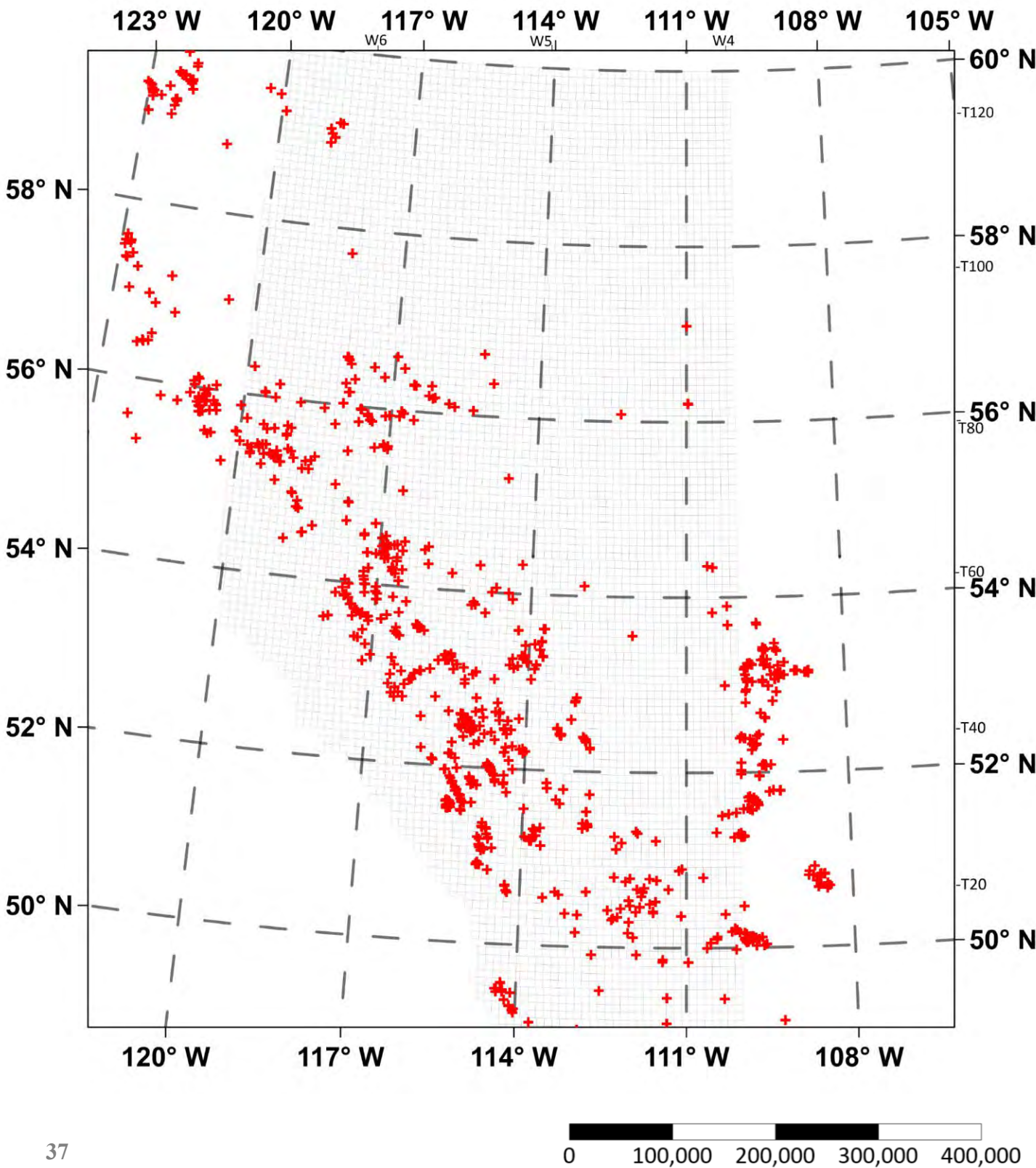
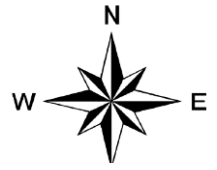


Fig. 2B. Map of Surface Casing Vent (SCV) Locations in the Western Canada Sedimentary Basin (WCSB)

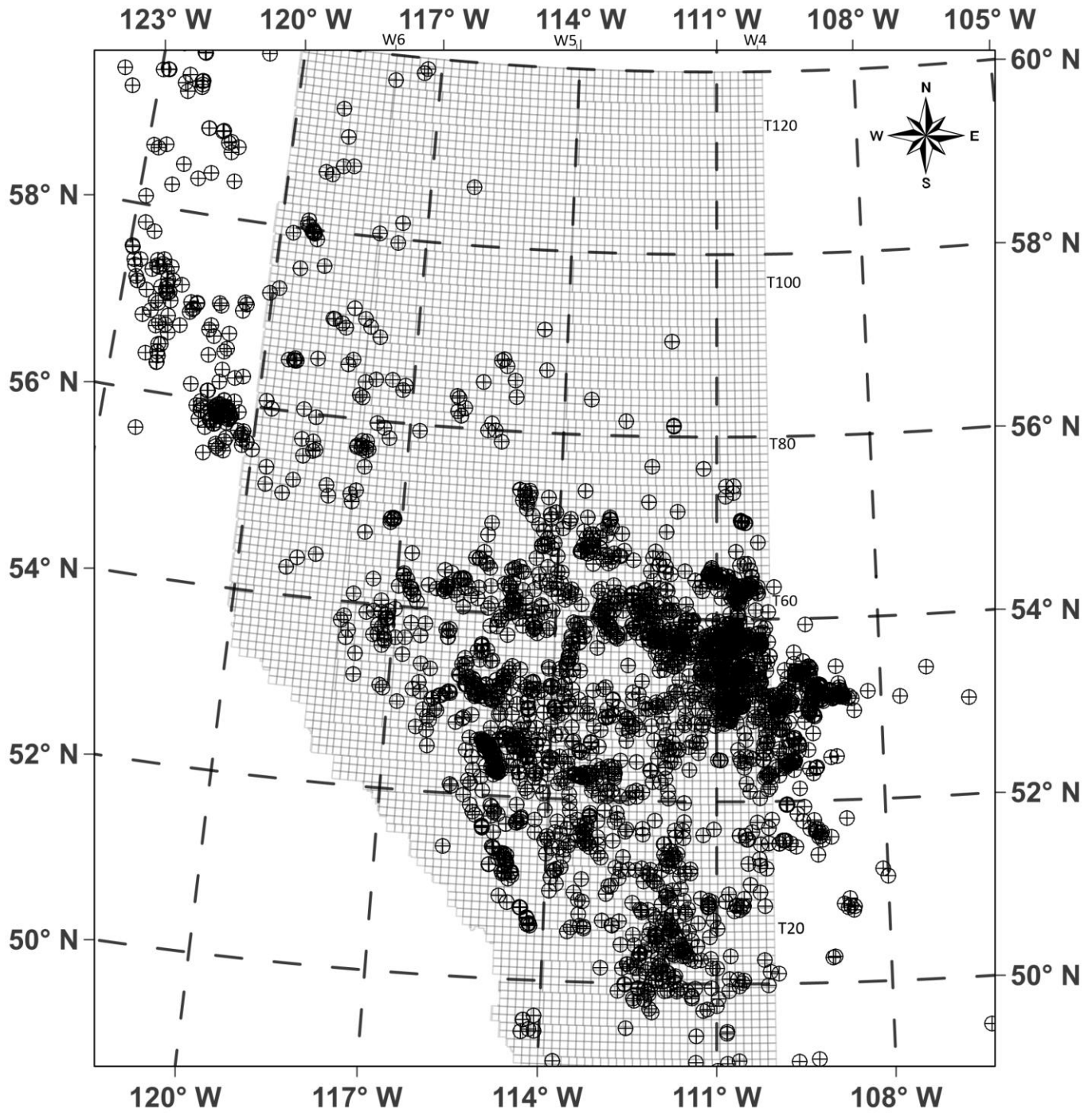


Fig. 2C. Map of Ground Migration Locations in the Western Canada Sedimentary Basin (WCSB)

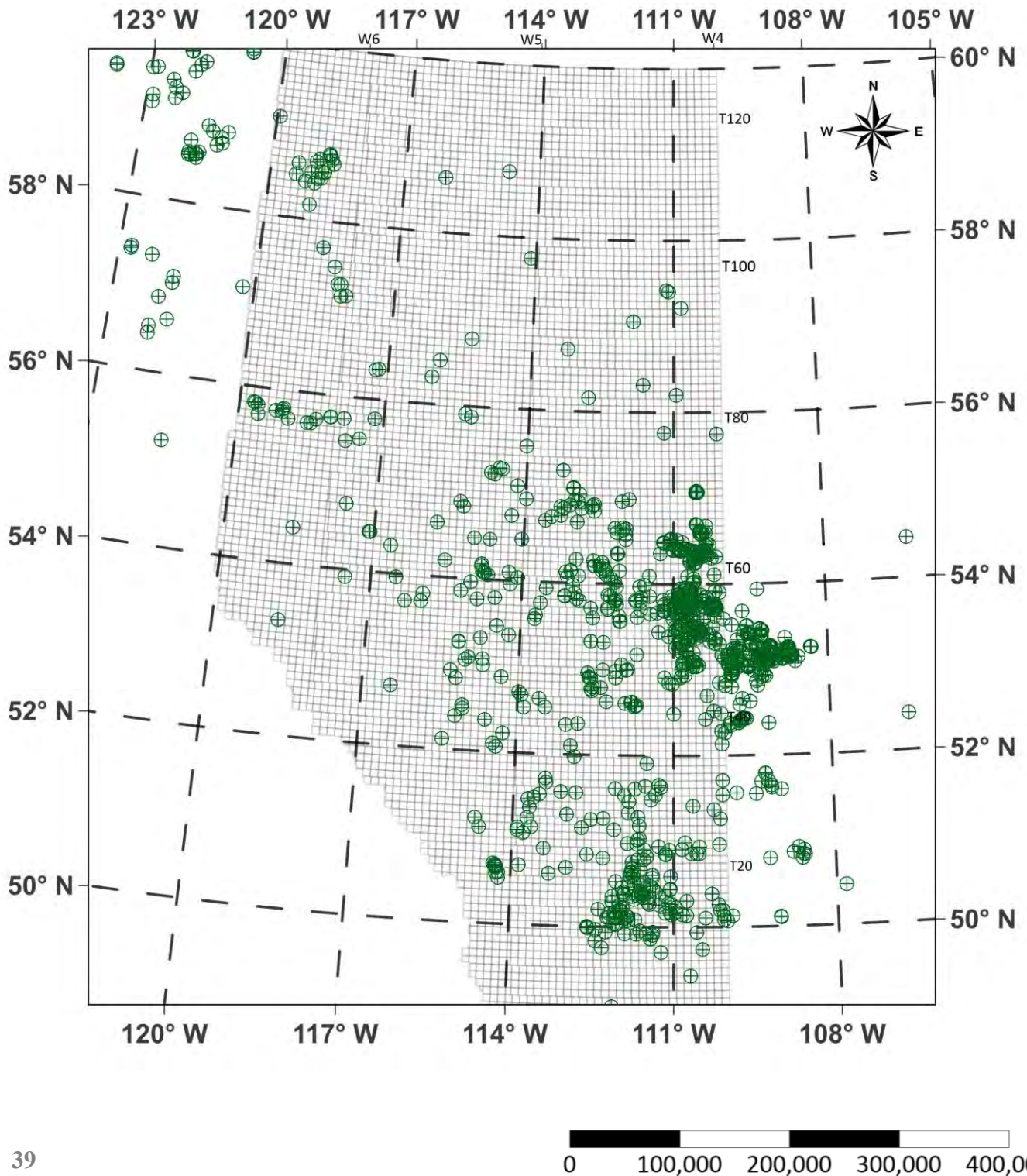




Fig. 3. WCSB statistical analyses for Production, SCV and GM regional data

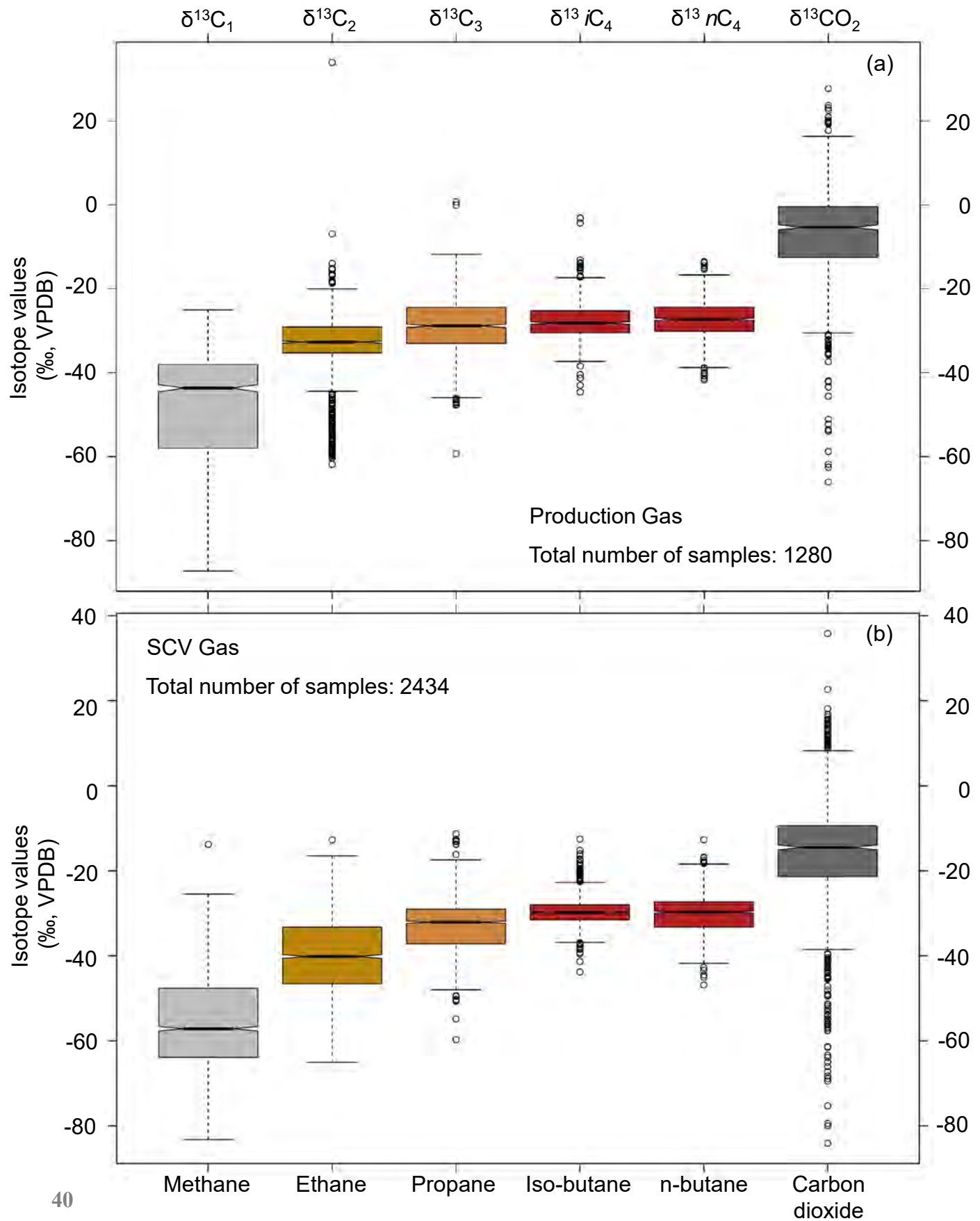


Fig. 3. WCSB boxplots for Production, SCV and GM regional data

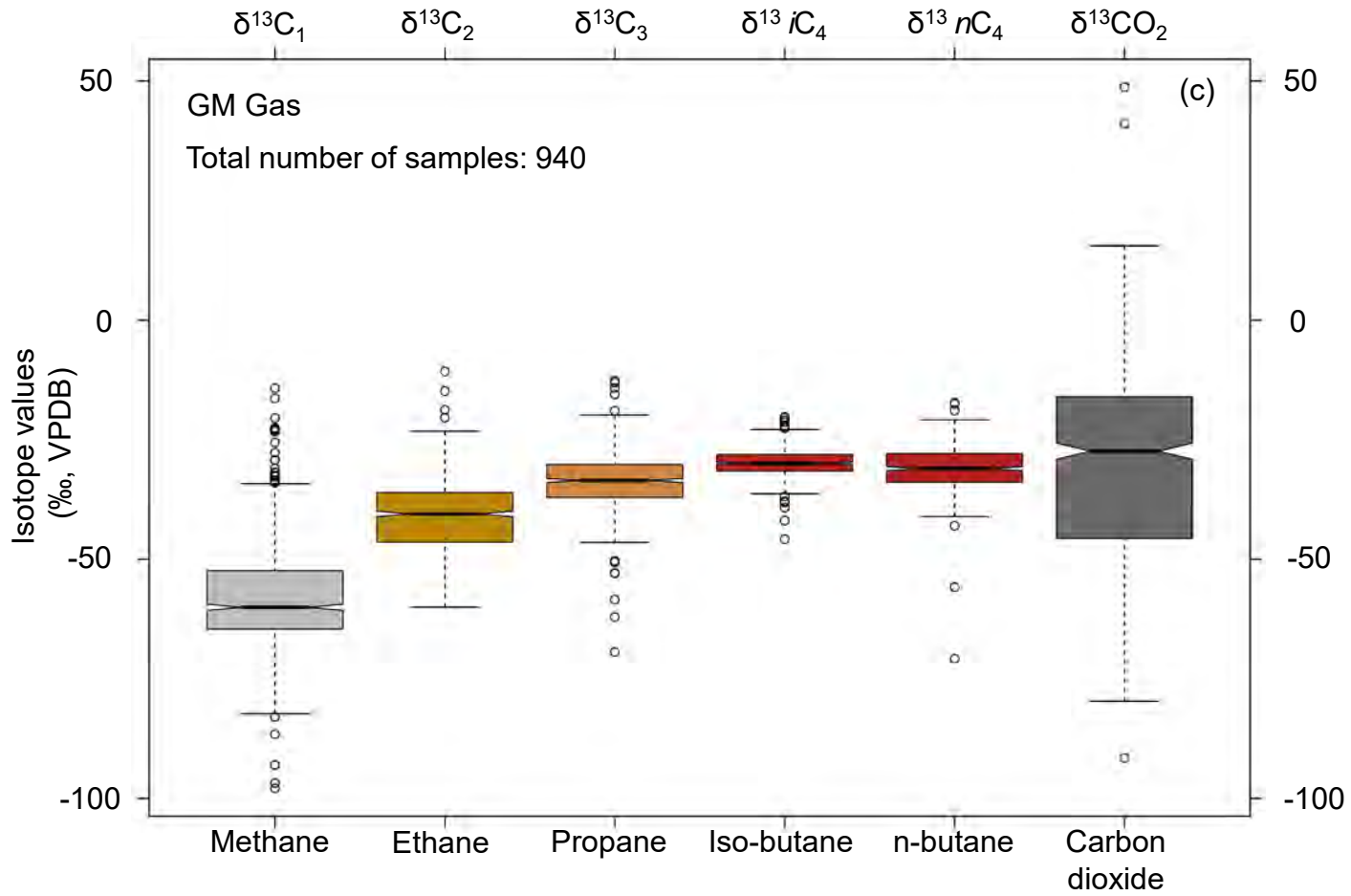


Fig. 4A. Histogram showing the methane, ethane, propane and carbon dioxide isotopic values for production gases from W3

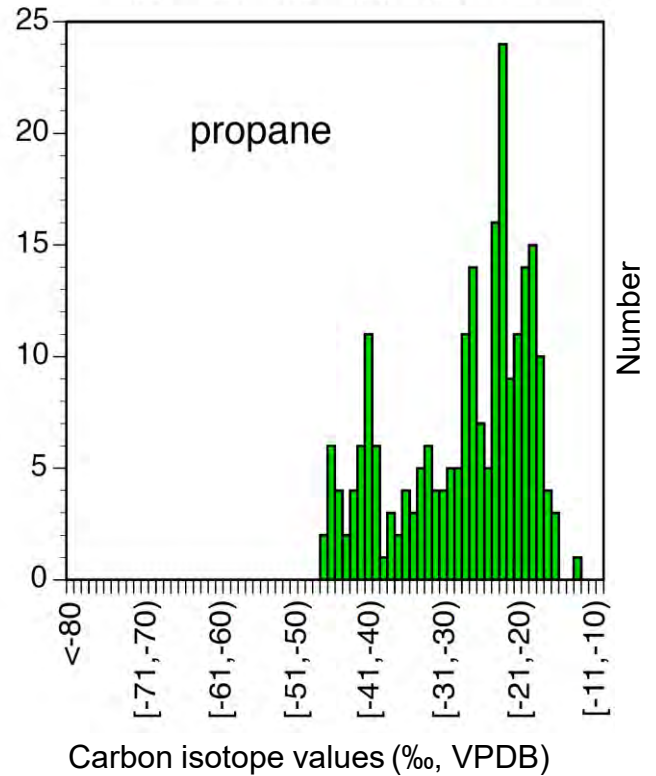
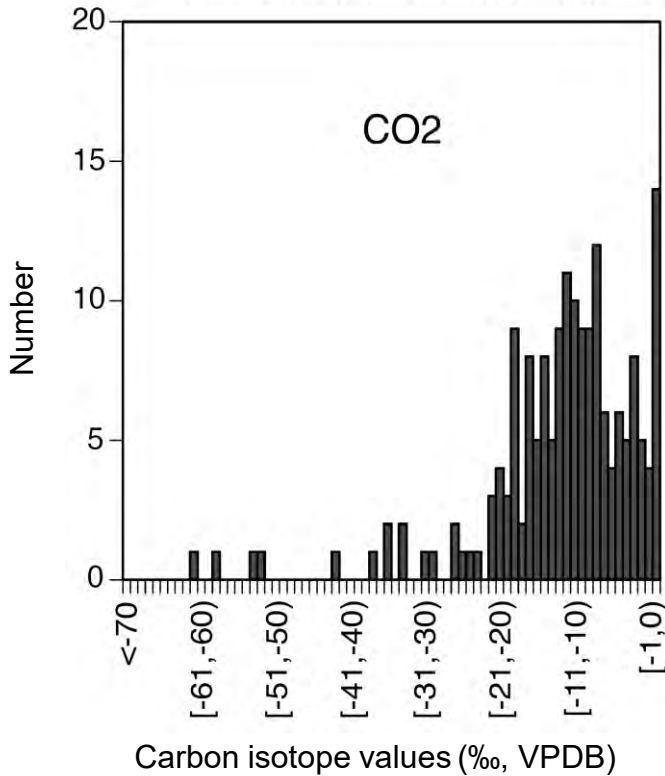
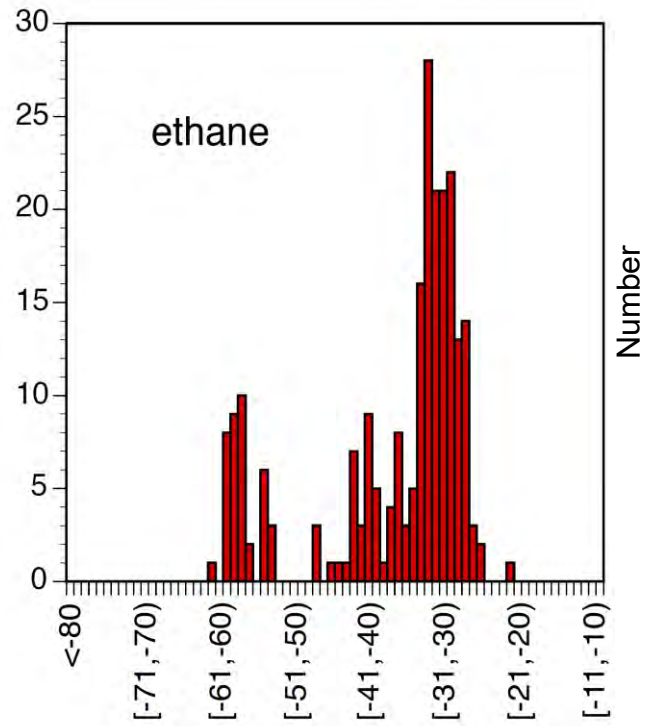
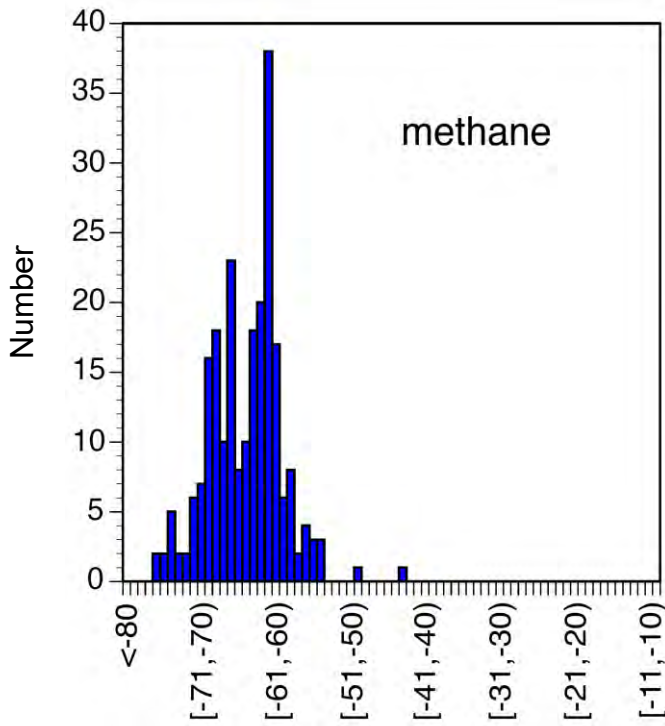


Fig. 4B. Histogram showing the methane, ethane, propane and carbon dioxide isotopic values for surface casing vent (SCV) gases from W3

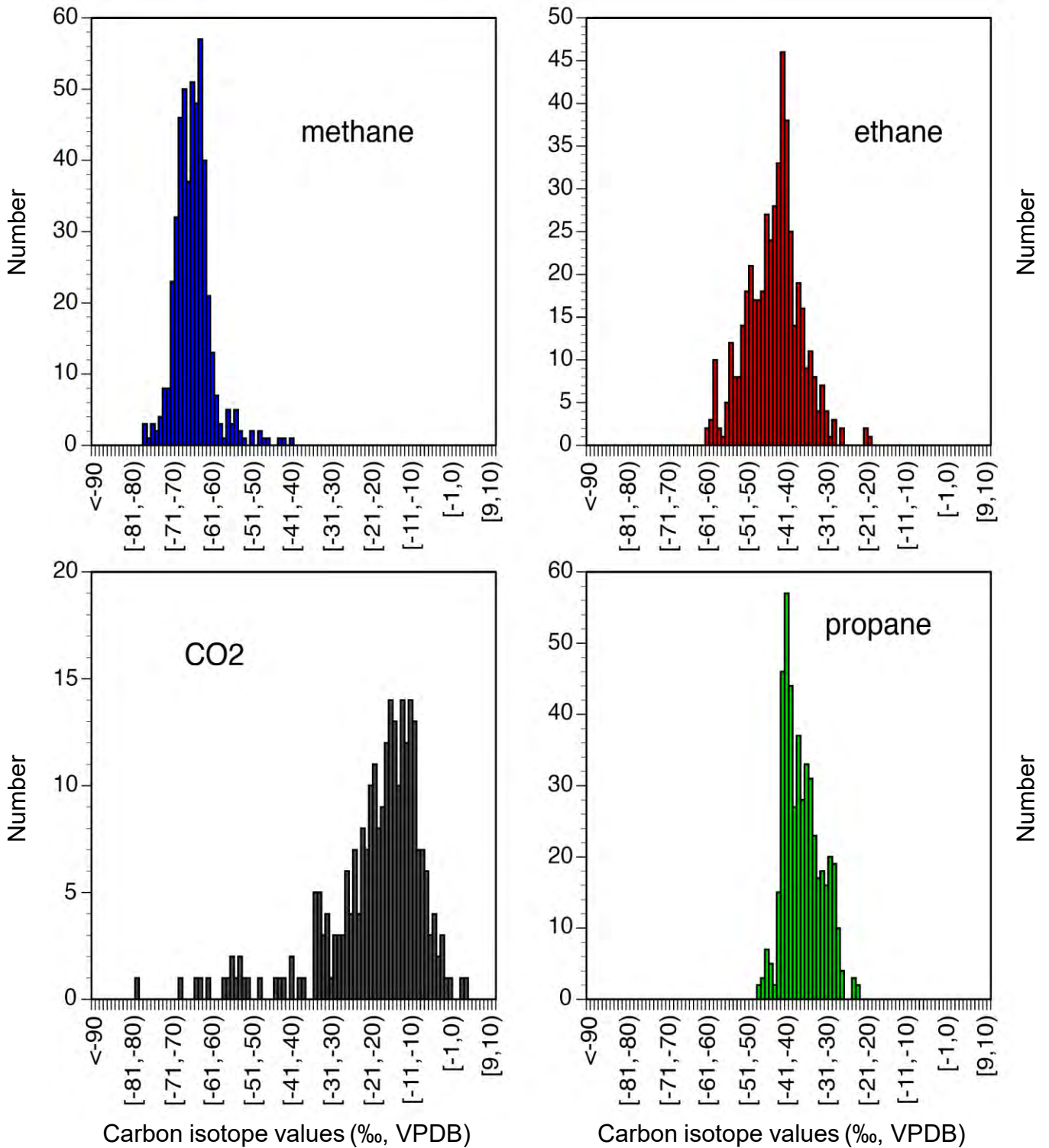


Fig. 4C. Histogram showing the methane, ethane, propane and carbon dioxide isotopic values for ground migration (GM) gases from W3

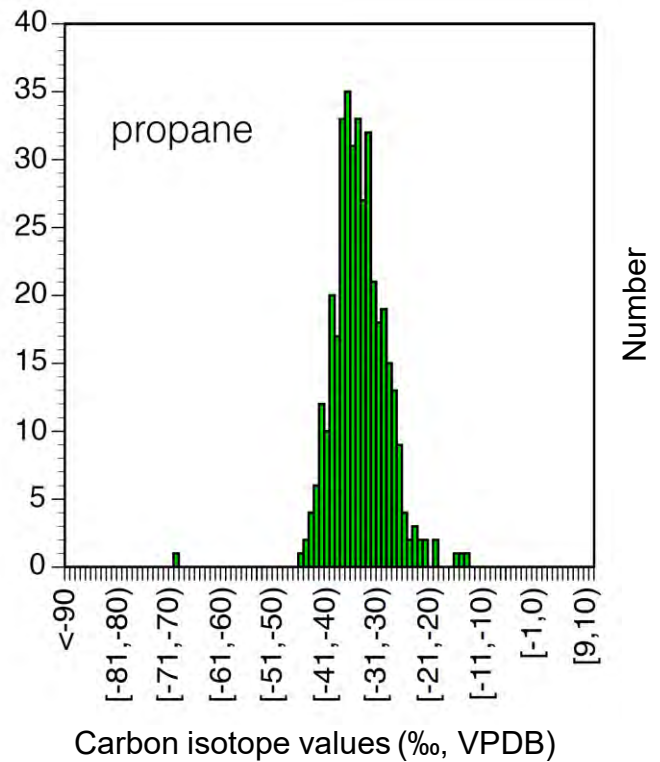
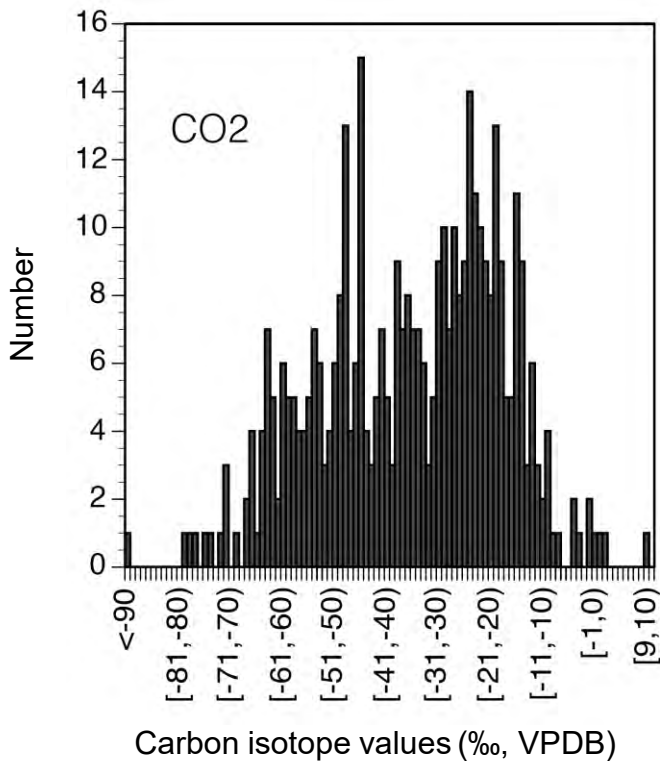
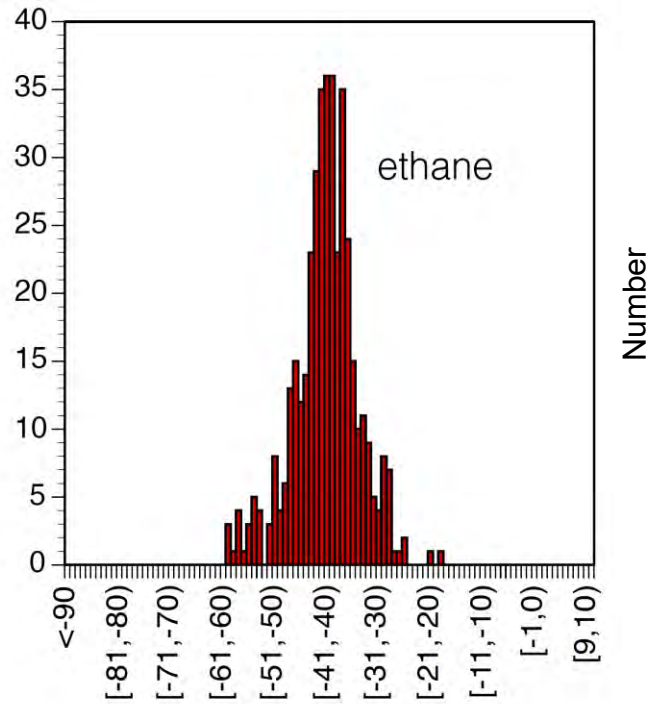
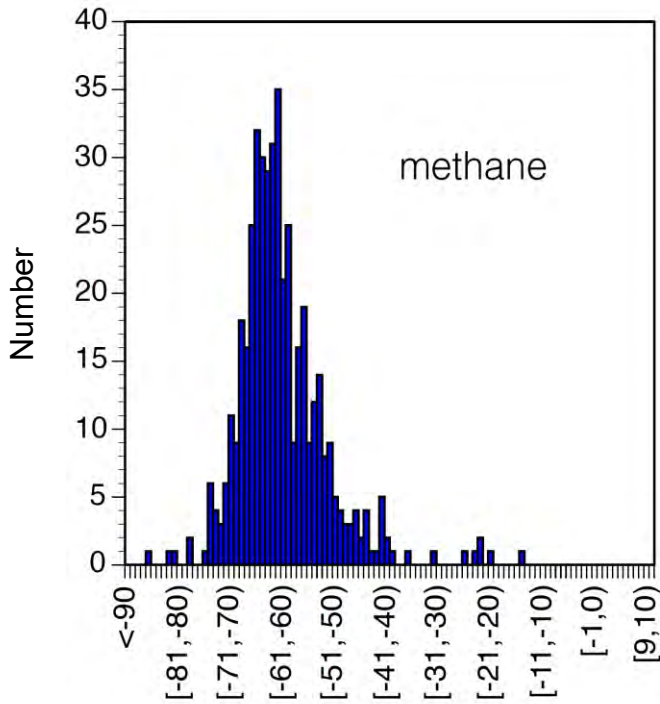
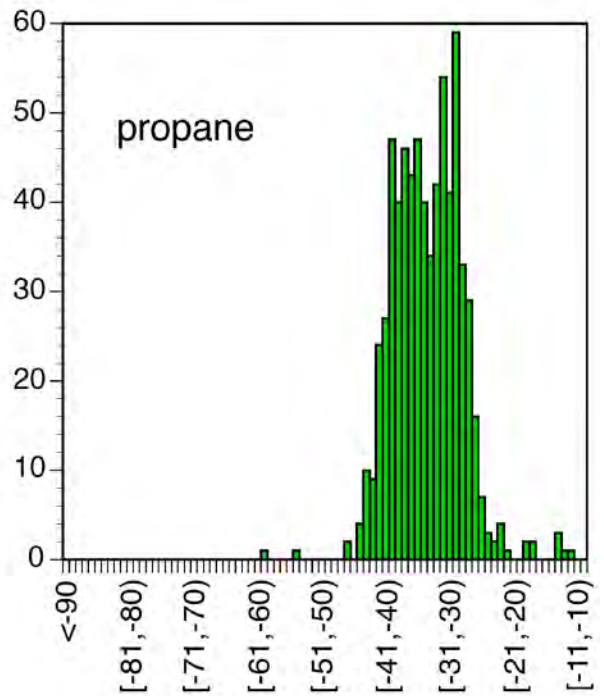
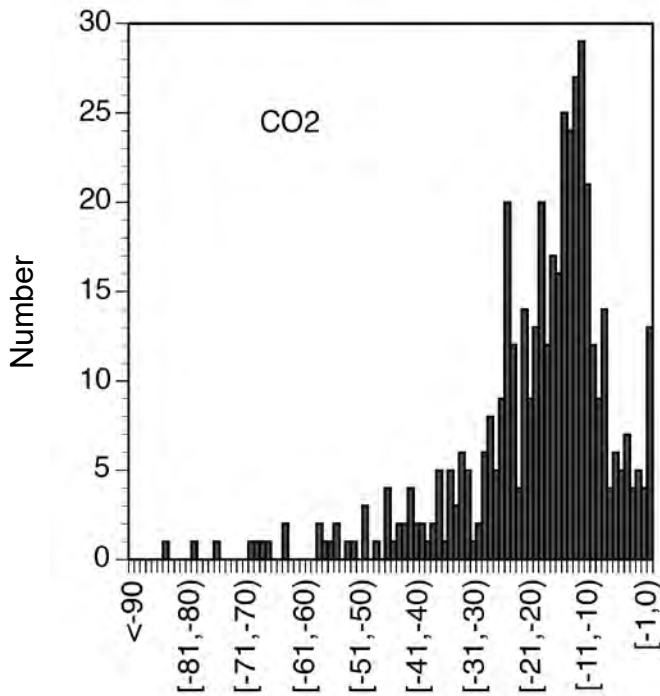
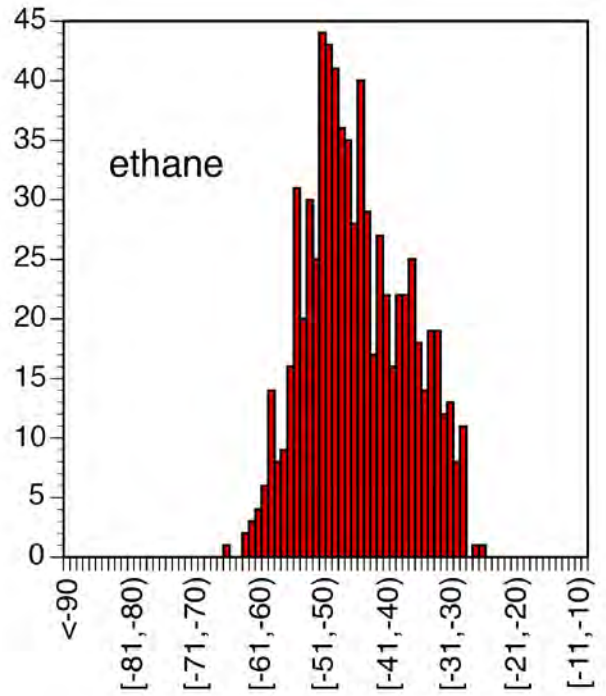
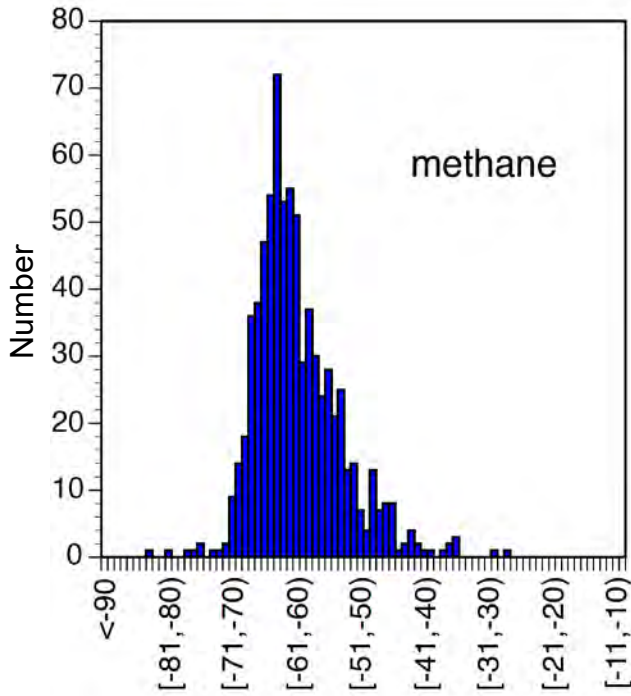






Fig. 5B. Histogram showing the methane, ethane, propane and carbon dioxide isotopic values for SCV gases from W4



Carbon isotope values (‰, VPDB)

Carbon isotope values (‰, VPDB)

Fig. 5C. Histogram showing the methane, ethane, propane and carbon dioxide isotopic values for GM gases from W4

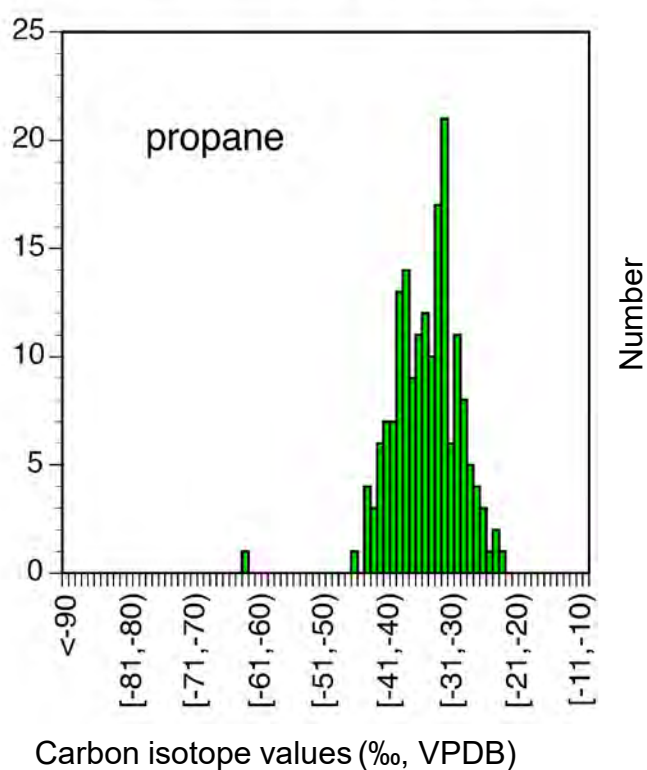
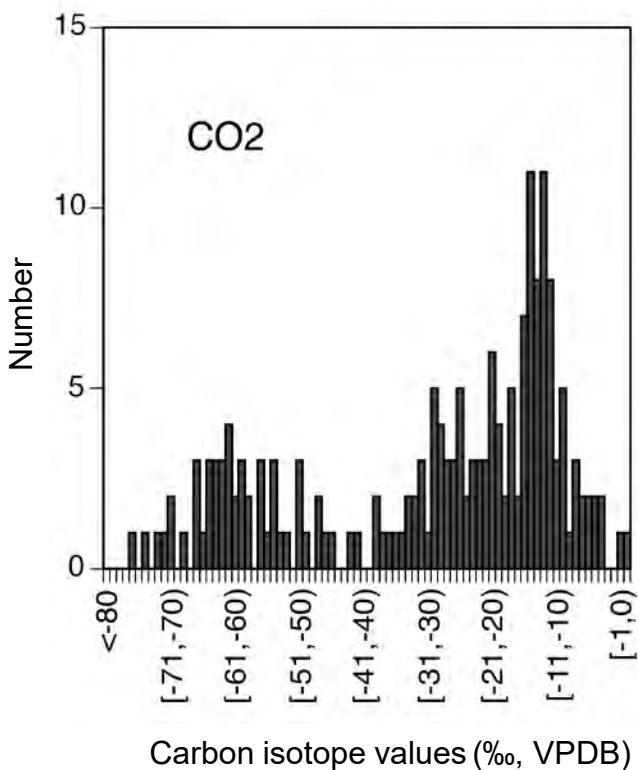
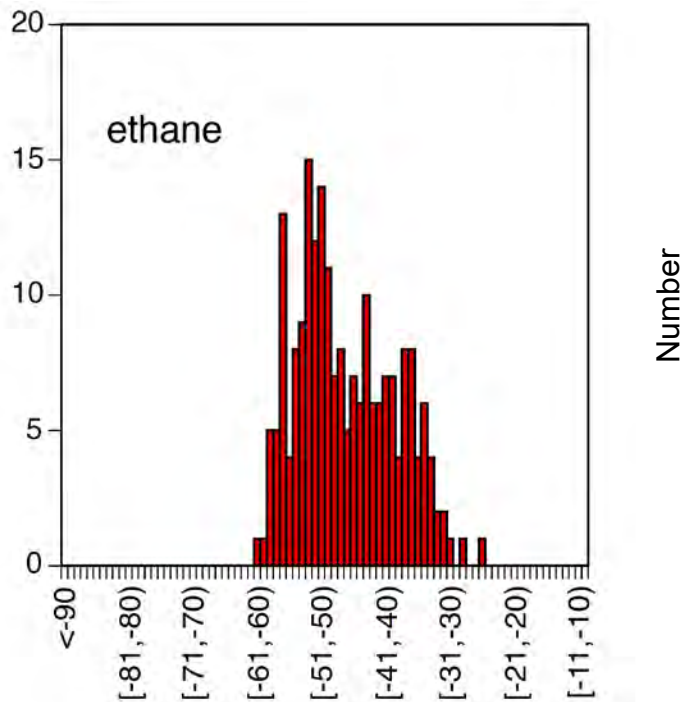
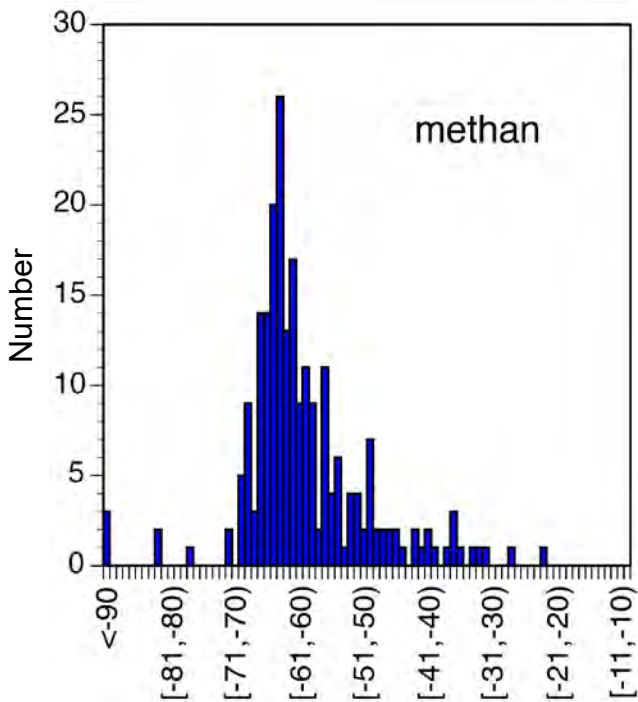
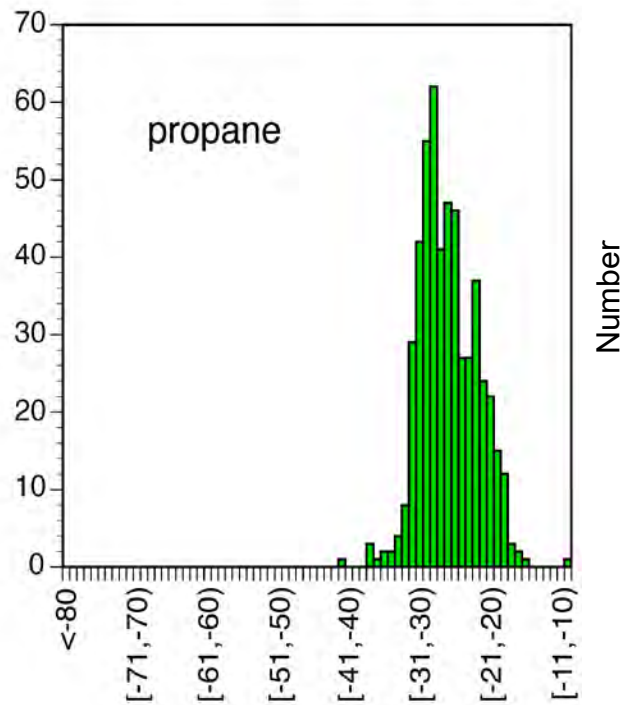
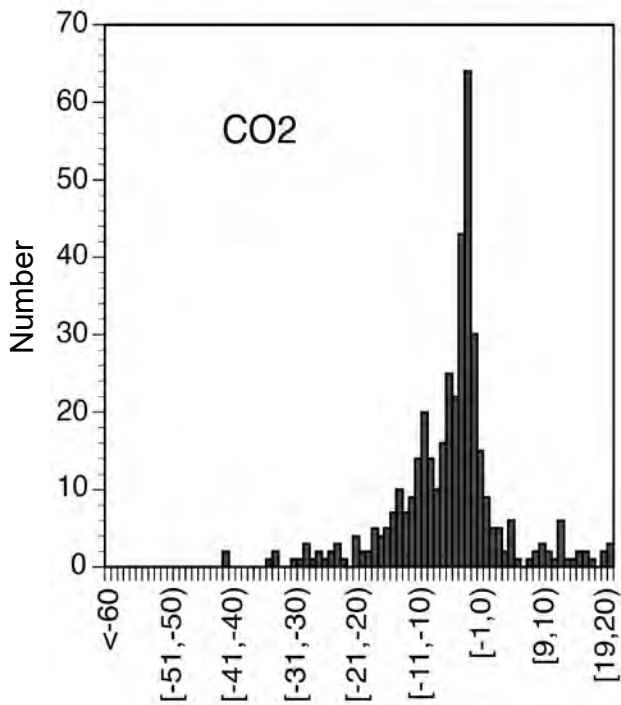
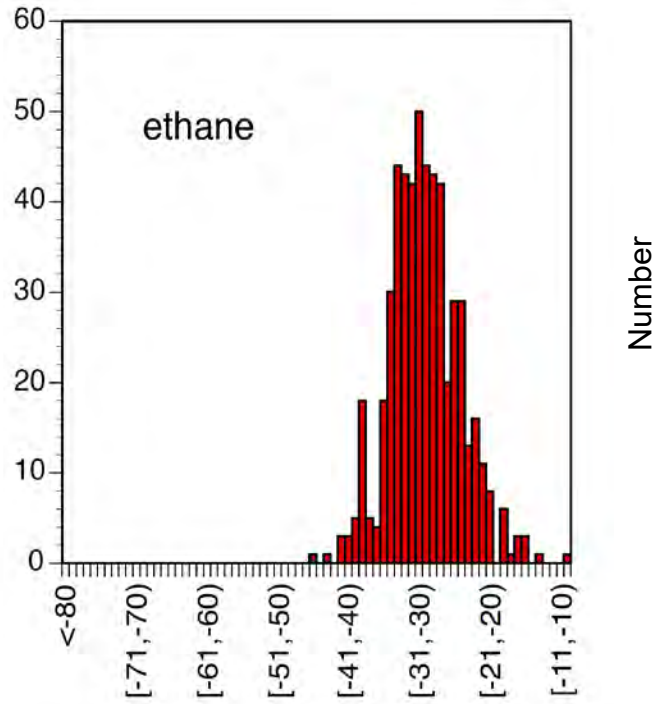
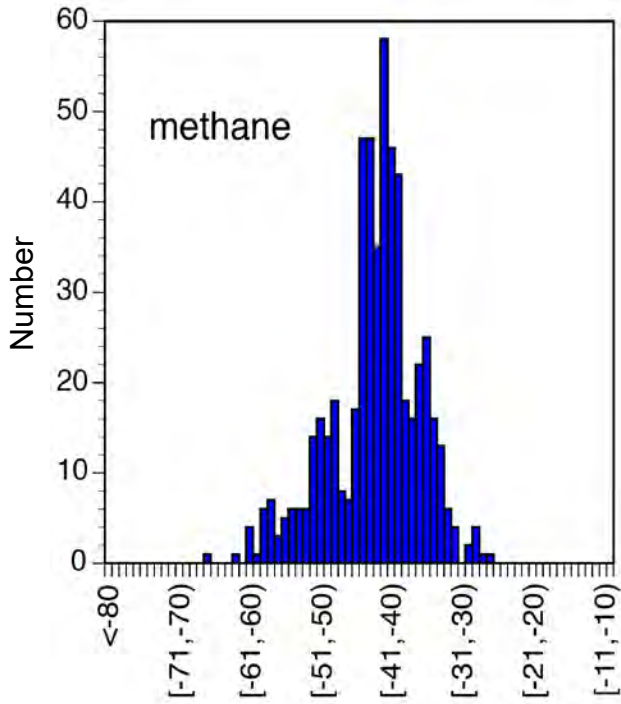




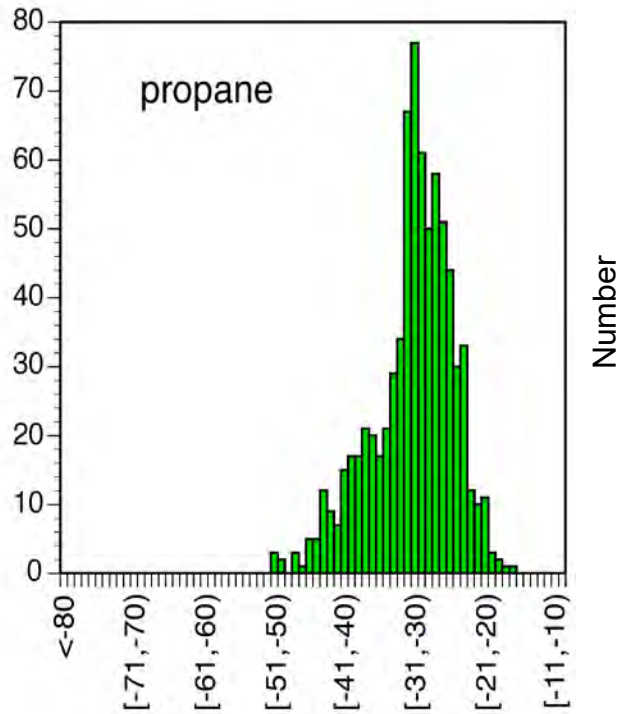
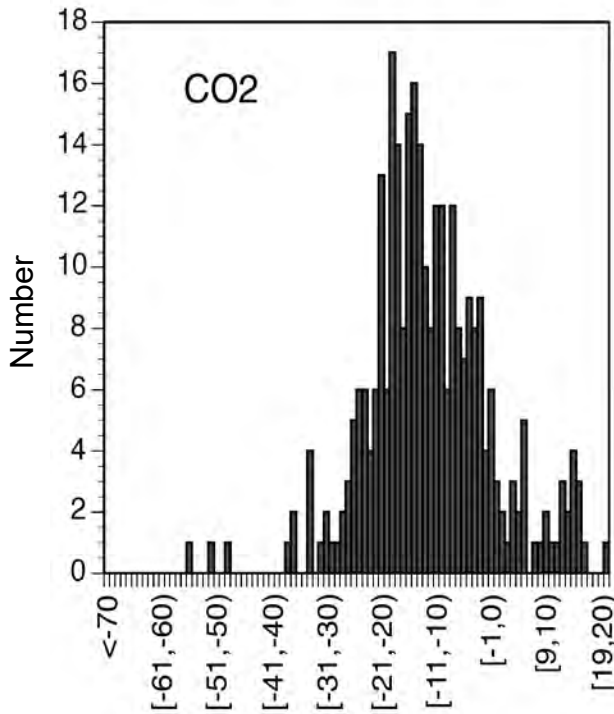
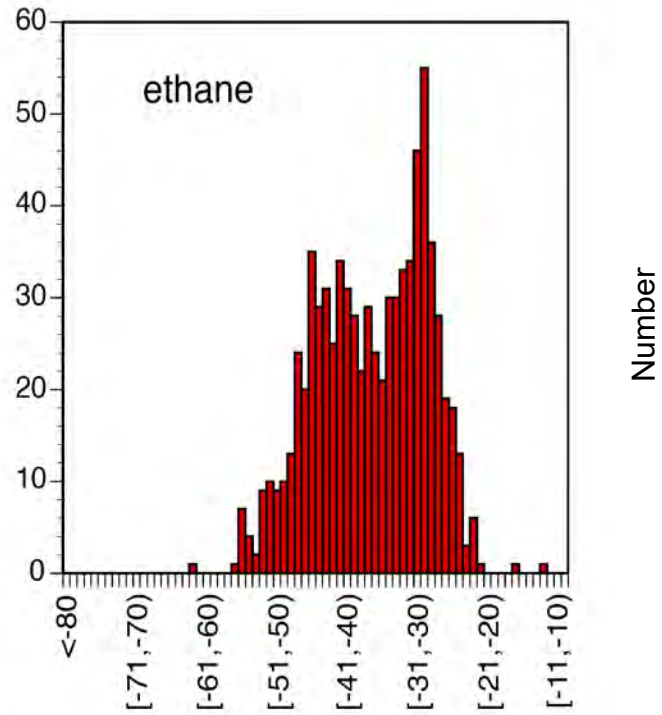
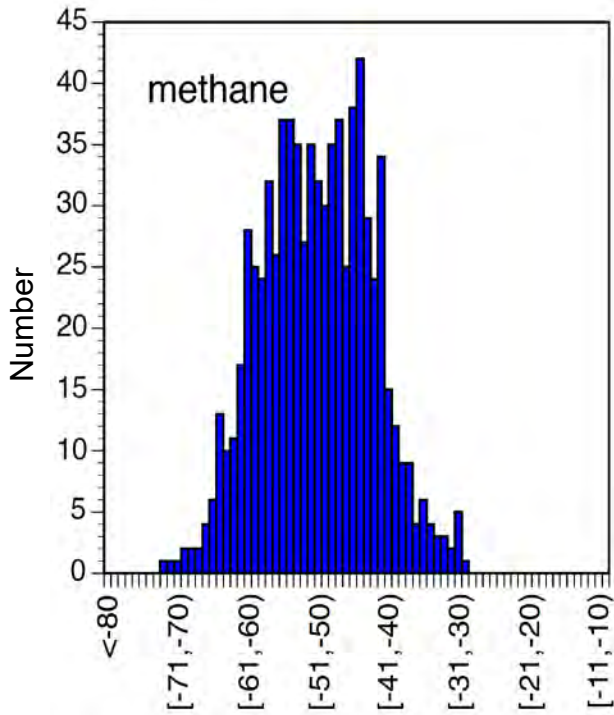
Fig. 6A. Histogram showing the methane, ethane, propane and carbon dioxide isotopic values for production gases from W5



Carbon isotope values (‰, VPDB)

Carbon isotope values (‰, VPDB)

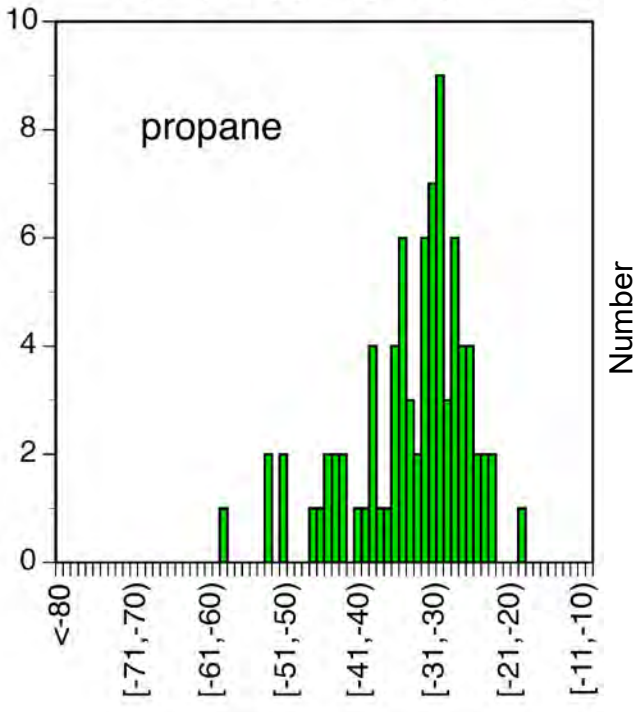
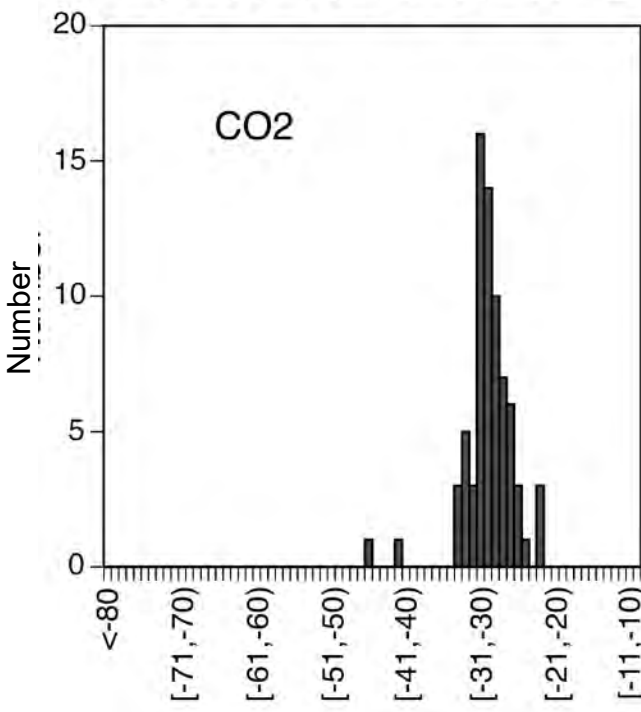
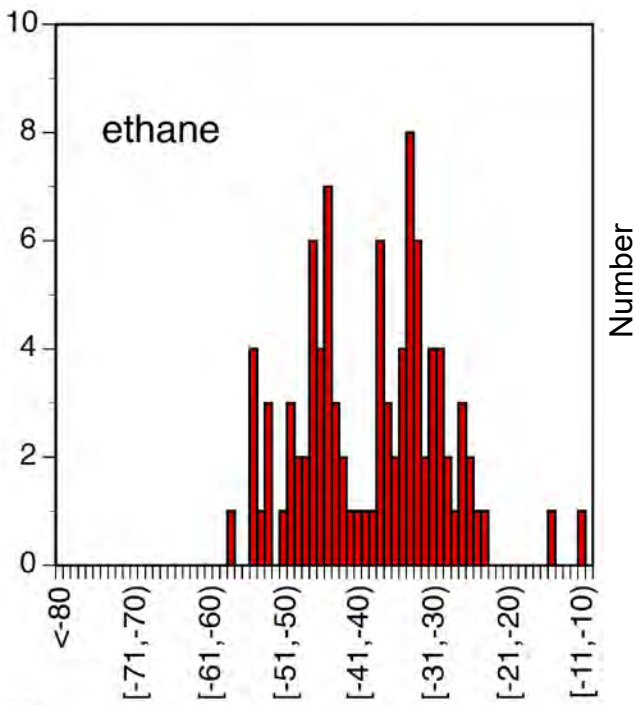
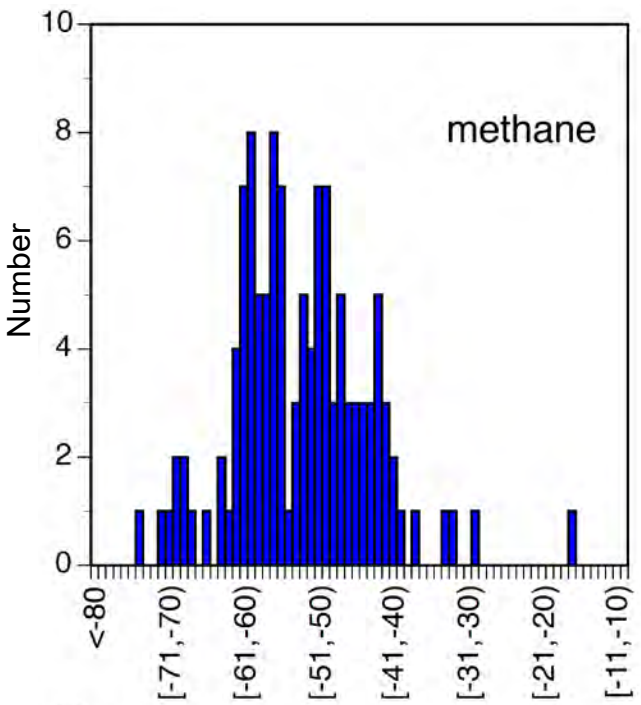
Fig. 6B. Histogram showing the methane, ethane, propane and carbon dioxide isotopic values for SCV gases from W5



Carbon isotope values (‰, VPDB)

Carbon isotope values (‰, VPDB)

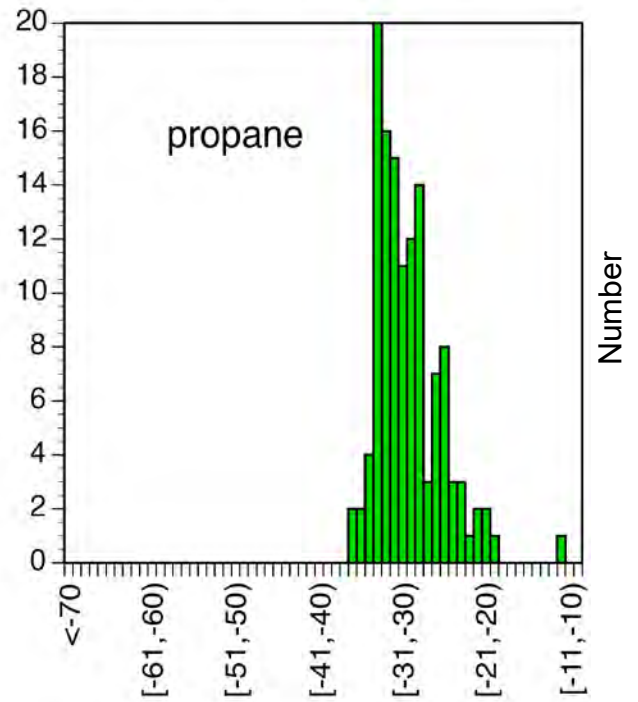
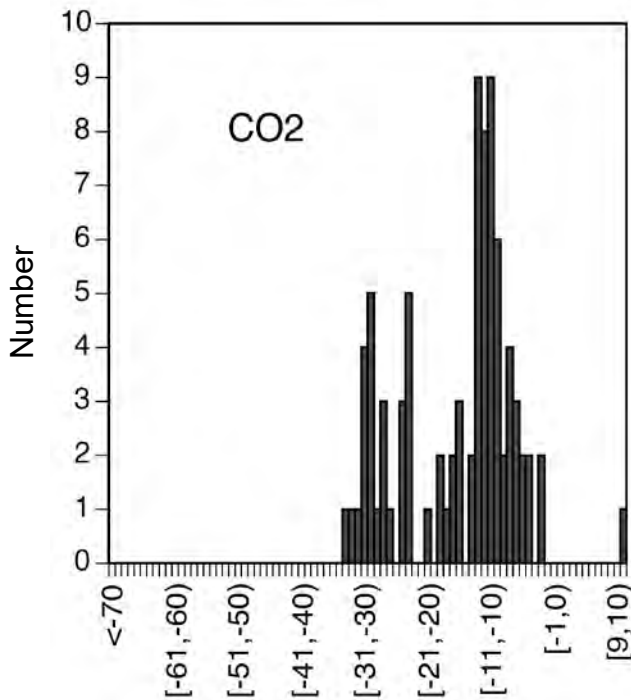
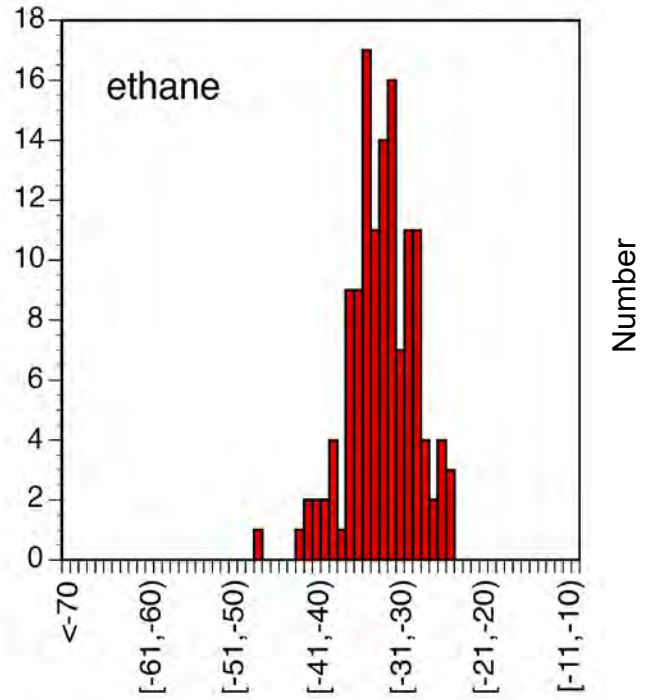
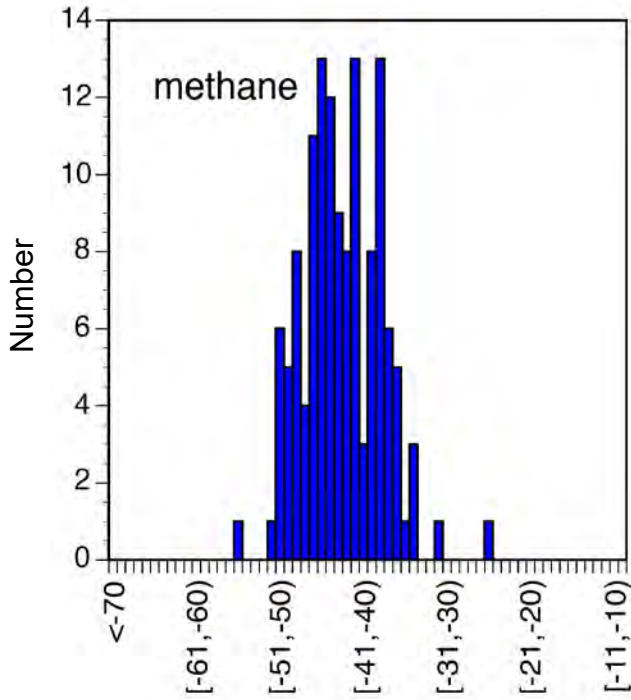
Fig. 6C. Histogram showing the methane, ethane, propane and carbon dioxide isotopic values for GM gases from W5



Carbon isotope values (‰, VPDB)

Carbon isotope values (‰, VPDB)

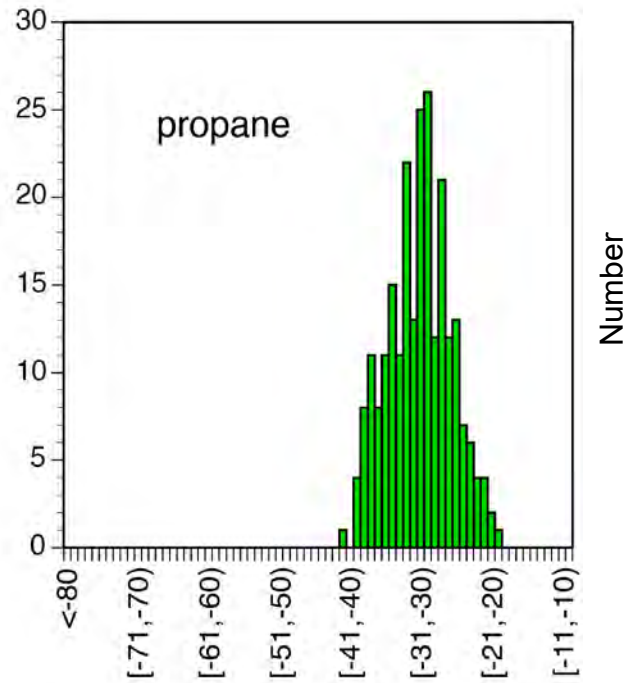
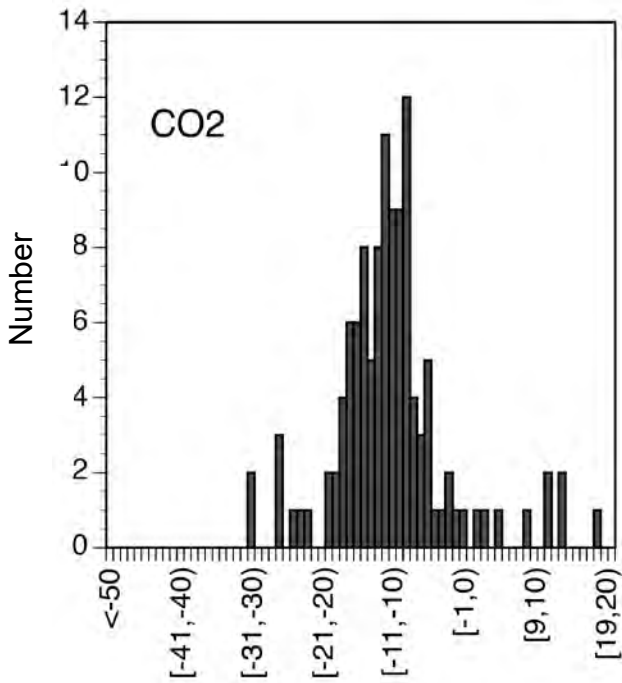
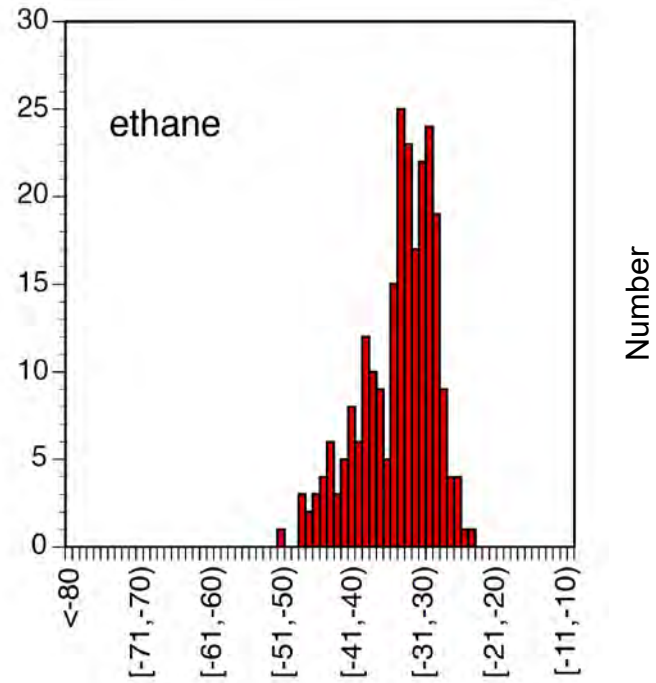
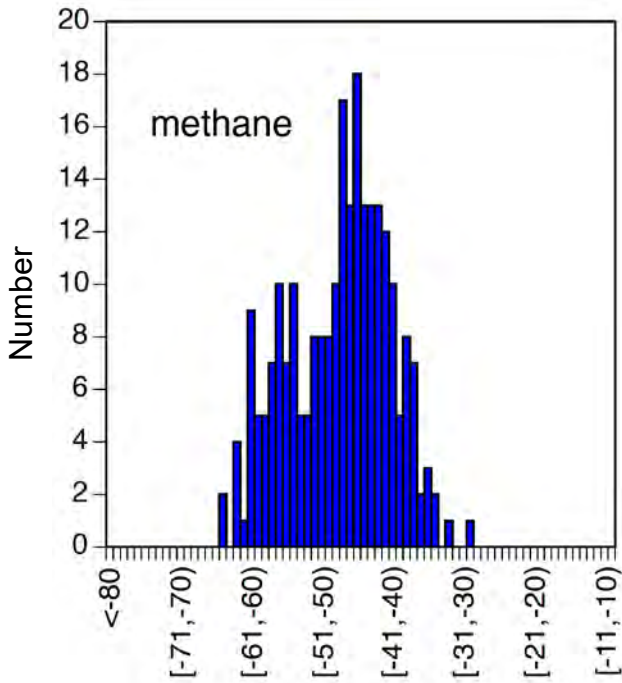
Fig. 7A. Histogram showing the methane, ethane, propane and carbon dioxide isotopic values for production gases from W6



Carbon isotope values (‰, VPDB)

Carbon isotope values (‰, VPDB)

Fig. 7B. Histogram showing the methane, ethane, propane and carbon dioxide isotopic values for production gases from W6

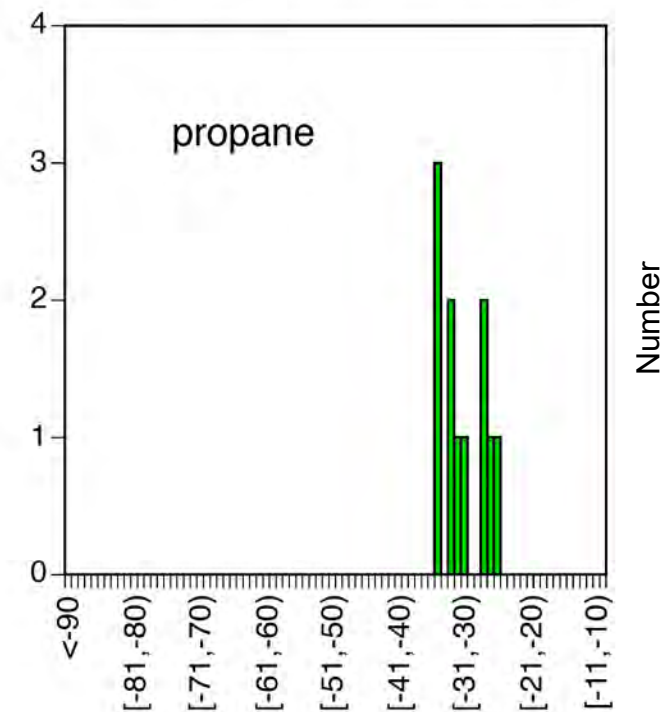
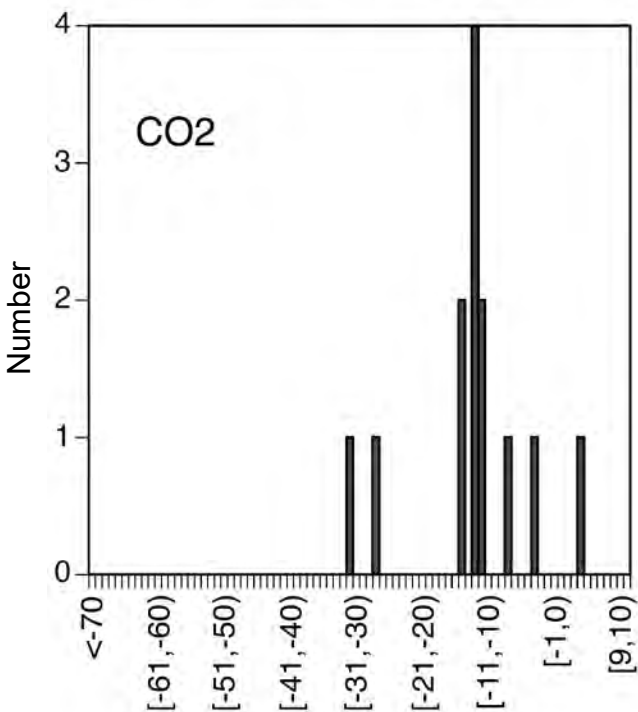
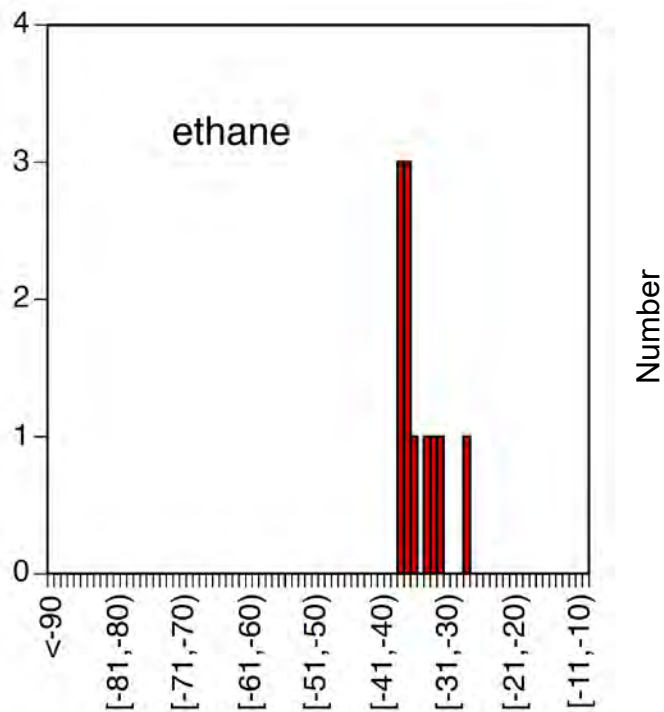
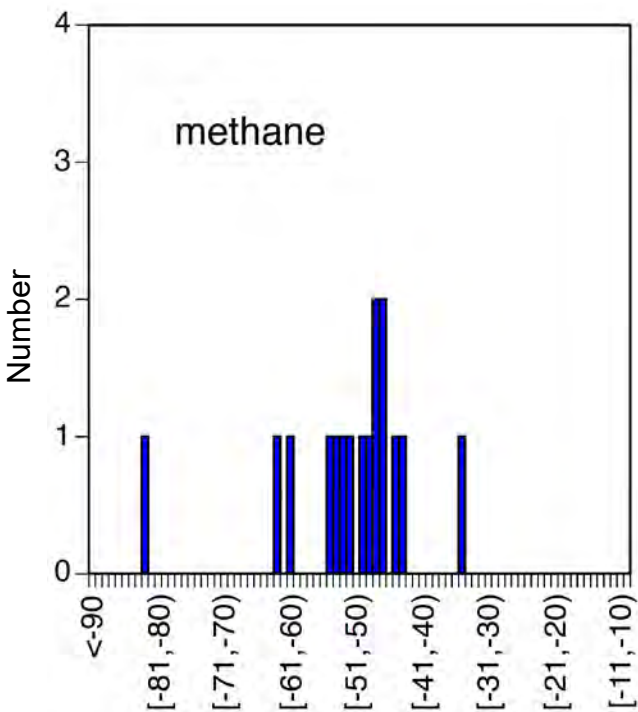


Carbon isotope values (‰, VPDB)

Carbon isotope values (‰, VPDB)



Fig. 7C. Histogram showing the methane, ethane, propane and carbon dioxide isotopic values for production gases from W6



Carbon isotope values (‰, VPDB)

Carbon isotope values (‰, VPDB)

Fig. 8A. Histogram showing the methane (i), ethane (ii), propane (iv) and carbon dioxide (v) isotopic values for production gases from British Columbia

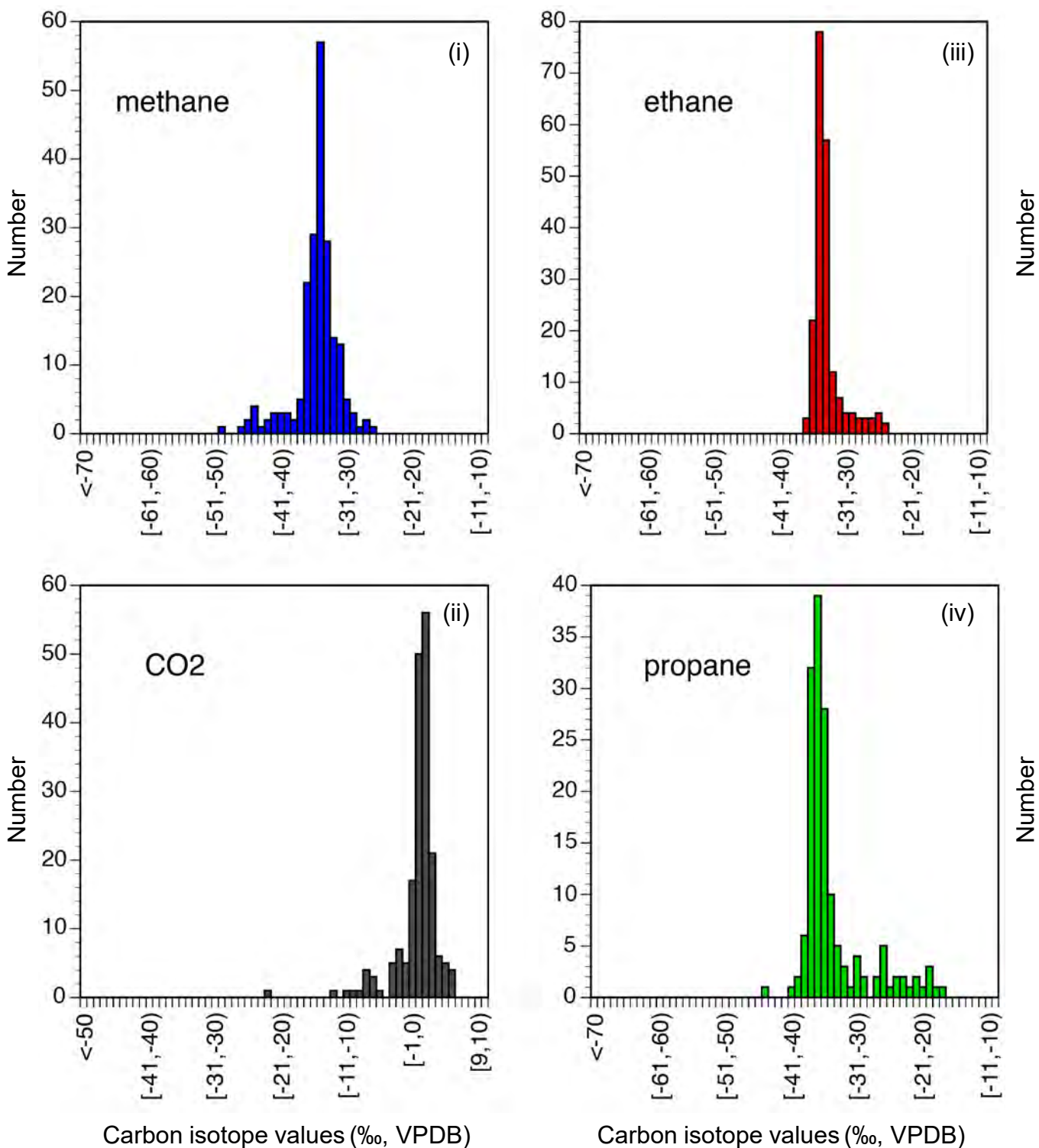
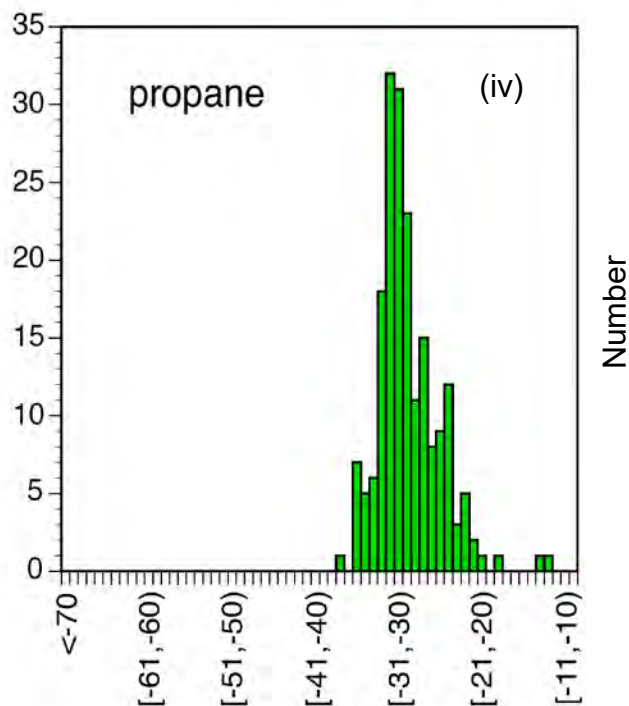
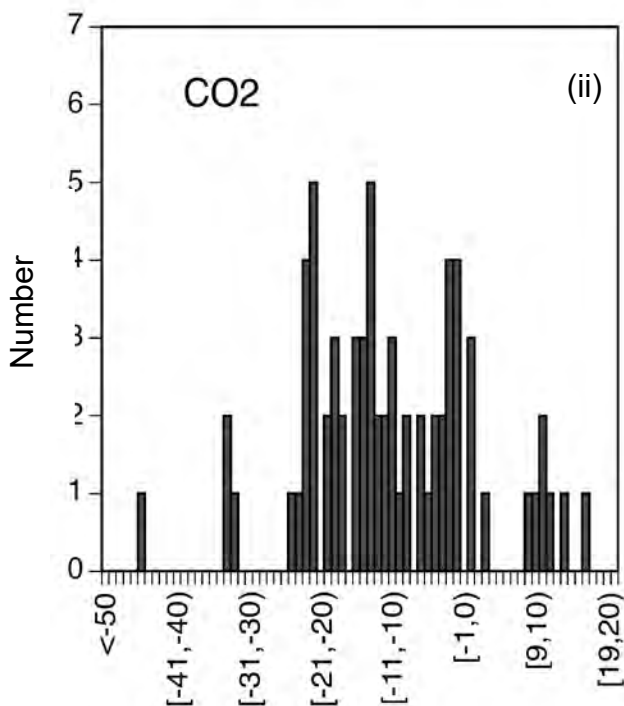
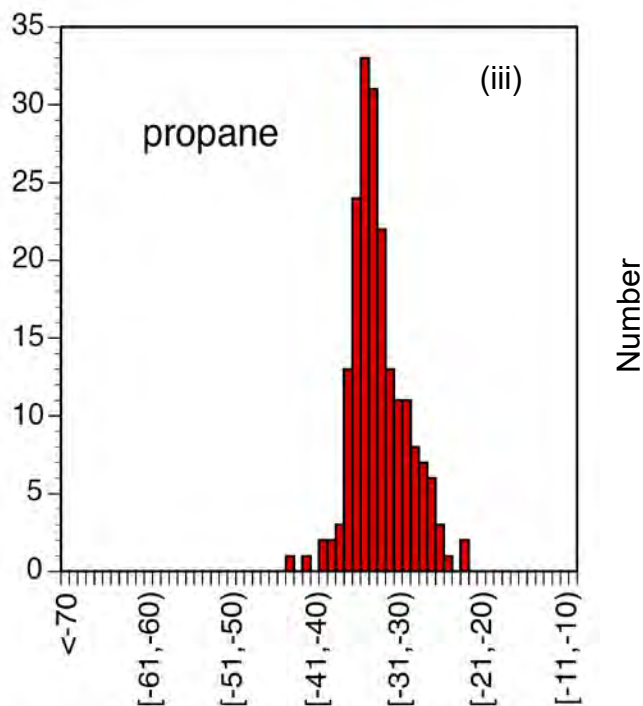
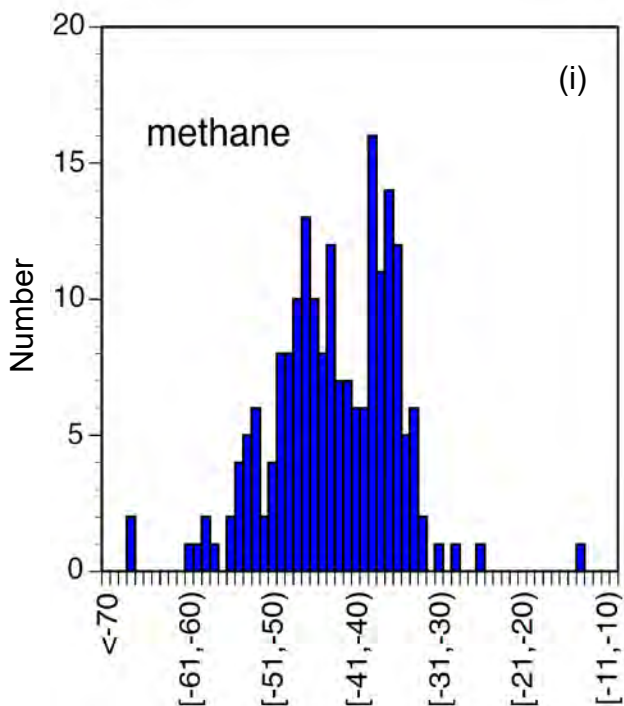


Fig. 8B. Histogram showing the methane (i), ethane (ii), propane (iv) and carbon dioxide (v) isotopic values for surface casing vent (SCV) gases from British Columbia

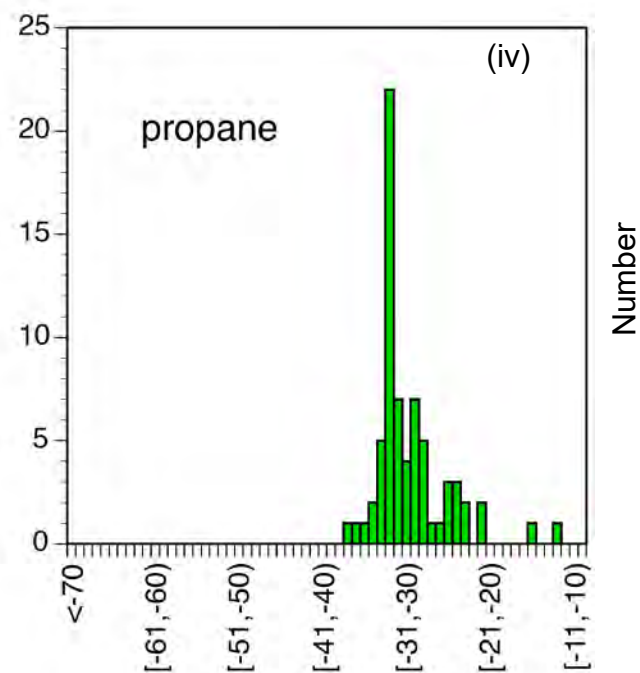
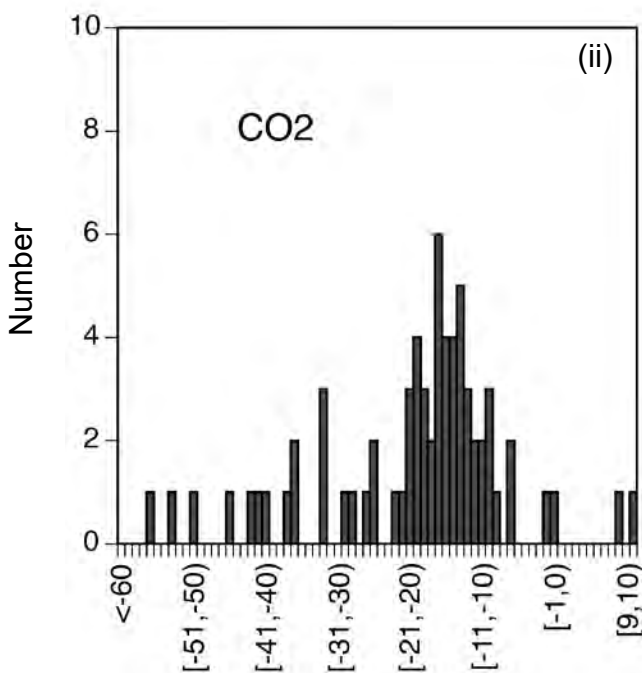
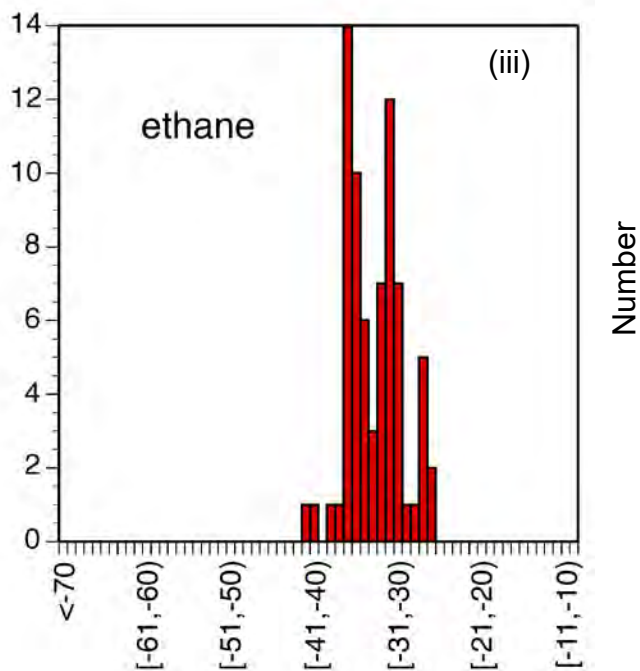
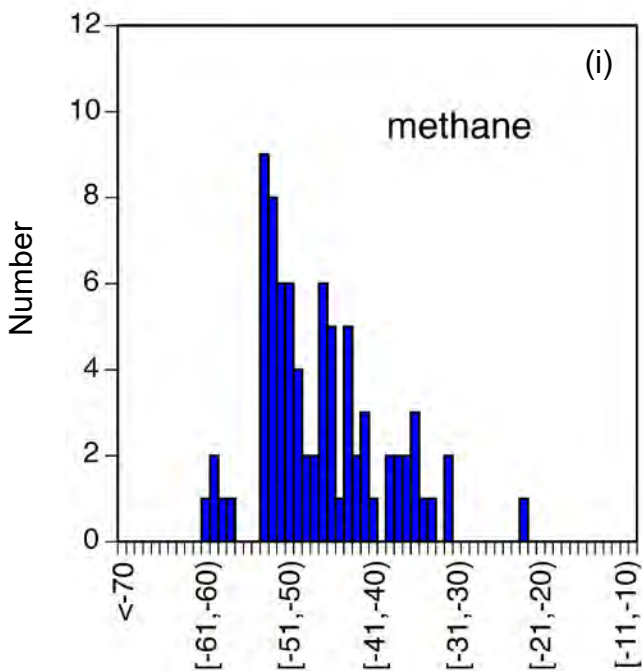


Carbon isotope values (‰, VPDB)

Carbon isotope values (‰, VPDB)



Fig. 8C. Histogram showing the methane (i), ethane (ii), propane (iv) and carbon dioxide (v) isotopic values for ground migration (GM) gases from British Columbia



Carbon isotope values (‰, VPDB)

Carbon isotope values (‰, VPDB)

Fig. 9A. Contour Map of Methane Carbon Isotope Values of Production Wells

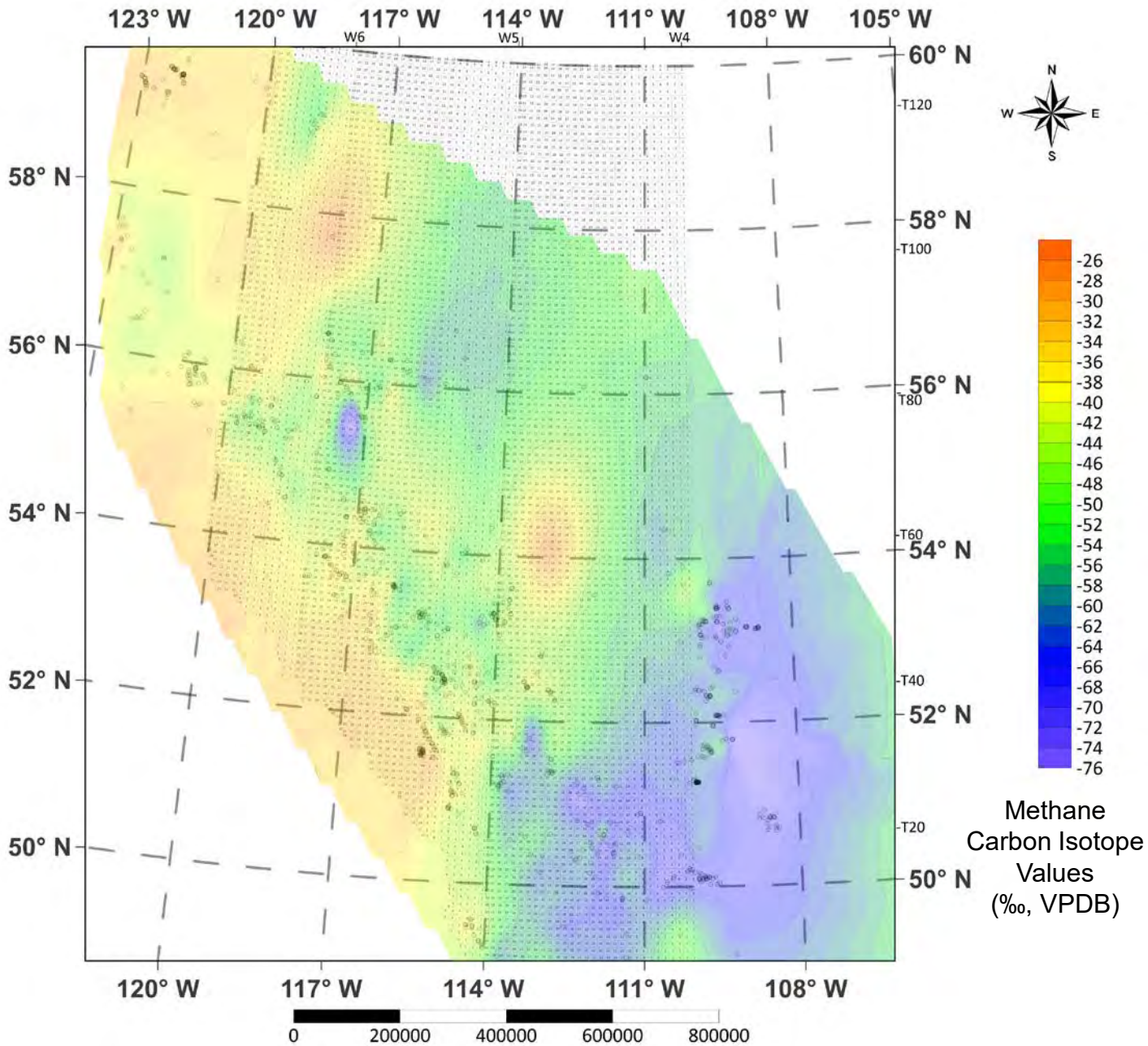




Fig. 9B. Contour Map of Methane Carbon Isotope Values of SCV

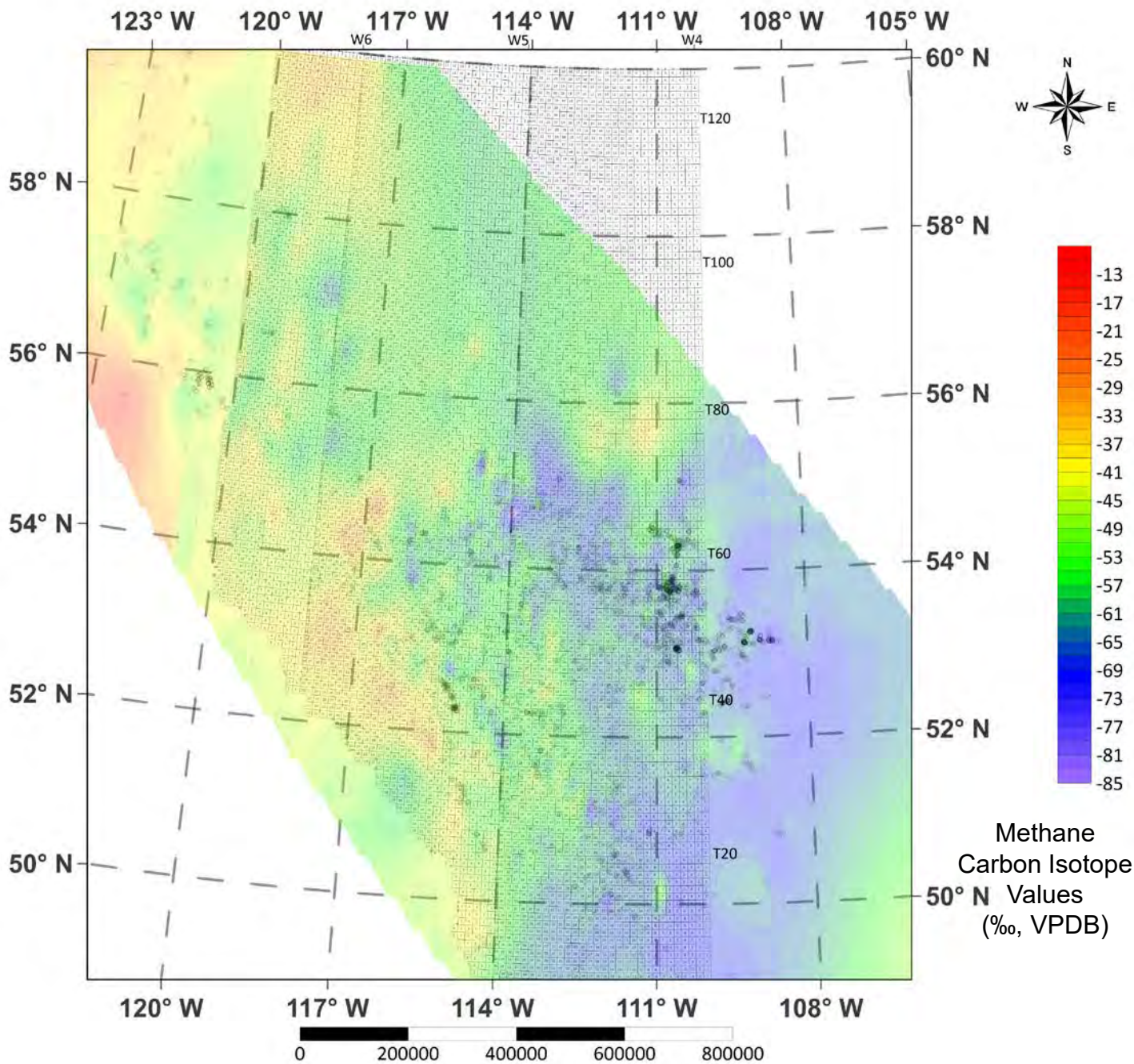


Fig. 9C. Contour Map of Methane Carbon Isotope Values of GM

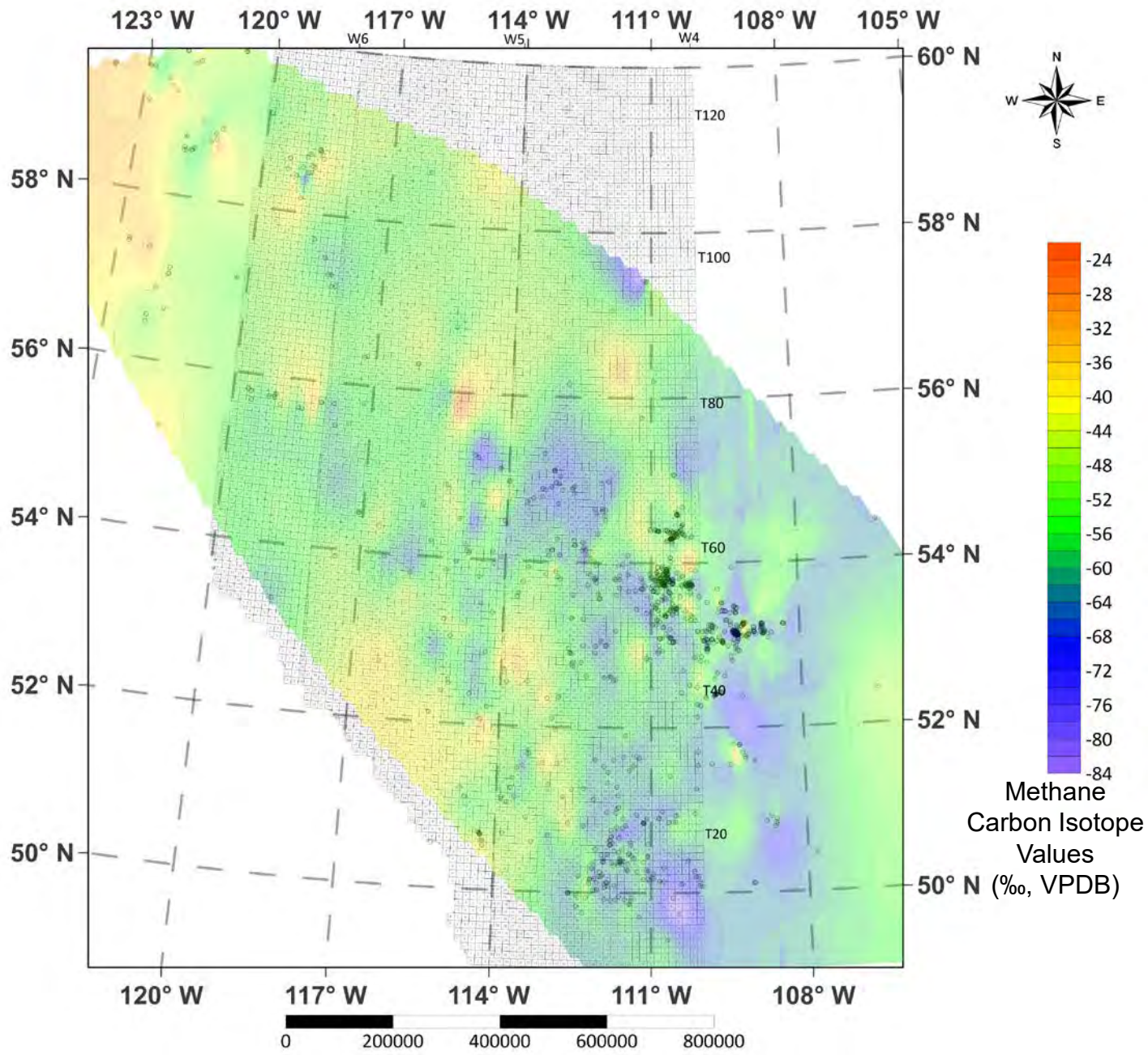




Fig. 10A. Contour Map of Ethane Carbon Isotope Values of Production Wells

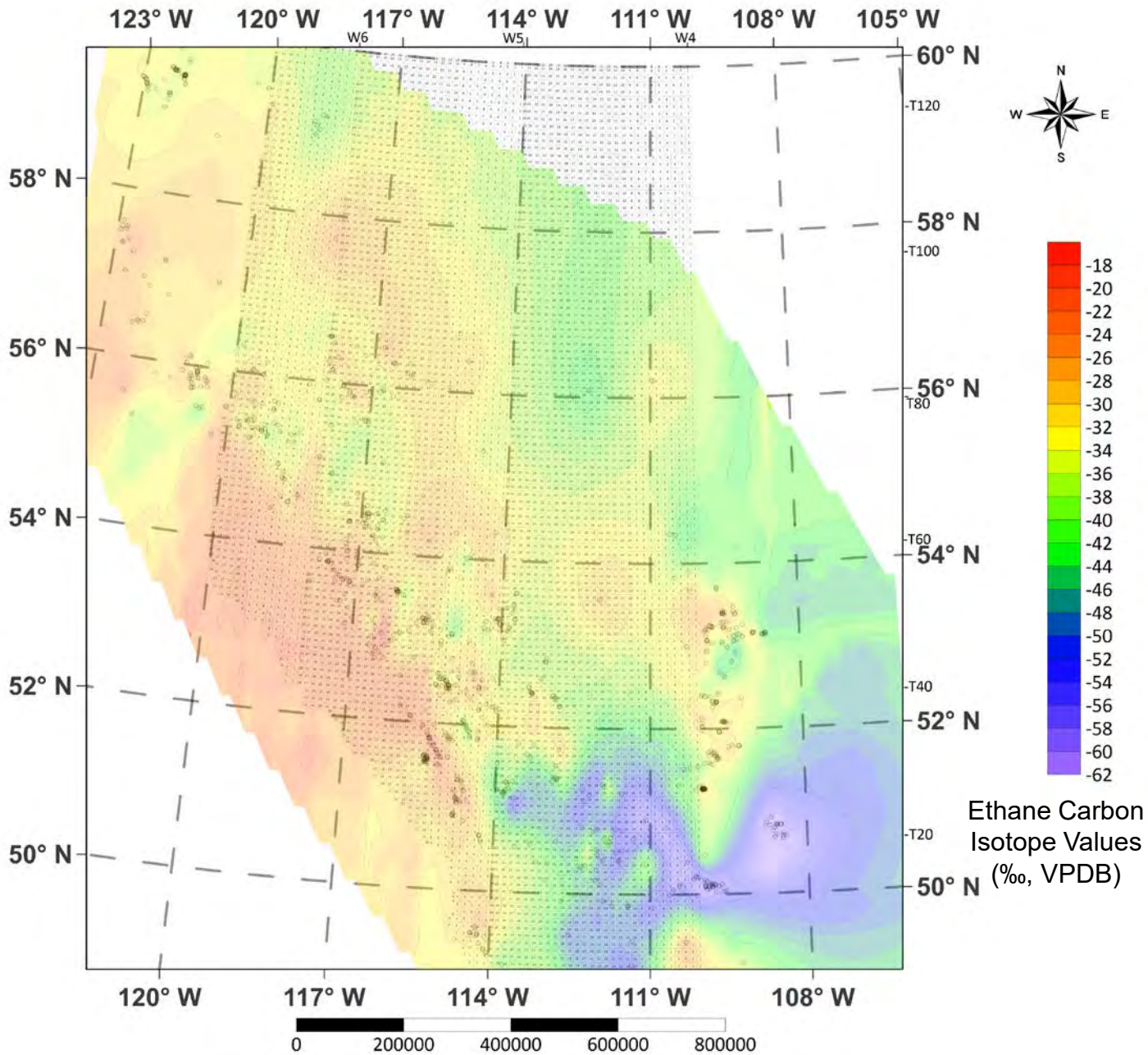


Fig. 10B. Contour Map of Ethane Carbon Isotope Values of SCV

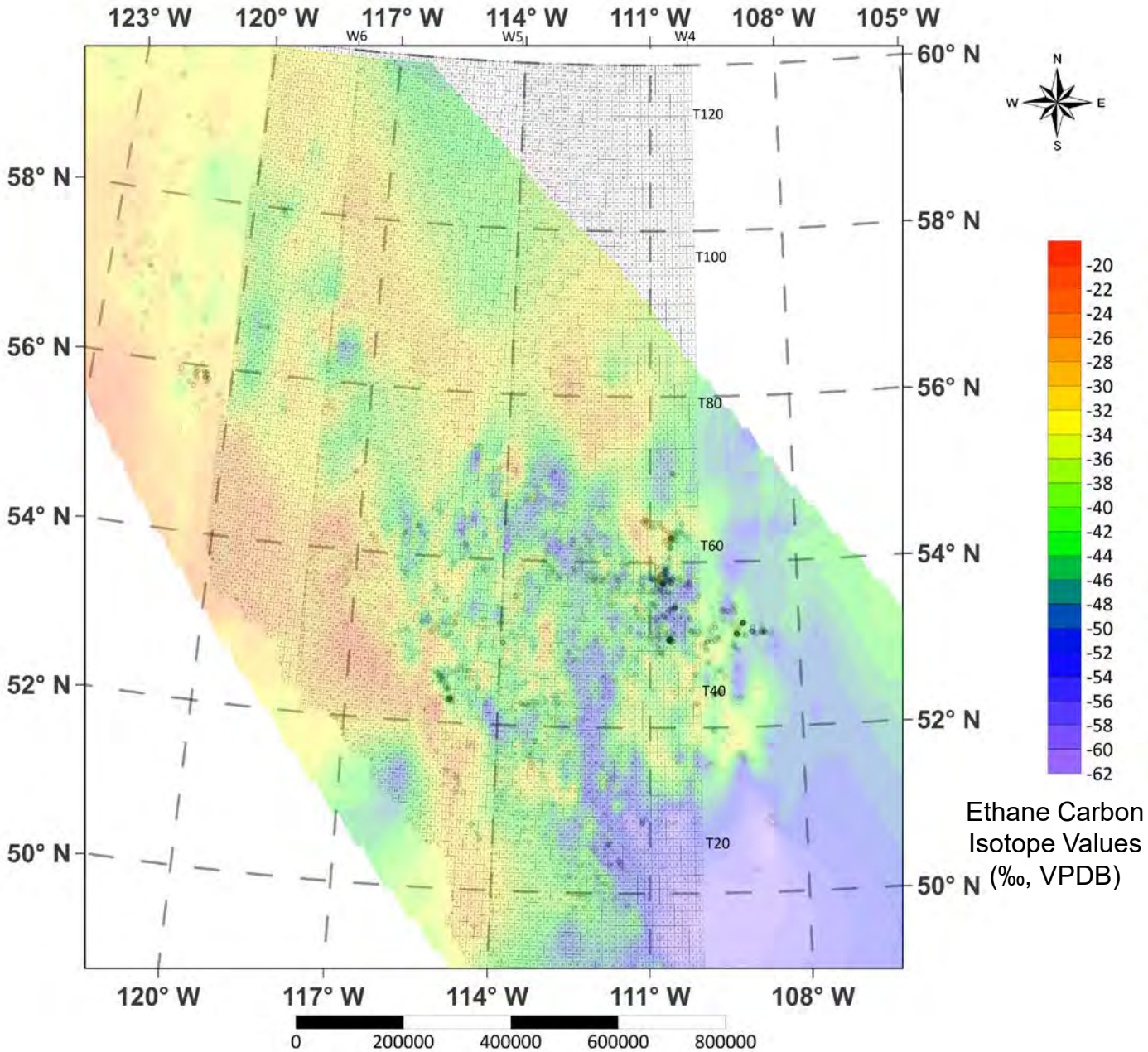




Fig. 10C. Contour Map of Ethane Carbon Isotope Values of GM

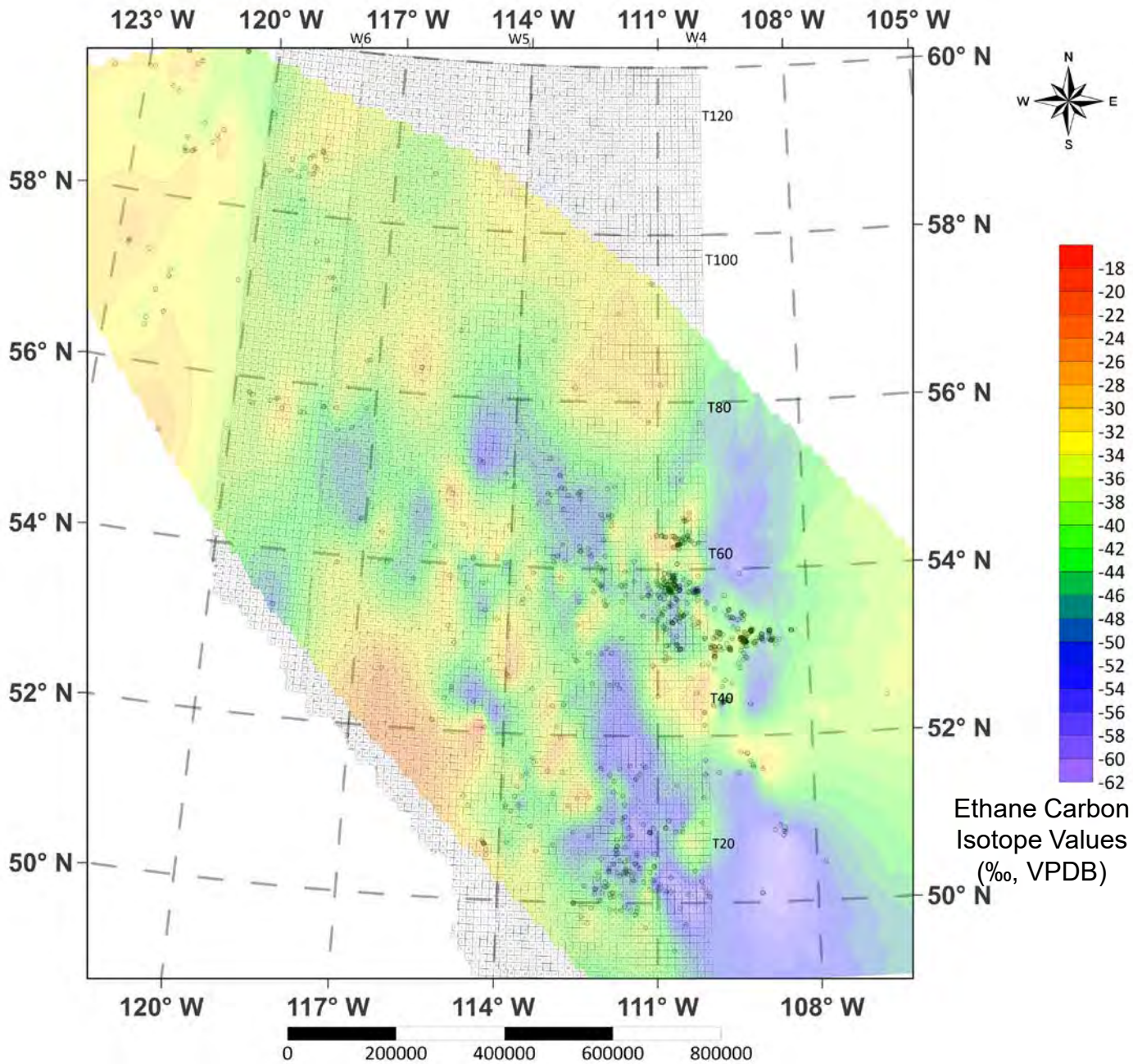


Fig. 11A. Contour Map of Propane Carbon Isotope Values of Production Wells

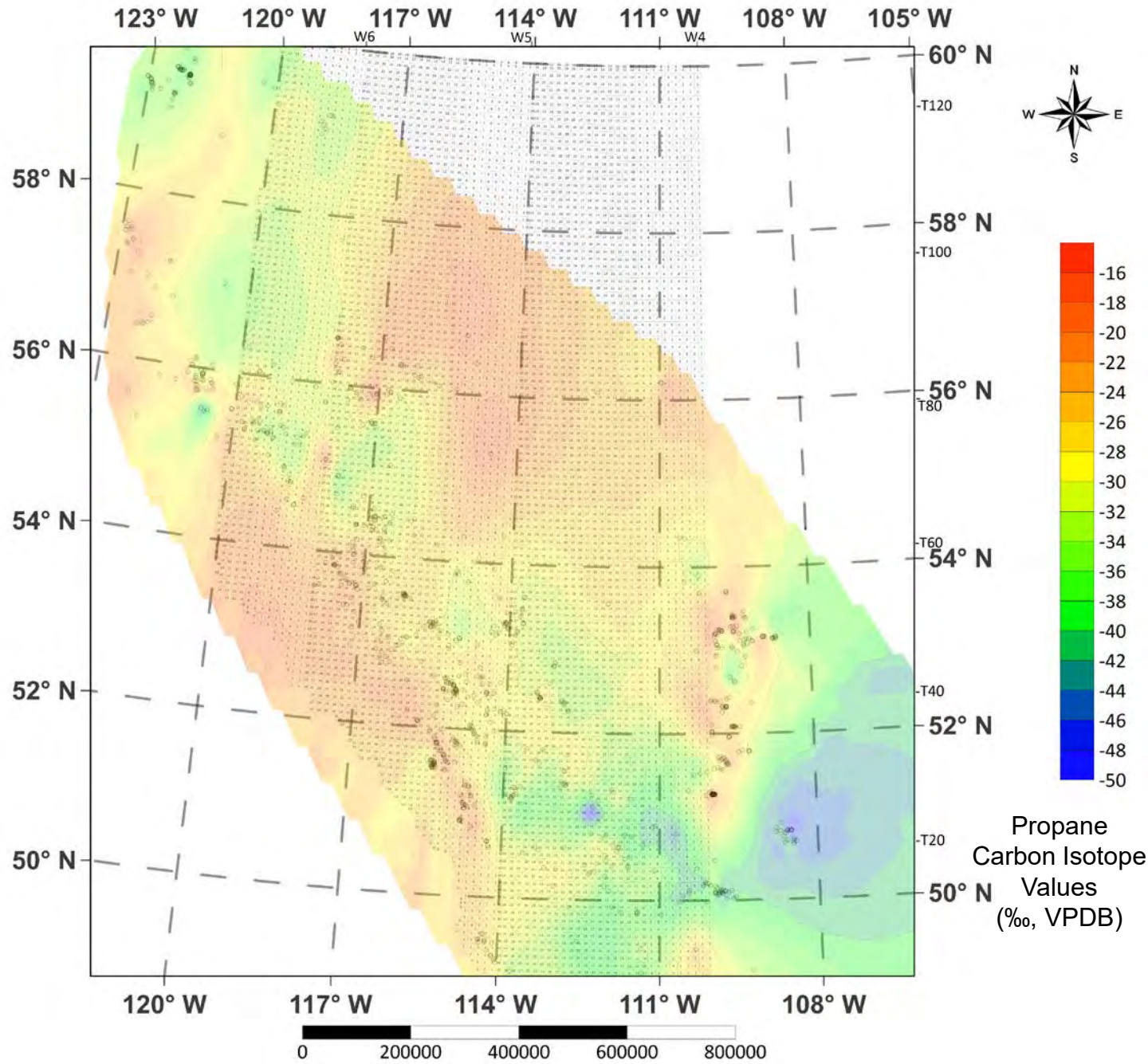




Fig. 11B. Contour Map of Propane Carbon Isotope Values of SCV

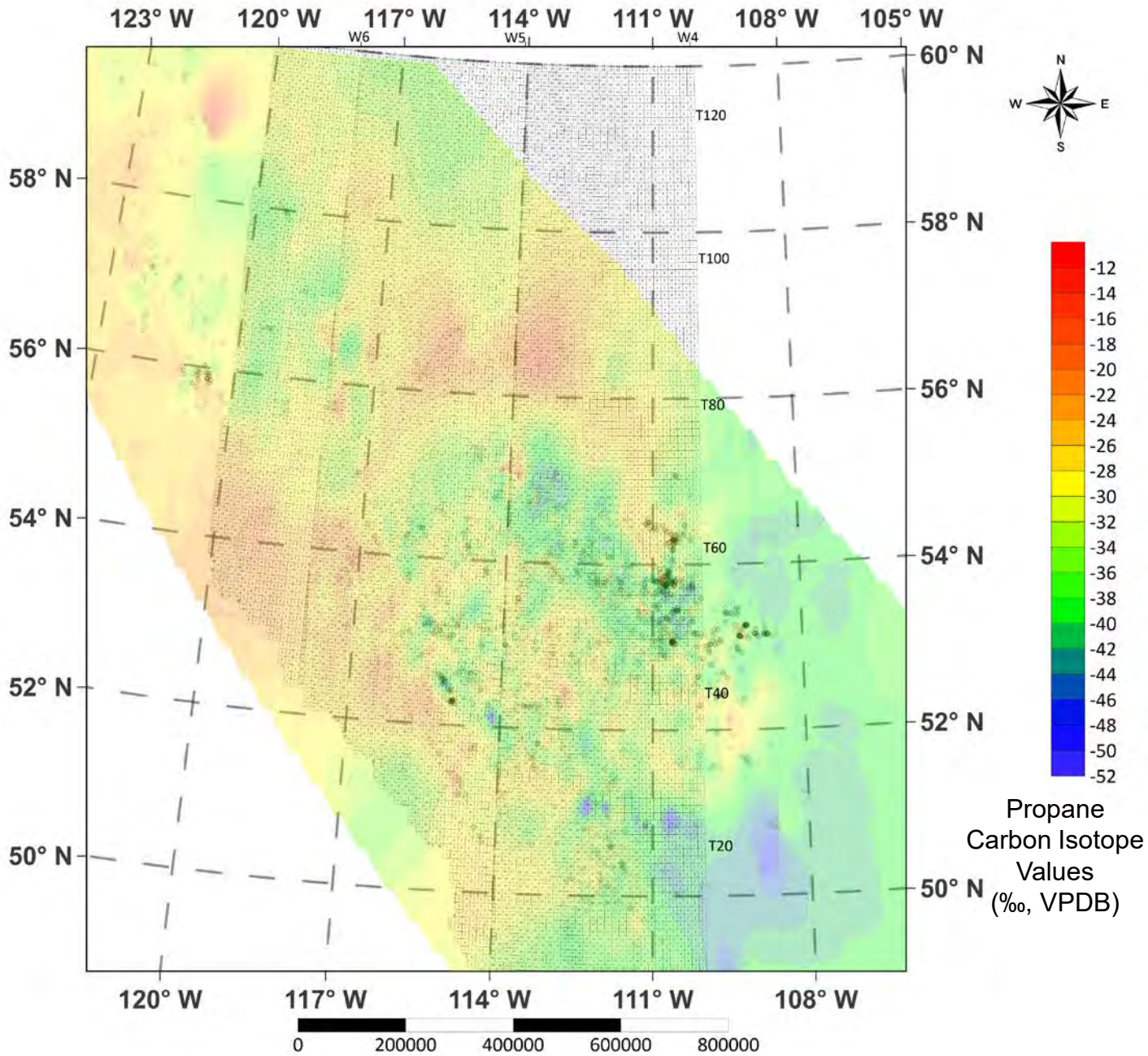


Fig. 11C. Contour Map of Propane Carbon Isotope Values of GM

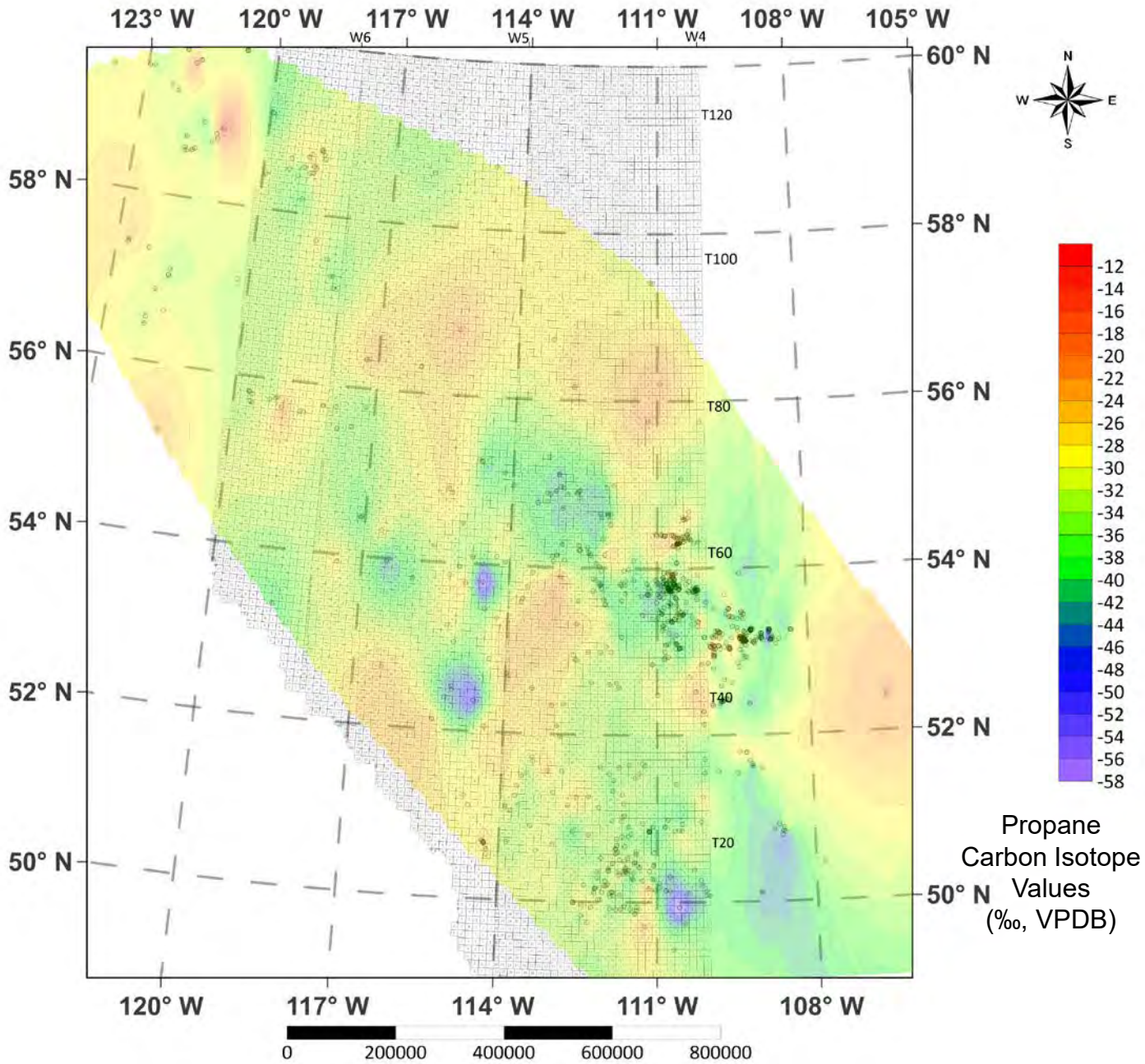




Fig. 12A. Contour Map of *n*-Butane Carbon Isotope Values of Production Wells

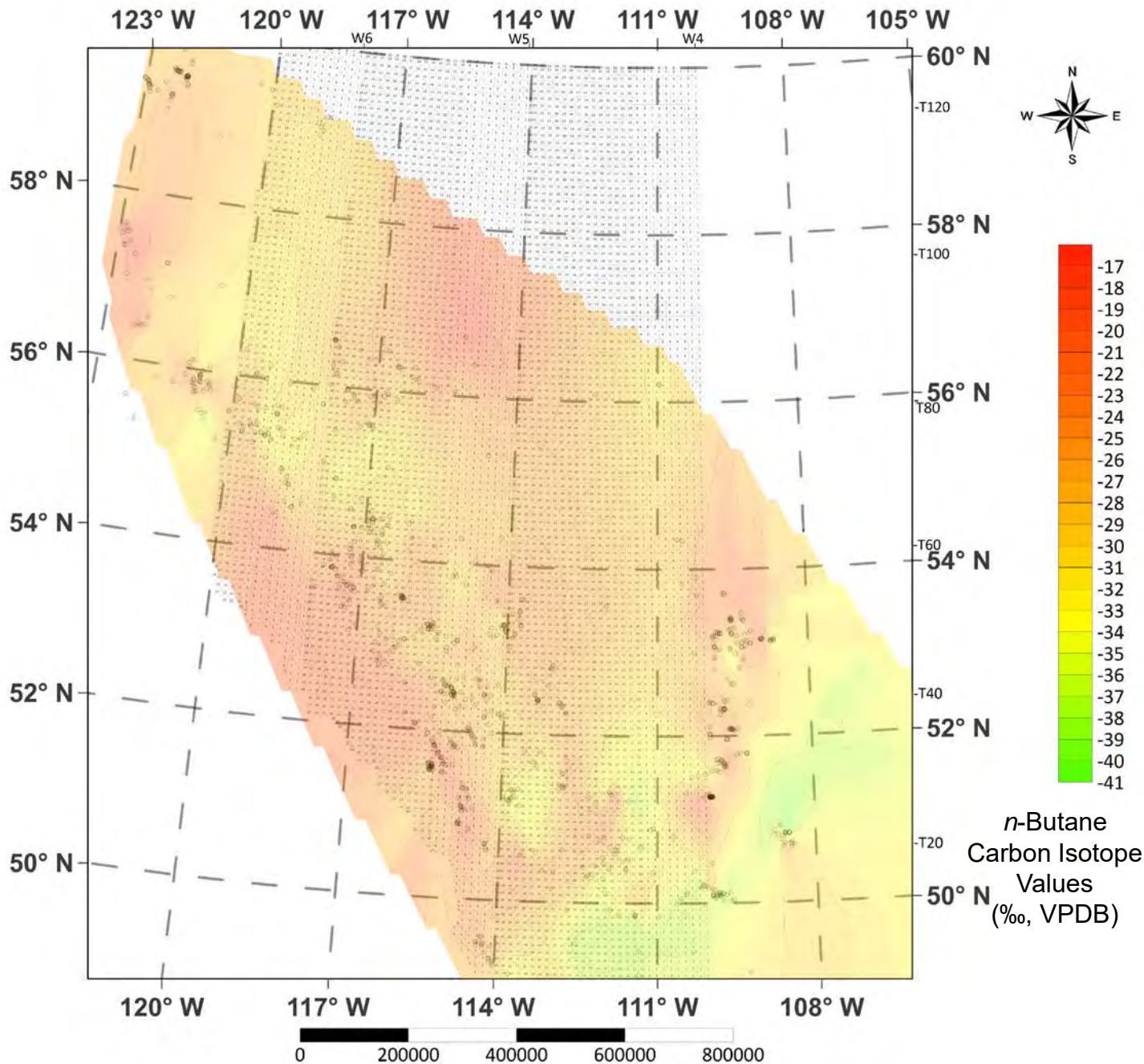


Fig. 12B. Contour Map of *n*-Butane Carbon Isotope Values of SCV

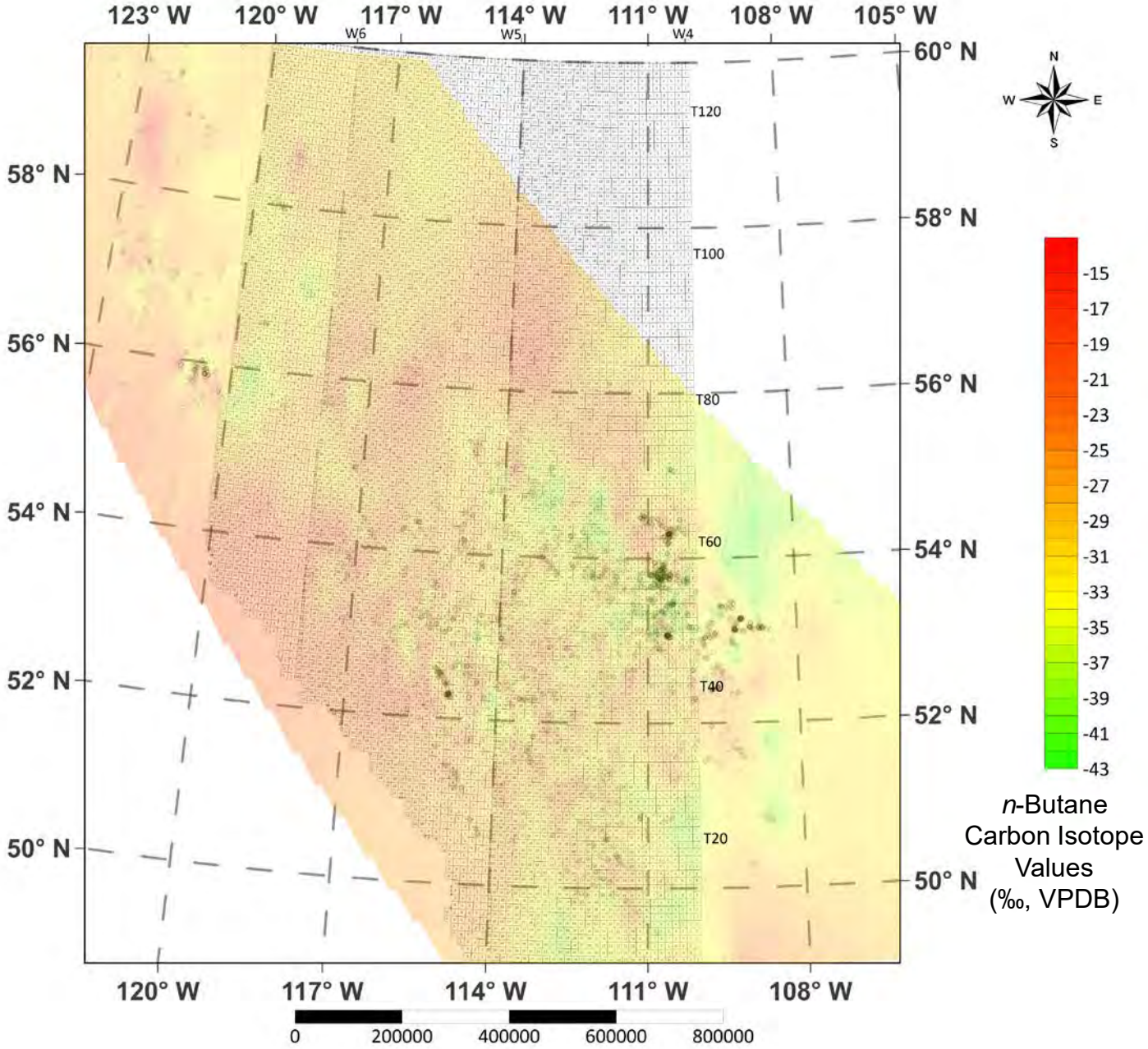




Fig. 12C. Contour Map of *n*-Butane Carbon Isotope Values of GM

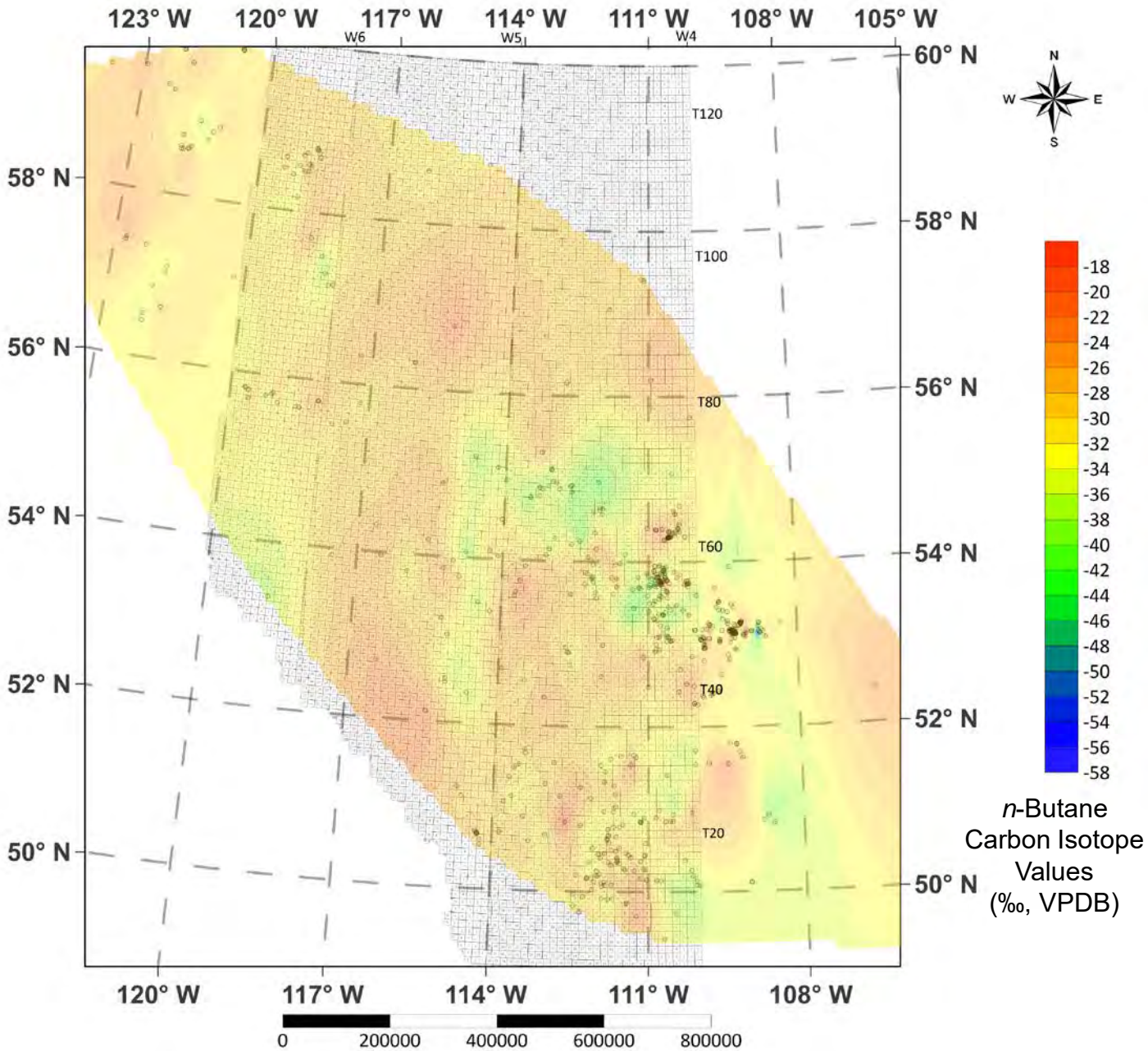


Fig. 13A. Contour Map of *i*-Butane Carbon Isotope Values of Production Wells

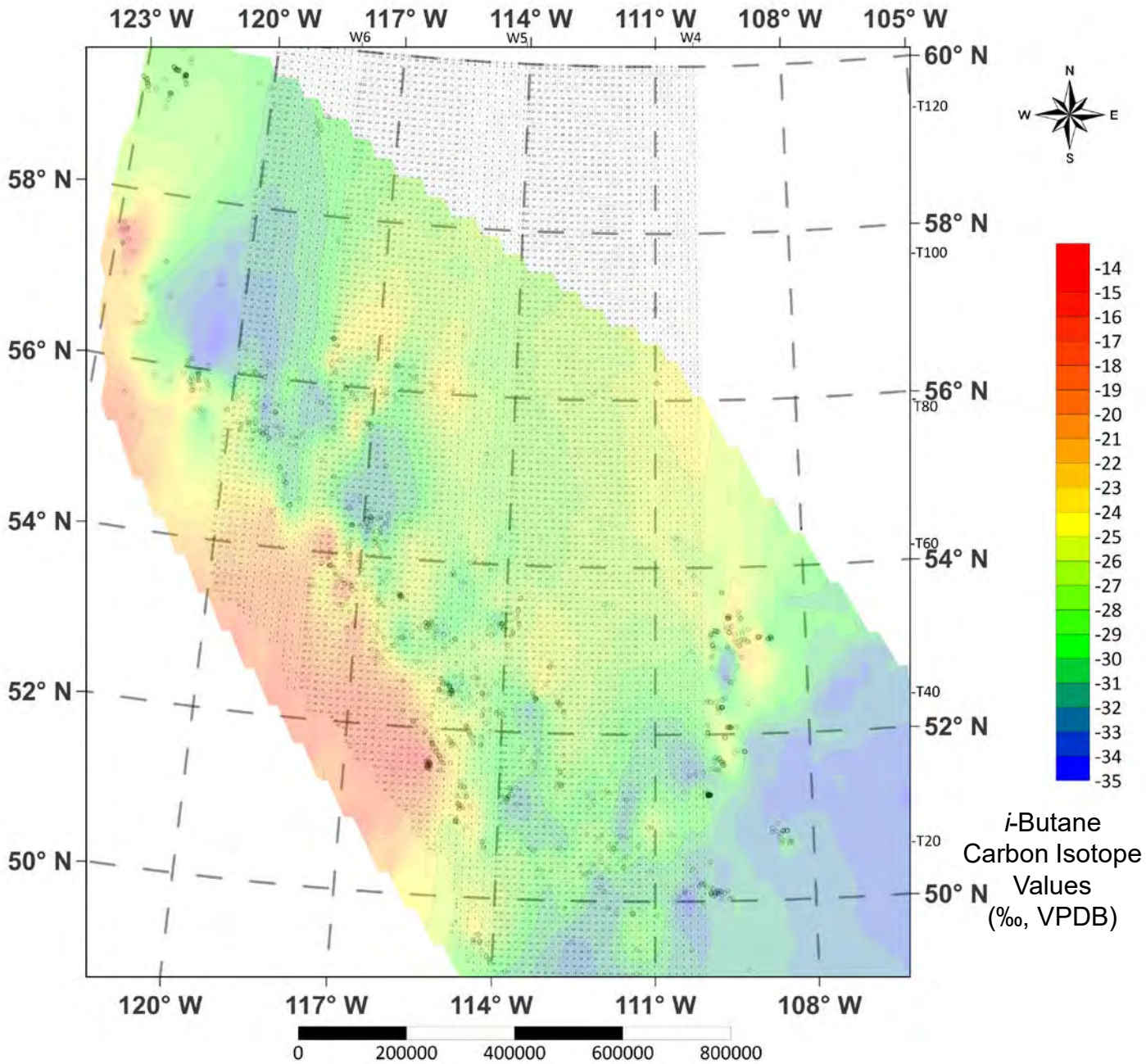




Fig. 13B. Contour Map of *i*-Butane Carbon Isotope Values of SCV

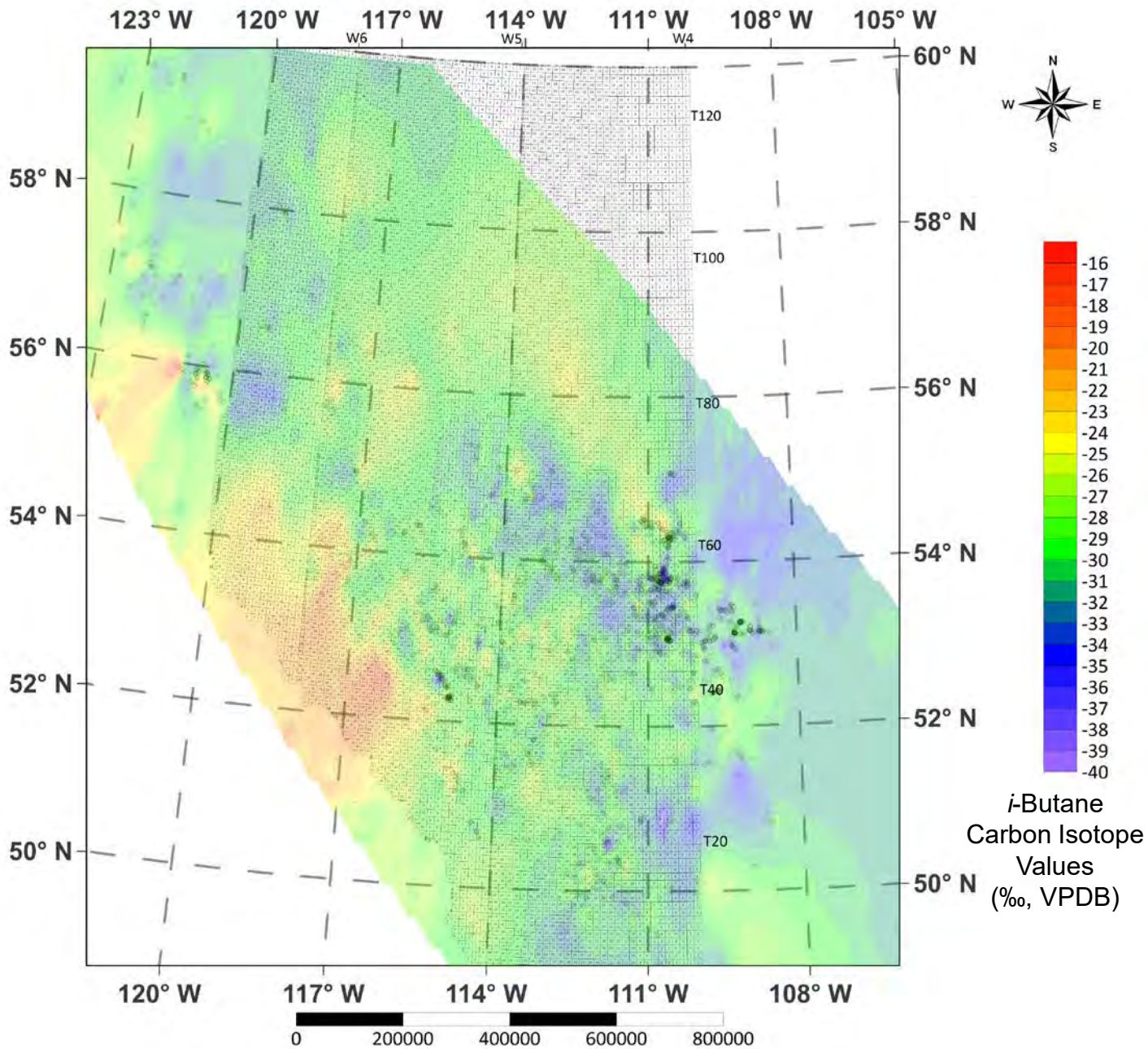


Fig. 13C. Contour Map of *i*-Butane Carbon Isotope Values of GM

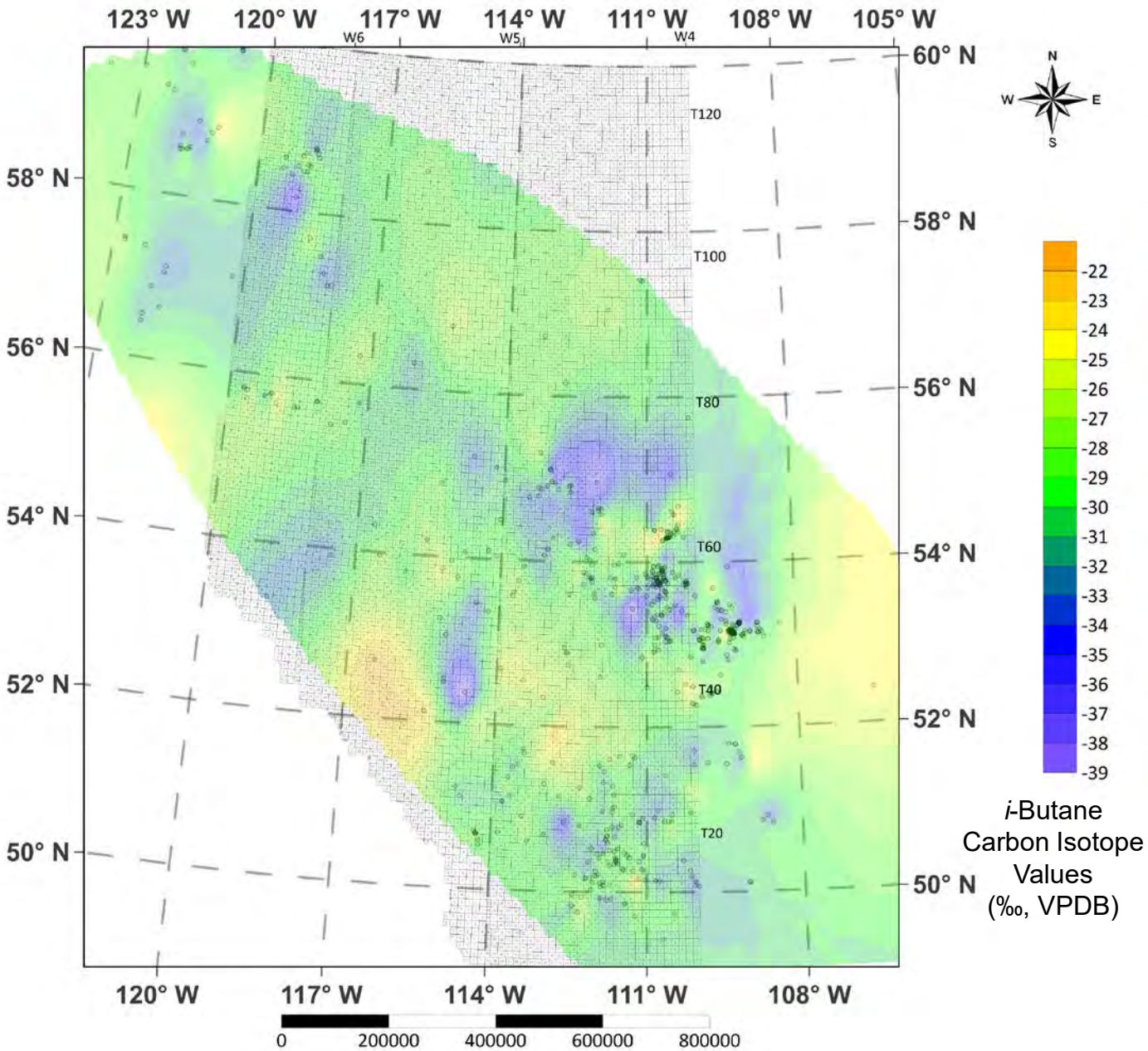




Fig. 14A. Contour Map of Carbon Dioxide Carbon Isotope Values of Production Wells

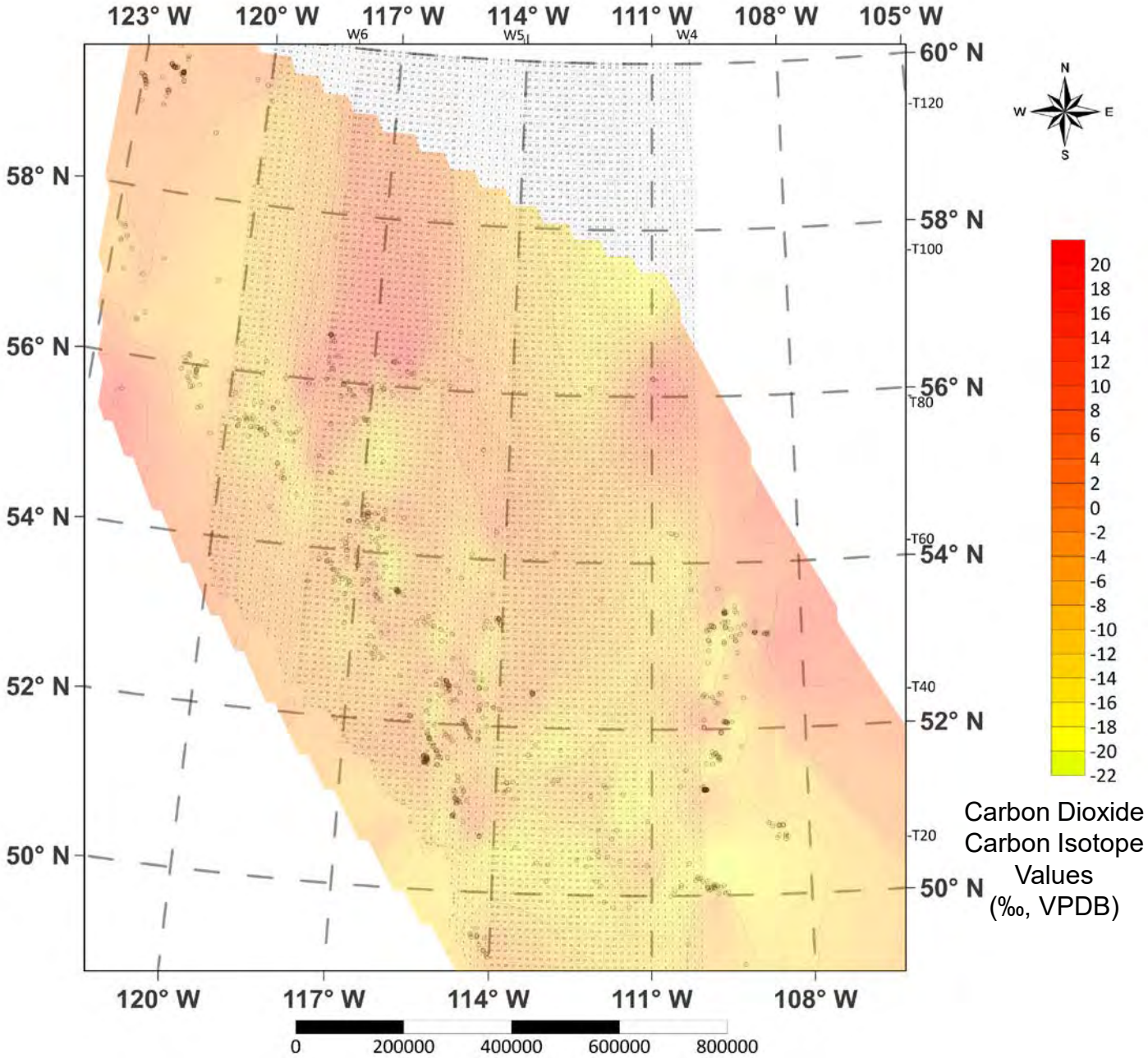


Fig. 14B. Contour Map of Carbon Dioxide Carbon Isotope Values of SCV

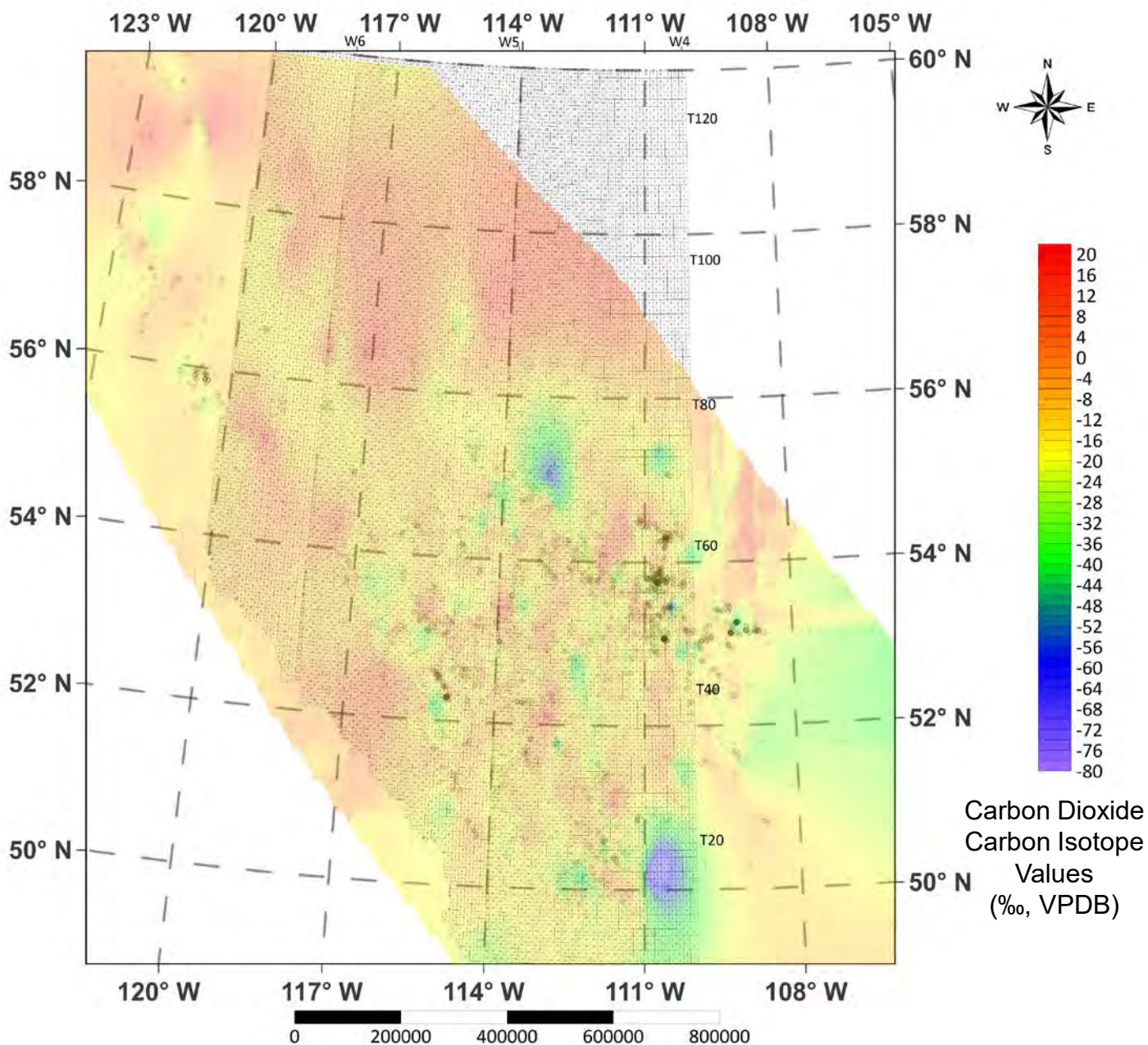




Fig. 14C. Contour Map of Carbon Dioxide  
Carbon Isotope Values of GM

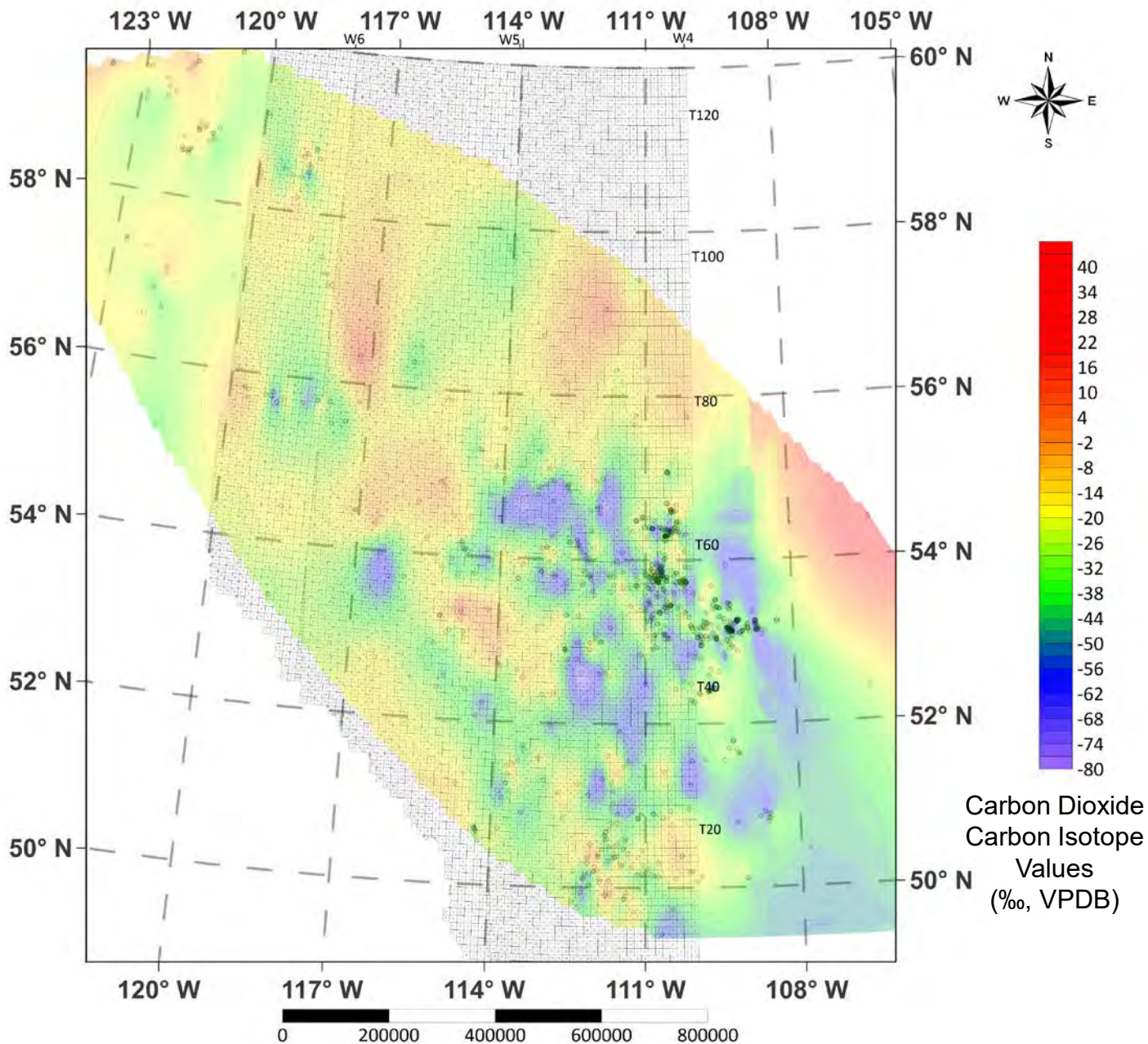




Fig. 15A. Contour Map of Methane Carbon Isotope Values of Production Wells over Topographic Map

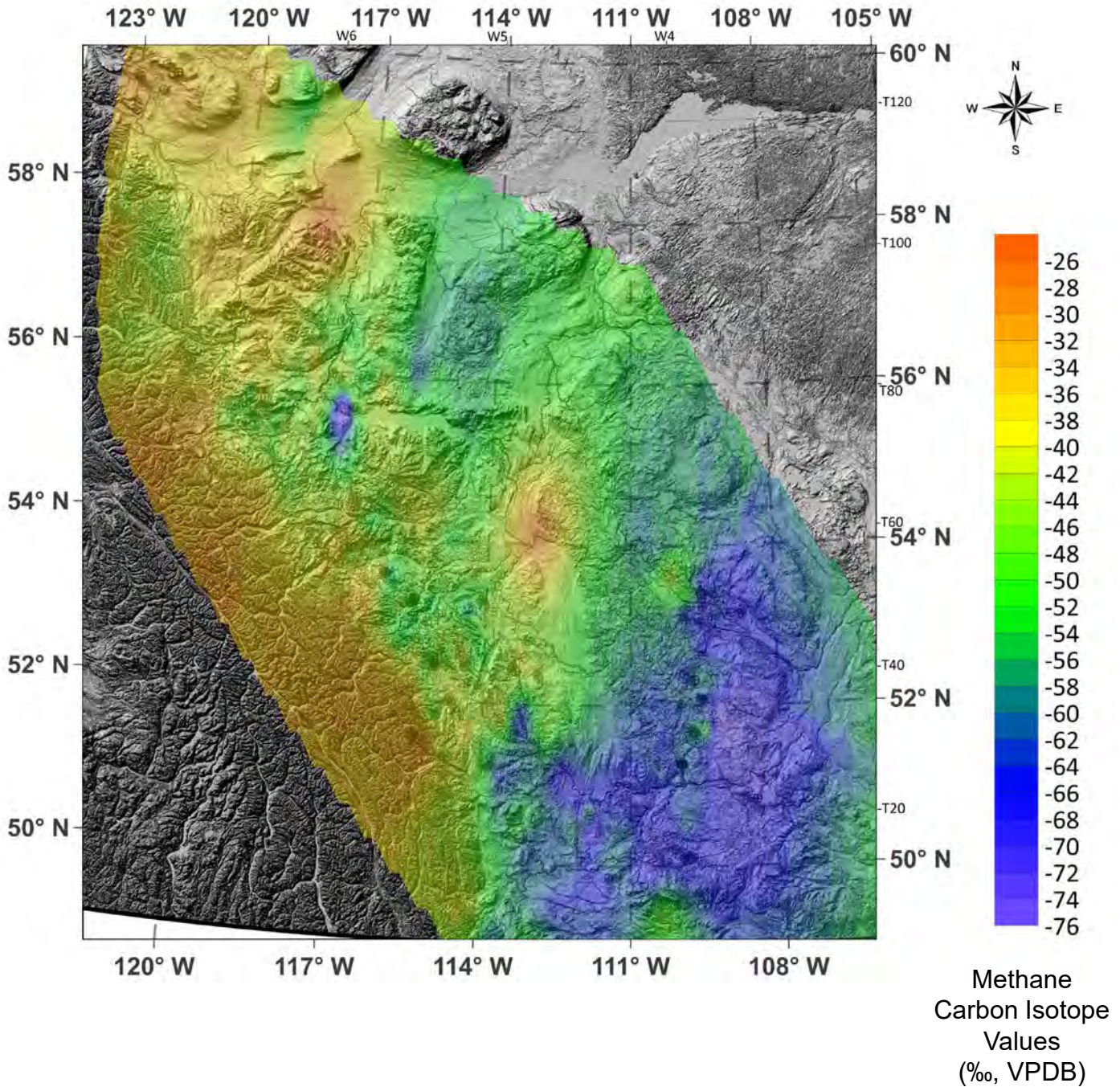




Fig. 15B. Contour Map of Methane Carbon Isotope Values of SCV over Topographic Map

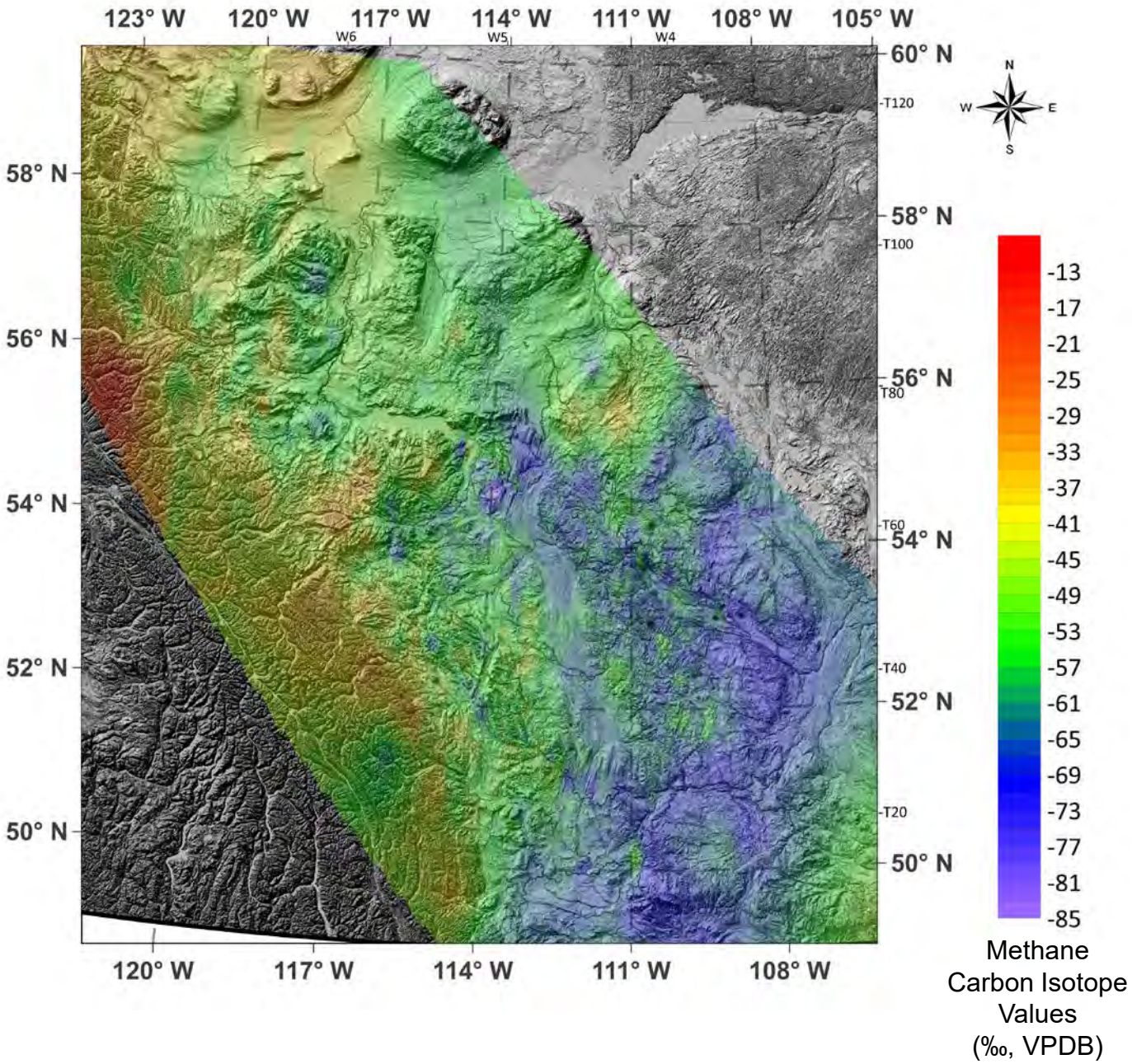




Fig. 15C. Contour Map of Methane Carbon Isotope Values of GM over Topographic Map

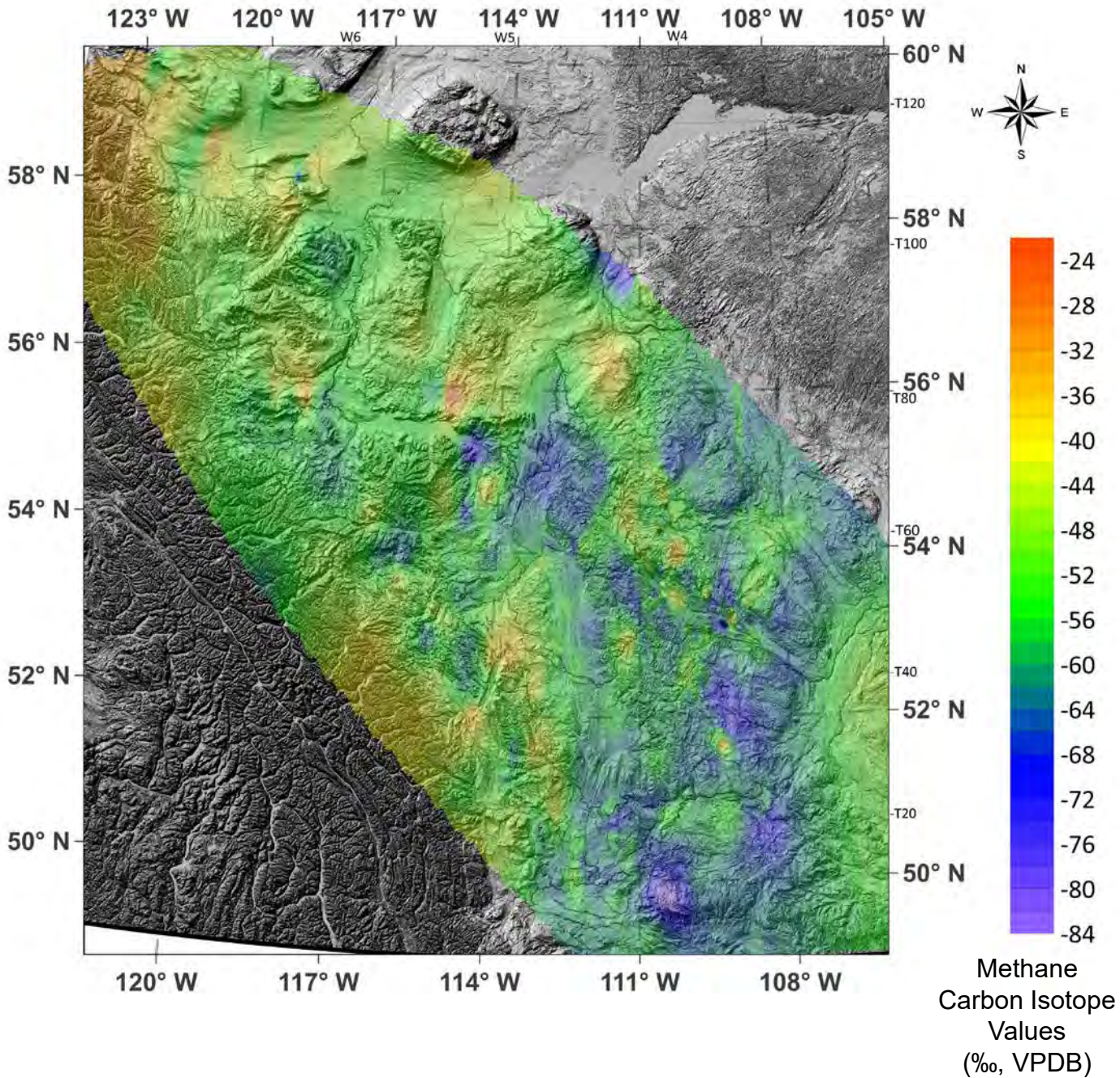




Fig. 16A. Contour Map of Ethane Carbon Isotope Values of Production Wells over Topographic Map

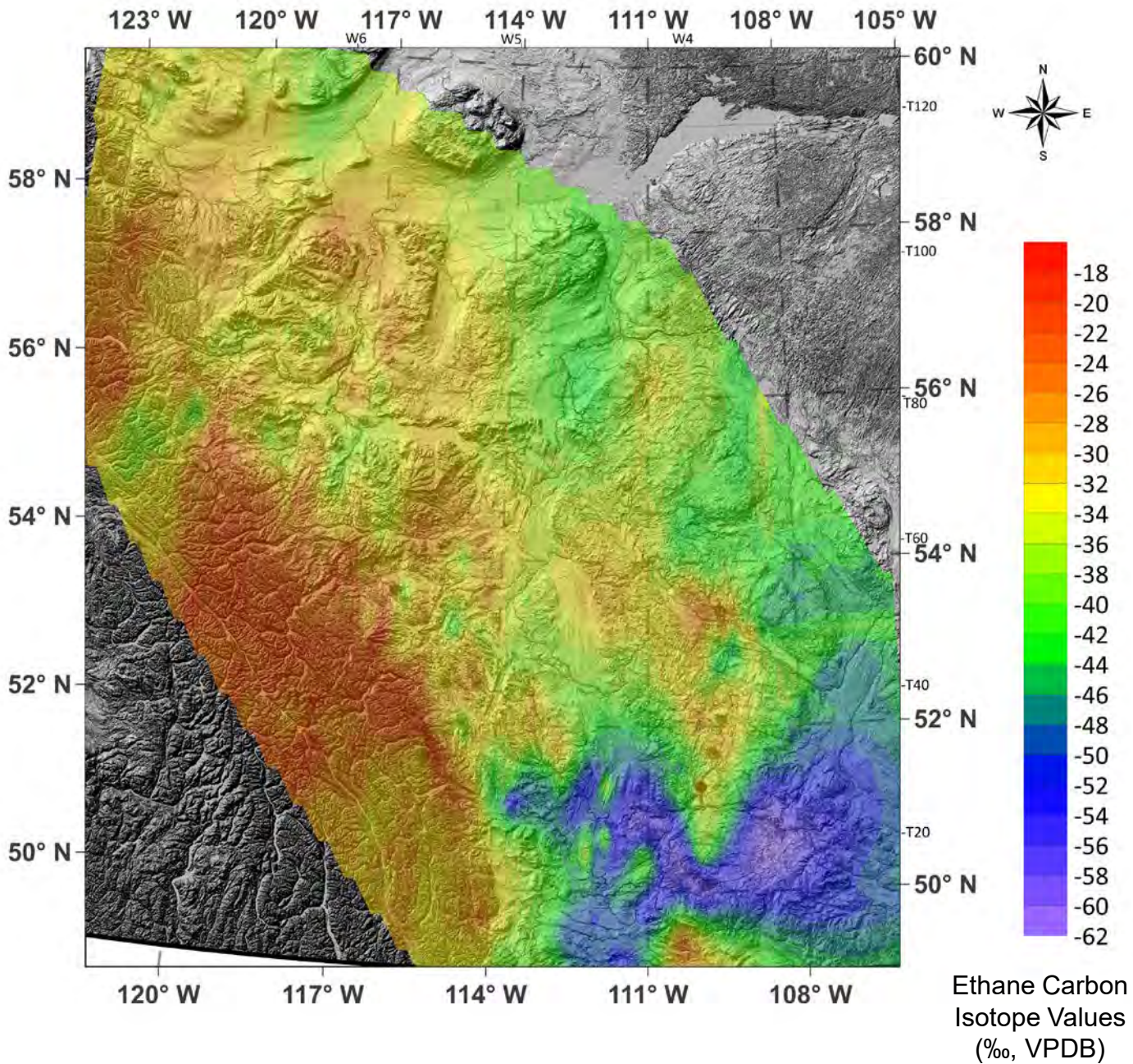




Fig. 16B. Contour Map of Ethane Carbon Isotope Values of SCV over Topographic Map

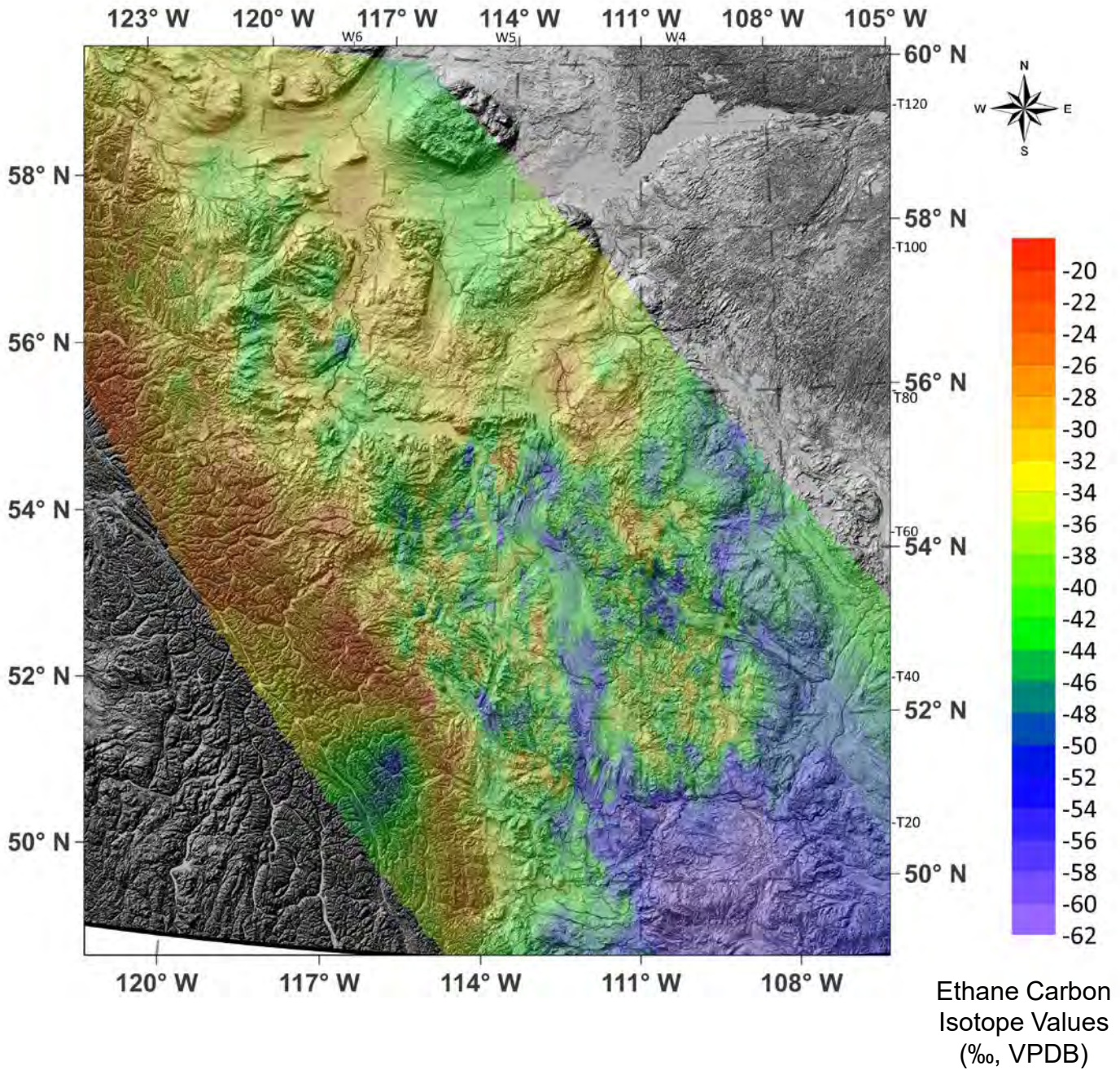




Fig. 16C. Contour Map of Ethane Carbon Isotope Values of GM over Topographic Map

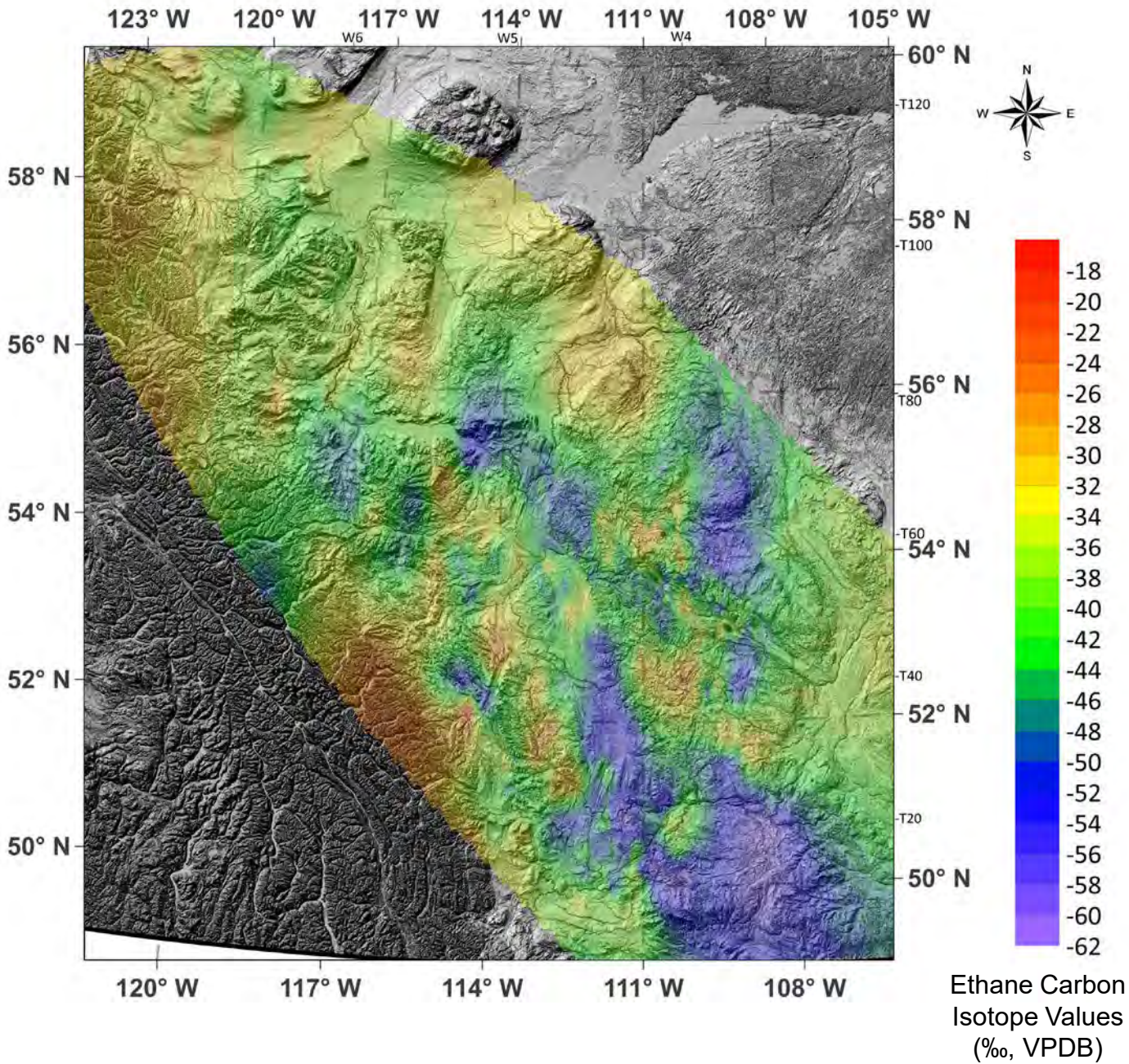




Fig. 17A. Contour Map of Propane Carbon Isotope Values of Production Wells over Topographic Map

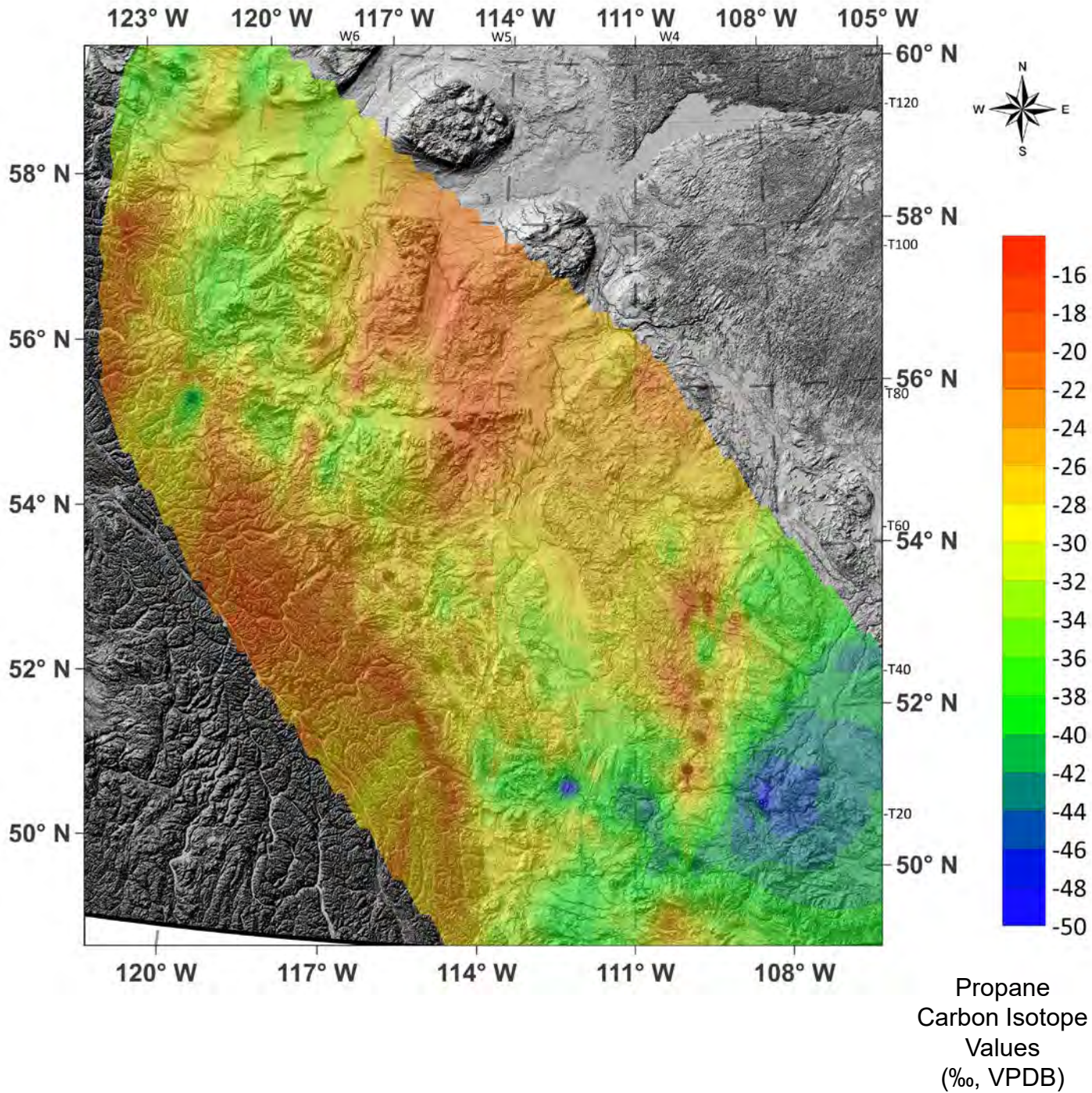




Fig. 17B. Contour Map of Propane Carbon Isotope Values of SCV over Topographic Map

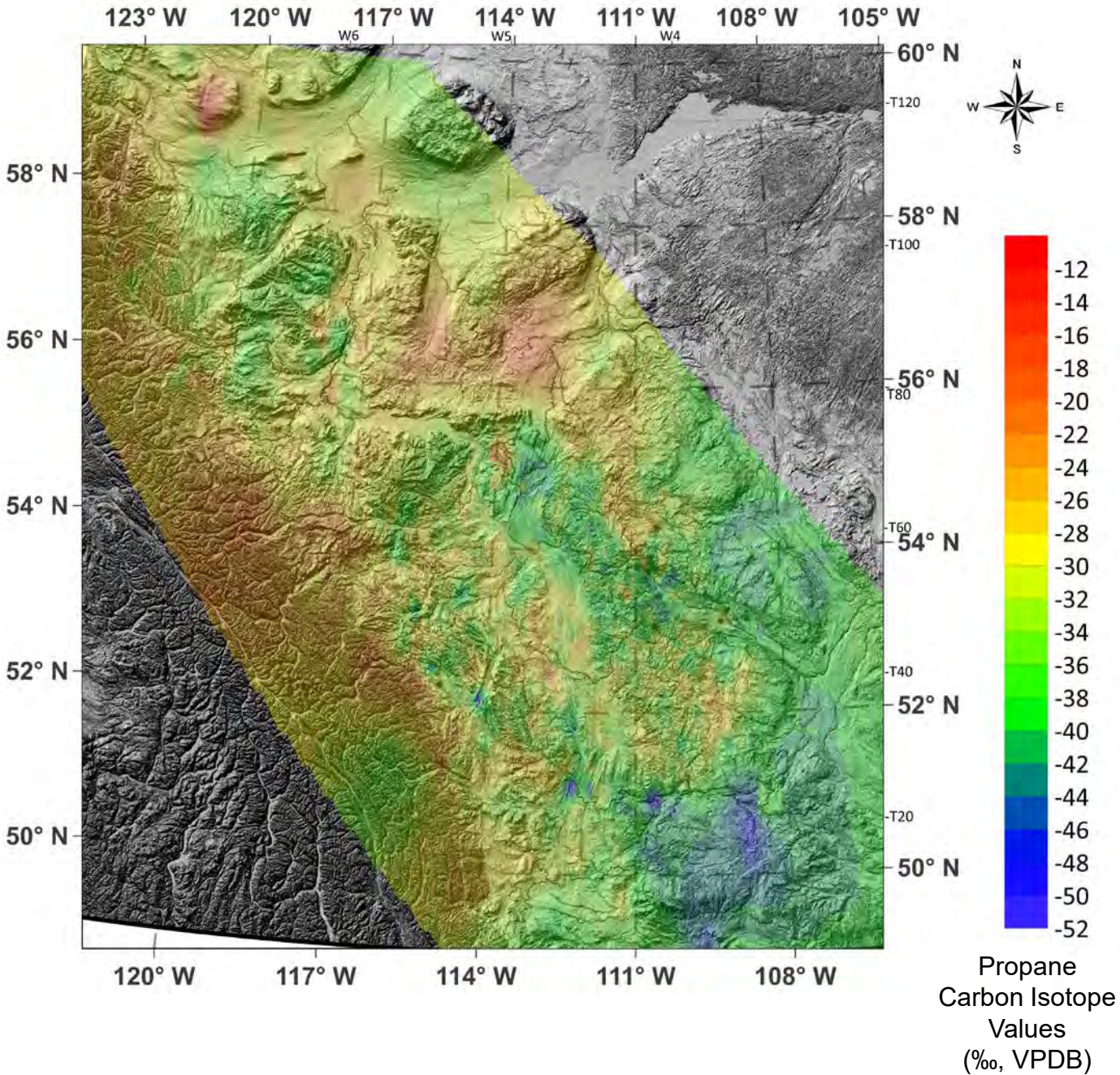




Fig. 17C. Contour Map of Propane Carbon Isotope Values of GM over Topographic Map

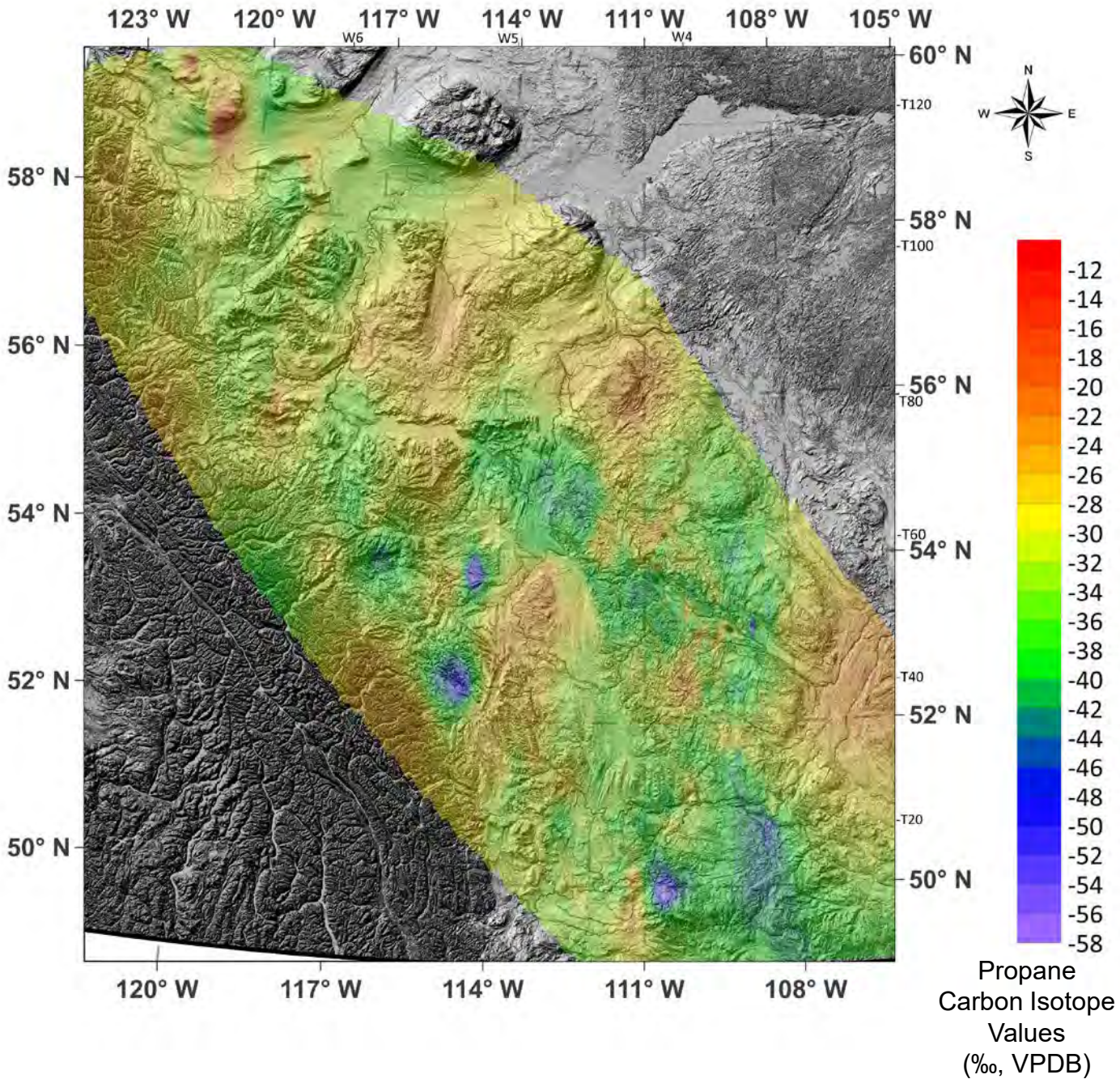




Fig. 18A. Contour Map of *n*-Butane Carbon Isotope Values of Production Wells over Topographic Map

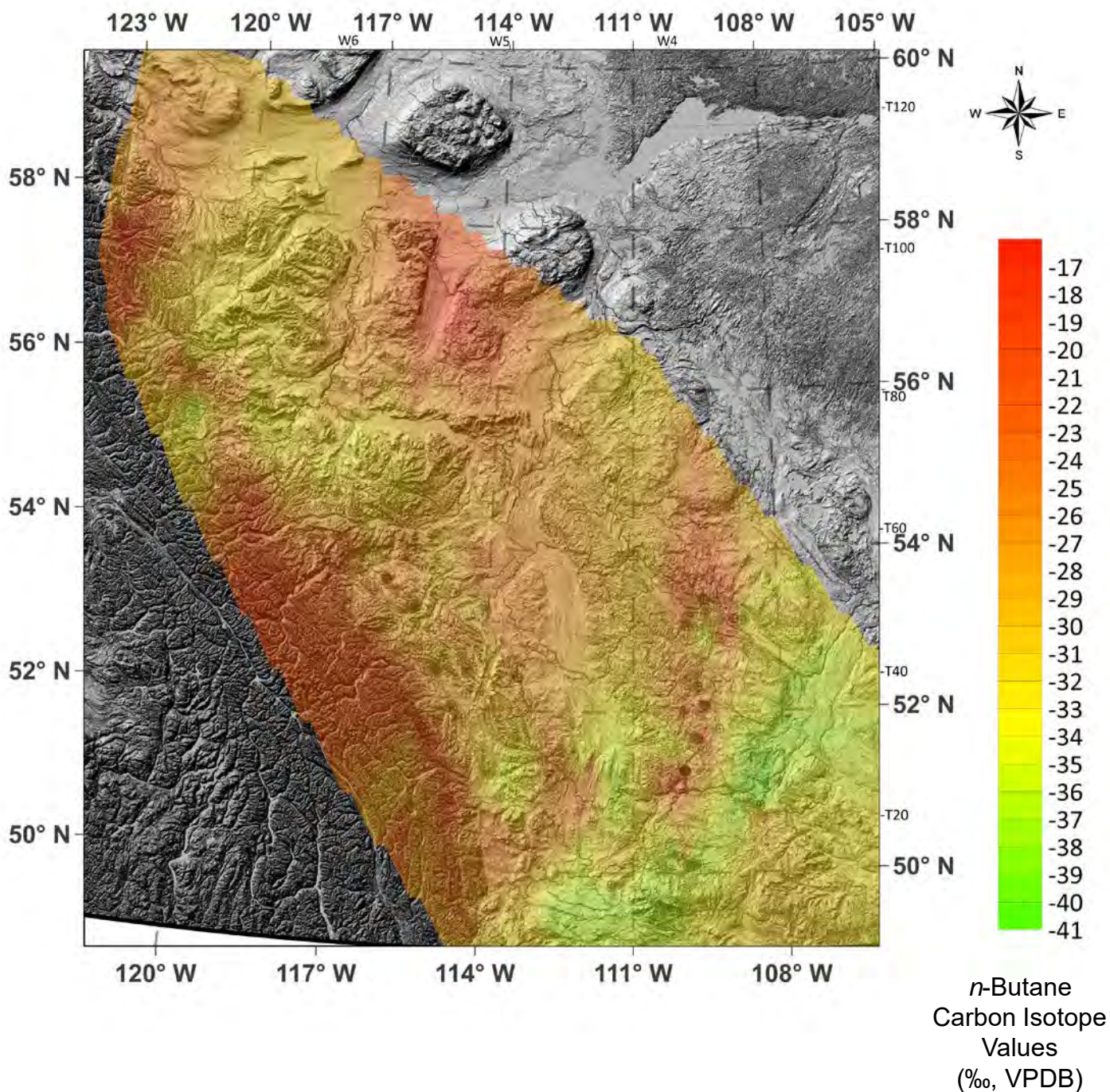




Fig. 18B. Contour Map of *n*-Butane Carbon Isotope Values of SCV over Topographic Map

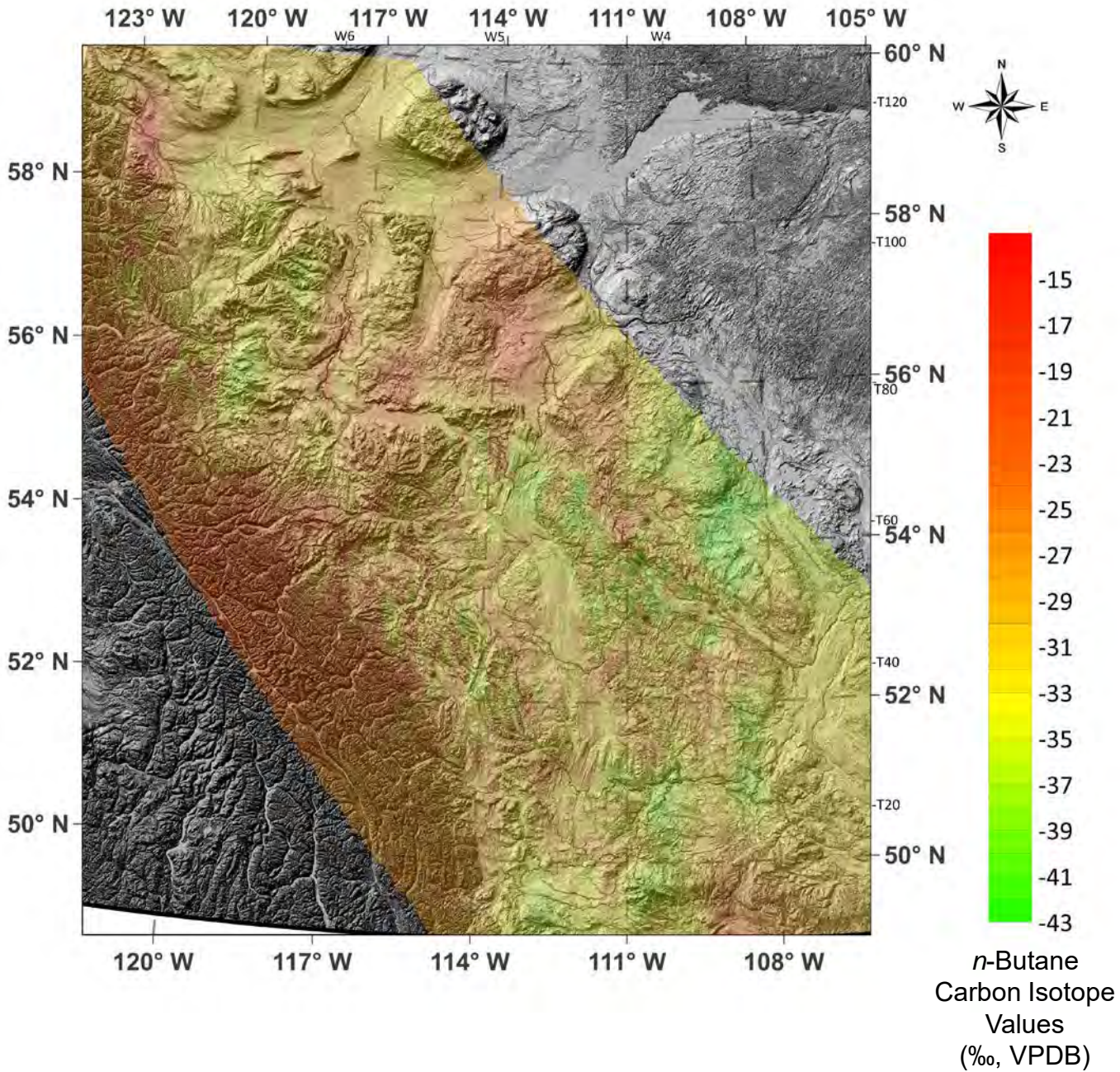




Fig. 18C. Contour Map of *n*-Butane Carbon Isotope Values of GM over Topographic Map

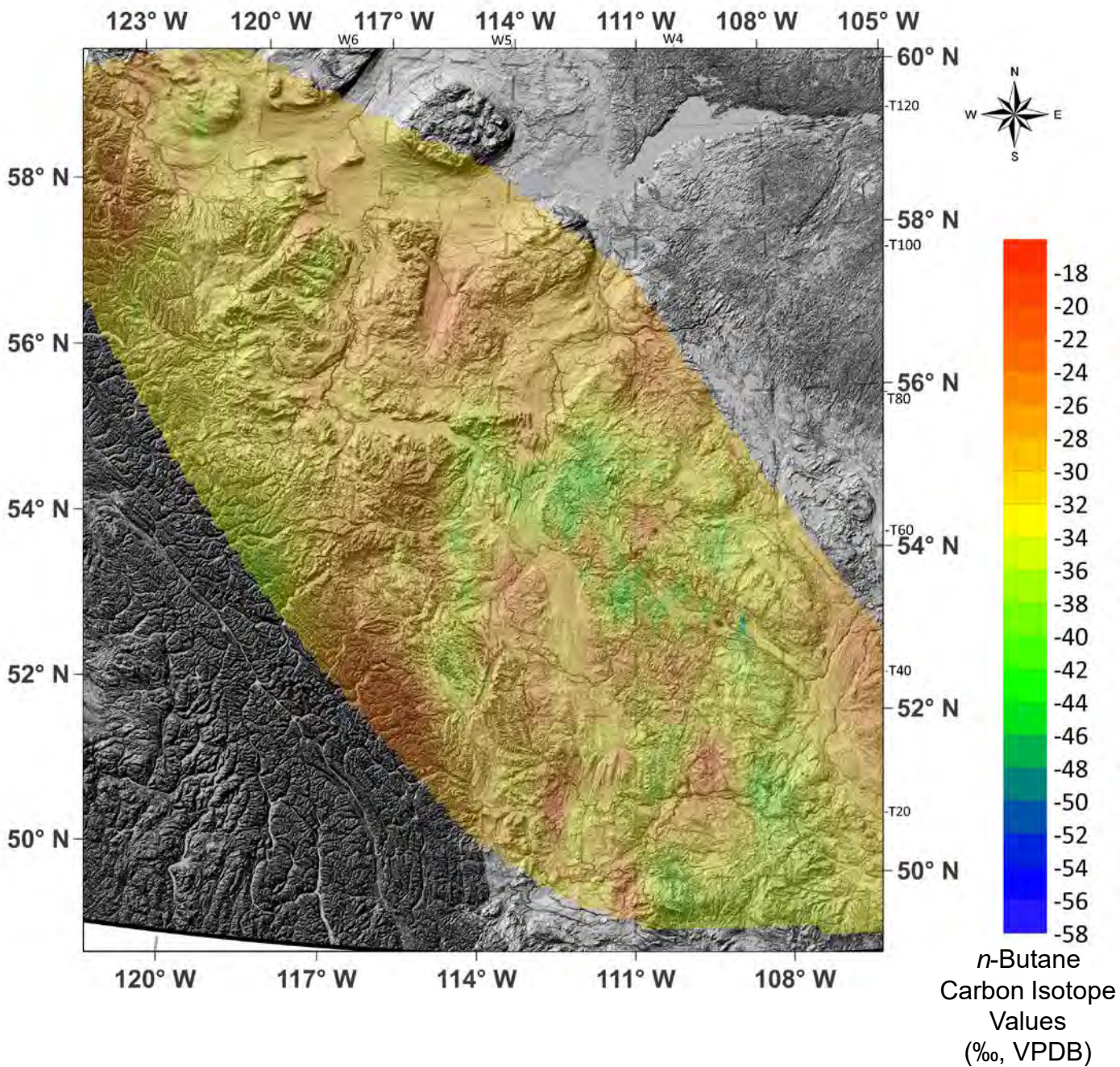




Fig. 20A. Contour Map of Carbon Dioxide Carbon Isotope Values of Production Wells over Topographic Map

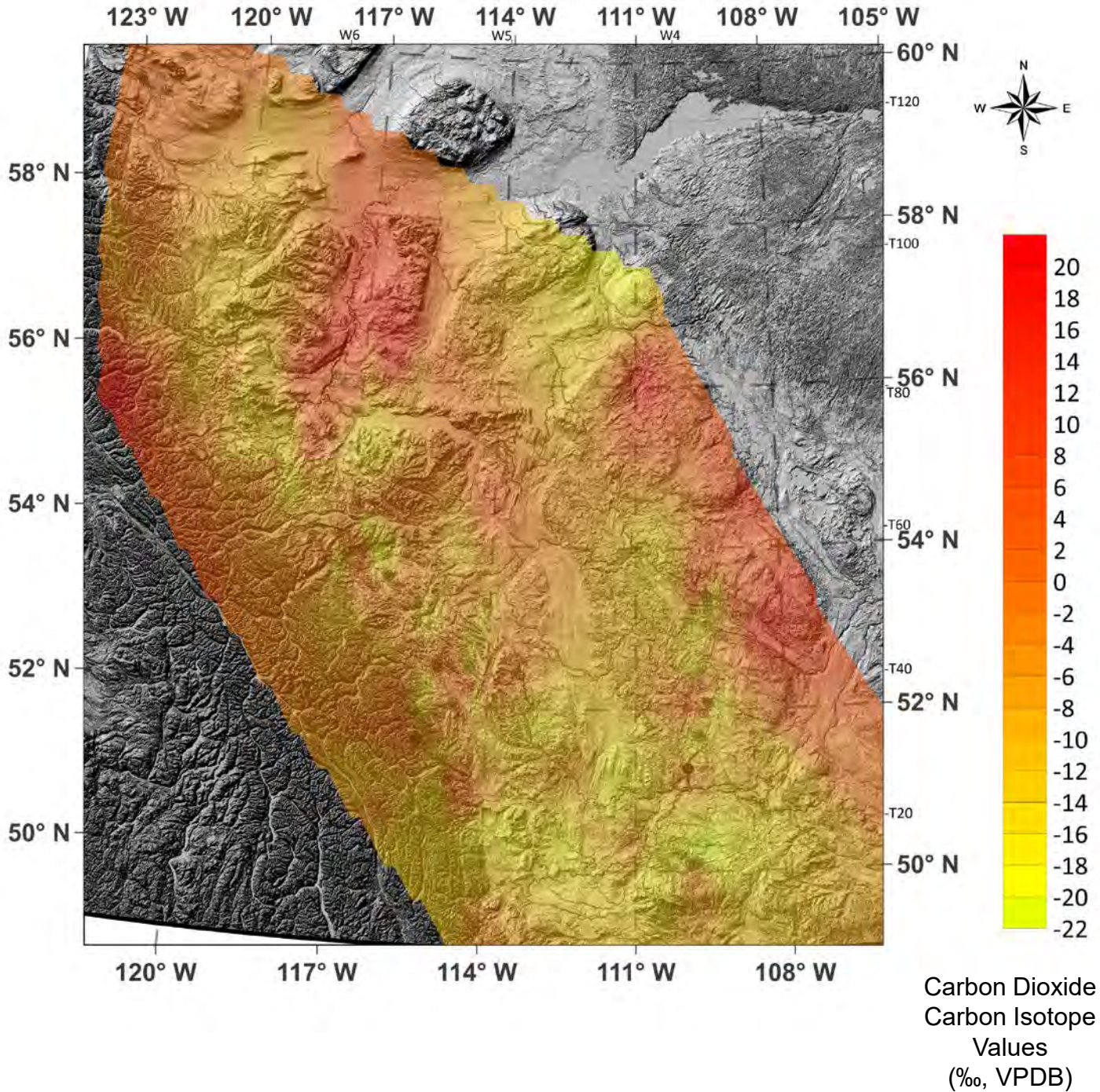




Fig. 20B. Contour Map of Carbon Dioxide  
Carbon Isotope Values of SCV over  
Topographic Map

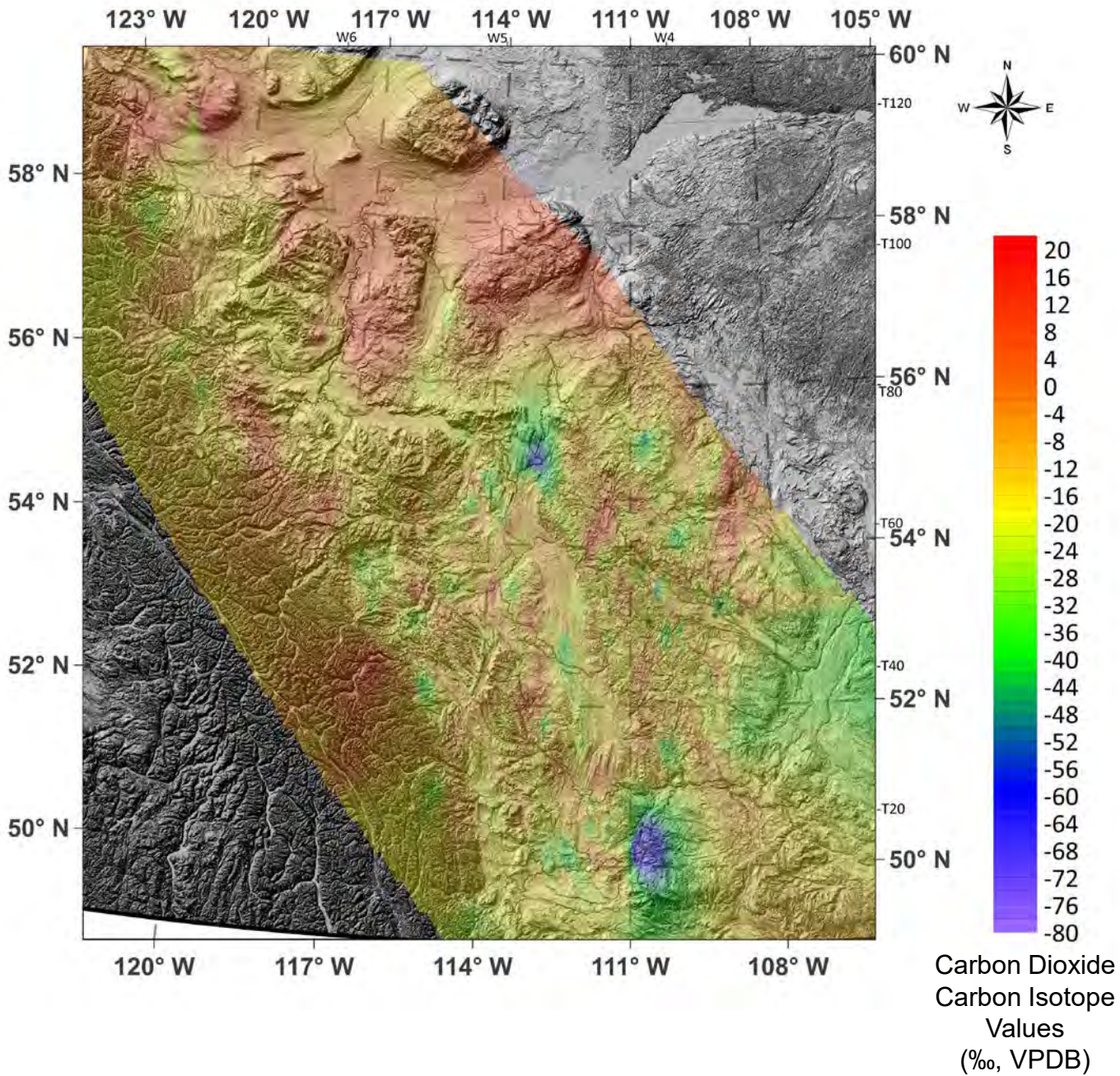




Fig. 20C. Contour Map of Carbon Dioxide Carbon Isotope Values of GM over Topographic Map

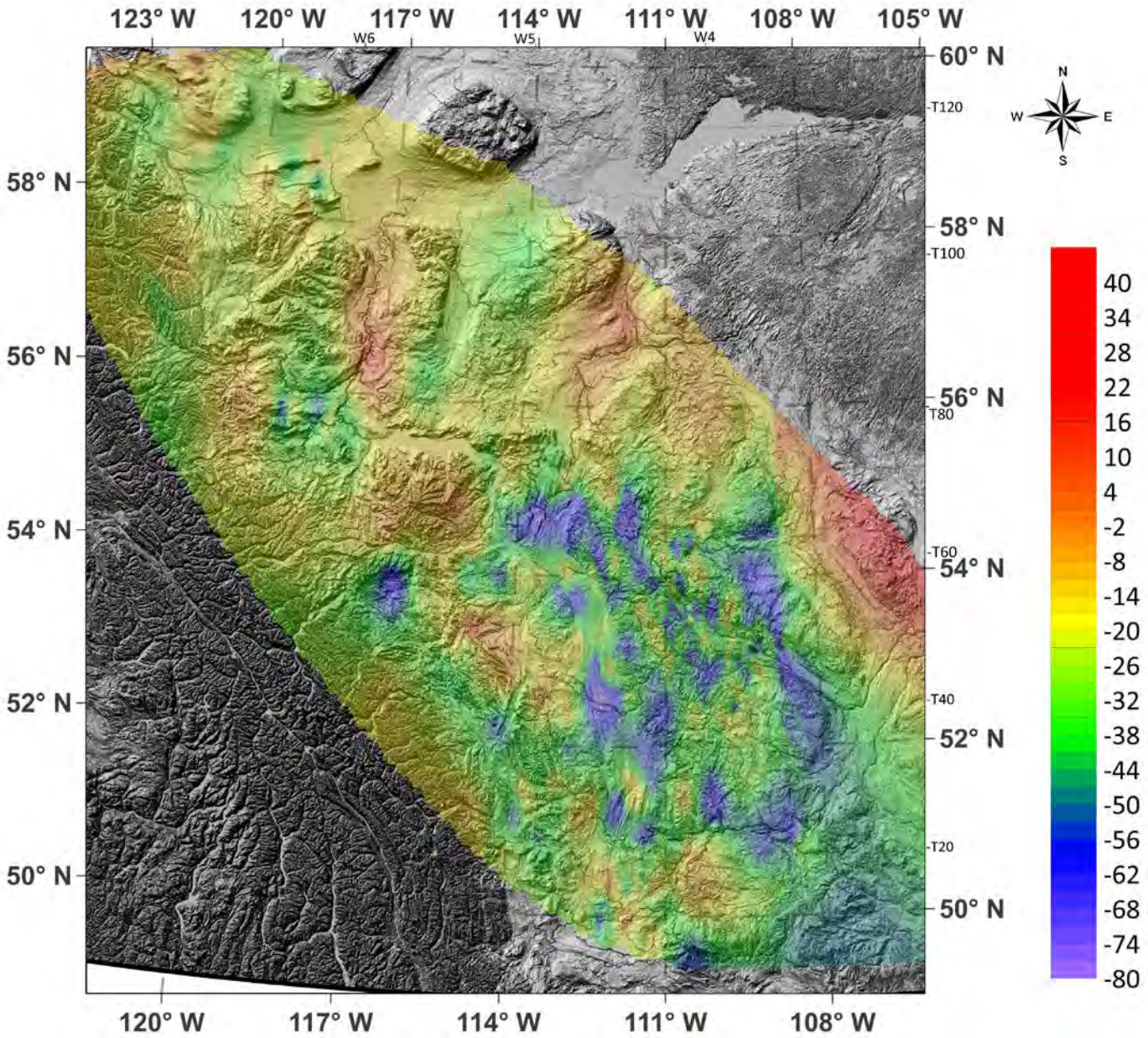




Fig. 20A. Contour Map of Carbon Dioxide Carbon Isotope Values of Production Wells over Topographic Map

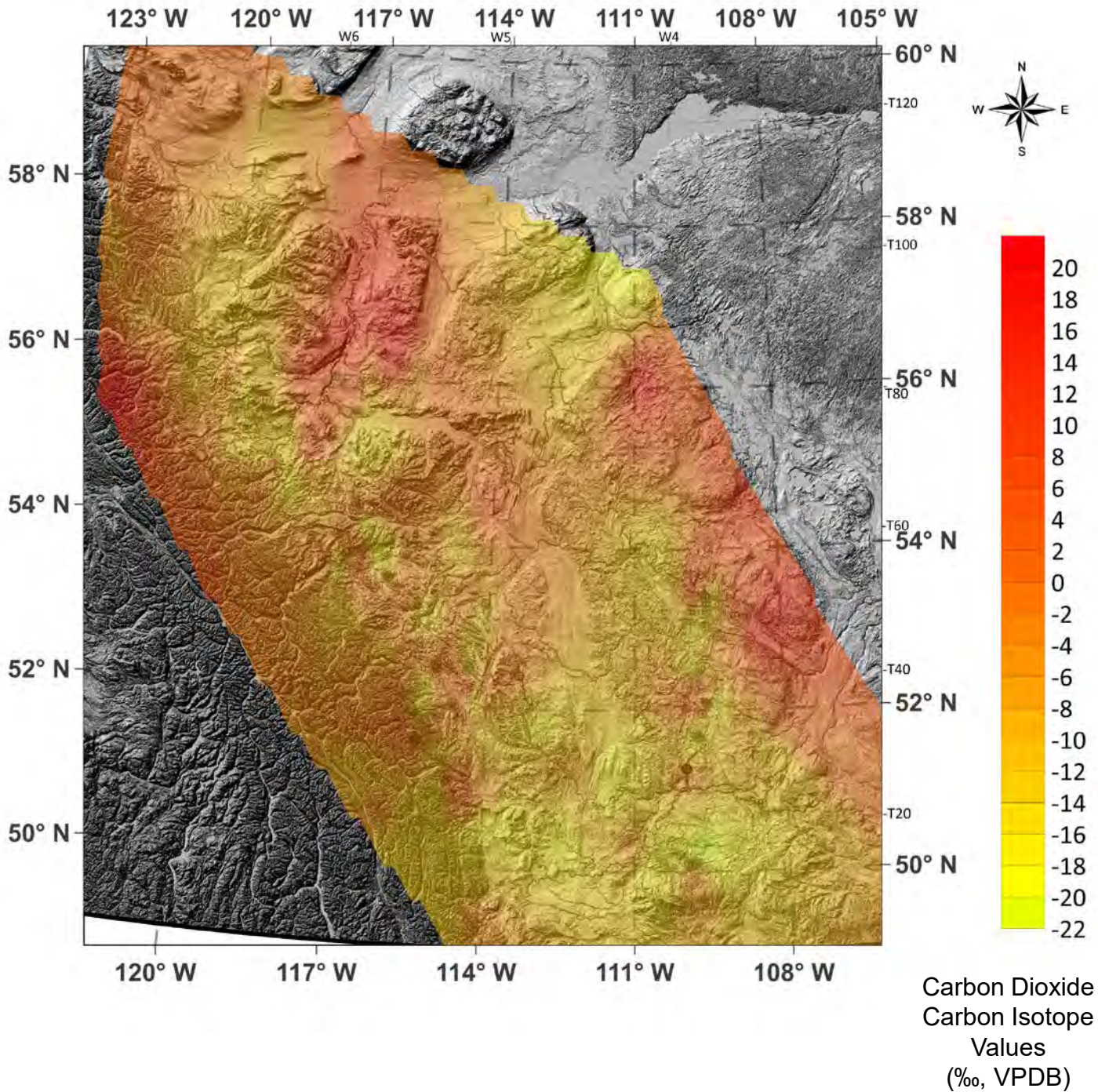




Fig. 20B. Contour Map of Carbon Dioxide  
Carbon Isotope Values of SCV over  
Topographic Map

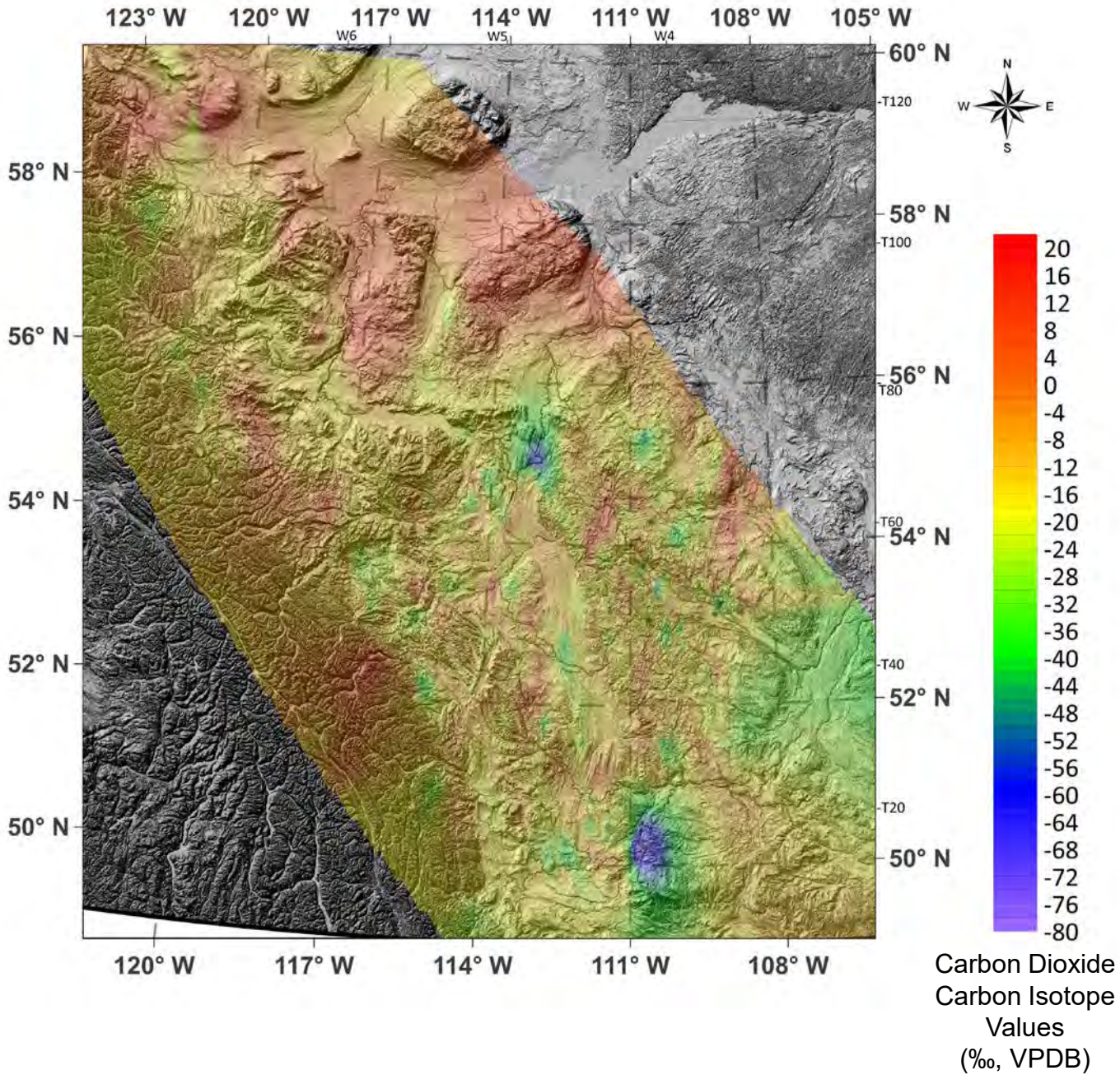




Fig. 20C. Contour Map of Carbon Dioxide Carbon Isotope Values of GM over Topographic Map

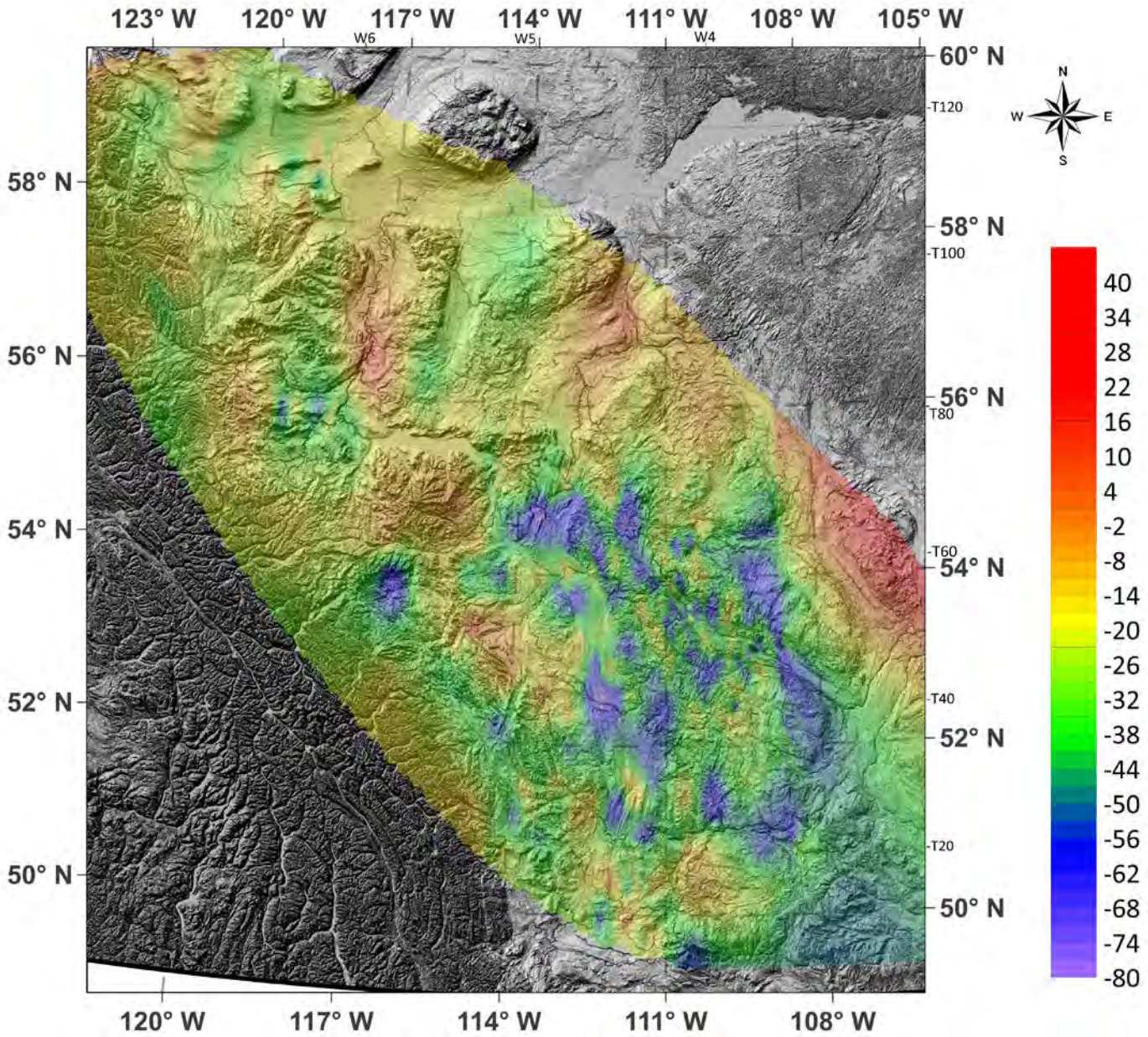




Fig. 21A. Map of Surface Casing Vent (SCV) Locations in the Eastern Alberta Zoom-in

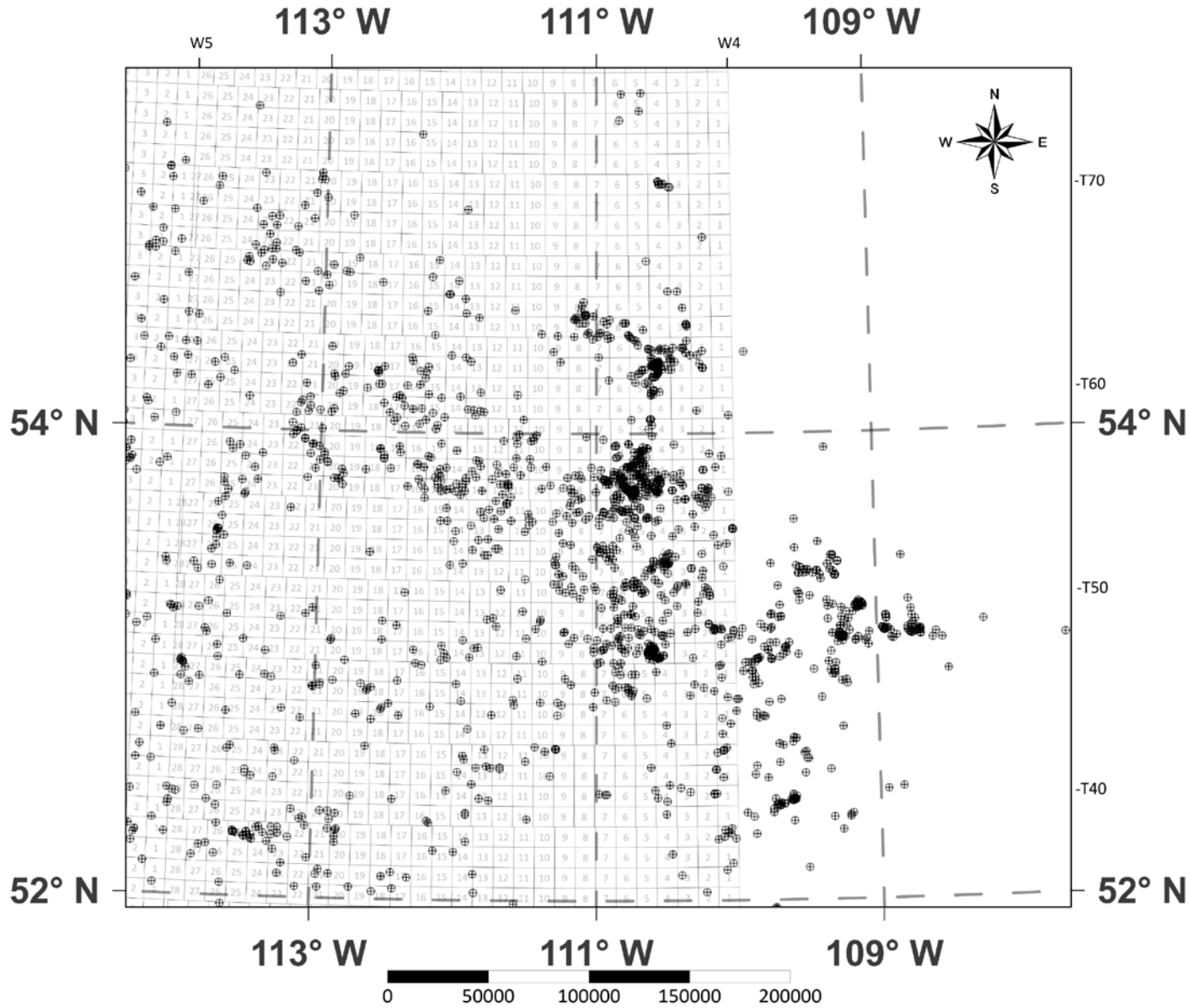


Fig. 21B. Contour Map of Methane Carbon Isotope Values of SCV Eastern Alberta Zoom-in

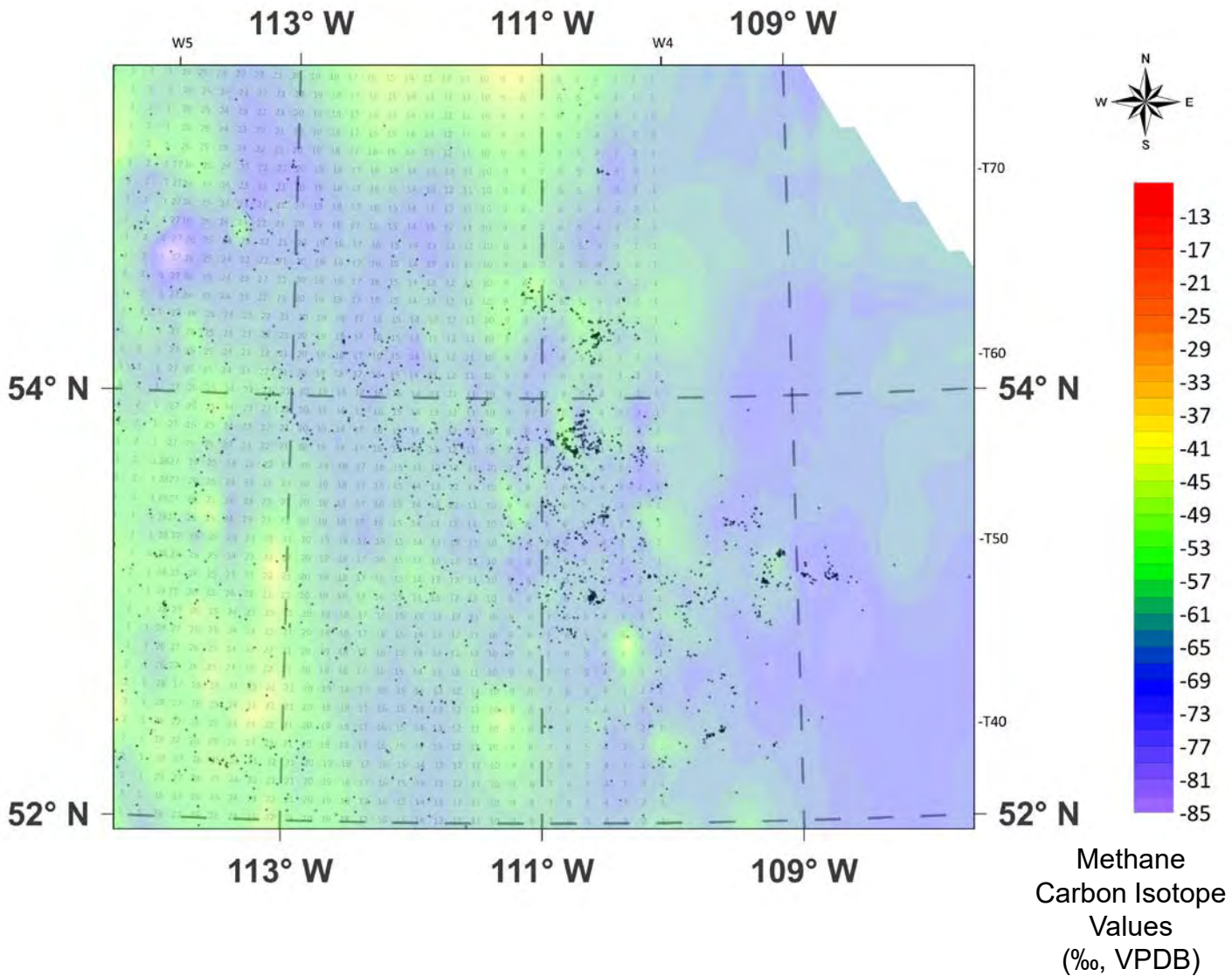




Fig. 21C. Contour Map of Ethane Carbon Isotope Values of SCV Eastern Alberta Zoom-in

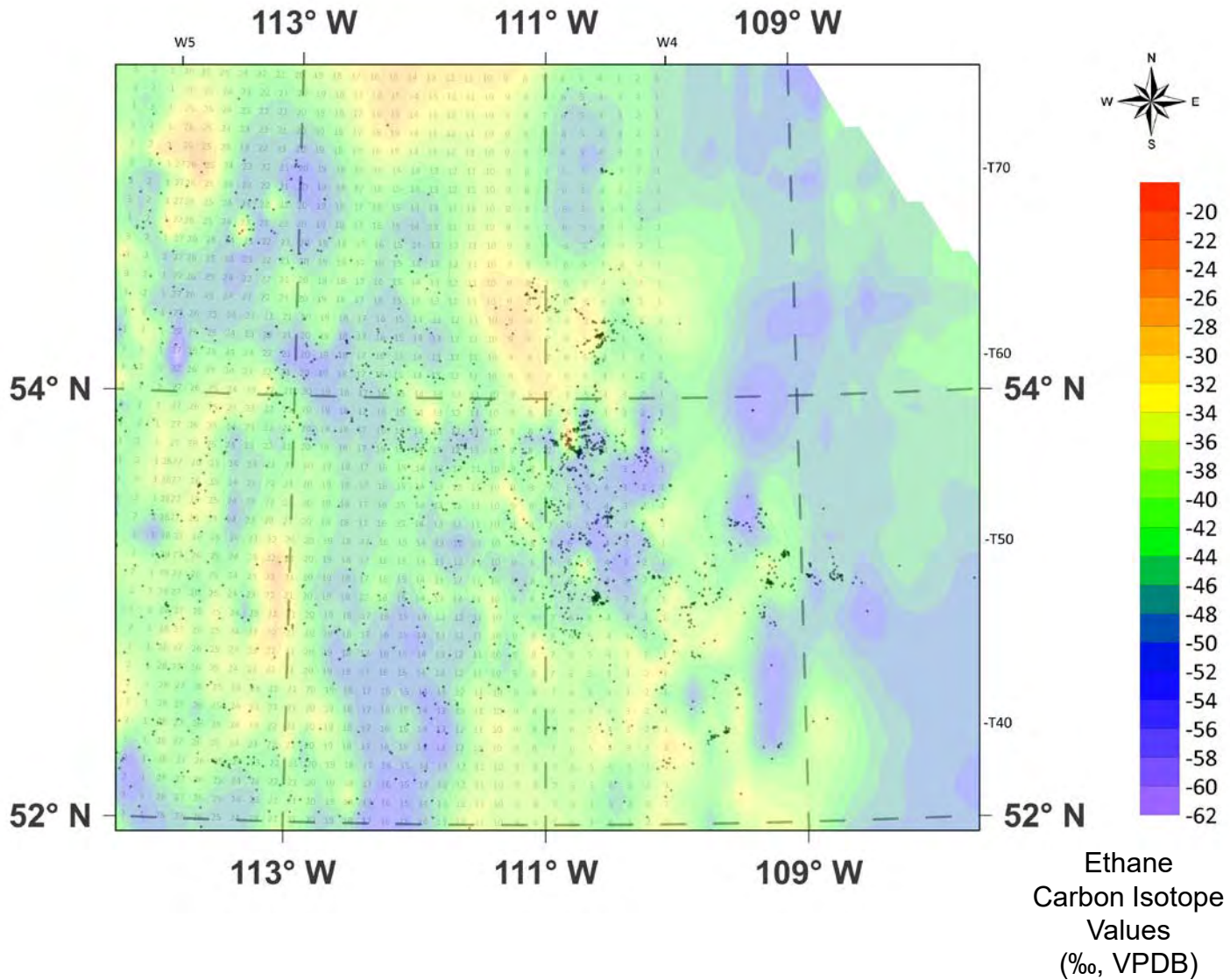


Fig. 21D. Contour Map of Propane Carbon Isotope Values of SCV Eastern Alberta Zoom-in

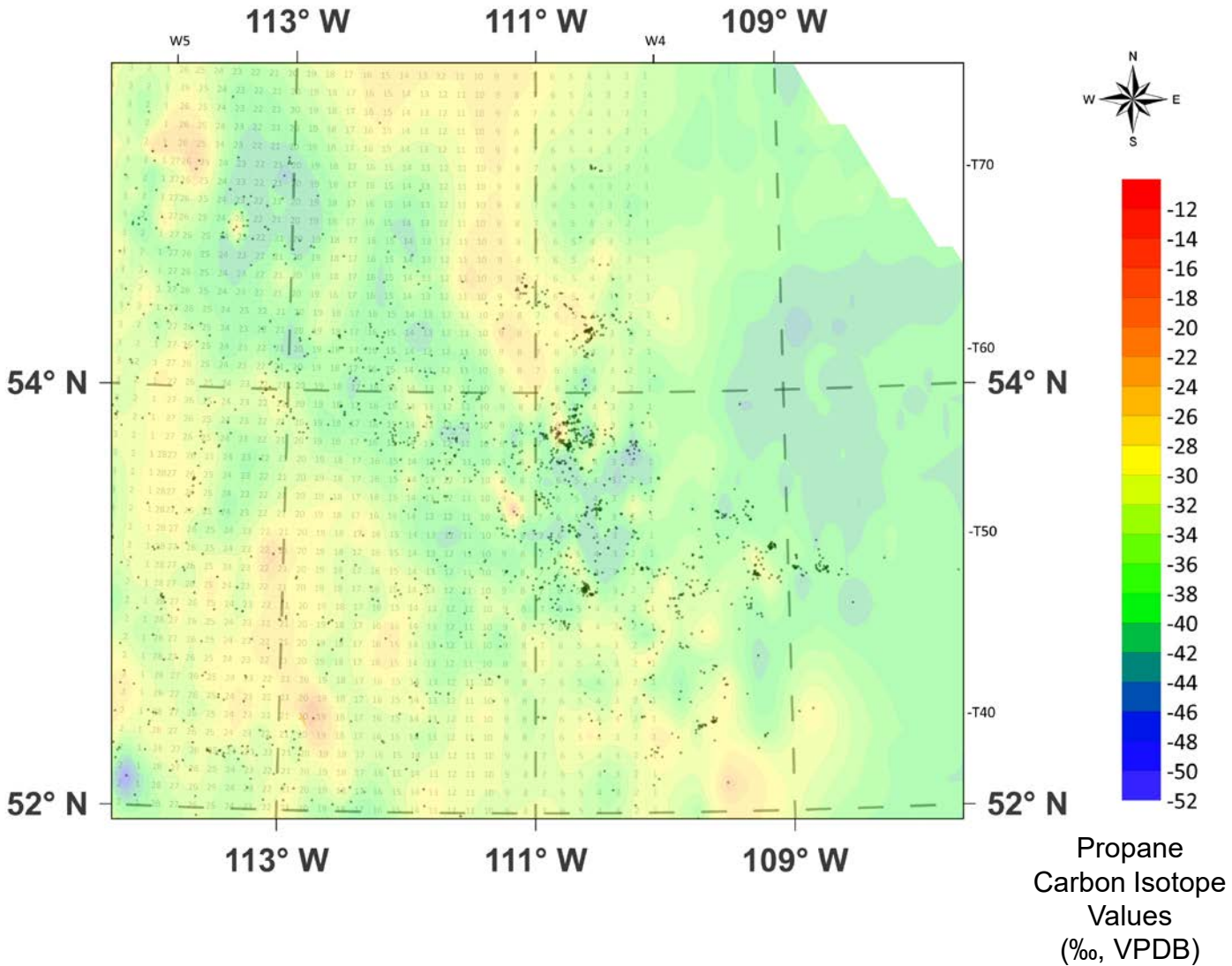




Fig. 21E. Contour Map of *n*-Butane Carbon Isotope Values of SCV Eastern Alberta Zoom-in

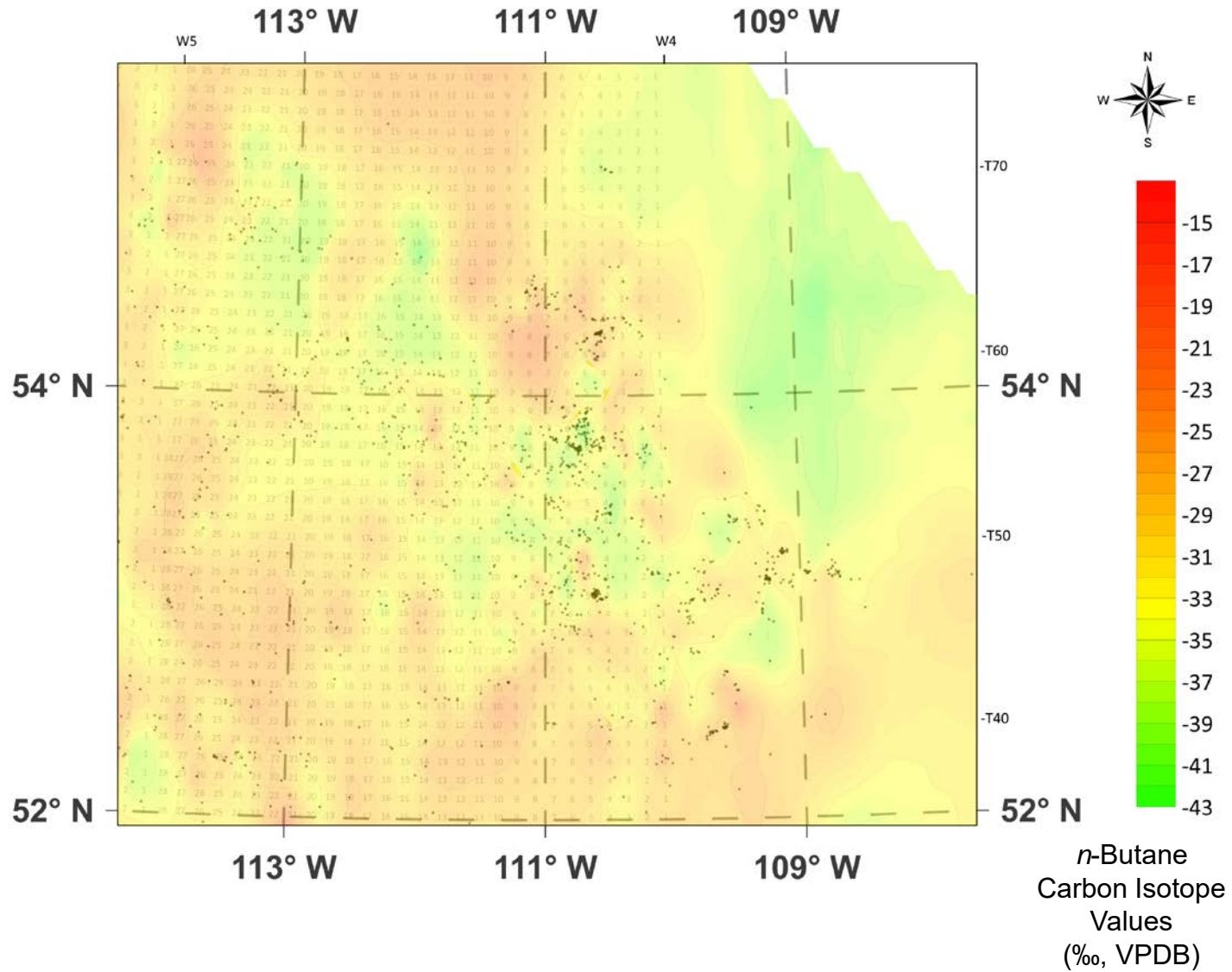


Fig. 21F. Contour Map of *i*-Butane Carbon Isotope Values of SCV Eastern Alberta Zoom-in

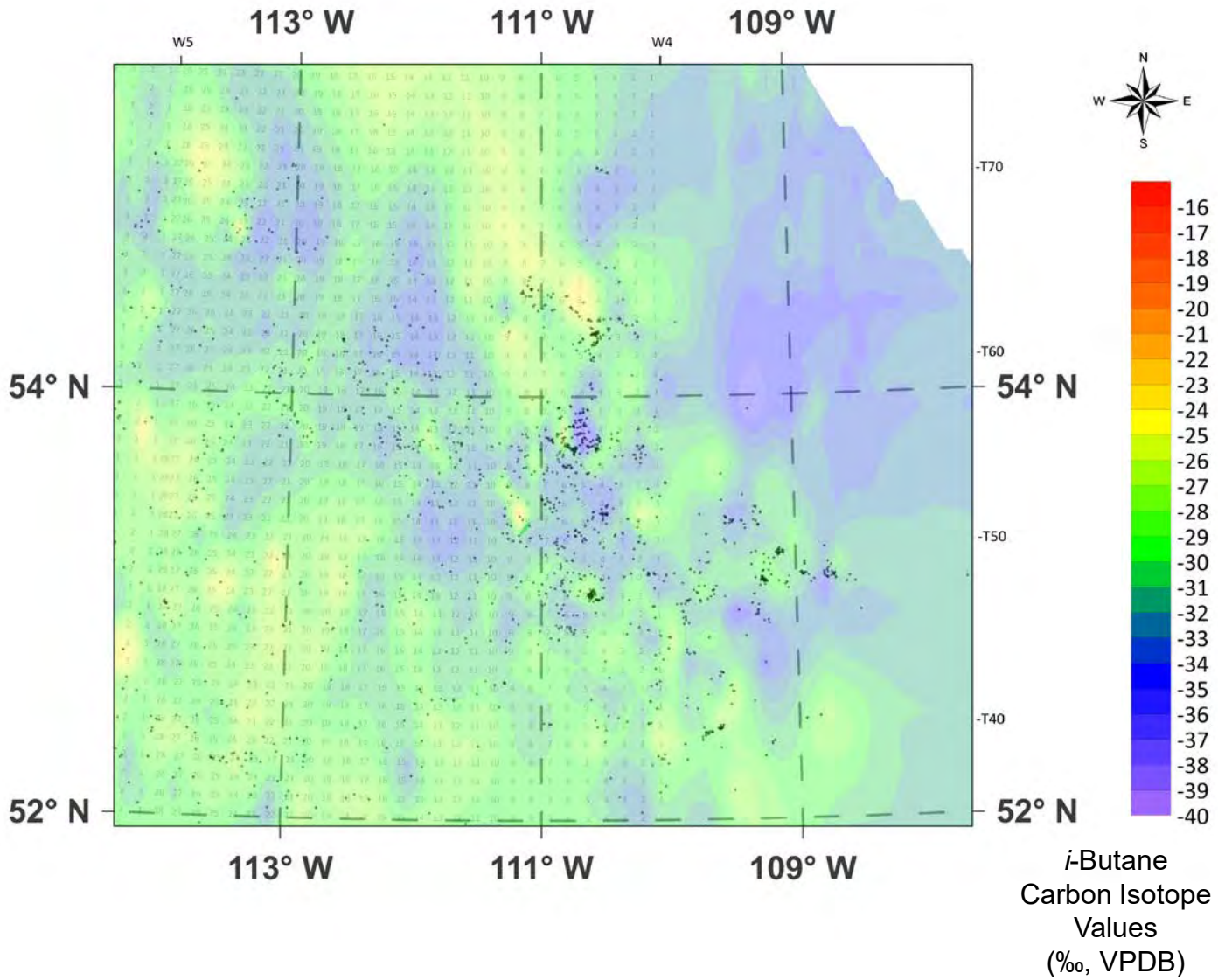




Fig. 21G. Contour Map of Carbon Dioxide Carbon Isotope Values of SCV Eastern Alberta Zoom-in

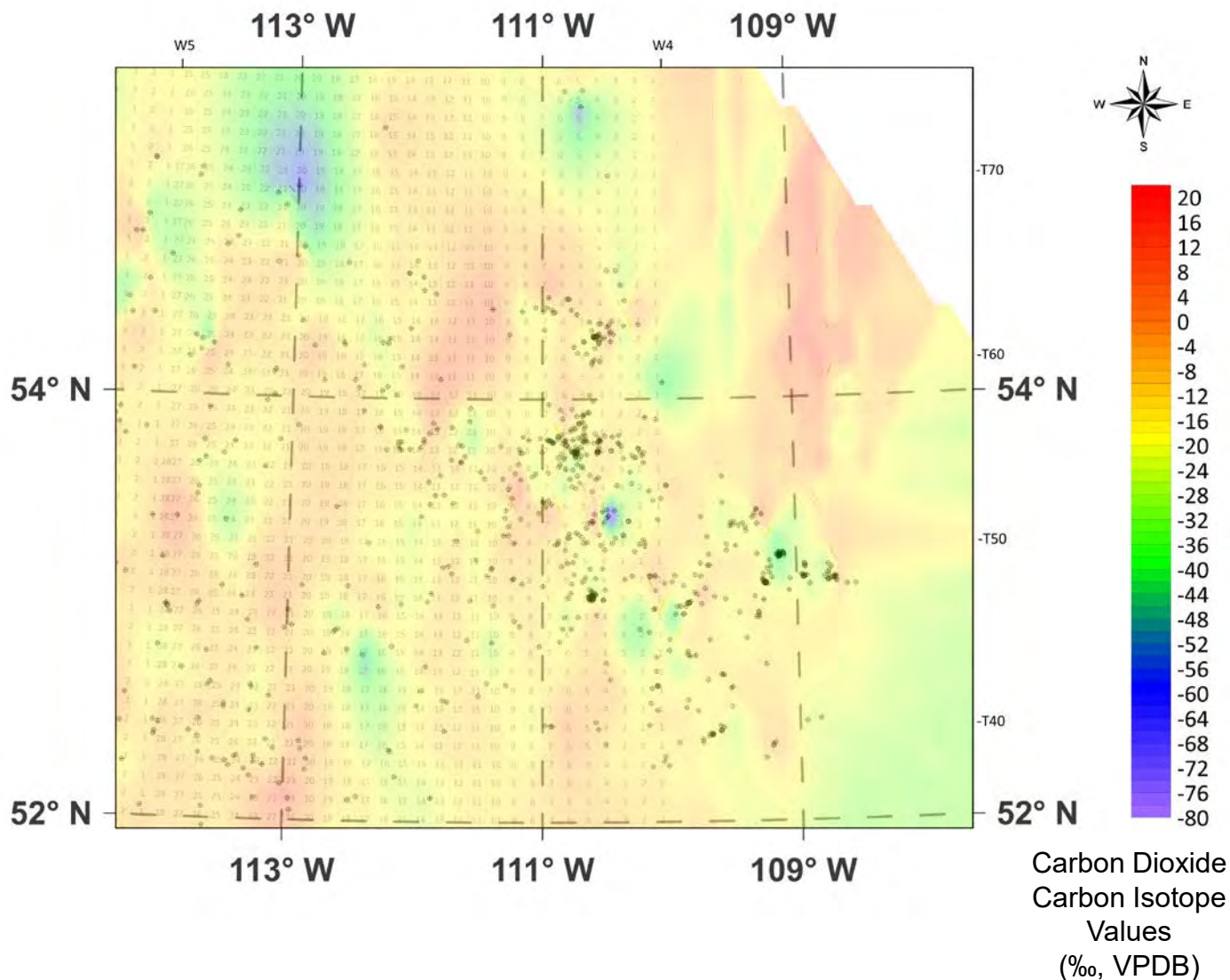
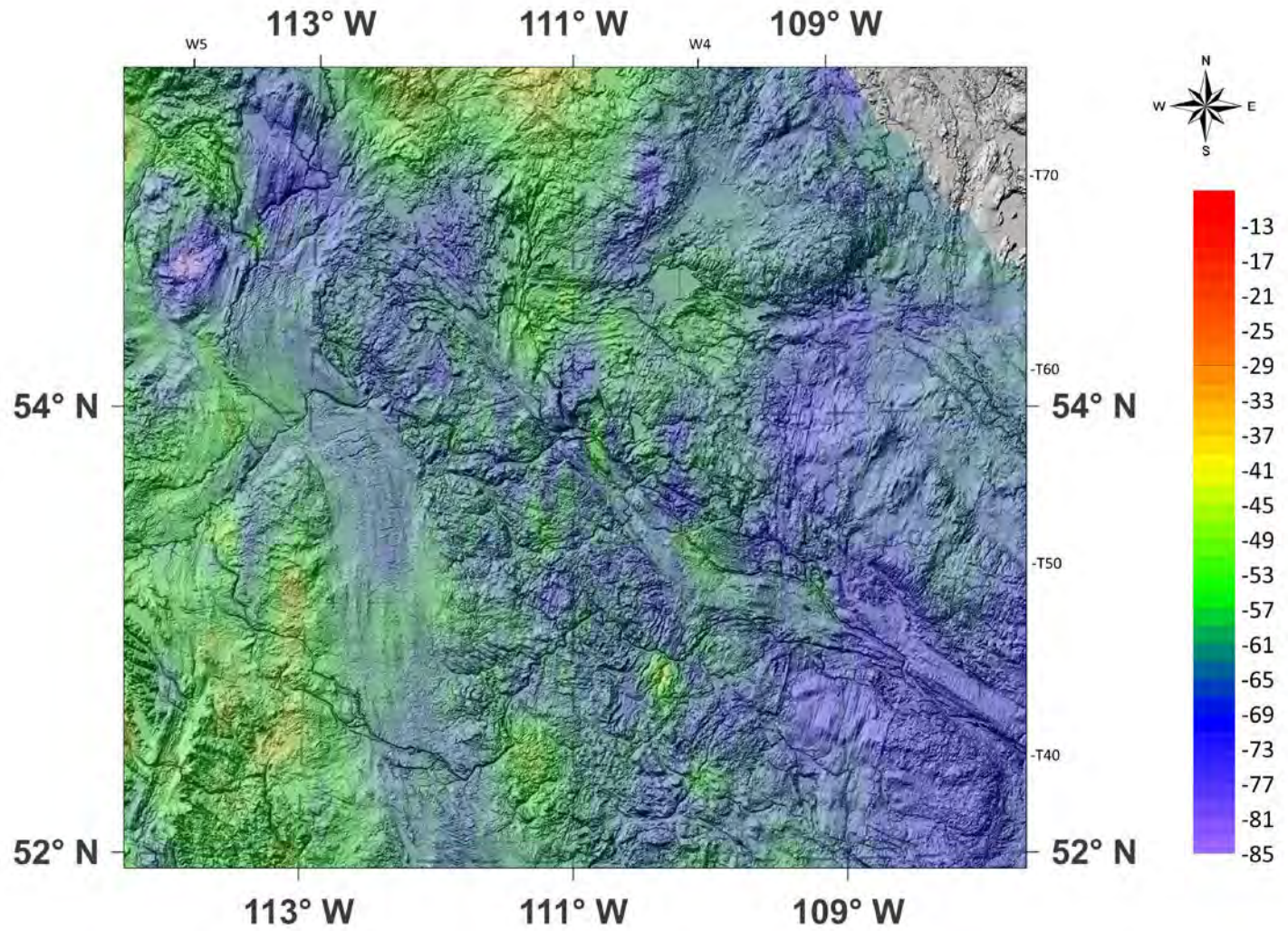


Fig. 21H. Contour Map of Methane Carbon Isotope Values of SCV Eastern Alberta Zoom-in over Topographic Map



Methane  
Carbon Isotope  
Values  
(‰, VPDB)



Fig. 21I. Contour Map of Ethane Carbon Isotope Values of SCV Eastern Alberta Zoom-in over Topographic Map

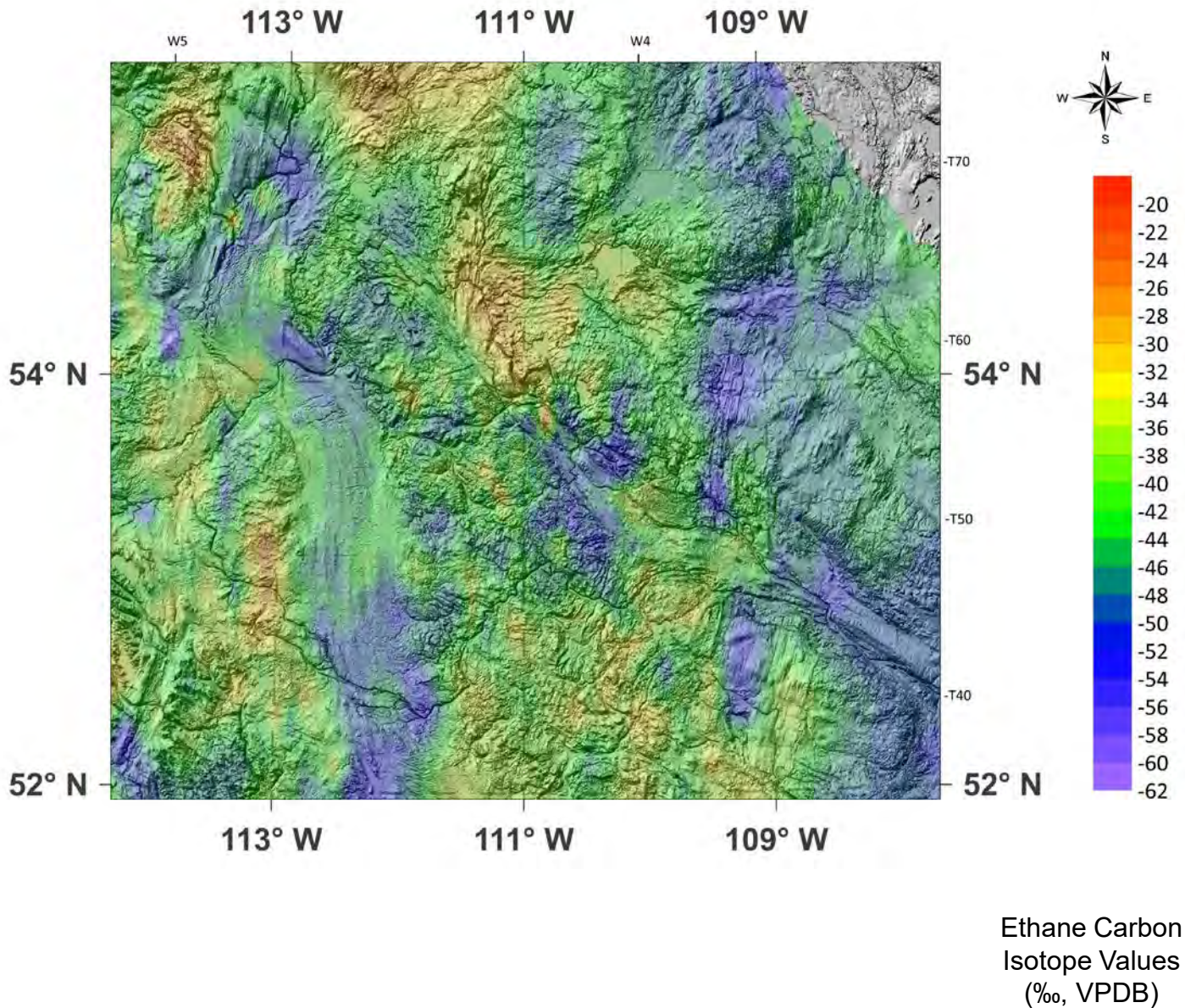




Fig. 21J. Contour Map of Propane Carbon Isotope Values of SCV Eastern Alberta Zoom-in over Topographic Map

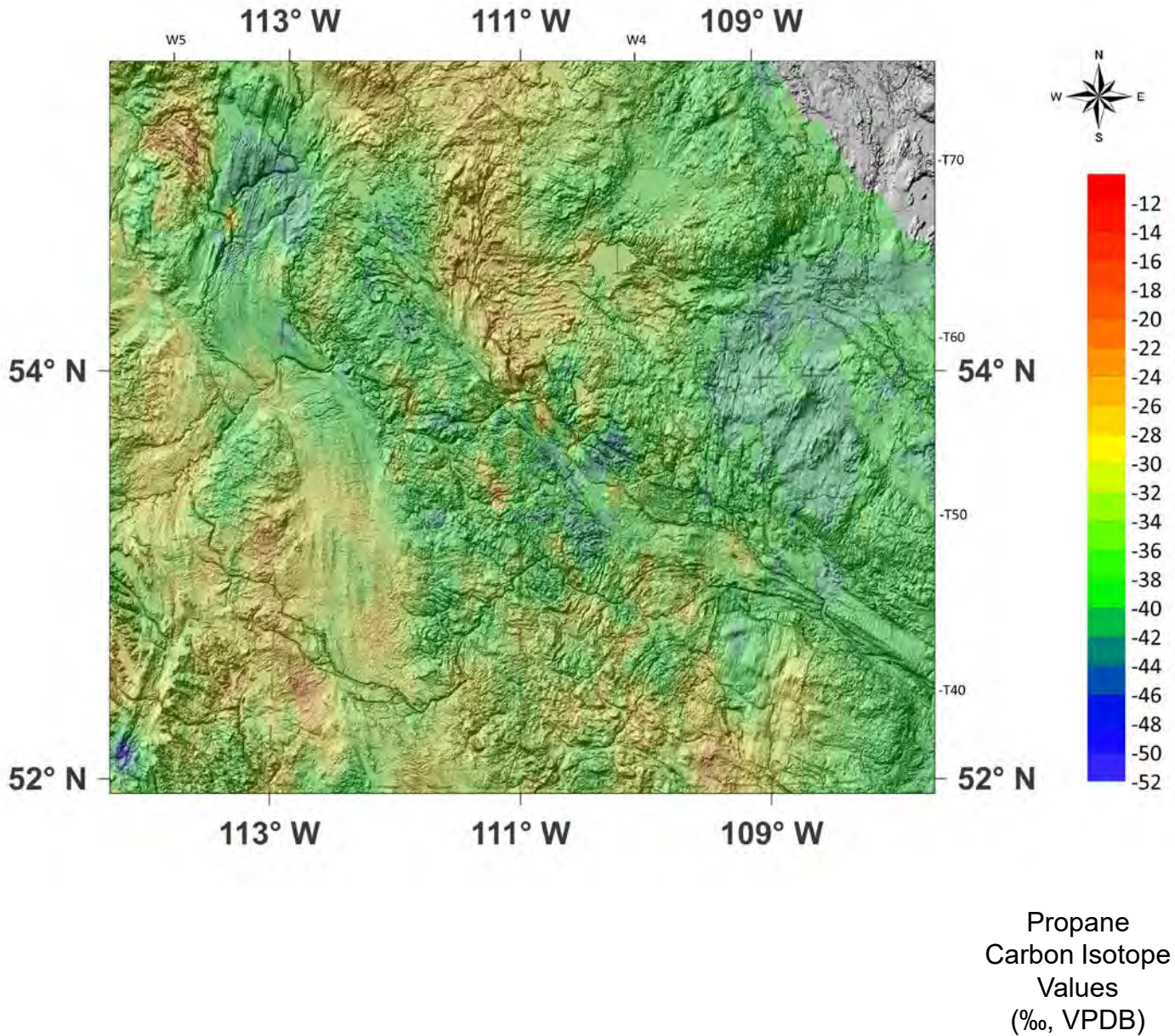




Fig. 21K. Contour Map of *n*-Butane Carbon Isotope Values of SCV Eastern Alberta Zoom-in over Topographic Map

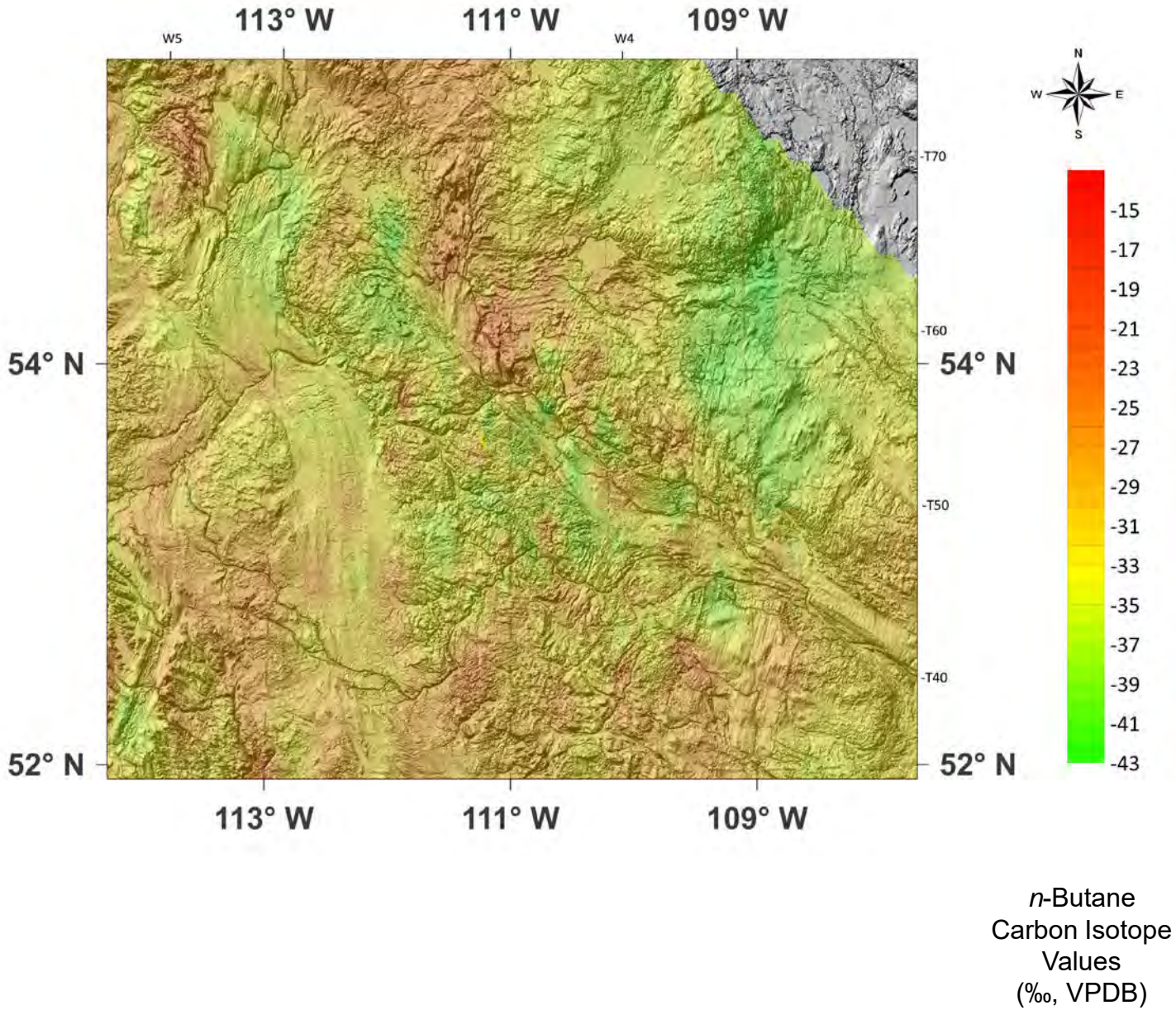


Fig. 21L. Contour Map of *i*-Butane Carbon Isotope Values of SCV Eastern Alberta Zoom-in over Topographic Map

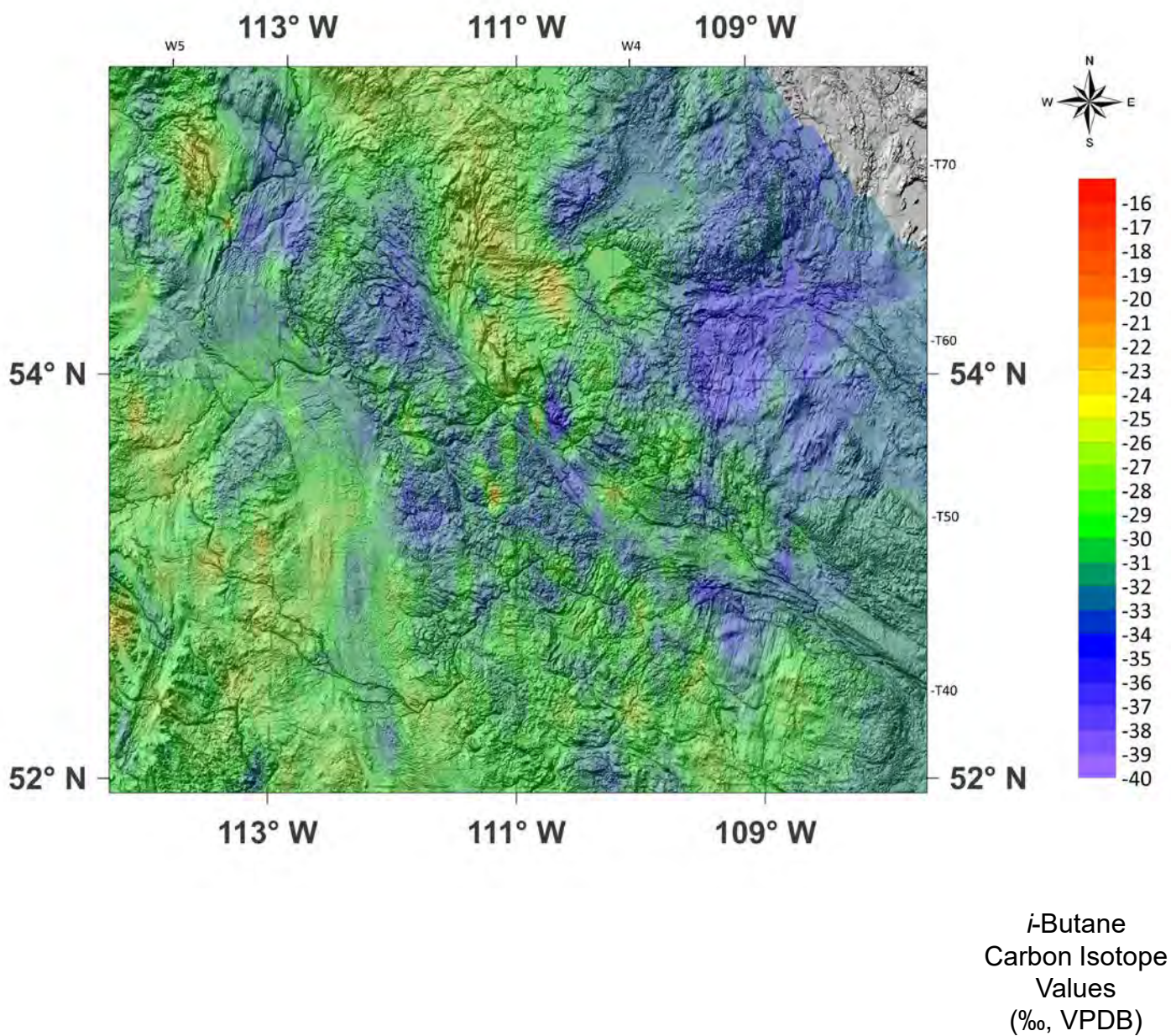
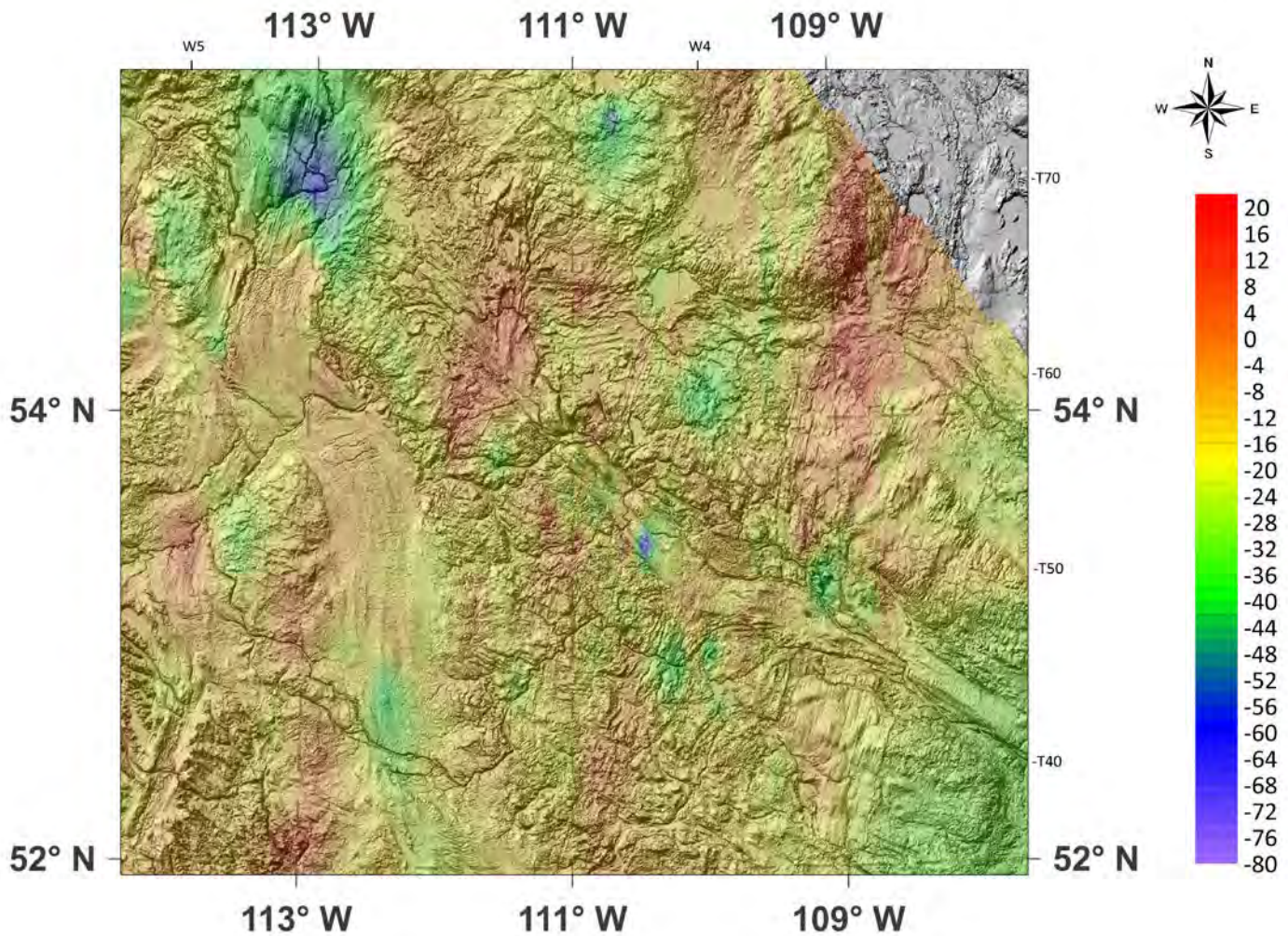




Fig. 21M. Contour Map of Carbon Dioxide Carbon Isotope Values of SCV Eastern Alberta Zoom-in over Topographic Map



Carbon Dioxide  
Carbon Isotope  
Values  
(‰, VPDB)

Fig. 22A. Map of Ground Migration (GM) Locations in the Eastern Alberta Zoom-in

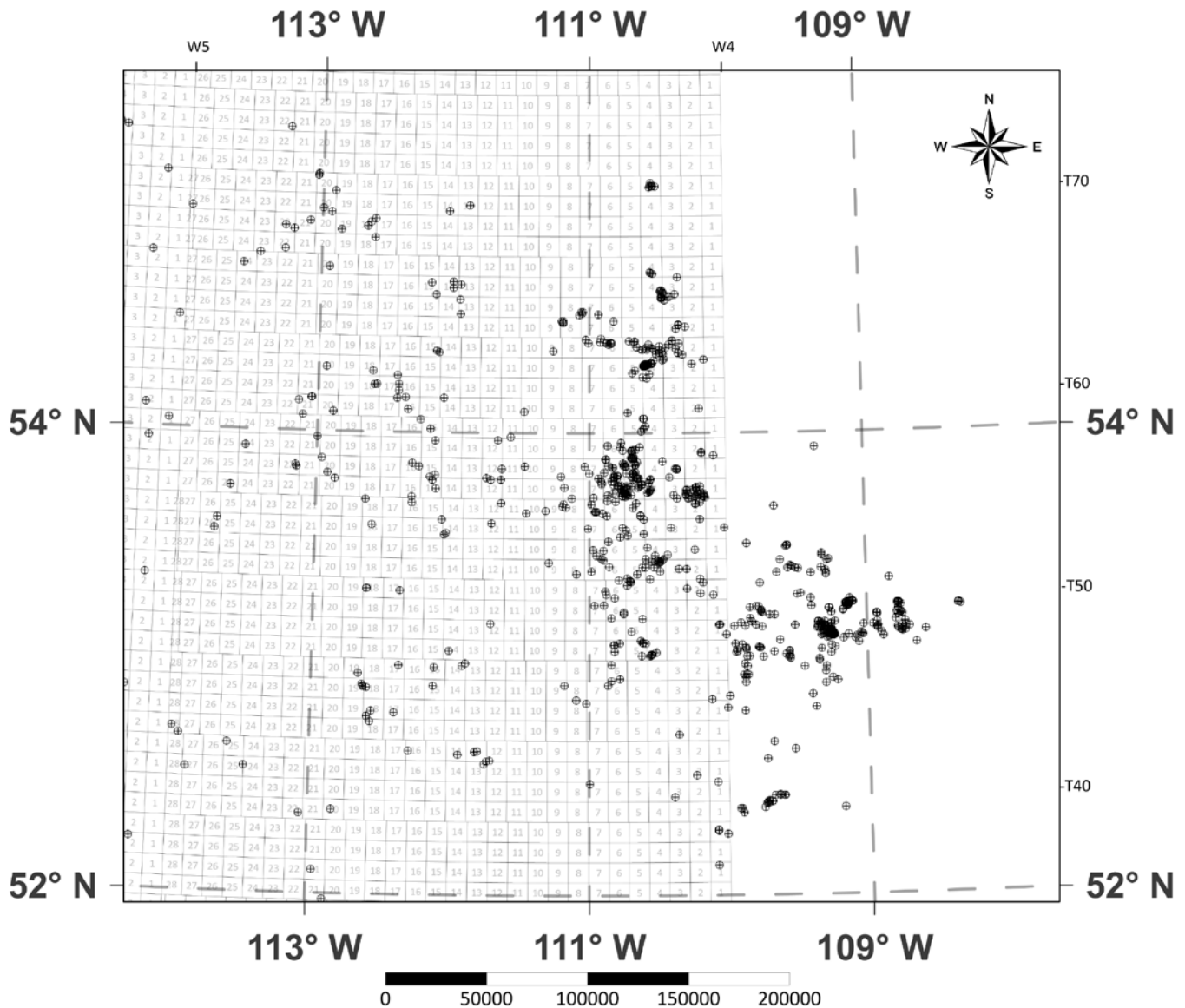




Fig. 22B. Contour Map of Methane Carbon Isotope Values of GM Eastern Alberta Zoom-in

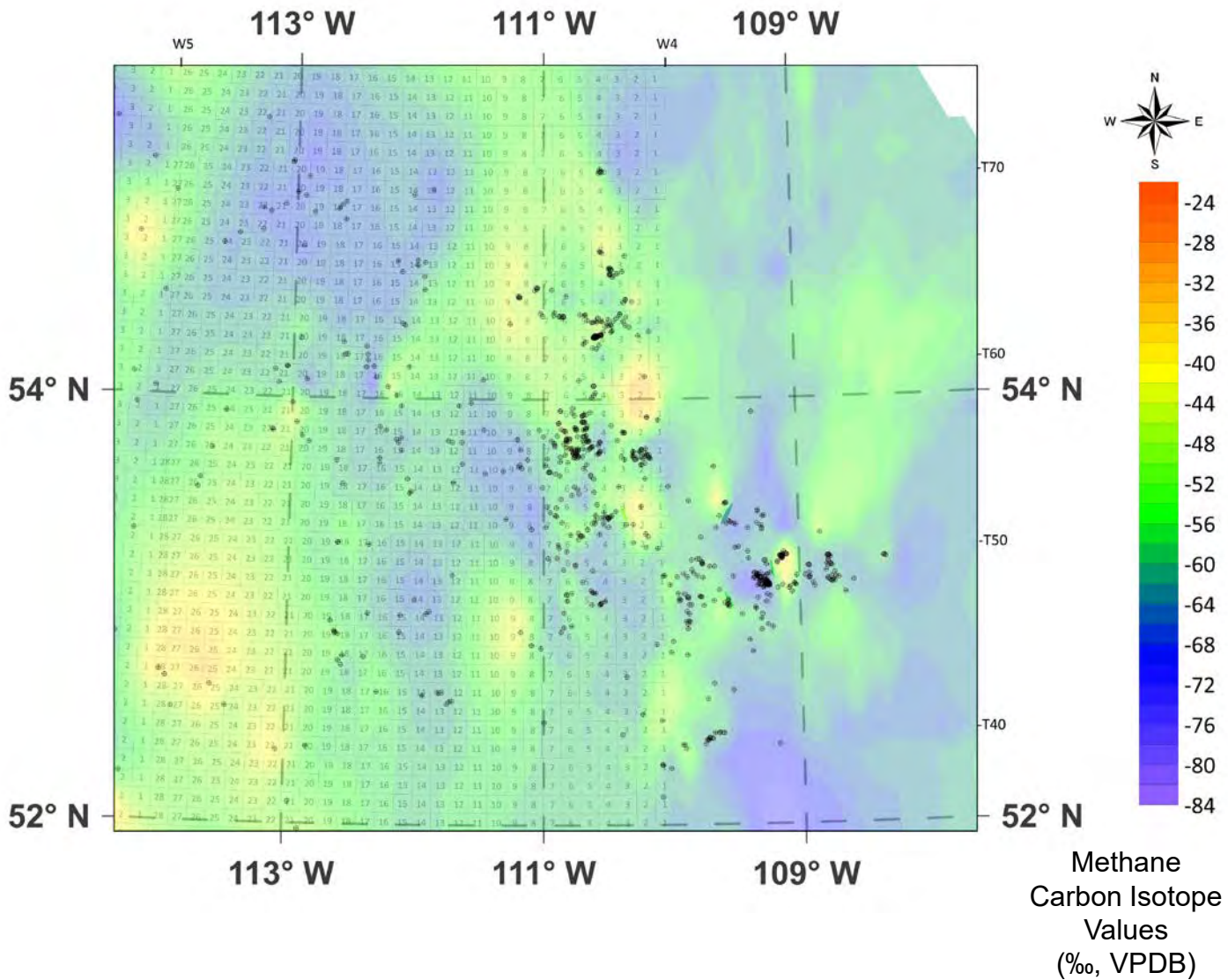


Fig. 22C. Contour Map of Ethane Carbon Isotope Values of GM Eastern Alberta Zoom-in

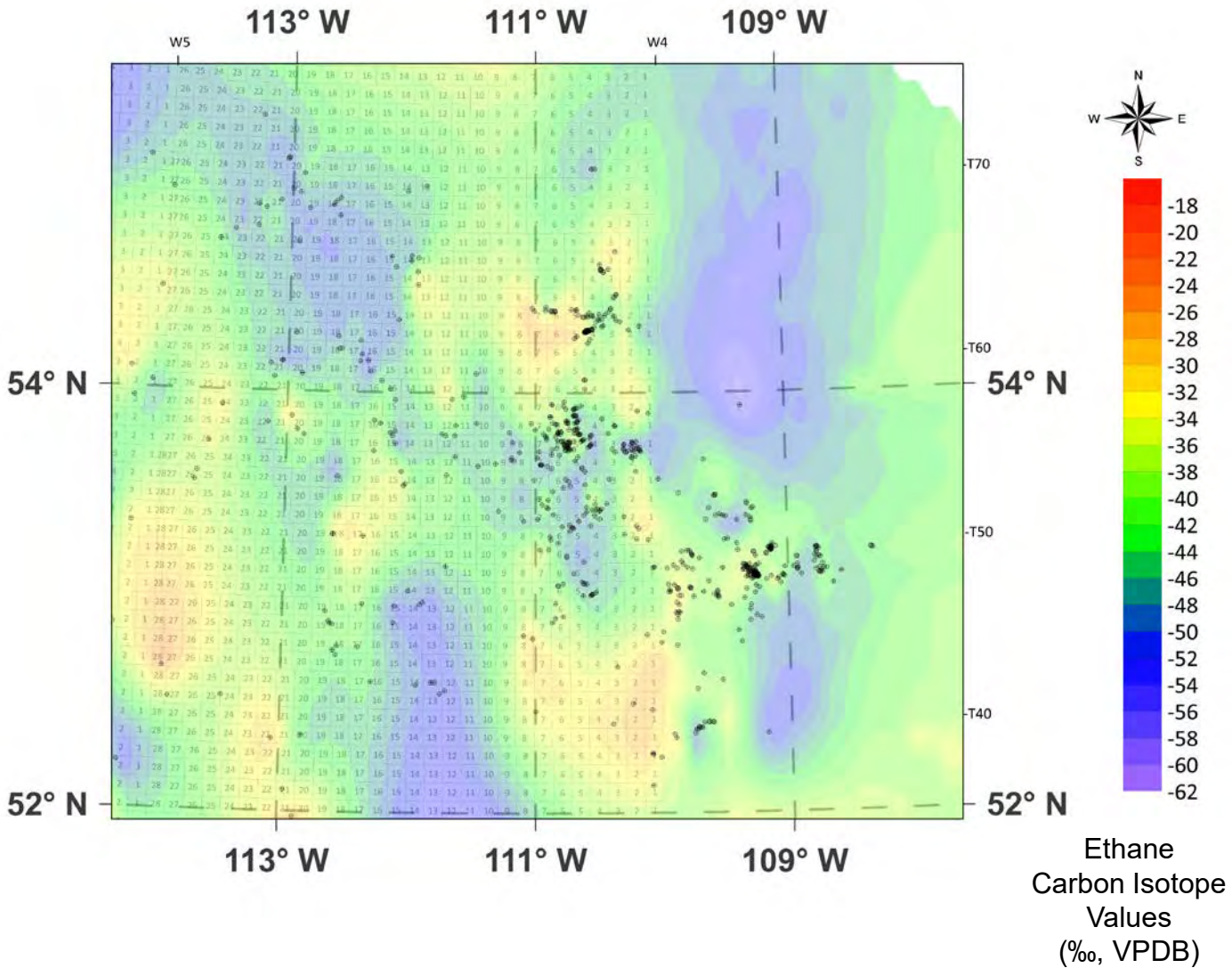




Fig. 22D. Contour Map of Propane Carbon Isotope Values of GM Eastern Alberta Zoom-in

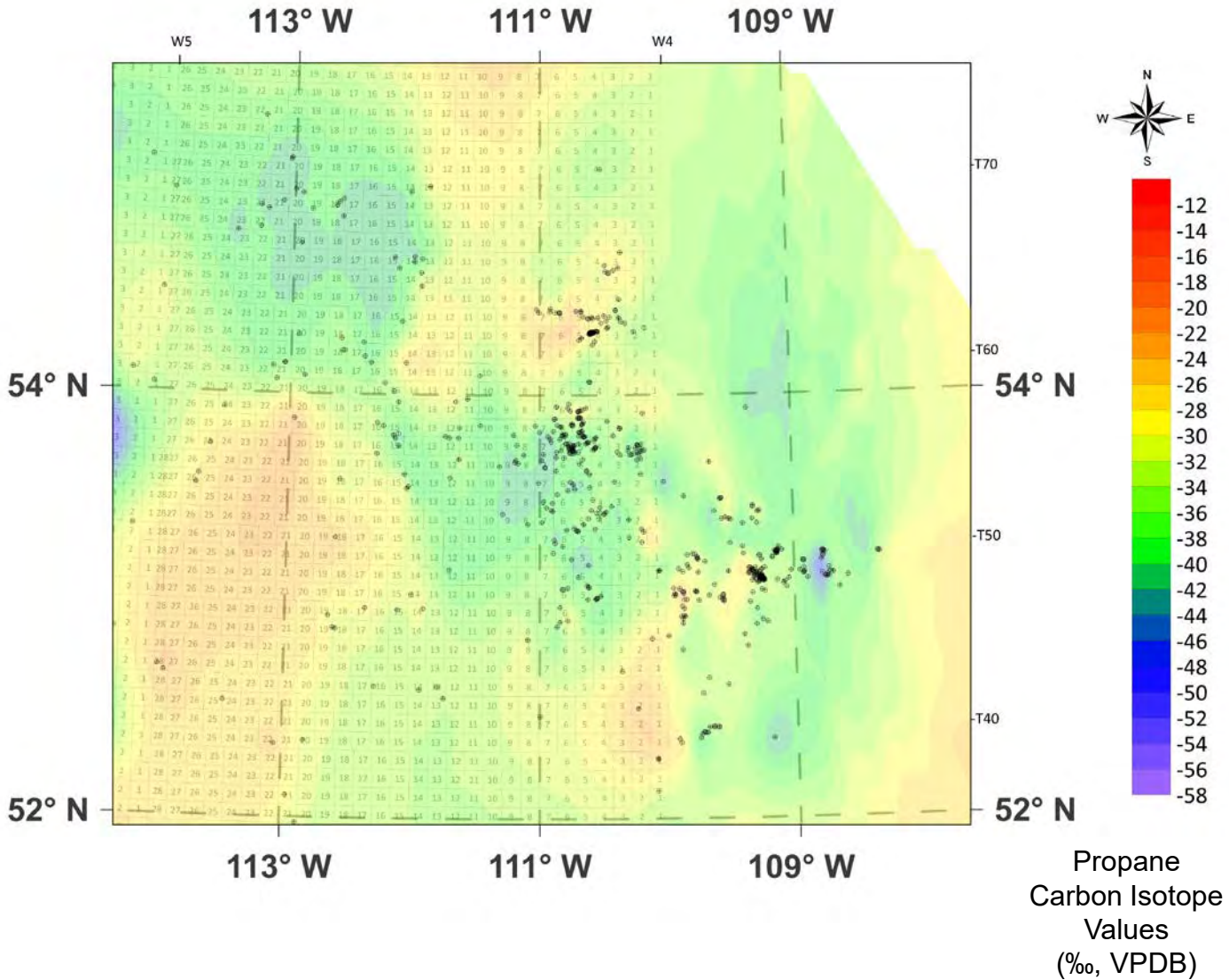


Fig. 22E. Contour Map of *n*-Butane Carbon Isotope Values of GM Eastern Alberta Zoom-in

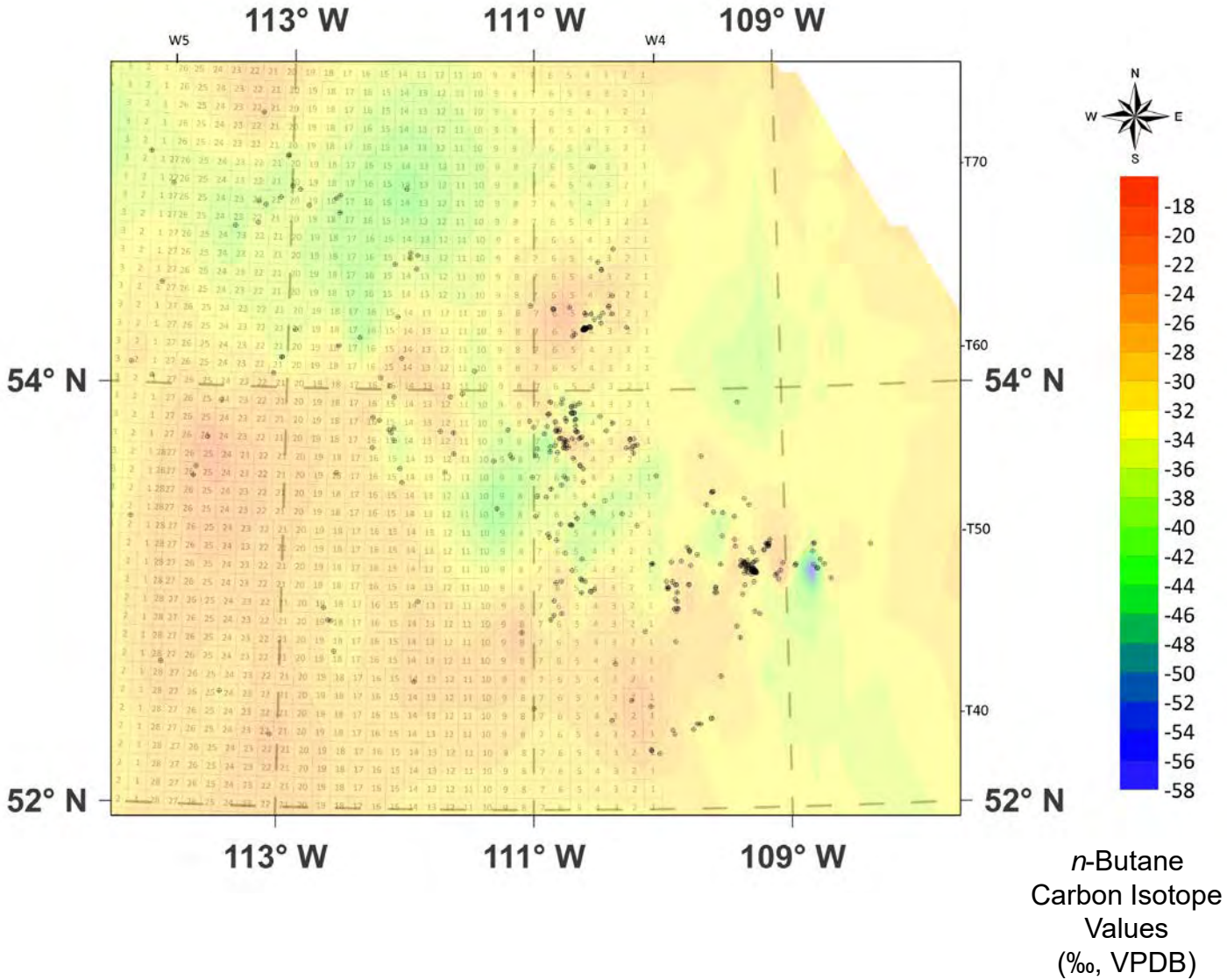




Fig. 22F. Contour Map of *i*-Butane Carbon Isotope Values of GM Eastern Alberta Zoom-in

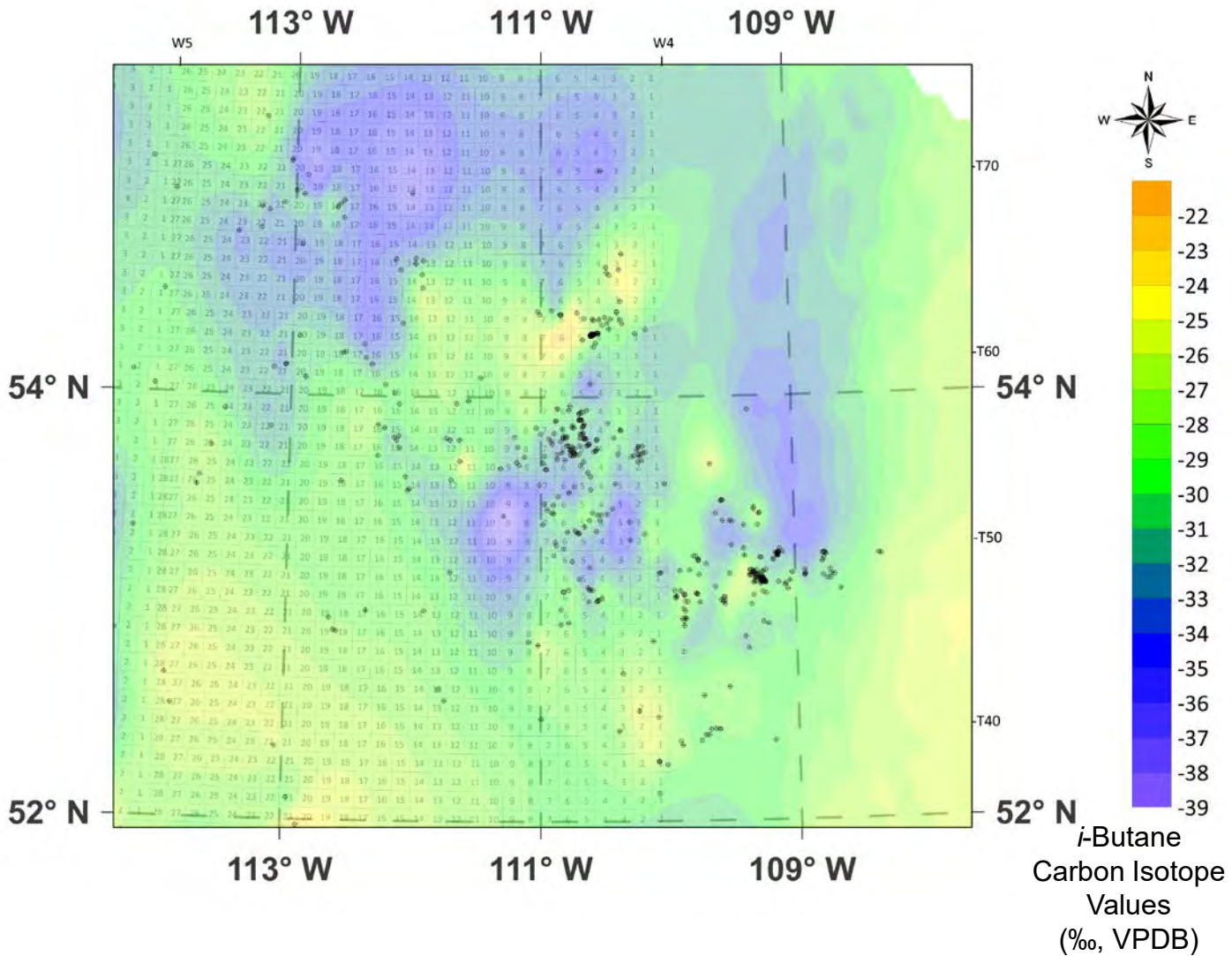


Fig. 22G. Contour Map of Carbon Dioxide Carbon Isotope Values of GM Eastern Alberta Zoom-in

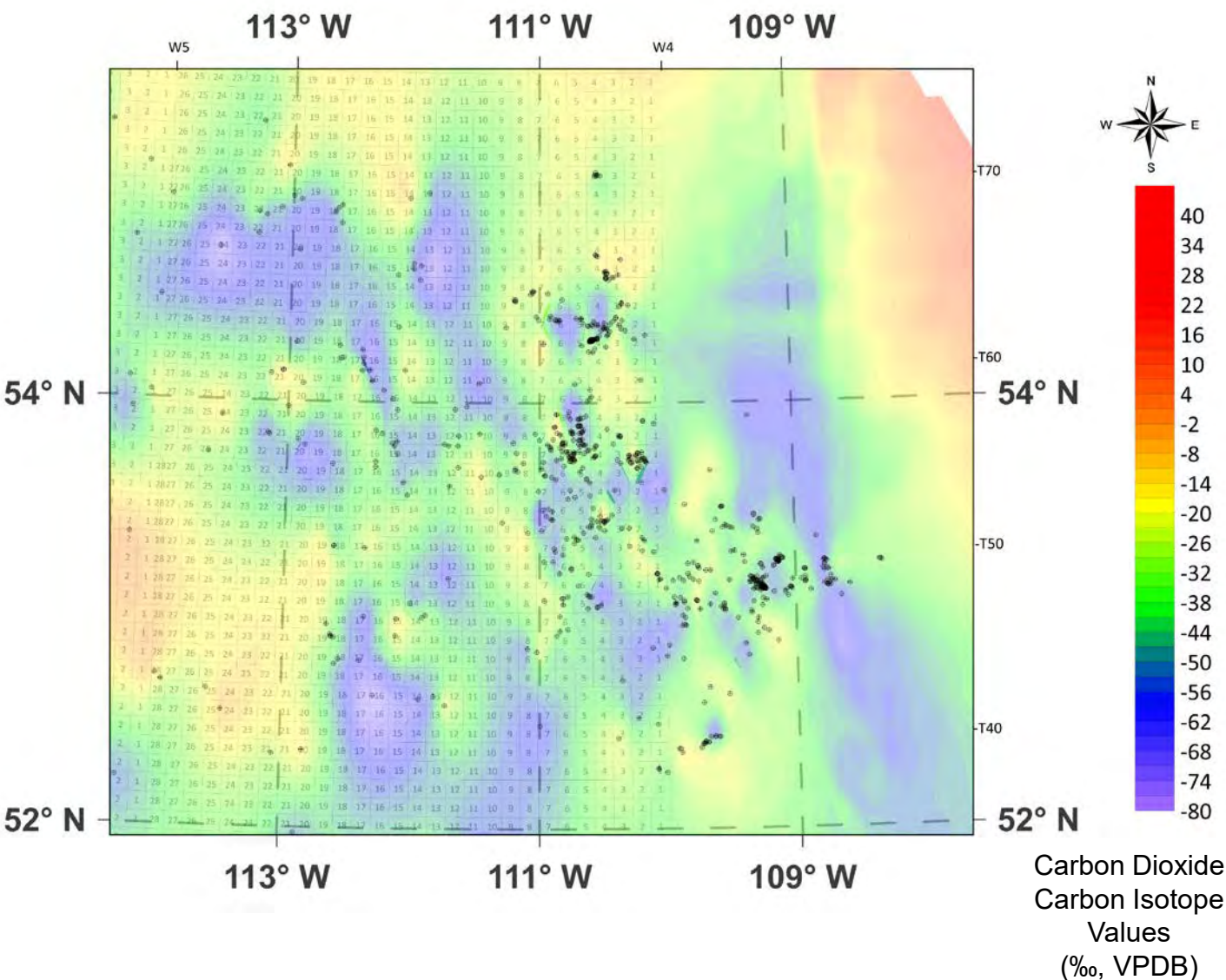
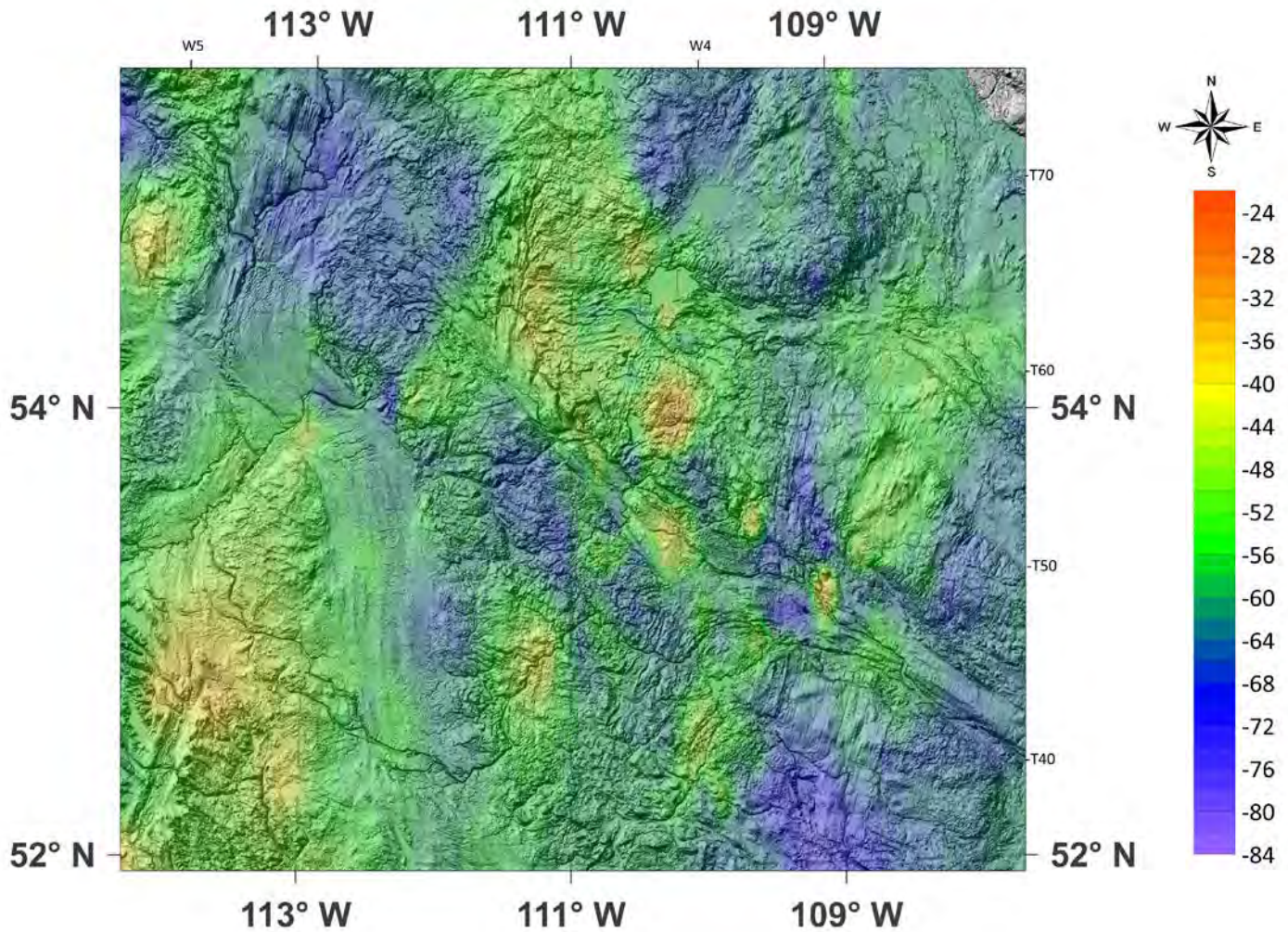




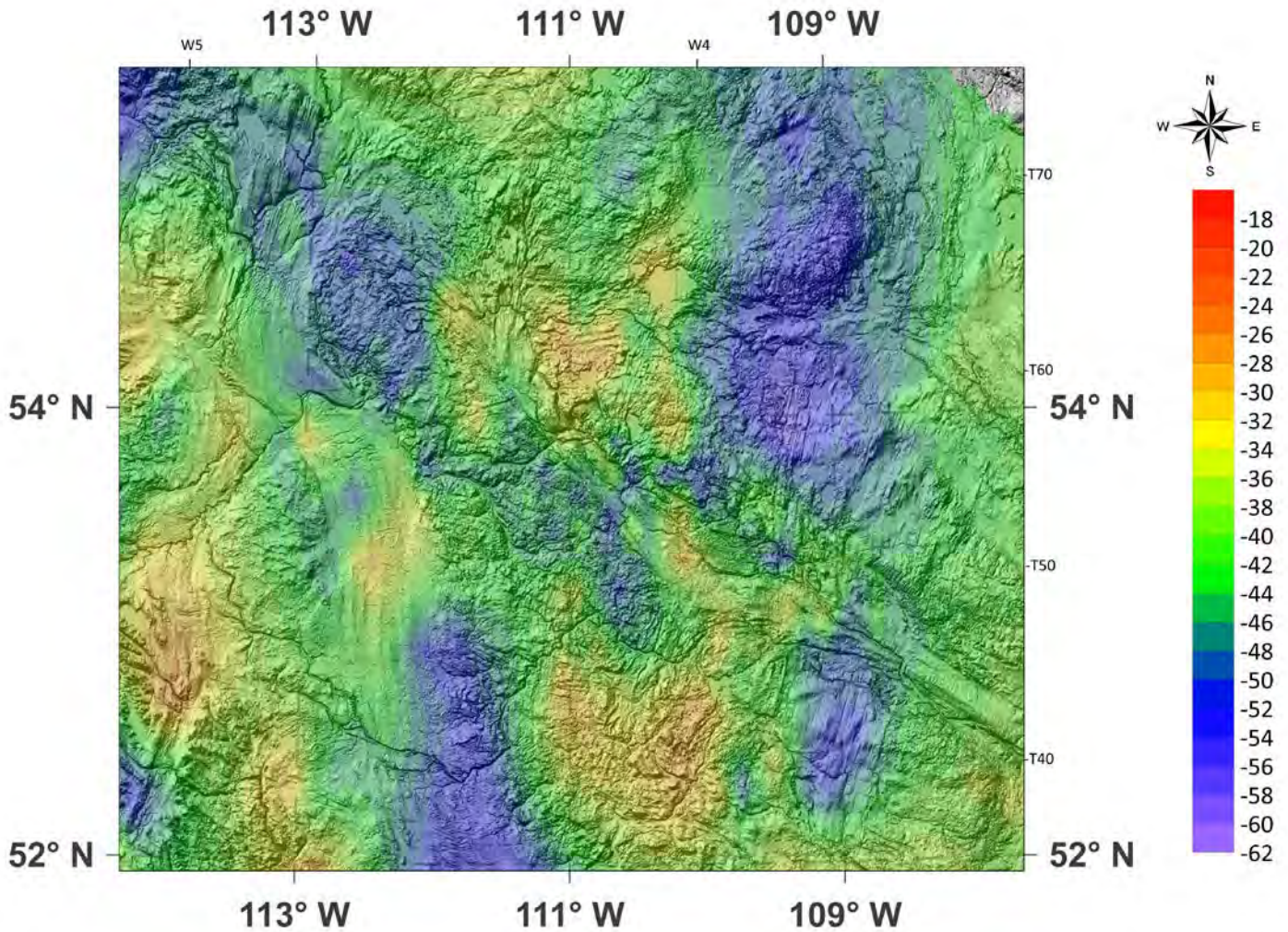
Fig. 22H. Contour Map of Methane Carbon Isotope Values of GM Eastern Alberta Zoom-in over Topographic Map



Methane  
Carbon Isotope  
Values  
(‰, VPDB)



Fig. 22I. Contour Map of Ethane Carbon Isotope Values of GM Eastern Alberta Zoom-in over Topographic Map



Ethane Carbon  
Isotope Values  
(‰, VPDB)



Fig. 22J. Contour Map of Propane Carbon Isotope Values of GM Eastern Alberta Zoom-in over Topographic Map

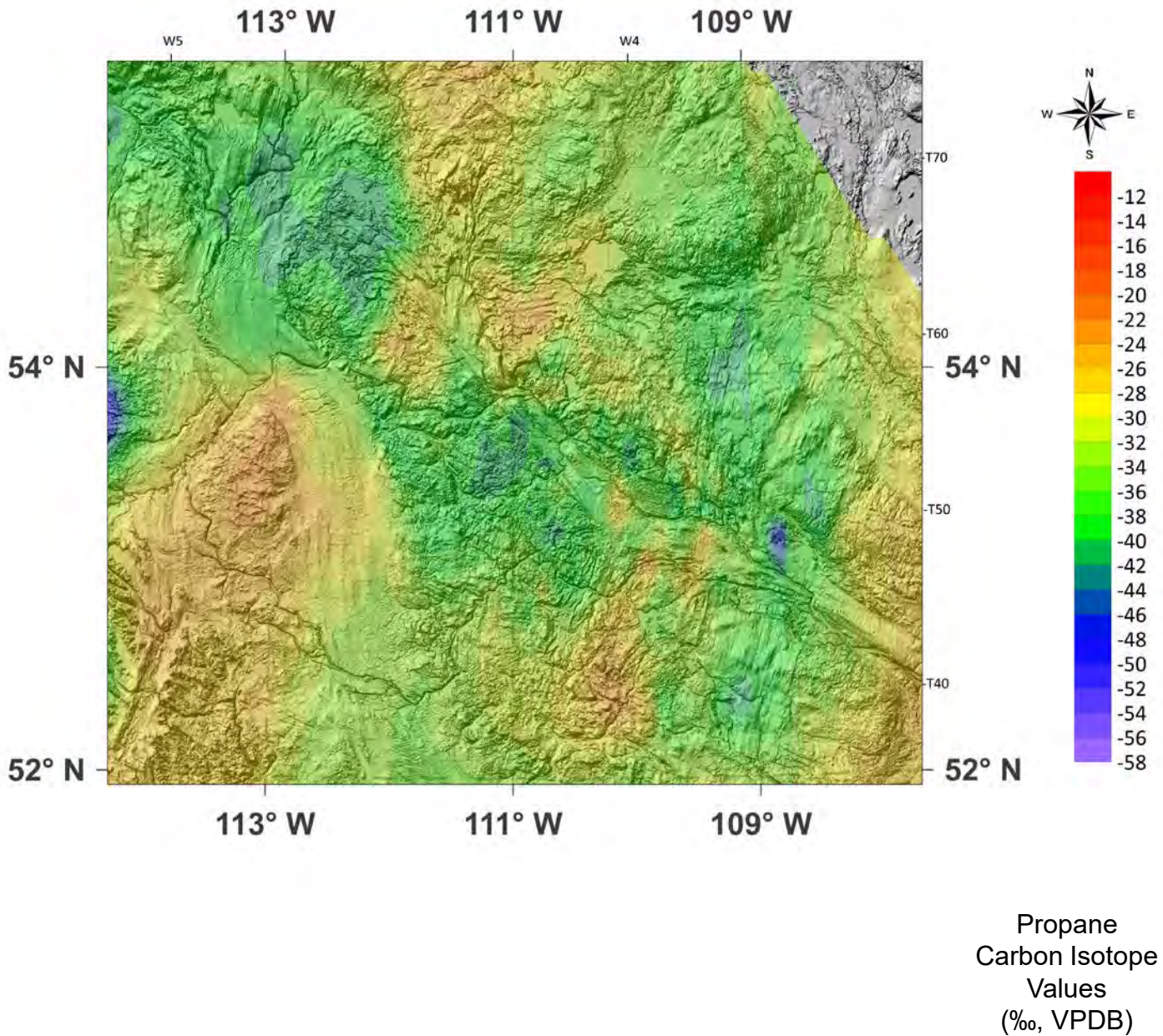


Fig. 22K. Contour Map of *n*-Butane Carbon Isotope Values of GM Eastern Alberta Zoom-in over Topographic Map

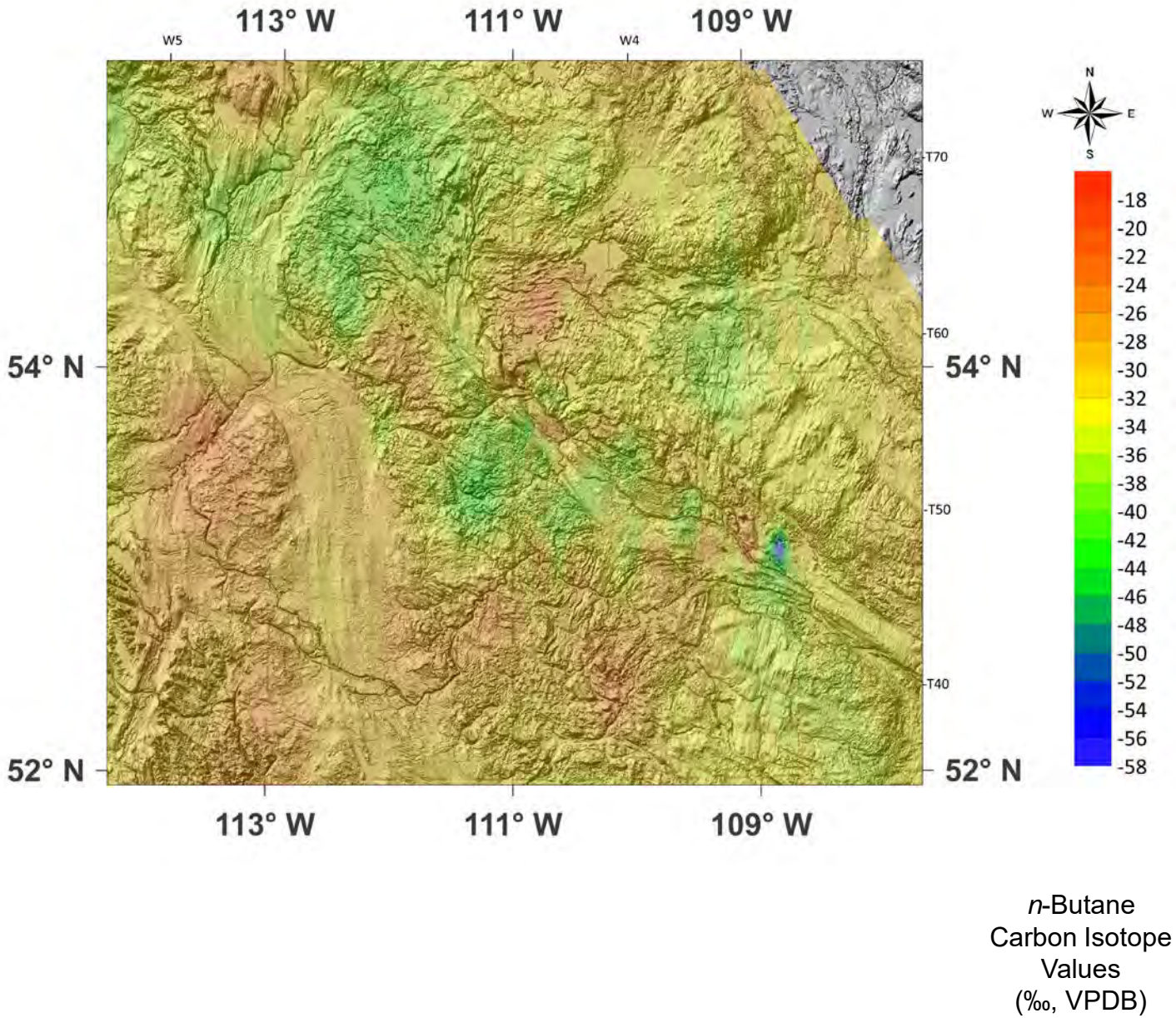




Fig. 22L. Contour Map of *i*-Butane Carbon Isotope Values of GM Eastern Alberta Zoom-in over Topographic Map

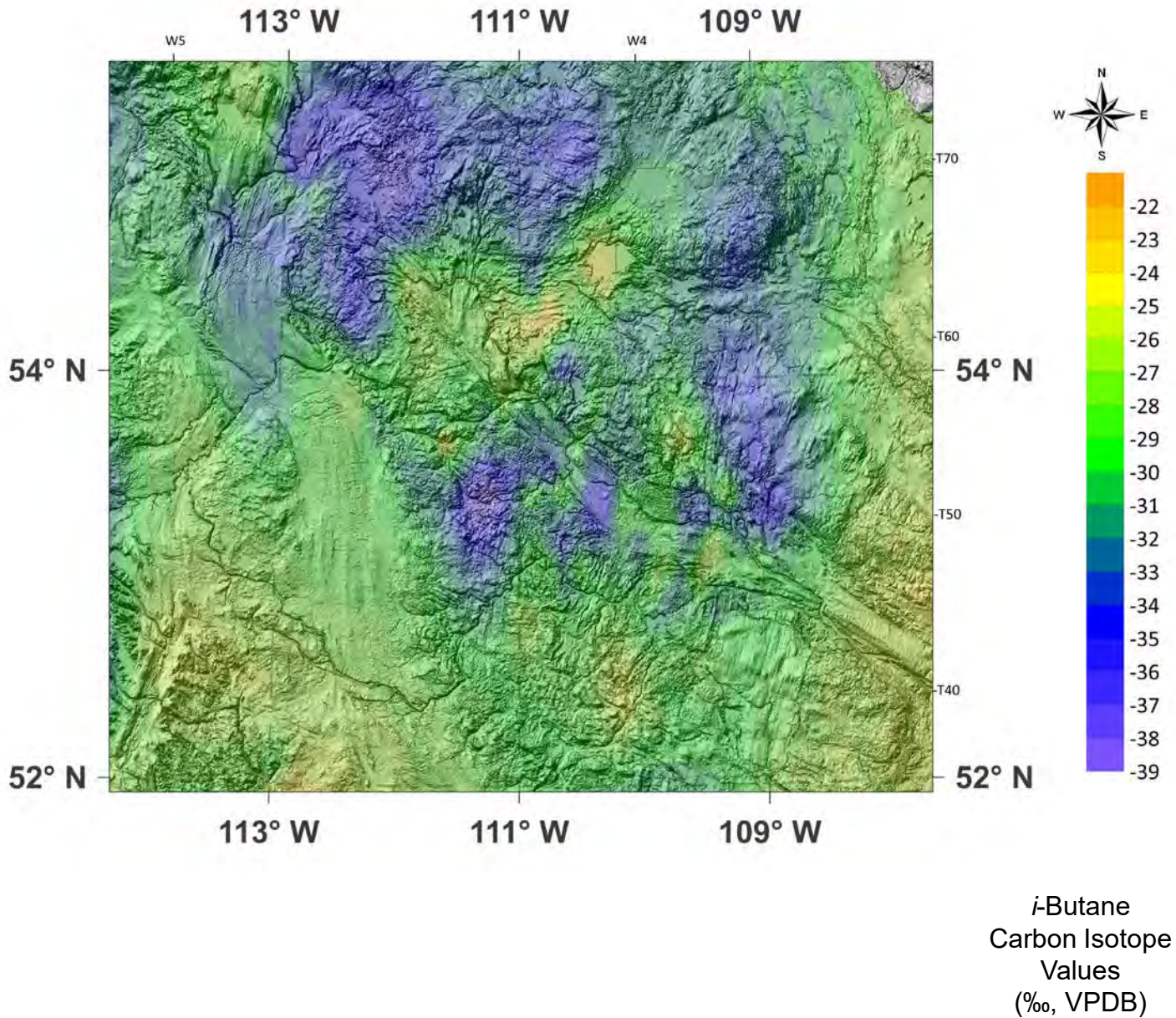




Fig. 22M. Contour Map of Carbon Dioxide Carbon Isotope Values of GM Eastern Alberta Zoom-in over Topographic Map

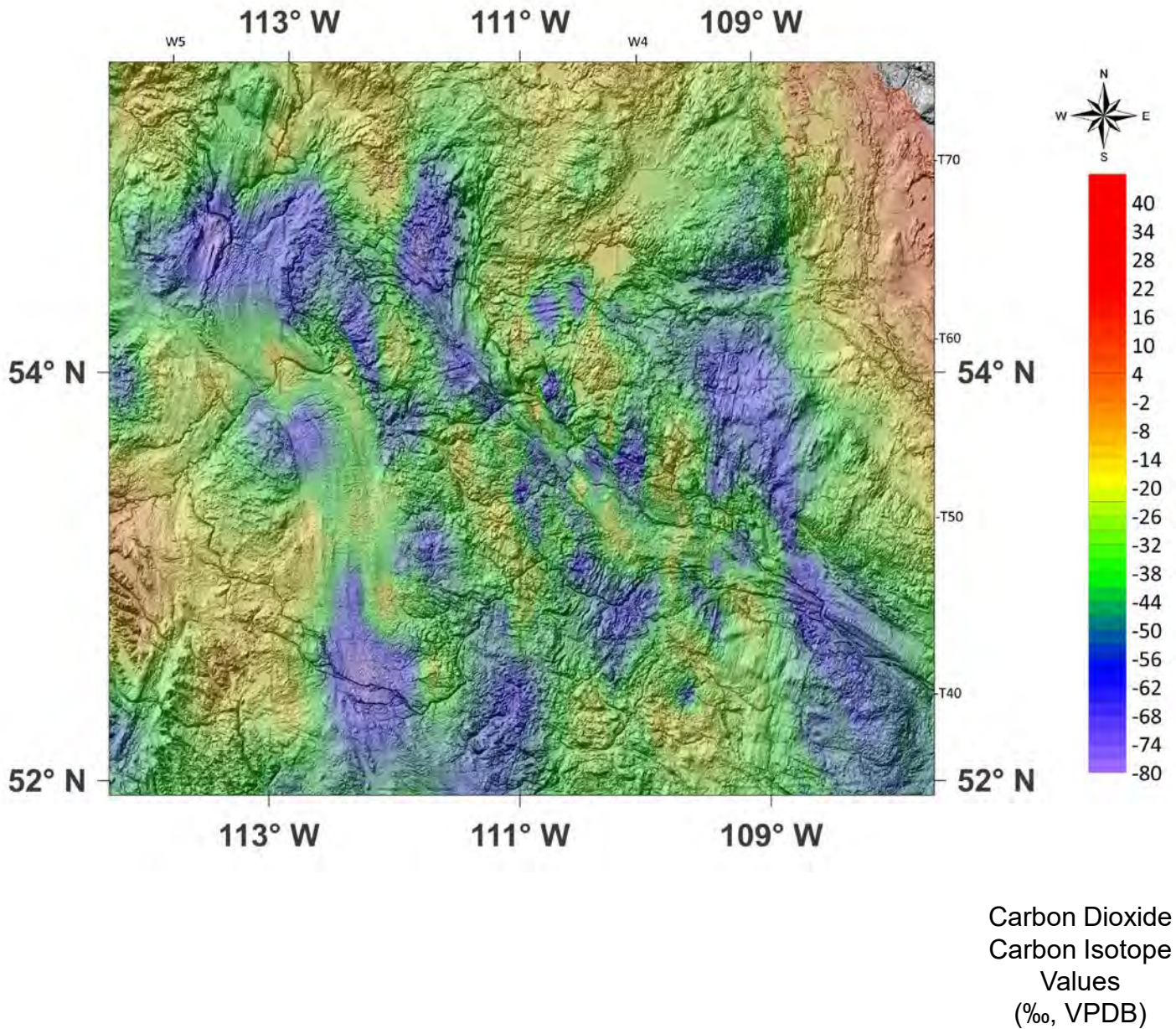




Fig. 23A. Map of Surface Casing Vent (SCV) Locations in the Lloydminster Zoom-in

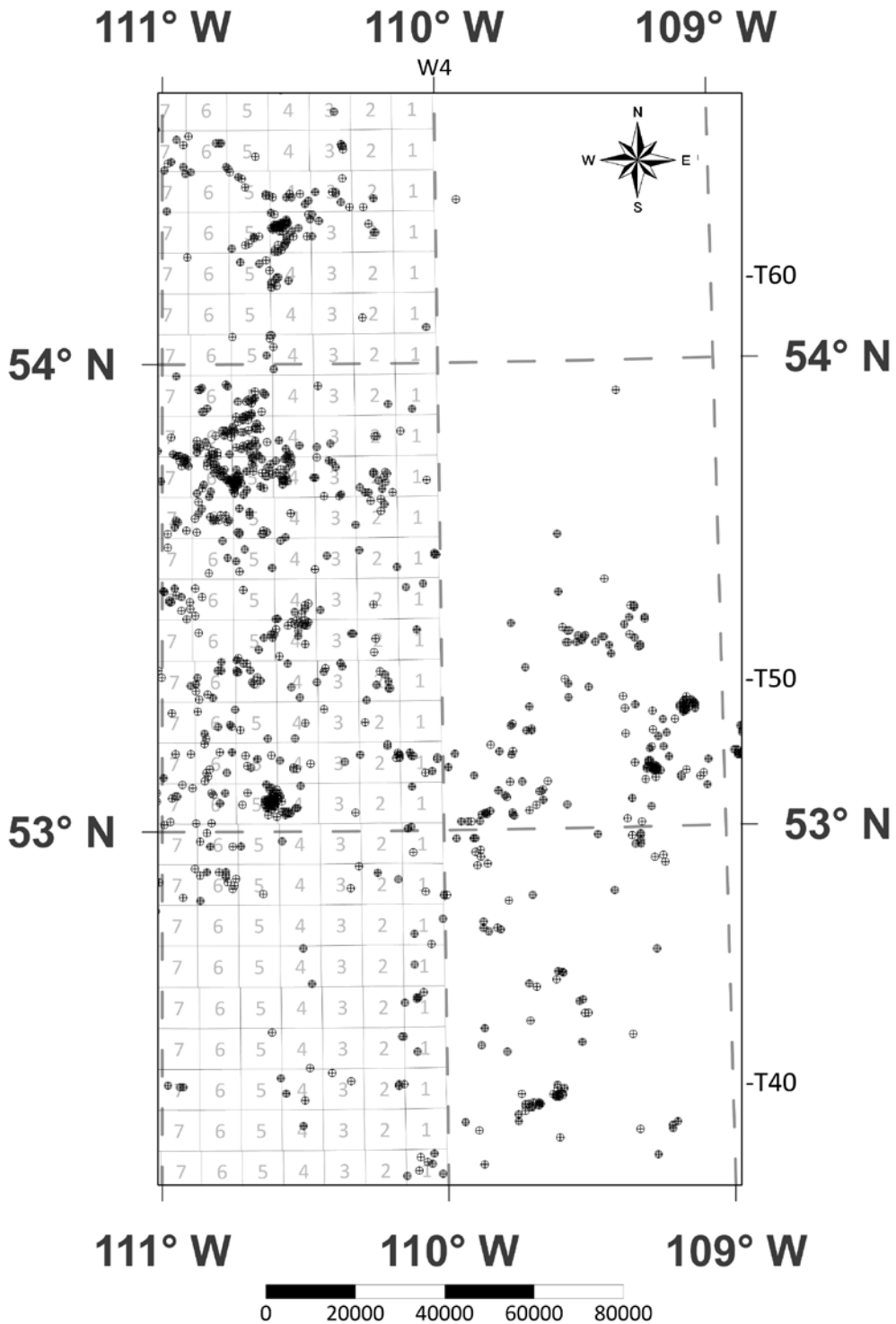


Fig. 23B. Contour Map of Methane Carbon Isotope Values of SCV Lloydminster Zoom-in

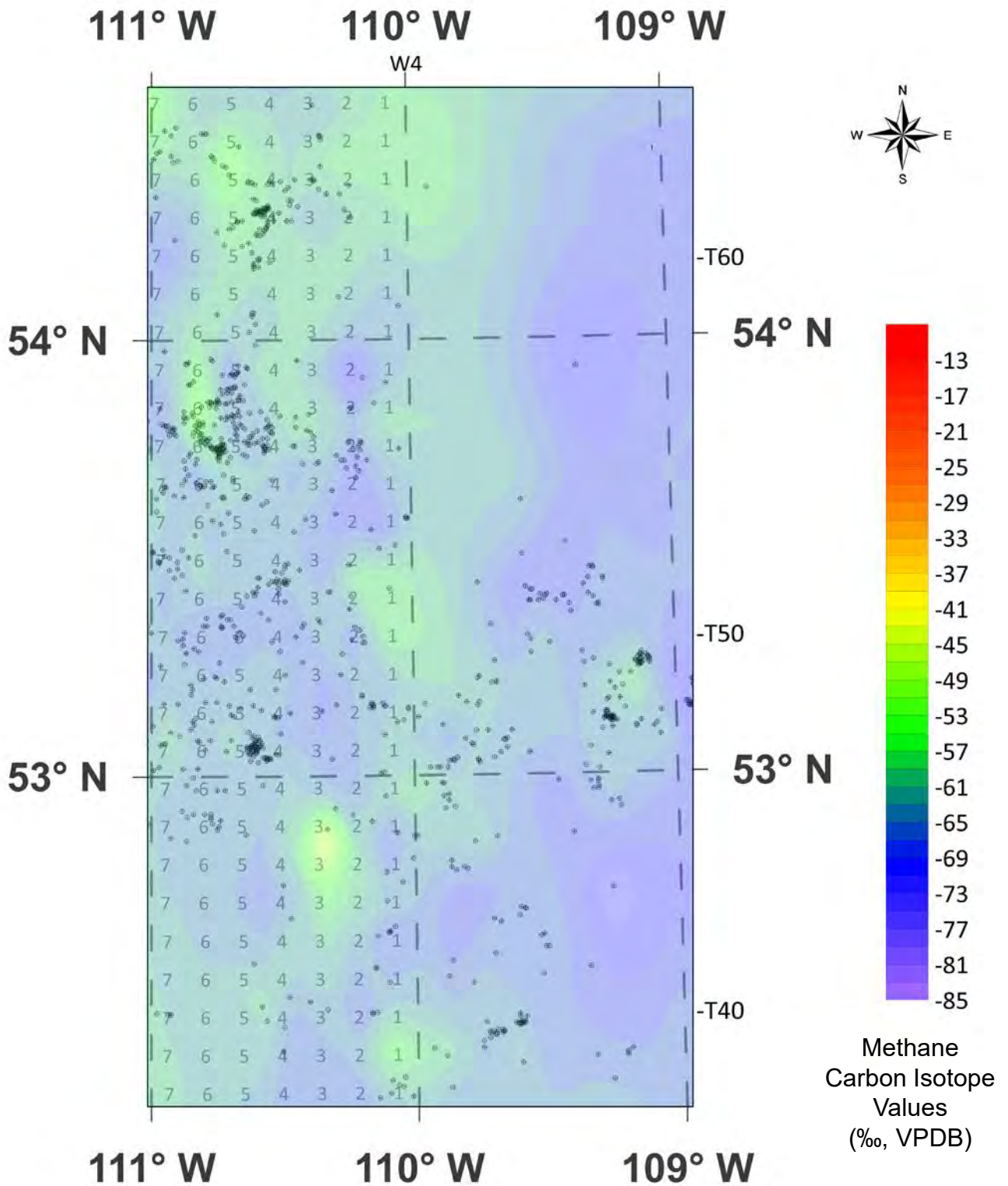




Fig. 23C. Contour Map of Ethane Carbon Isotope Values of SCV Lloydminster Zoom-in

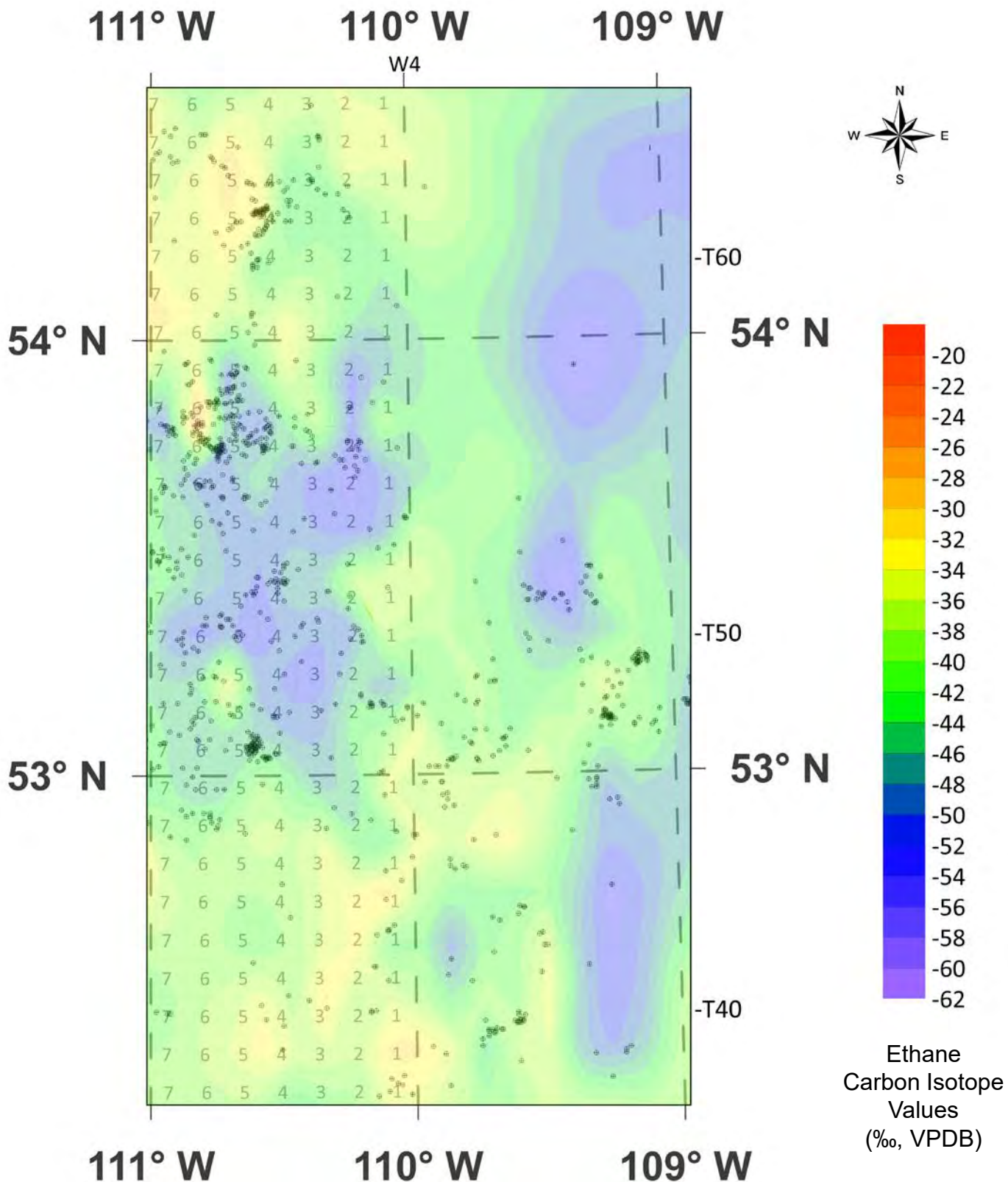


Fig. 23D. Contour Map of Propane Carbon Isotope Values of SCV Lloydminster Zoom-in

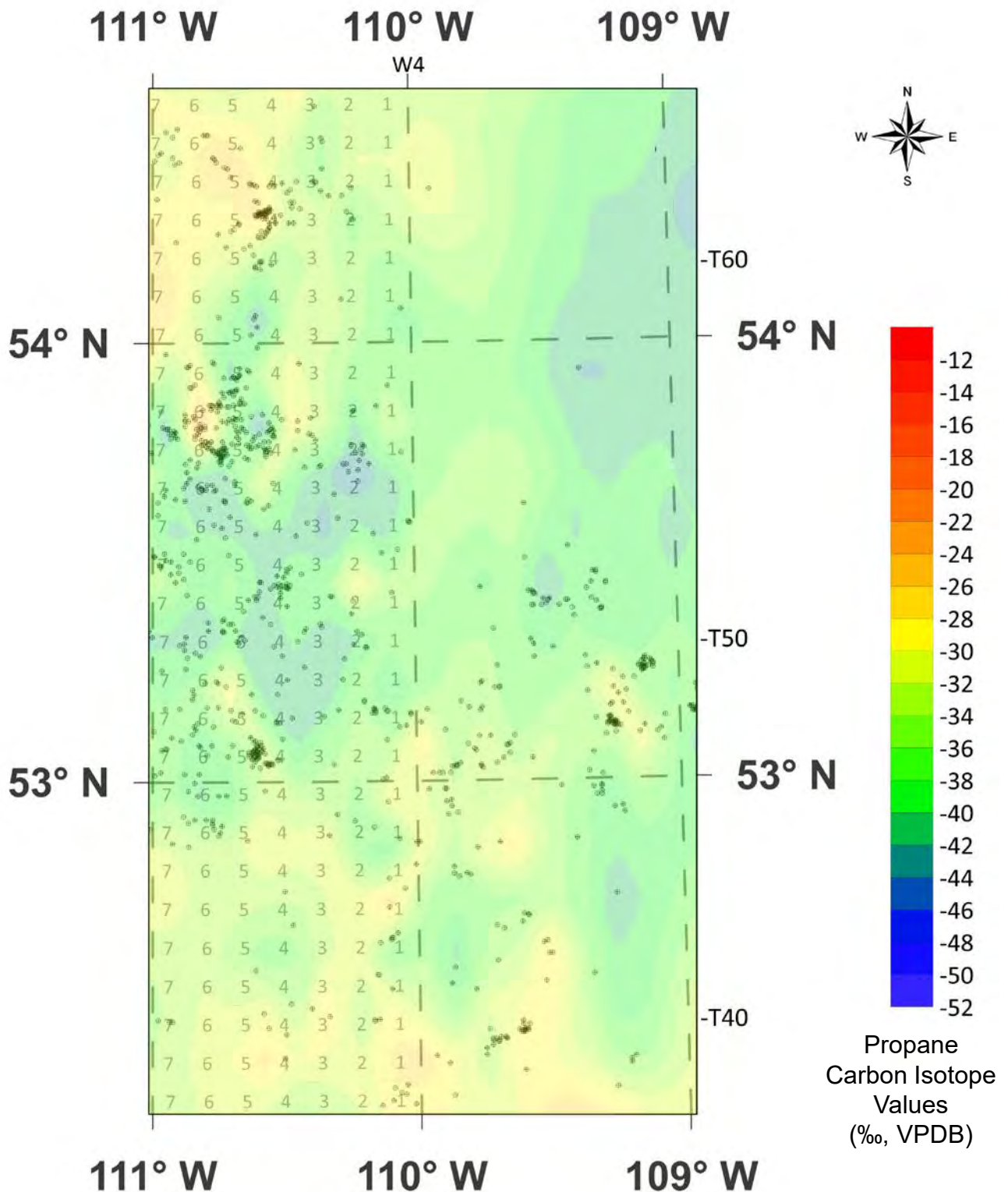




Fig. 23E. Contour Map of *n*-Butane Carbon Isotope Values of SCV Lloydminster Zoom-in

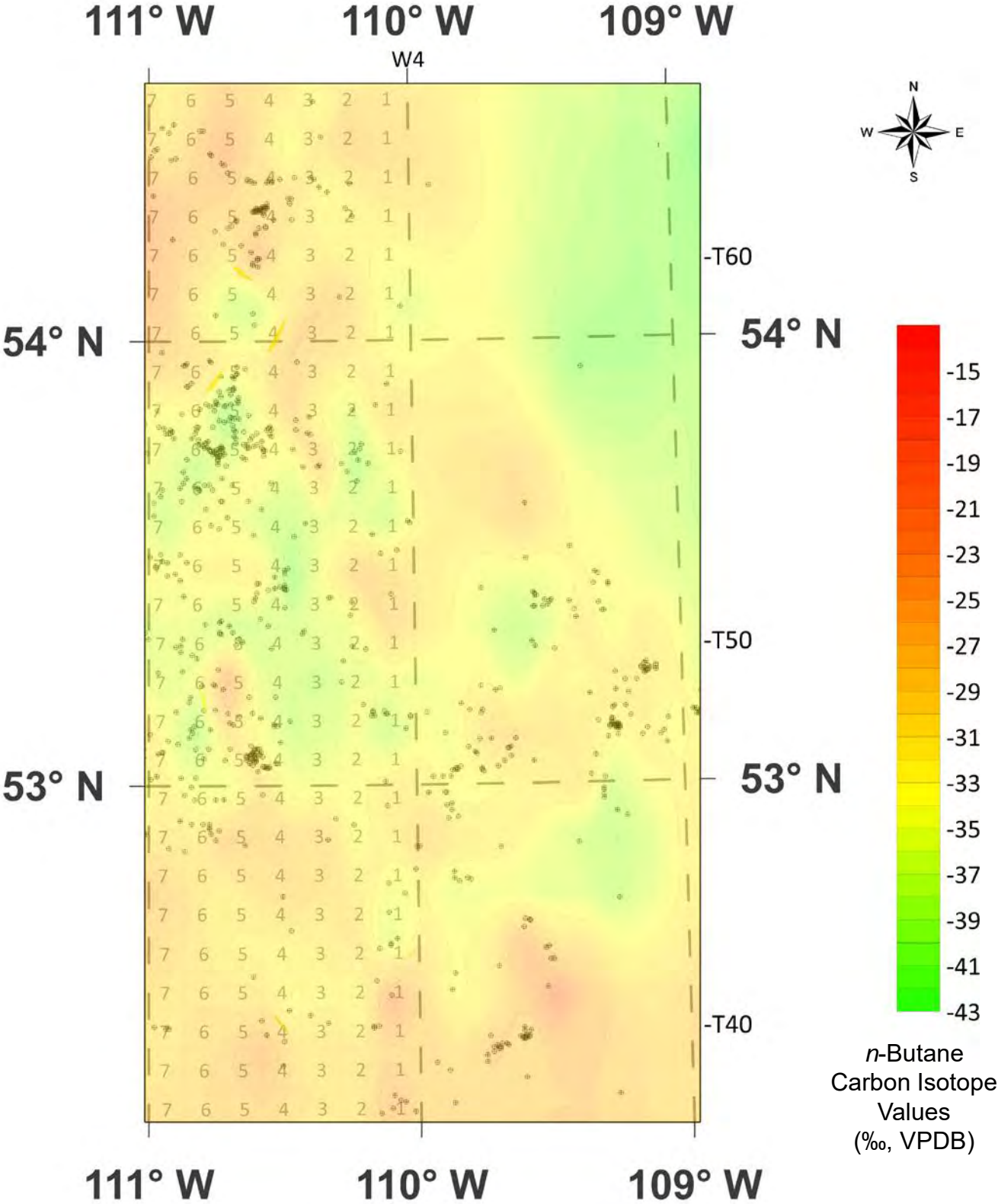


Fig. 23F. Contour Map of *i*-Butane Carbon Isotope Values of SCV Lloydminster Zoom-in

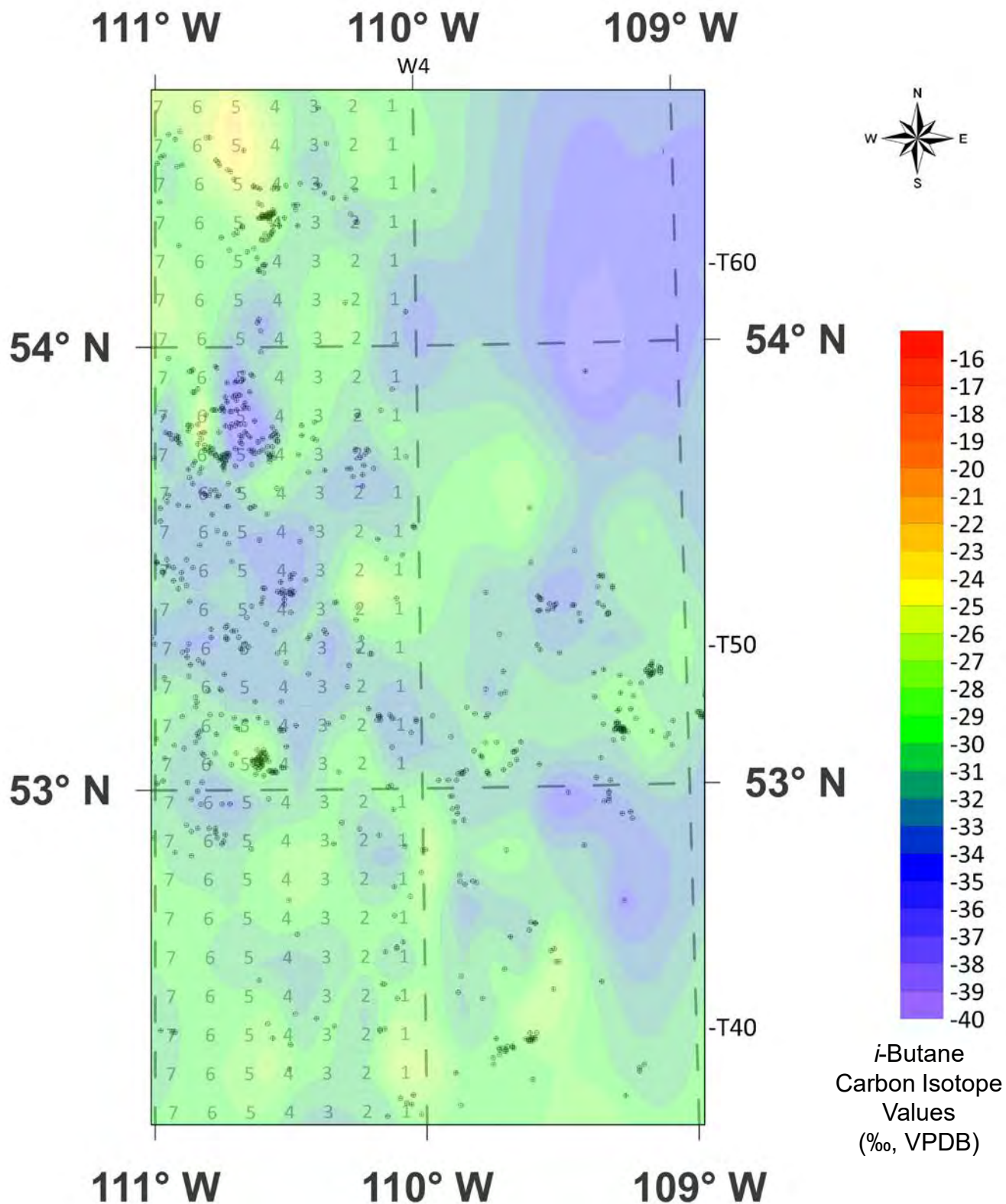




Fig. 23G. Contour Map of Carbon Dioxide Carbon Isotope Values of SCV Lloydminster Zoom-in

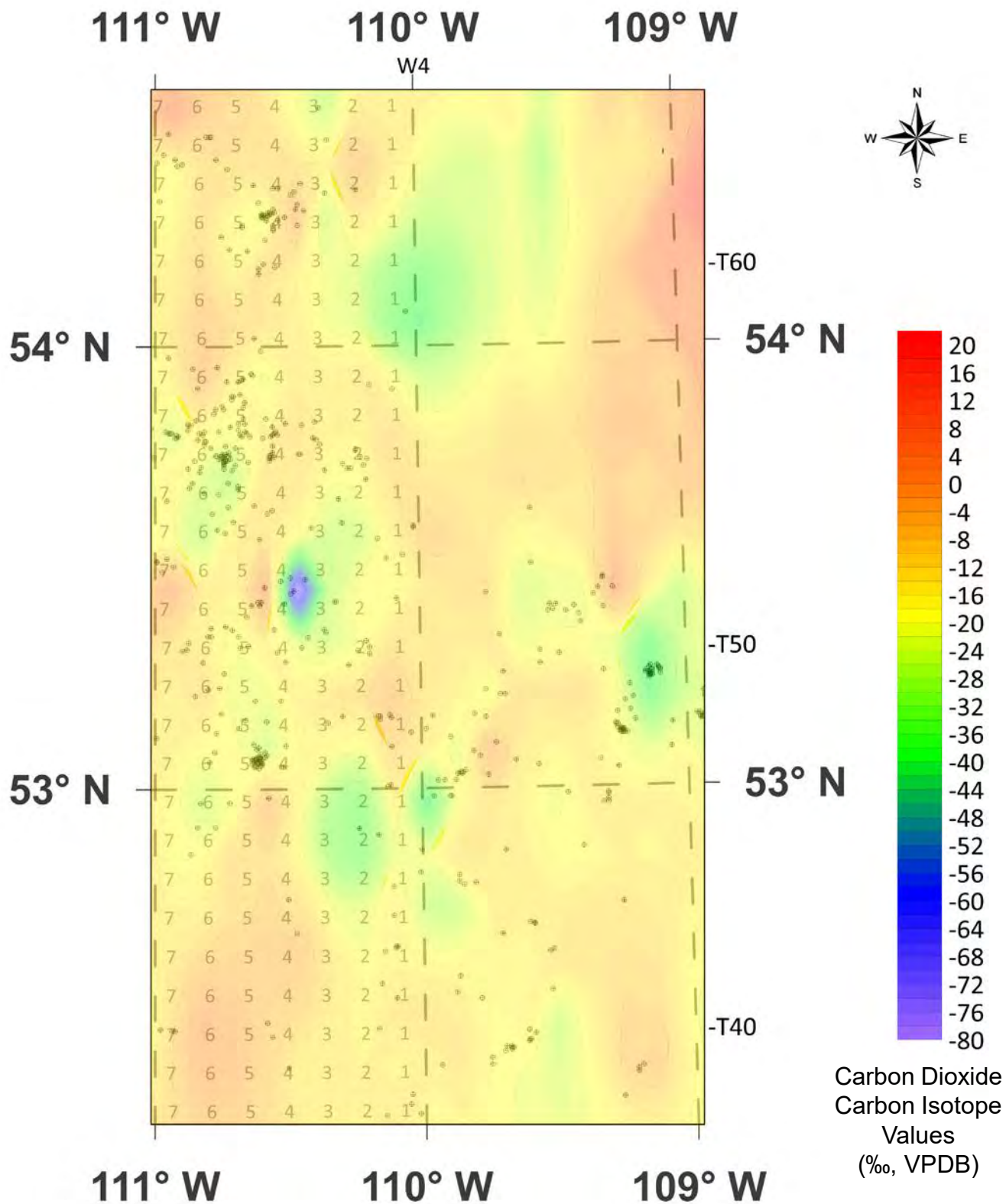


Fig. 23H. Contour Map of Methane Carbon Isotope Values of SCV Lloydminster Zoom-in over Topographic Map

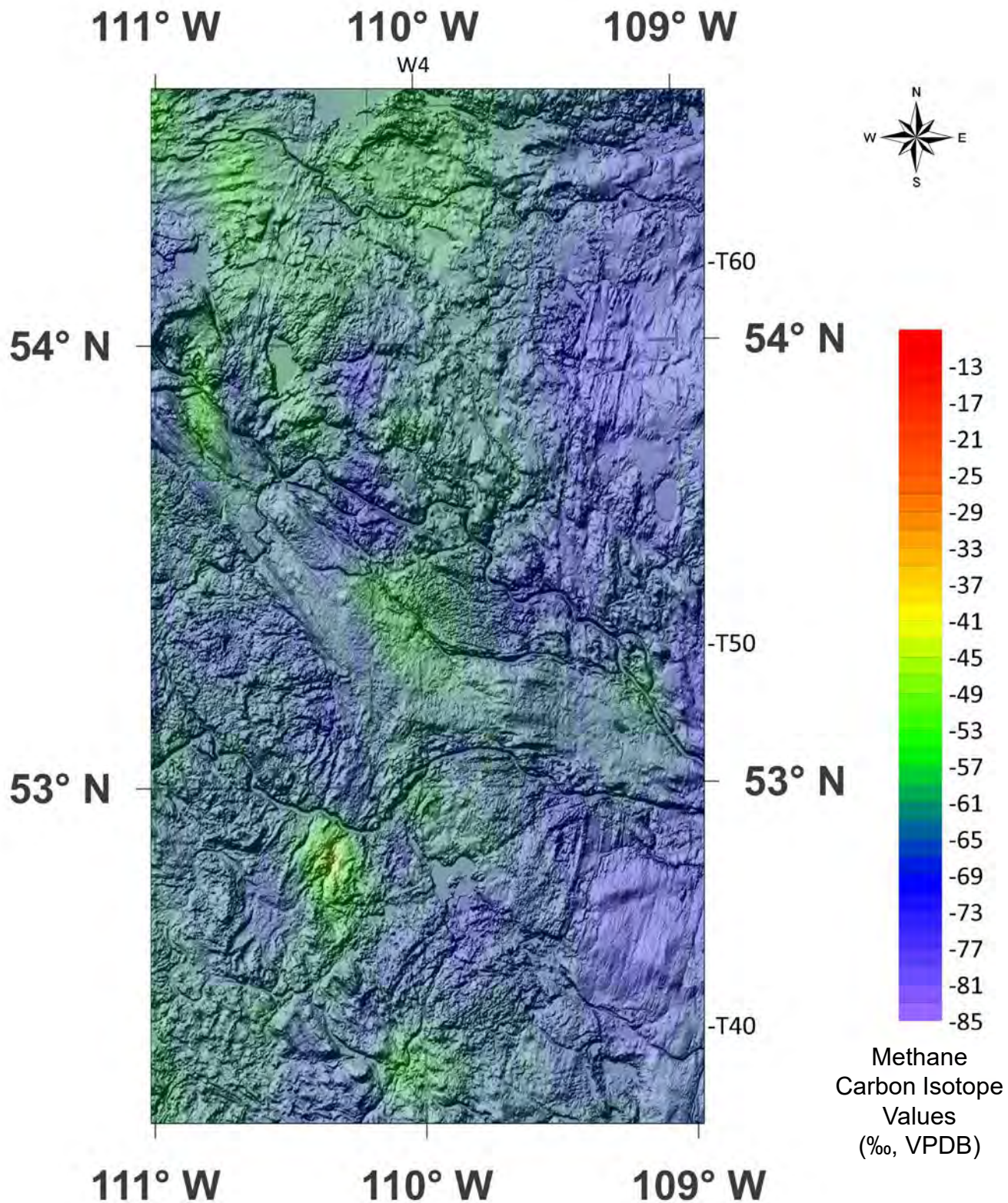




Fig. 23I. Contour Map of Ethane Carbon Isotope Values of SCV Lloydminster Zoom-in over Topographic Map

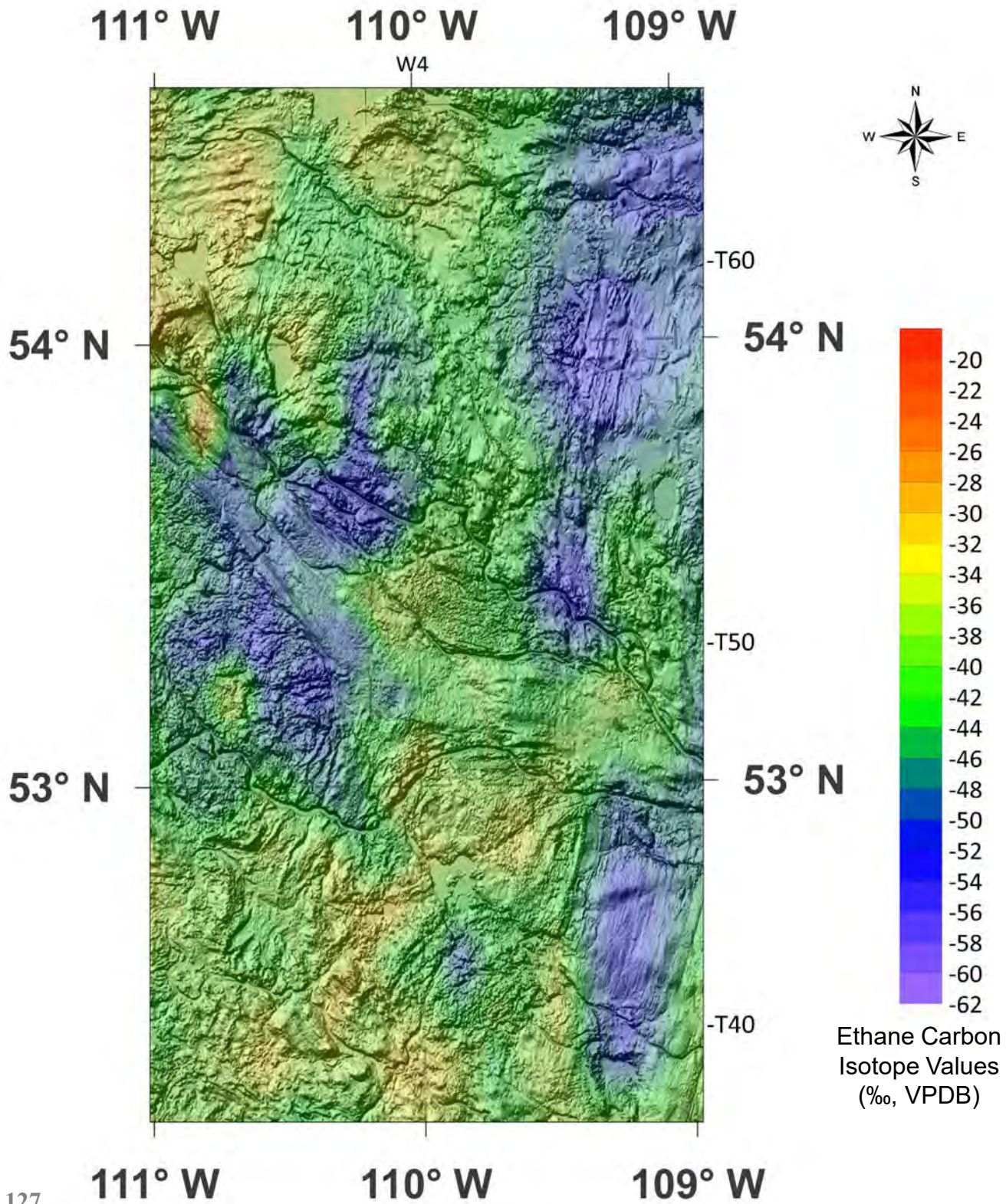




Fig. 23J. Contour Map of Propane Carbon Isotope Values of SCV Lloydminster Zoom-in over Topographic Map

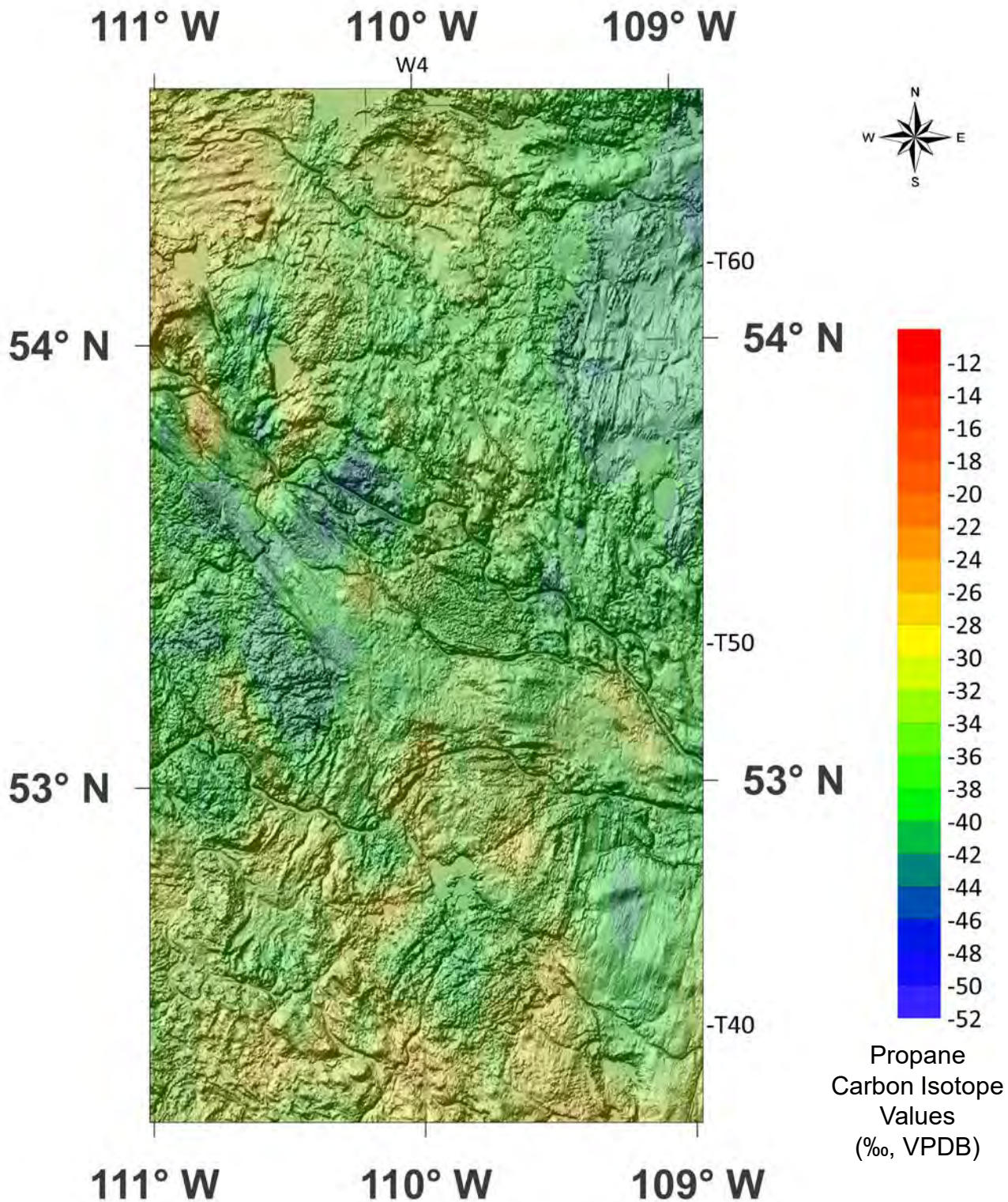




Fig. 23K. Contour Map of *n*-Butane Carbon Isotope Values of SCV Lloydminster Zoom-in over Topographic Map

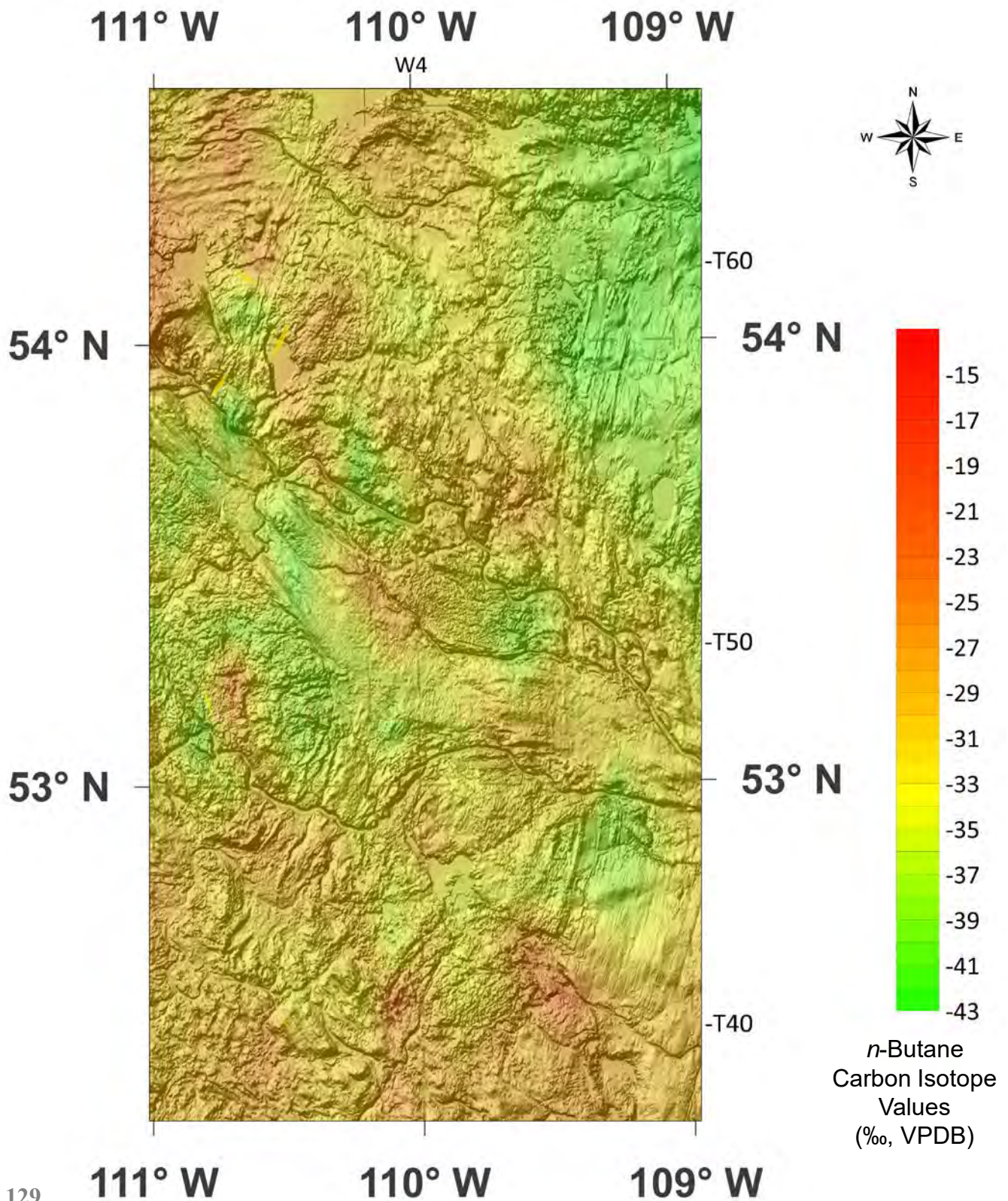




Fig. 23K. Contour Map of *i*-Butane Carbon Isotope Values of SCV Lloydminster Zoom-in over Topographic Map

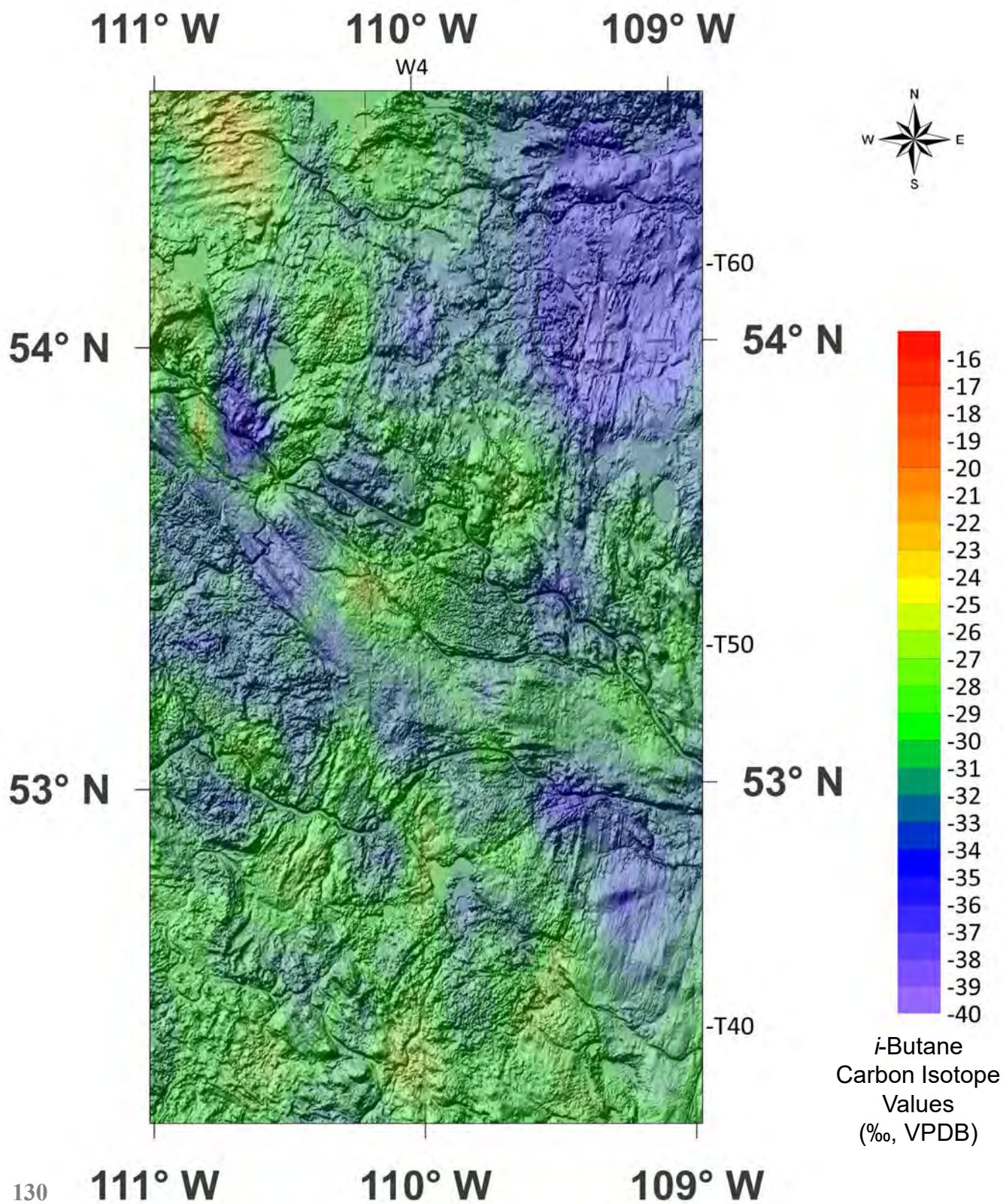




Fig. 23M. Contour Map of Carbon Dioxide Carbon Isotope Values of SCV Lloydminster Zoom-in over Topographic Map

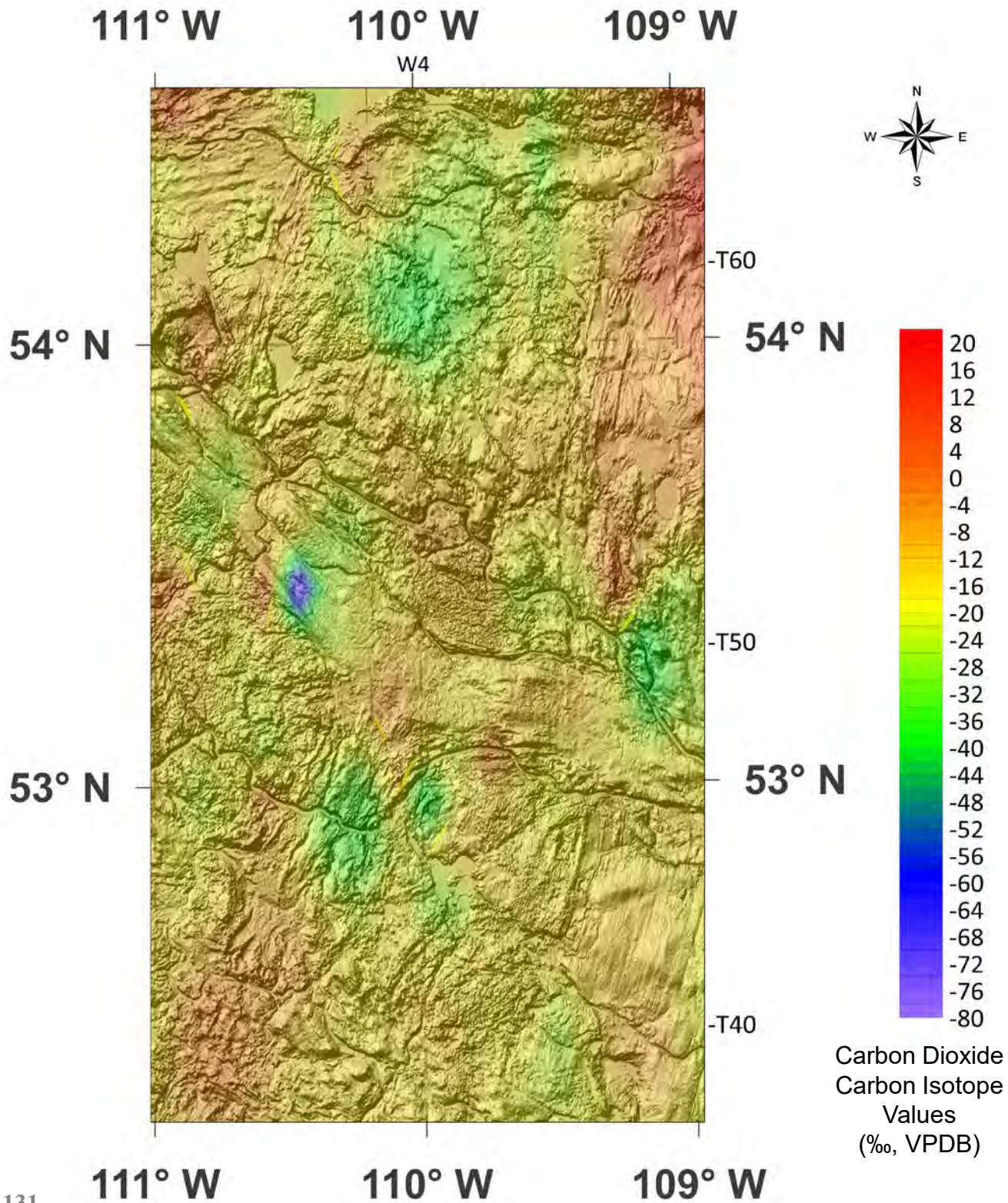


Fig. 24A. Map of Ground Migration (GM) Locations in the Lloydminster Zoom-in

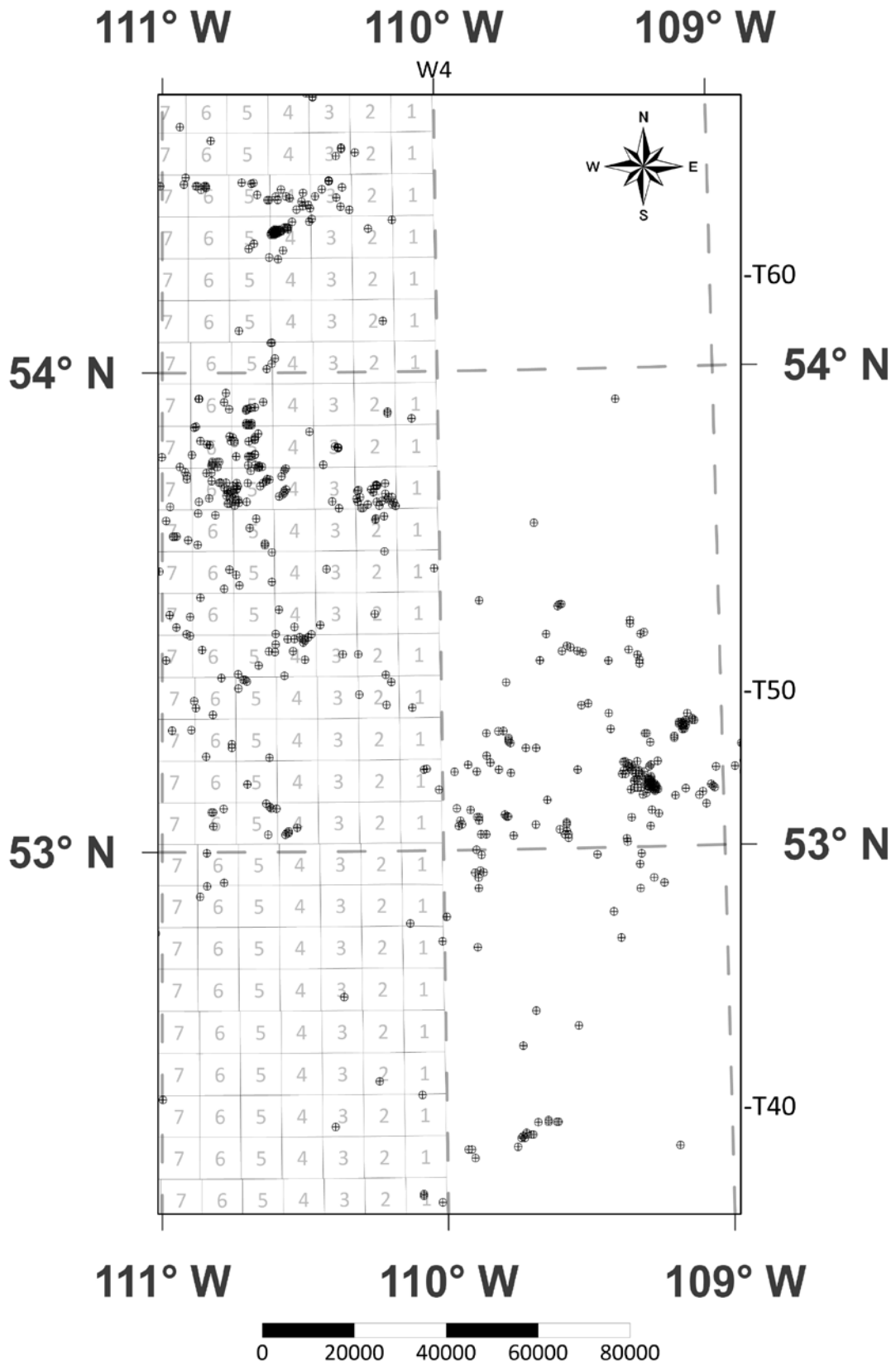




Fig. 24B. Contour Map of Methane Carbon Isotope Values of GM Lloydminster Zoom-in

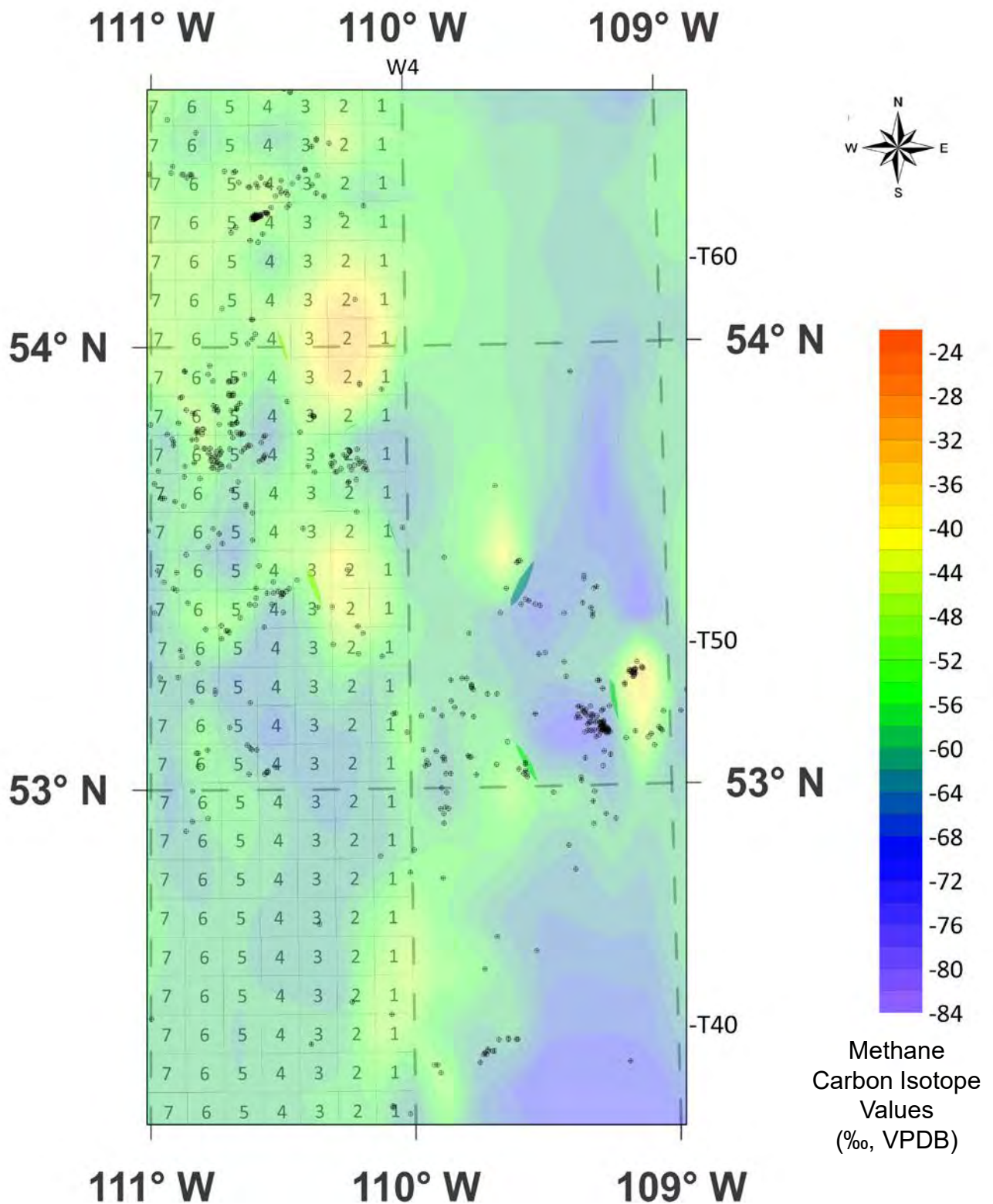


Fig. 24C. Contour Map of Ethane Carbon Isotope Values of GM Lloydminster Zoom-in

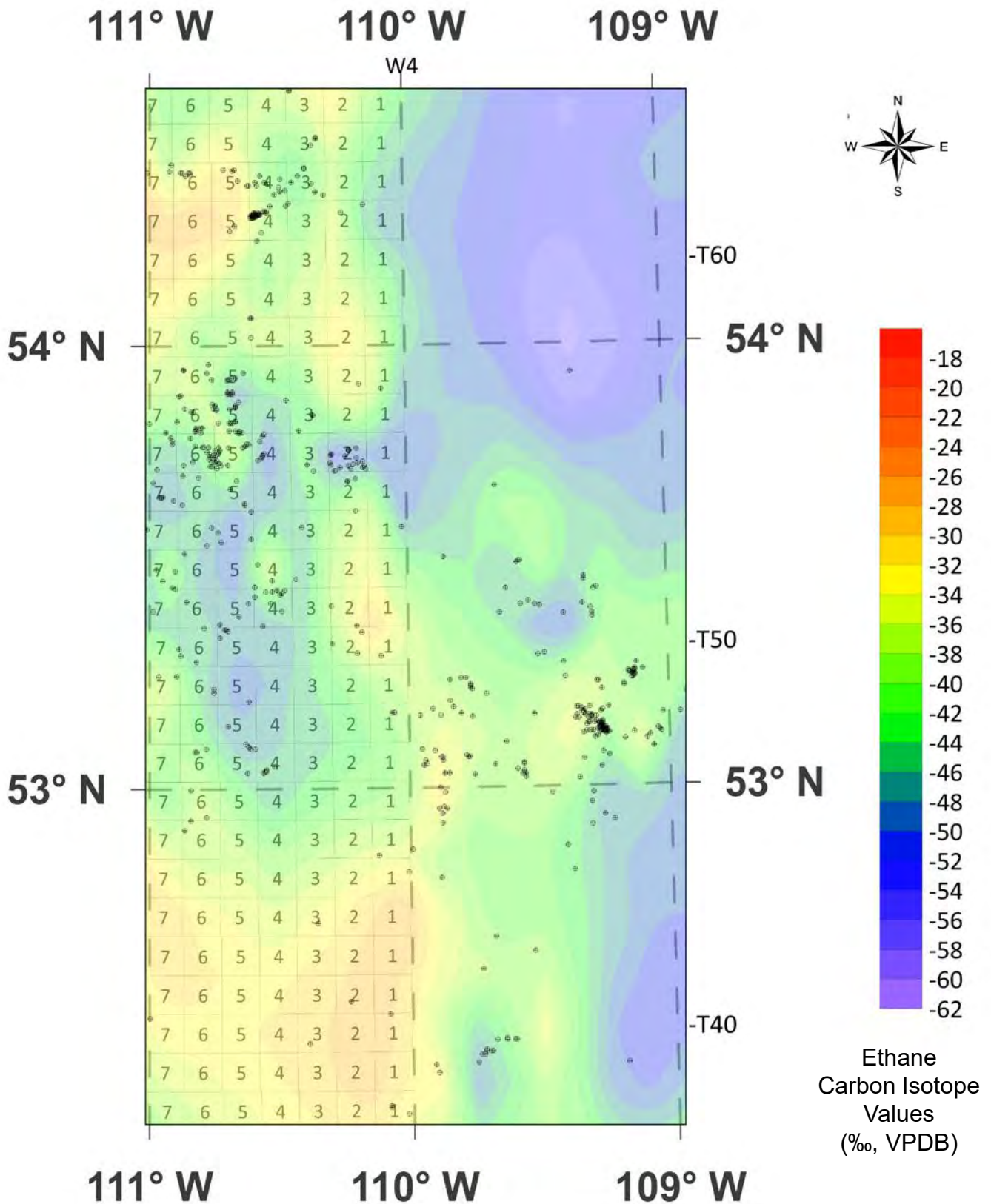




Fig. 24D. Contour Map of Propane Carbon Isotope Values of GM Lloydminster Zoom-in

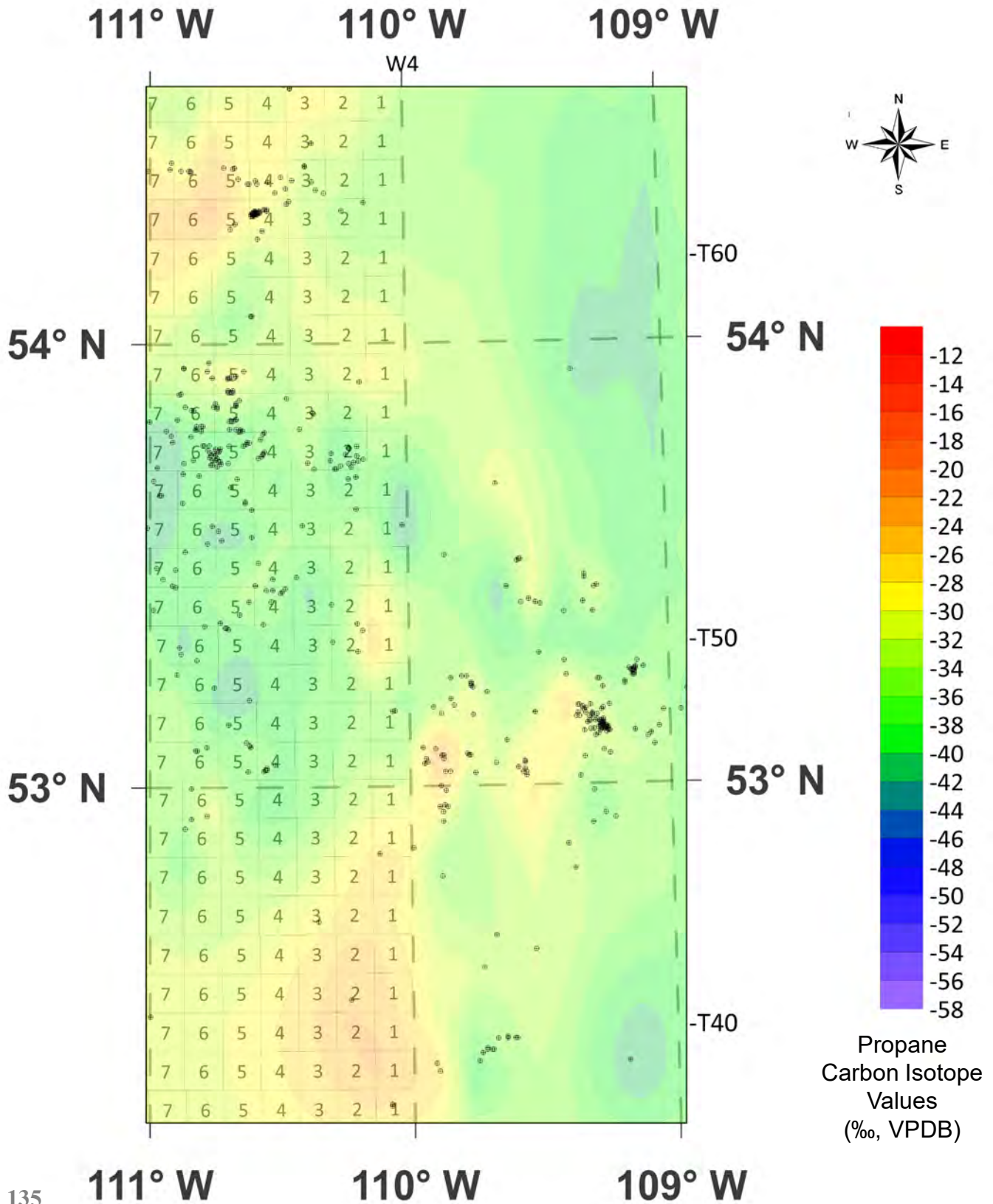


Fig. 24E. Contour Map of *n*-Butane Carbon Isotope Values of GM Lloydminster Zoom-in

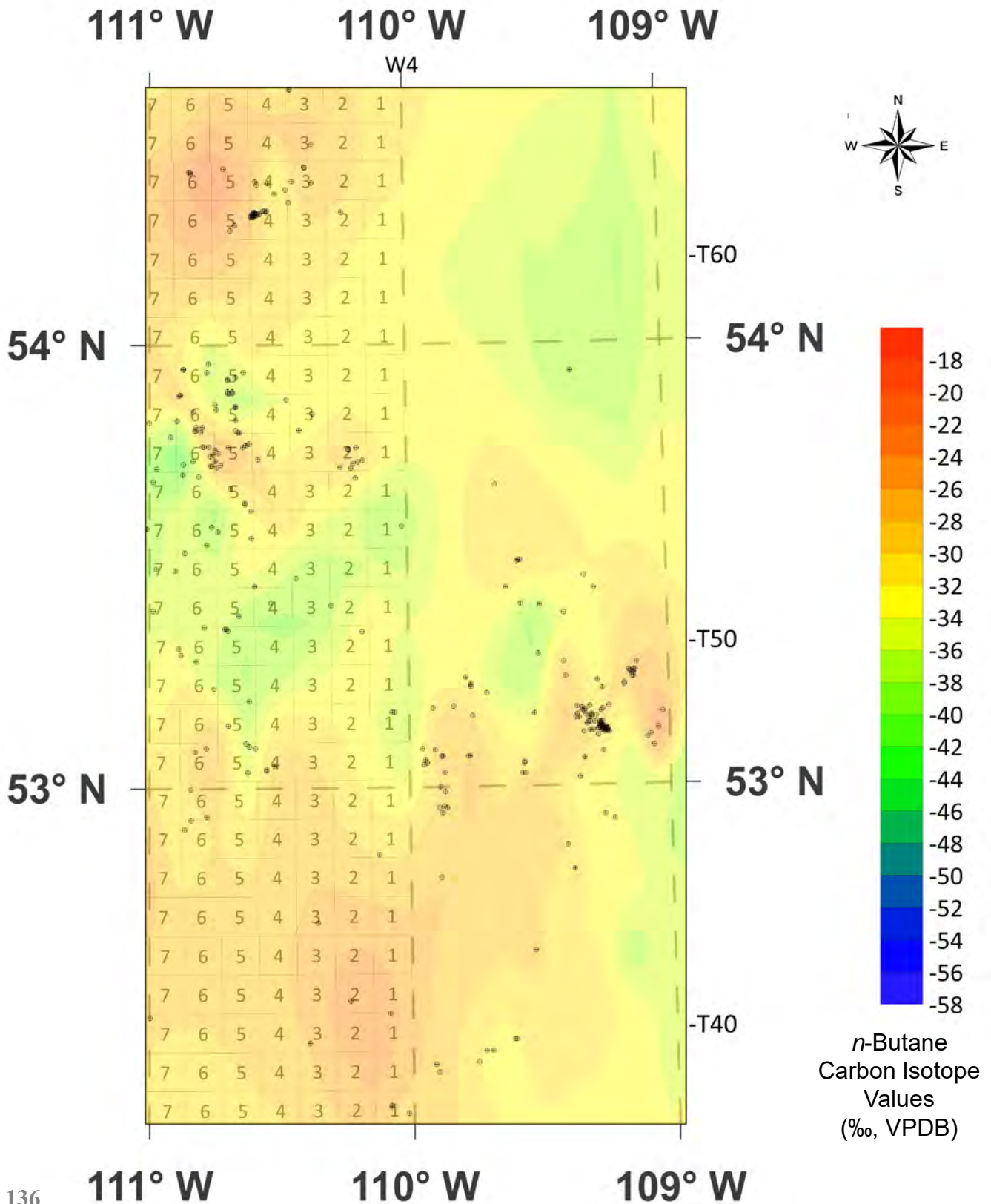




Fig. 24F. Contour Map of *i*-Butane Carbon Isotope Values of GM Lloydminster Zoom-in

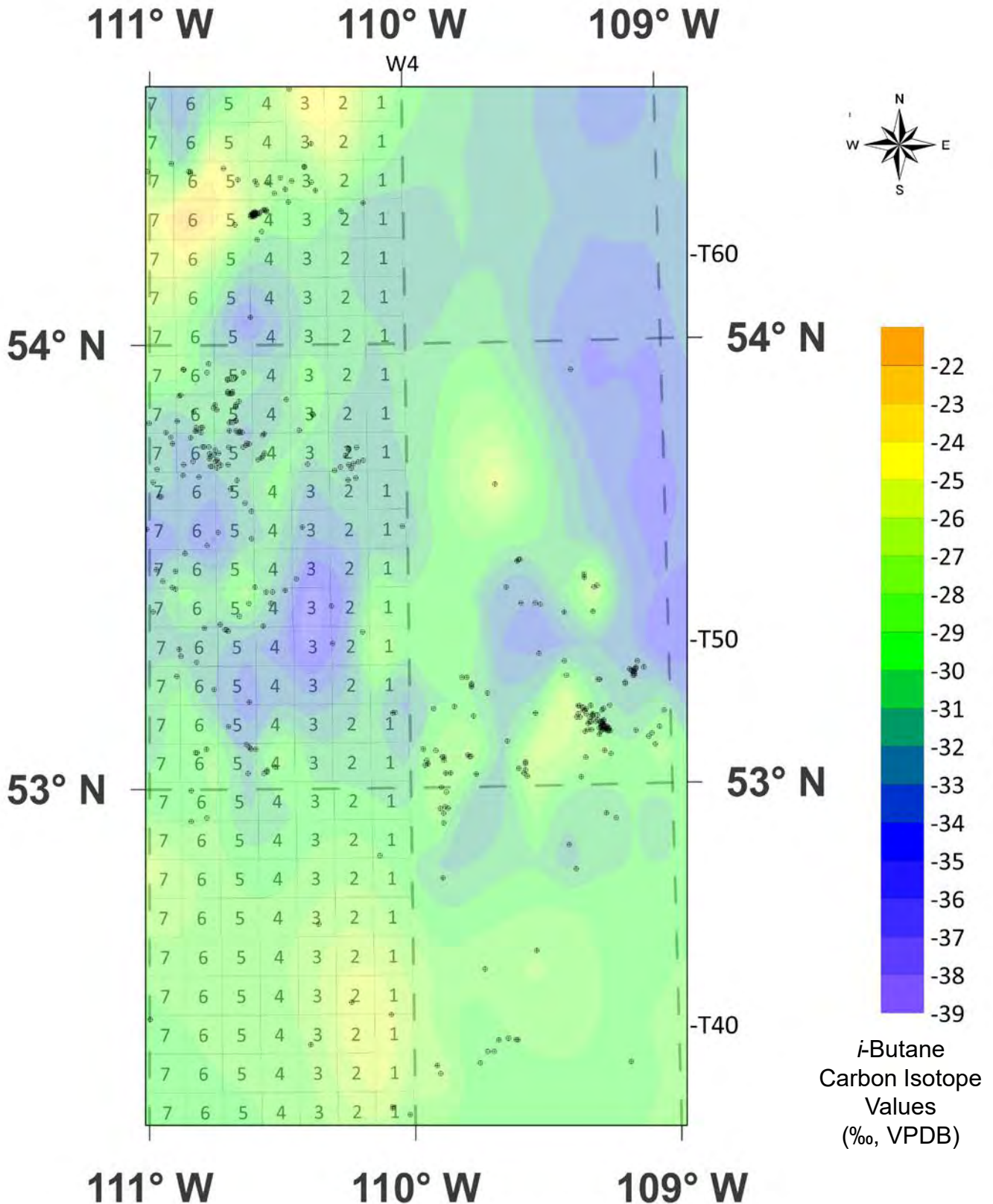


Fig. 24G. Contour Map of Carbon Dioxide Carbon Isotope Values of GM Lloydminster Zoom-in

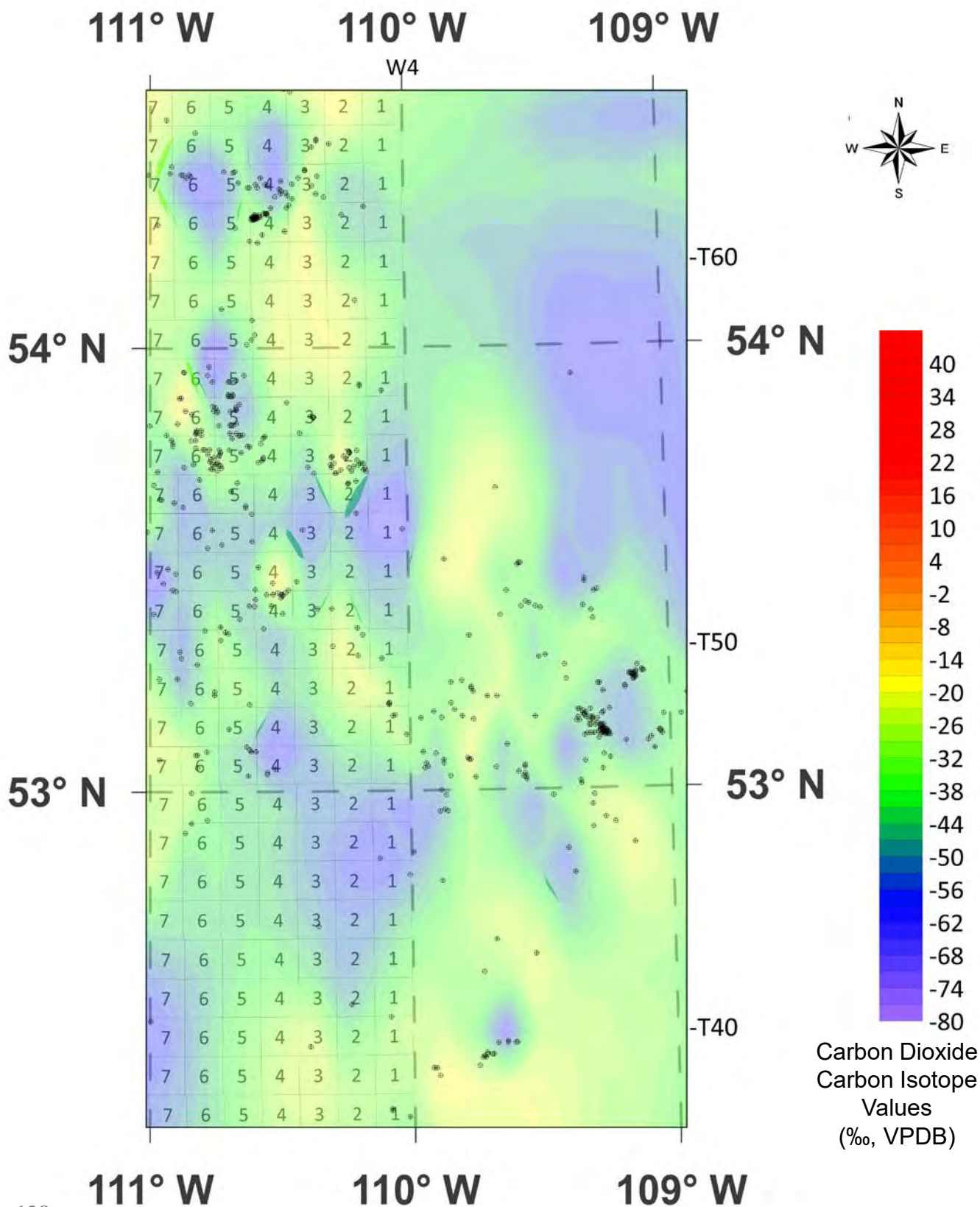




Fig. 24H. Contour Map of Methane Carbon Isotope Values of GM Lloydminster Zoom-in over Topographic Map

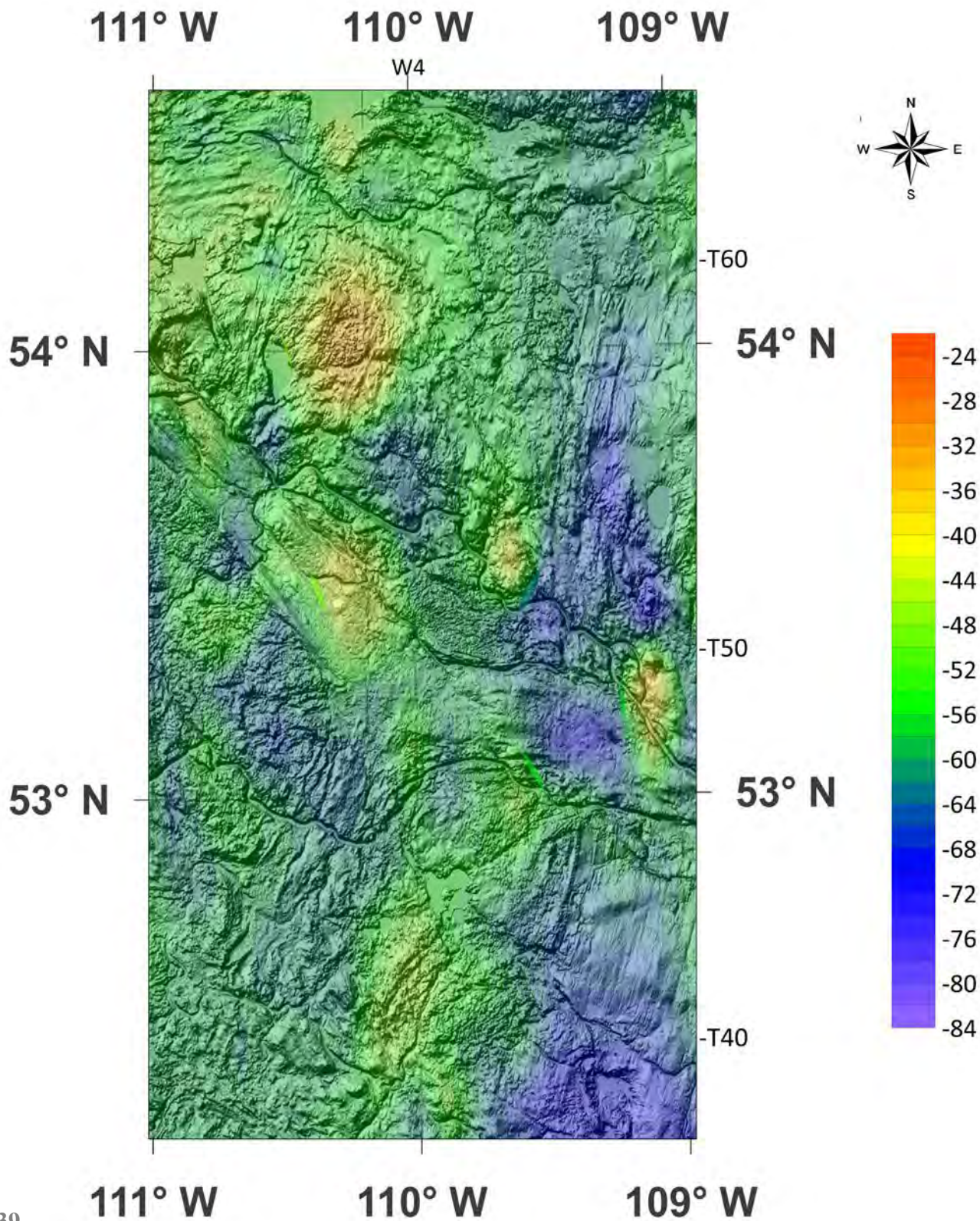




Fig. 24I. Contour Map of Ethane Carbon Isotope Values of GM Lloydminster Zoom-in over Topographic Map

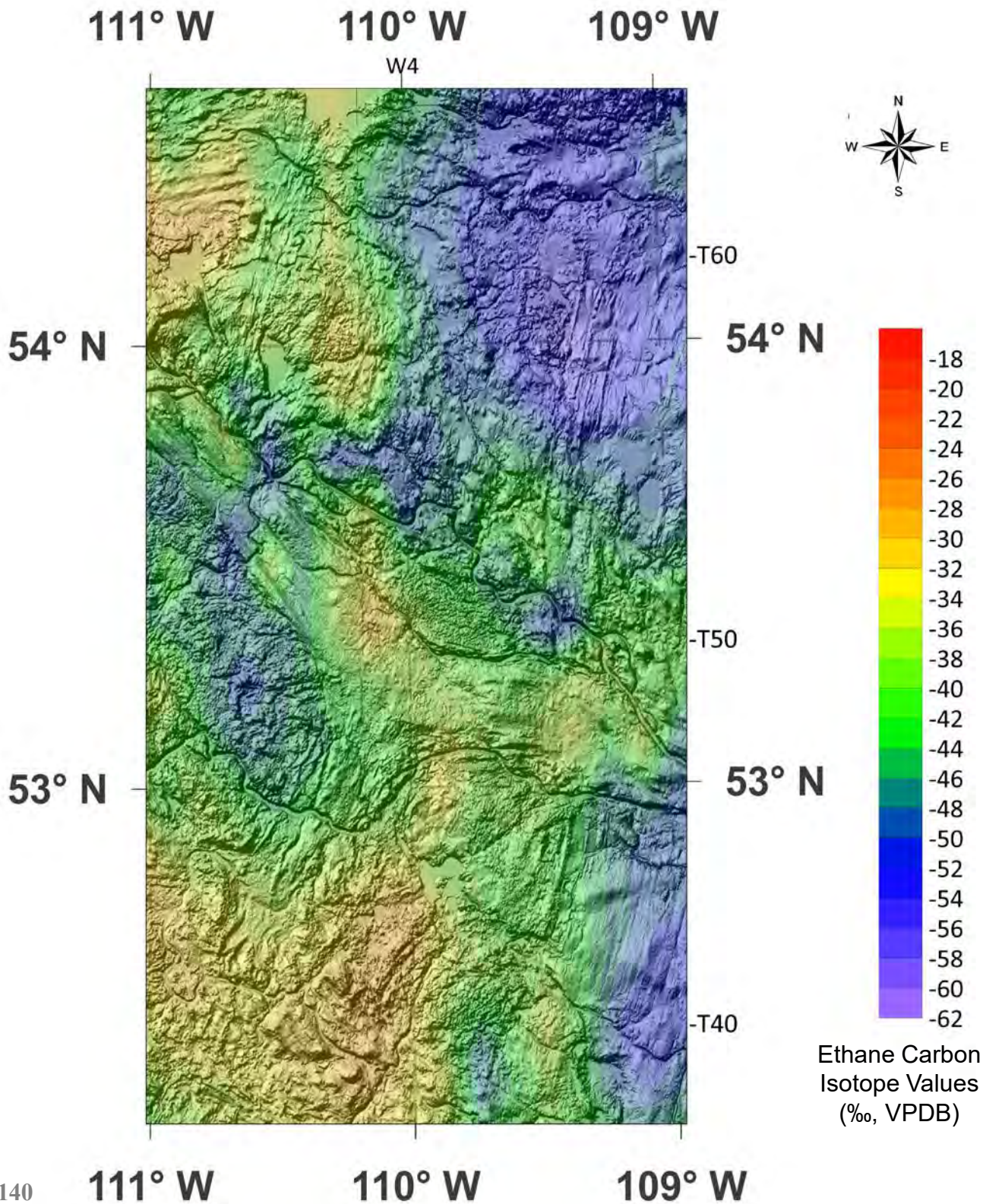




Fig. 24J. Contour Map of Propane Carbon Isotope Values of GM Lloydminster Zoom-in over Topographic Map

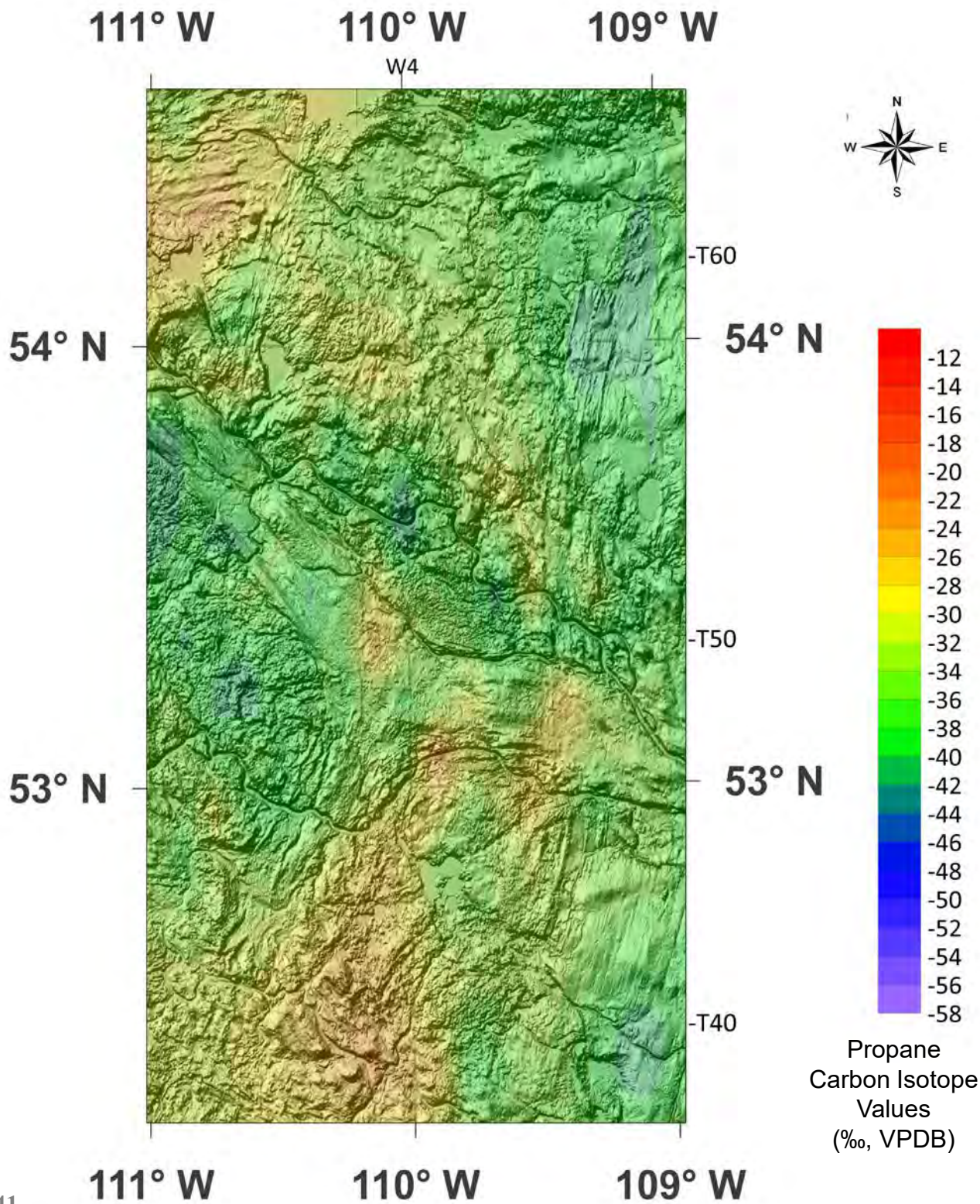




Fig. 24K. Contour Map of *n*-Butane Carbon Isotope Values of GM Lloydminster Zoom-in over Topographic Map

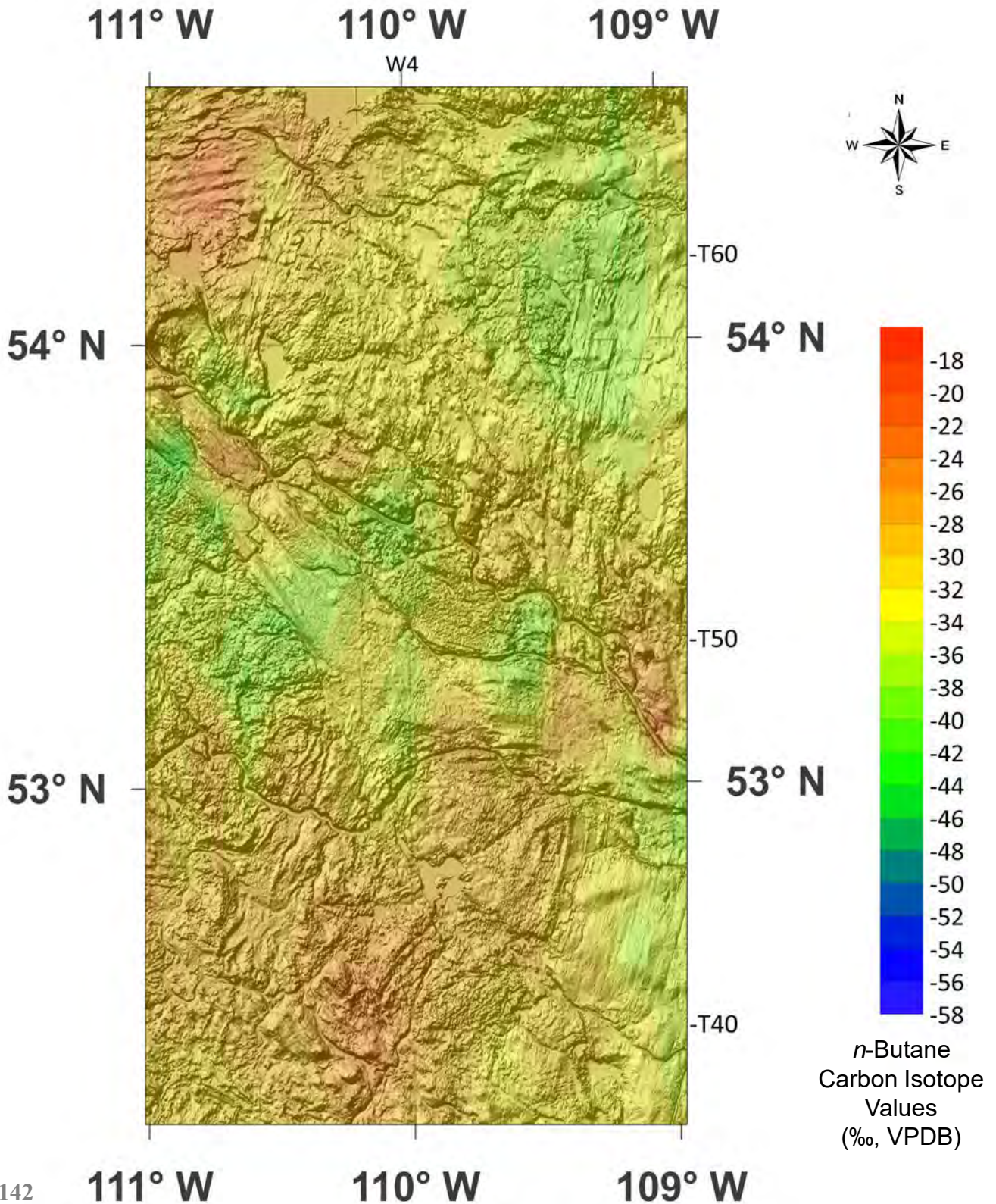




Fig. 24K. Contour Map of *i*-Butane Carbon Isotope Values of GM Lloydminster Zoom-in over Topographic Map

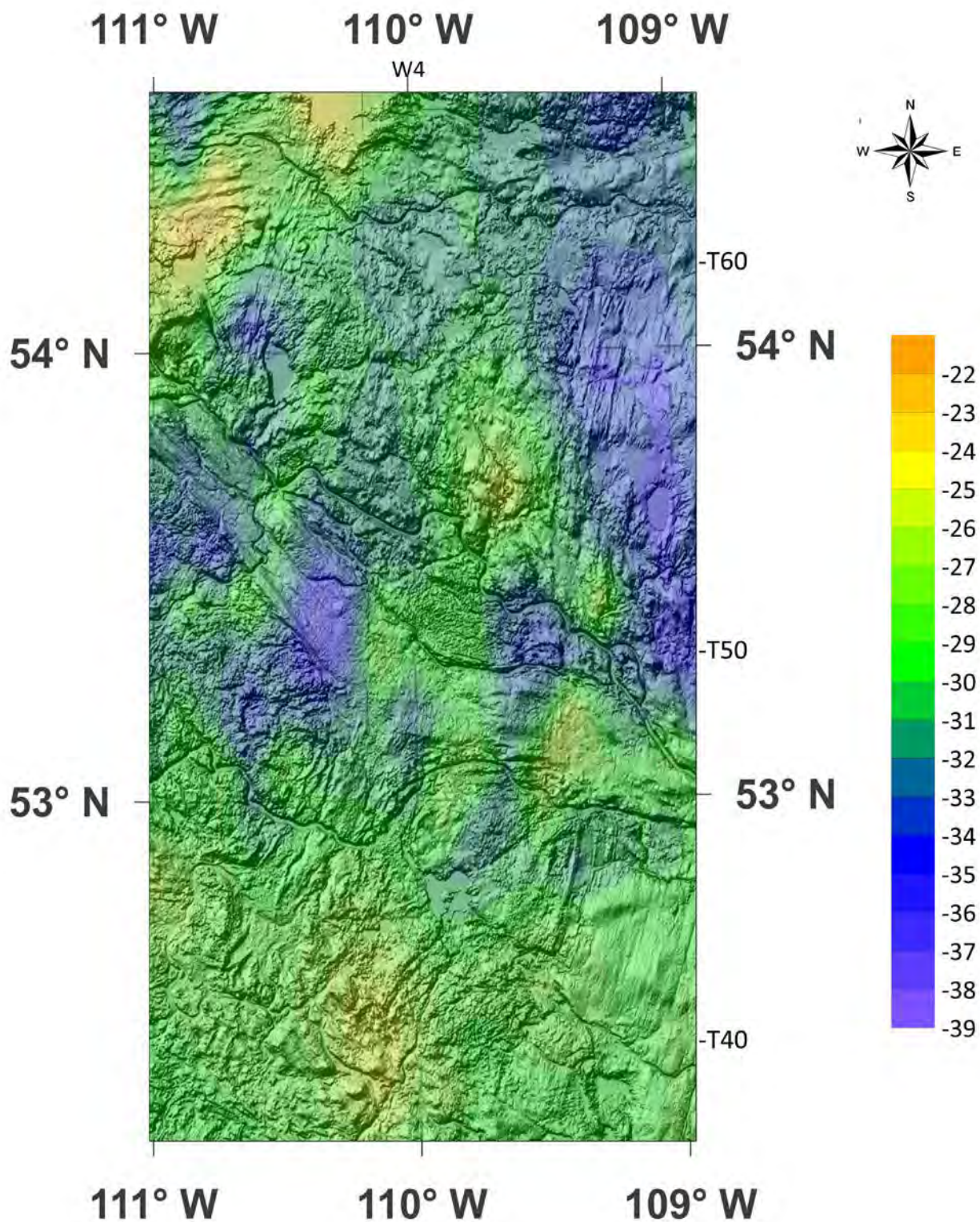




Fig. 24M. Contour Map of Carbon Dioxide Carbon Isotope Values of GM Lloydminster Zoom-in over Topographic Map

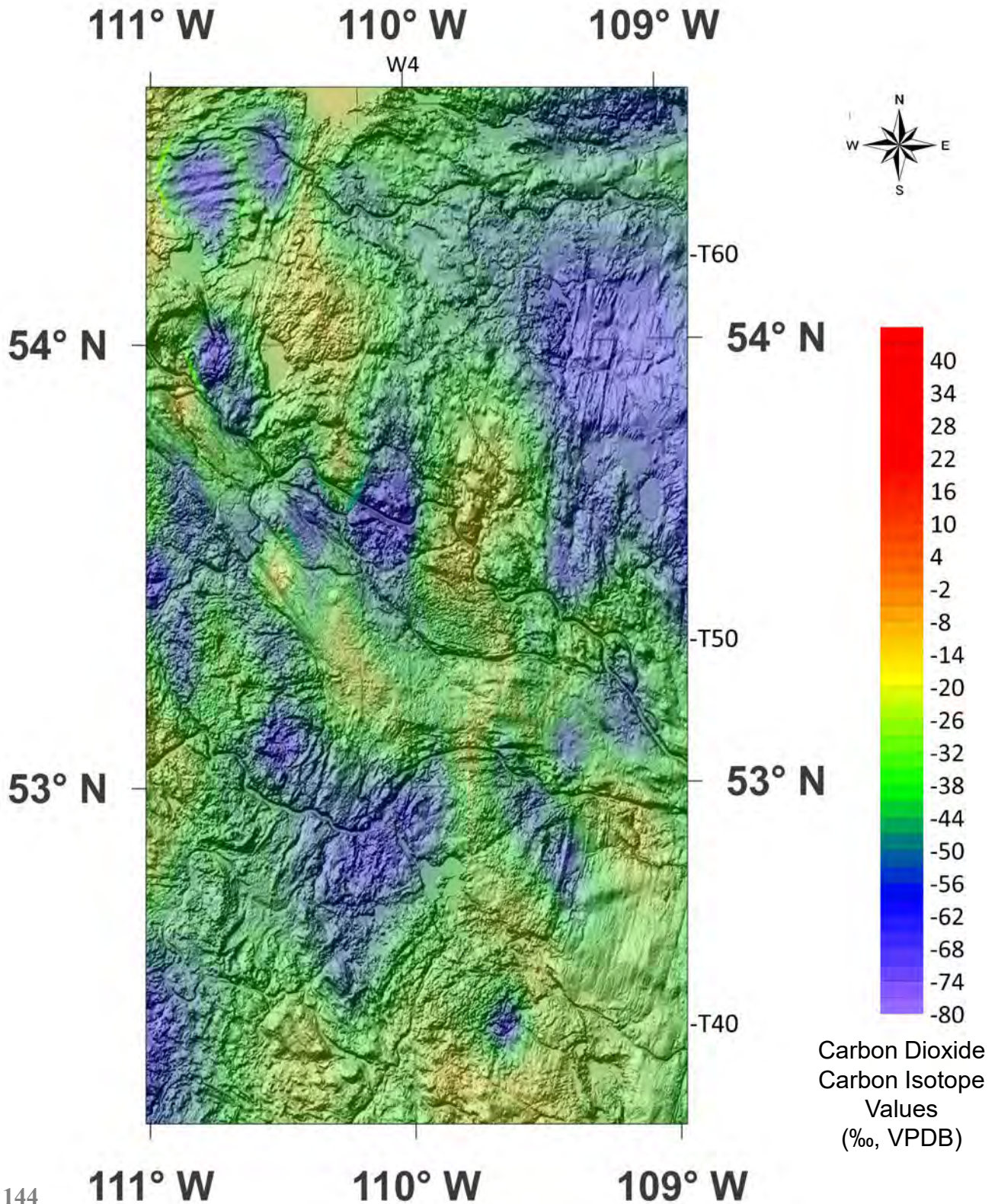




Fig. 25A. Map of Surface Casing Vent (SCV) Locations in the Lindbergh Zoom-in

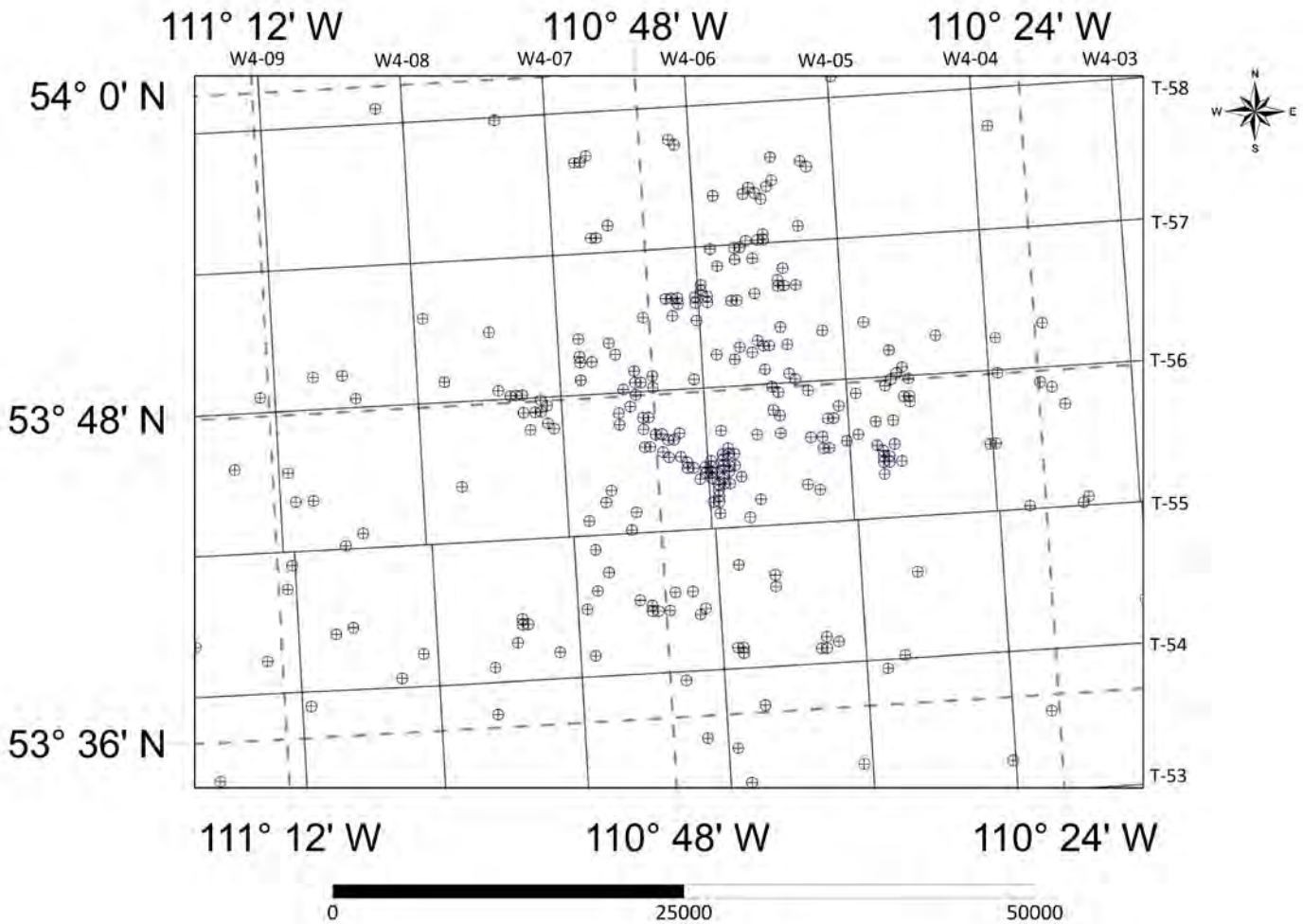


Fig. 25B. Contour Map of Methane Carbon Isotope Values of SCV Lindbergh Zoom-in

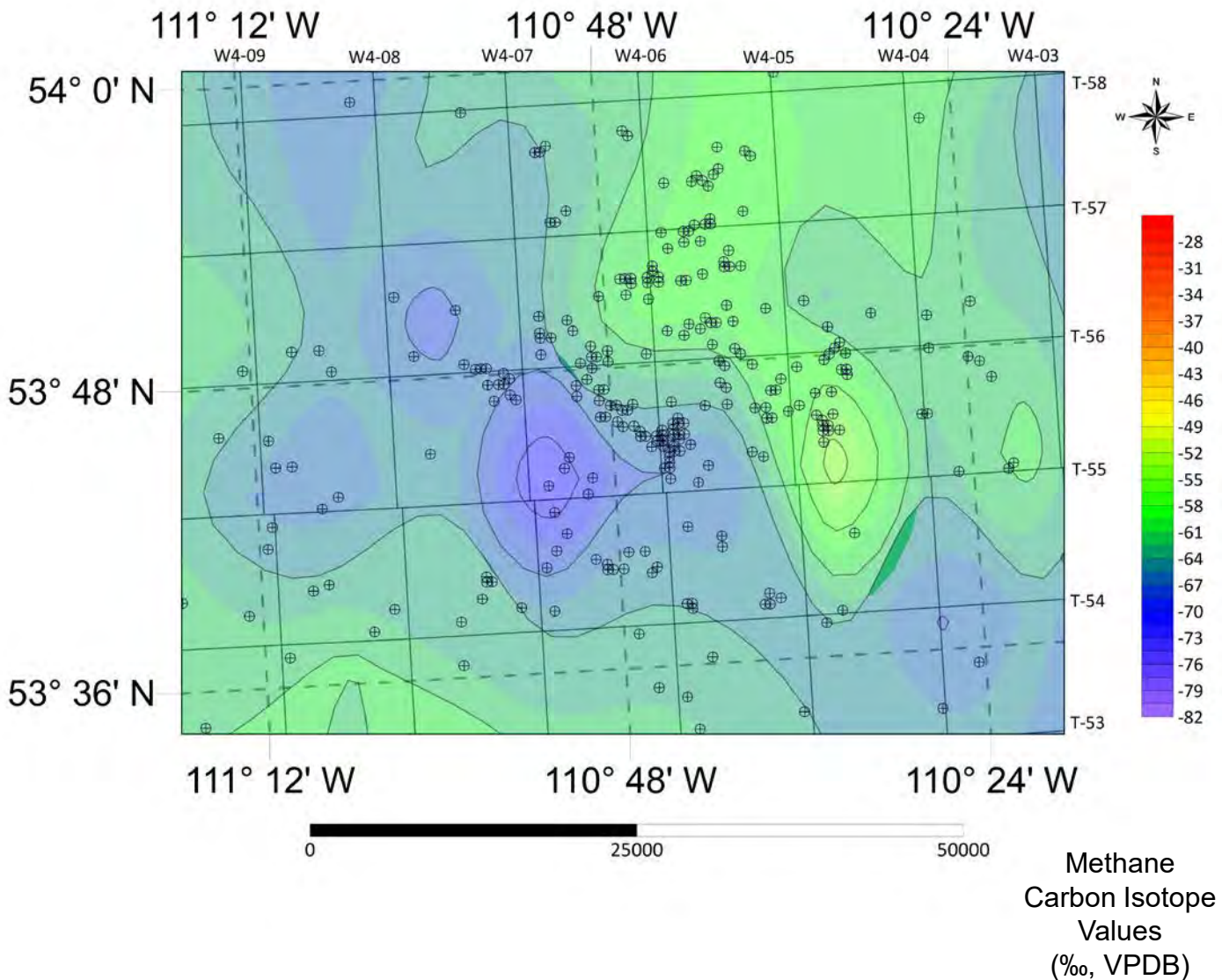




Fig. 25C. Contour Map of Ethane Carbon Isotope Values of SCV Lindbergh Zoom-in

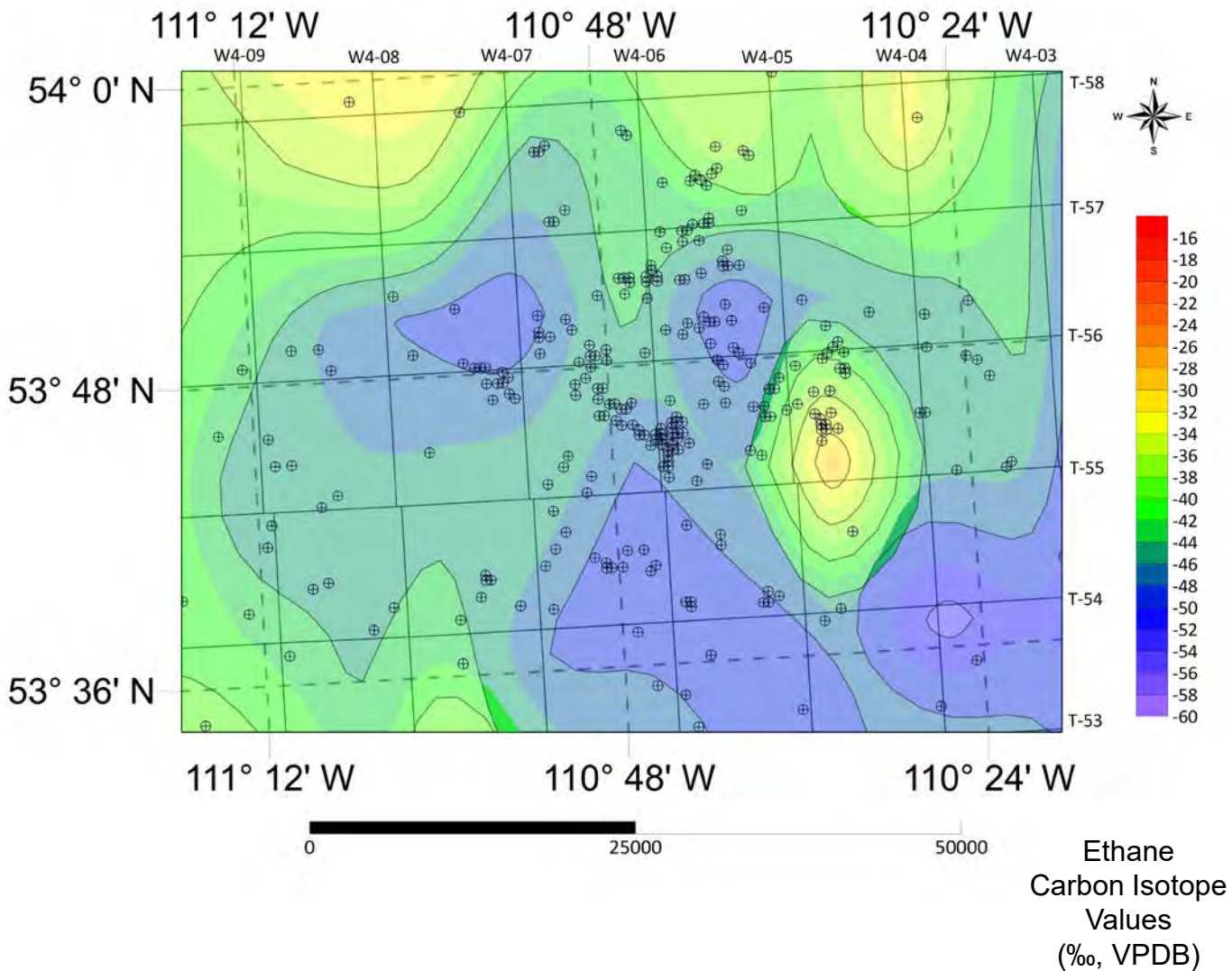


Fig. 25D. Contour Map of Propane Carbon Isotope Values of SCV Lindbergh Zoom-in

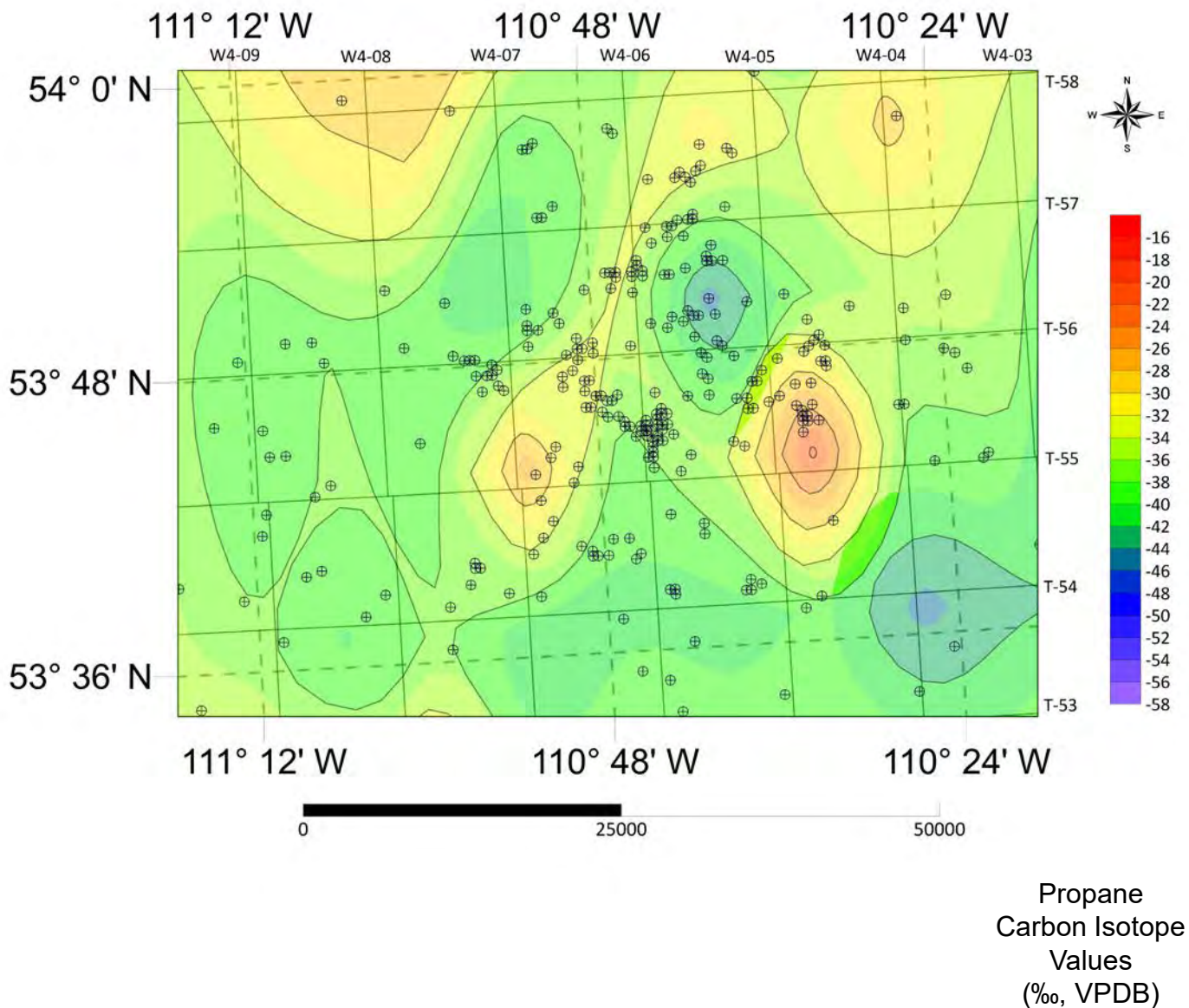




Fig. 25E. Contour Map of *n*-Butane Carbon Isotope Values of SCV Lindbergh Zoom-in

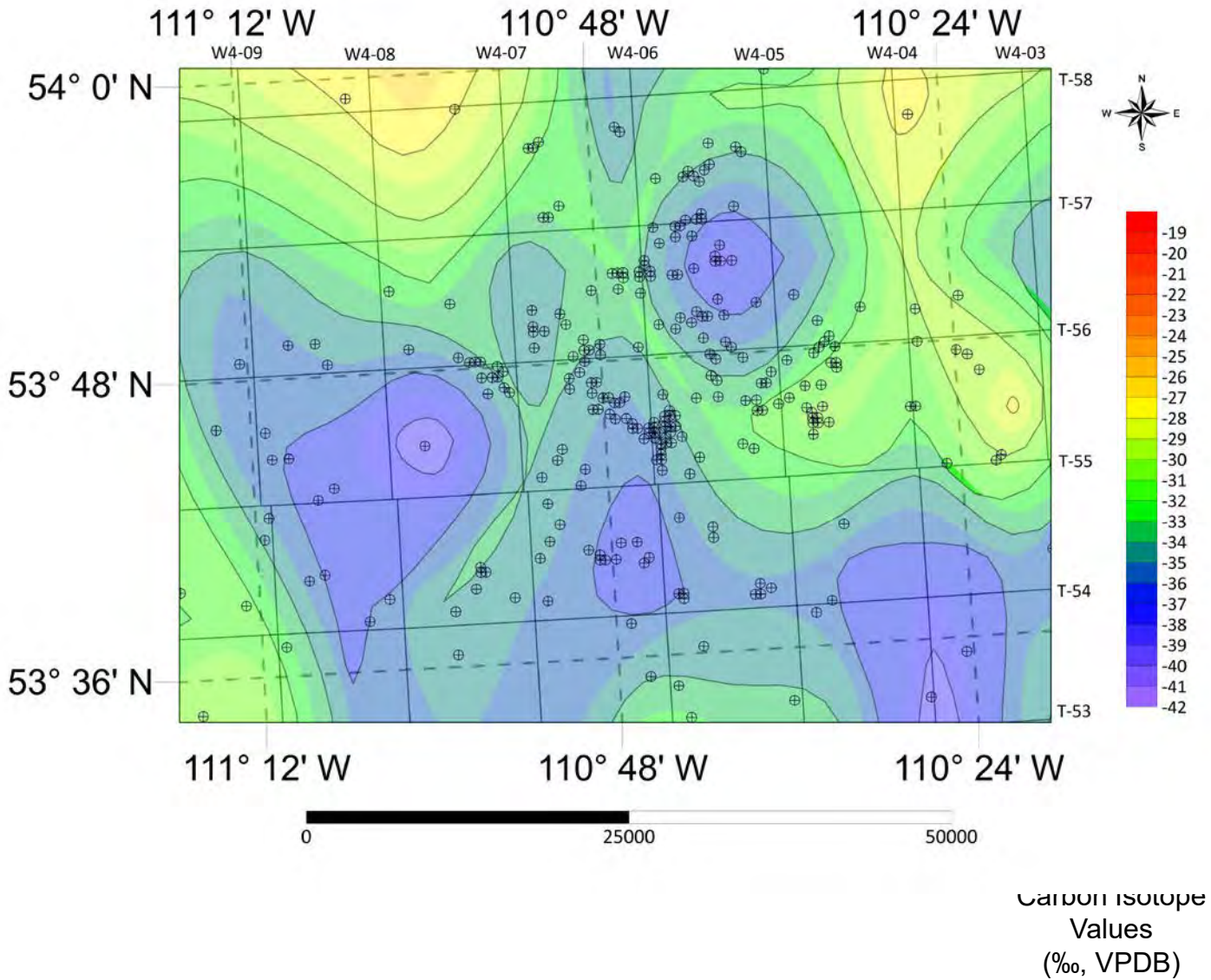


Fig. 25F. Contour Map of *i*-Butane Carbon Isotope Values of SCV Lindbergh Zoom-in

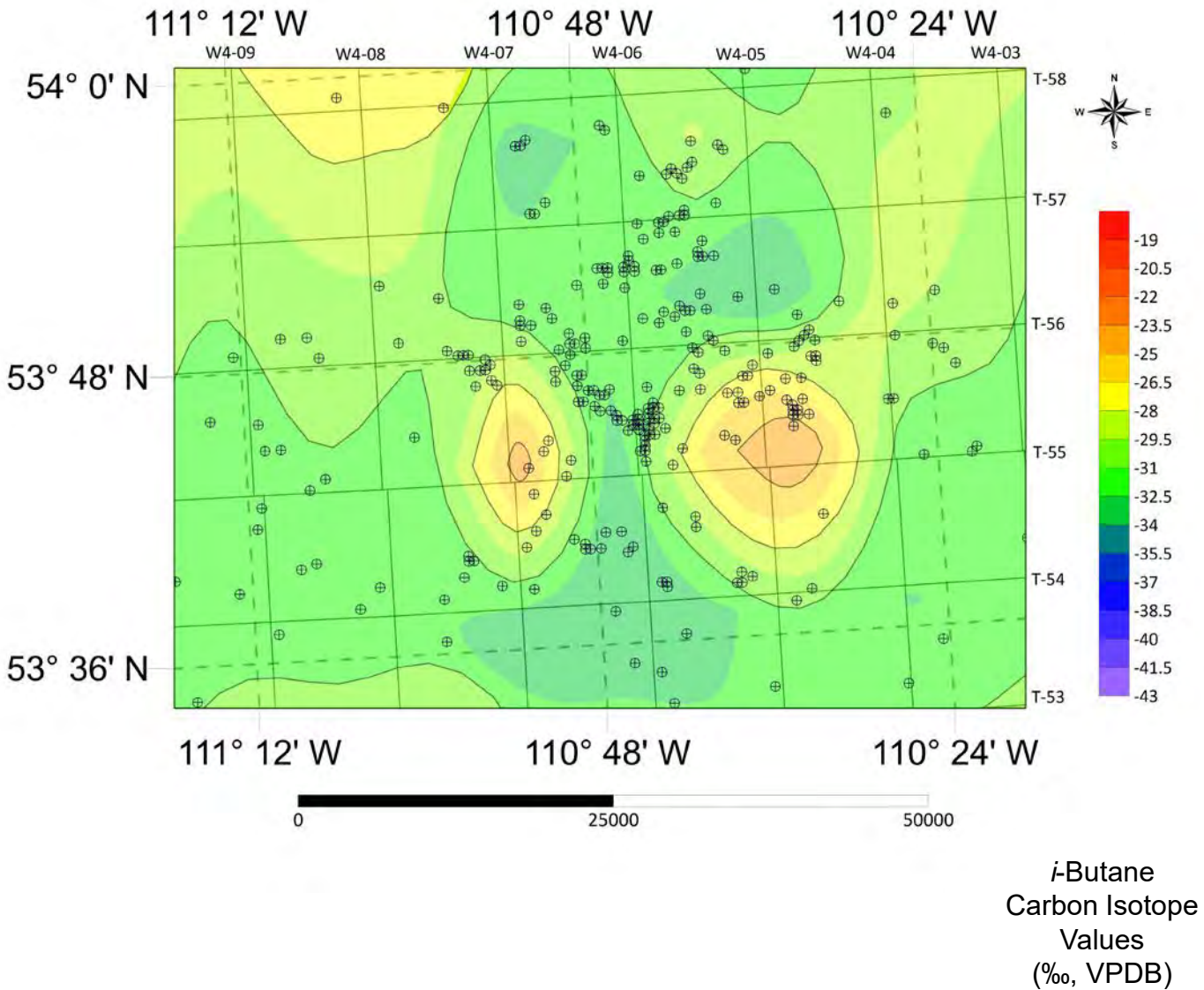




Fig. 25G. Contour Map of Carbon Dioxide Carbon Isotope Values of SCV Lindbergh Zoom-in

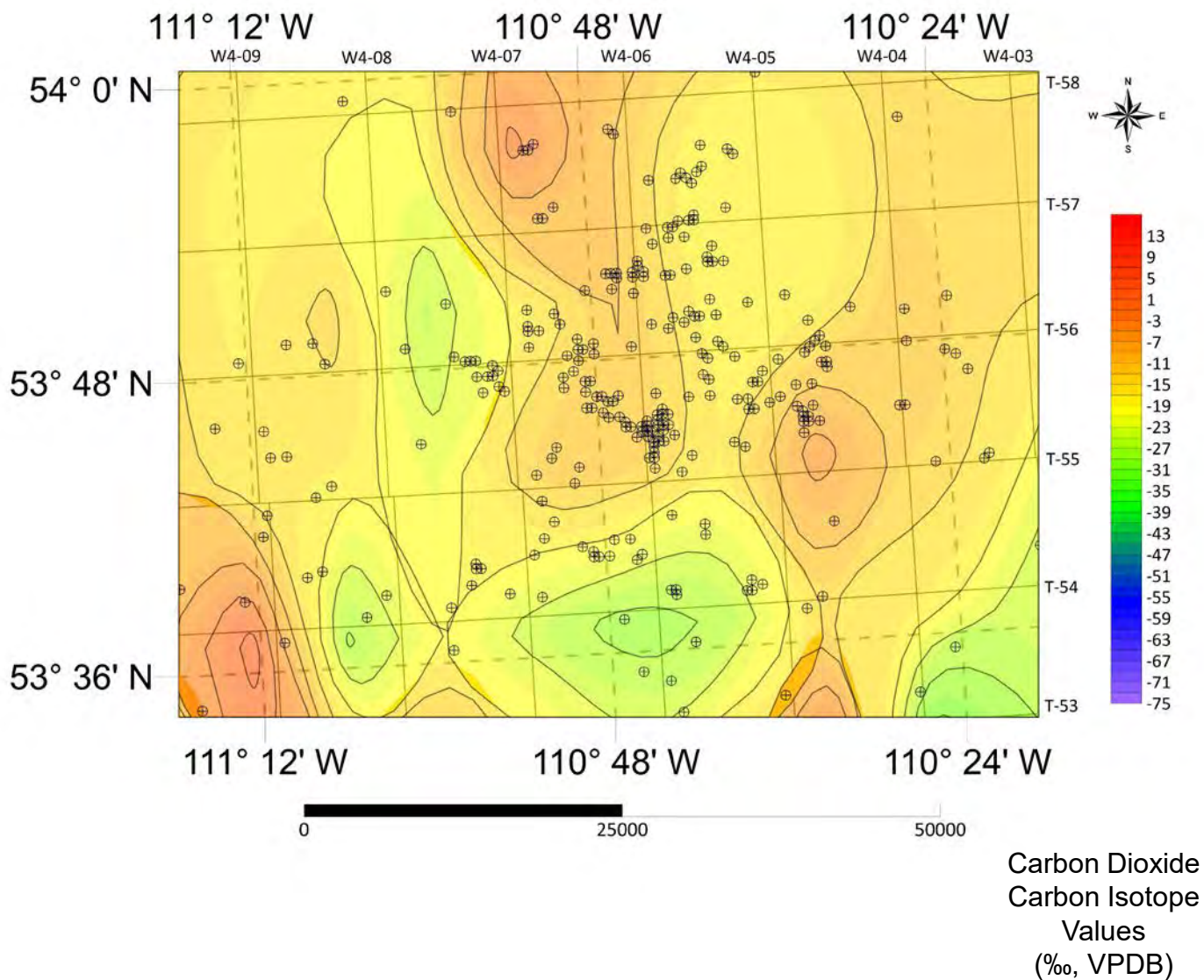


Fig. 25H. Contour Map of Methane Carbon Isotope Values of SCV Lindbergh Zoom-in over Topographic Map

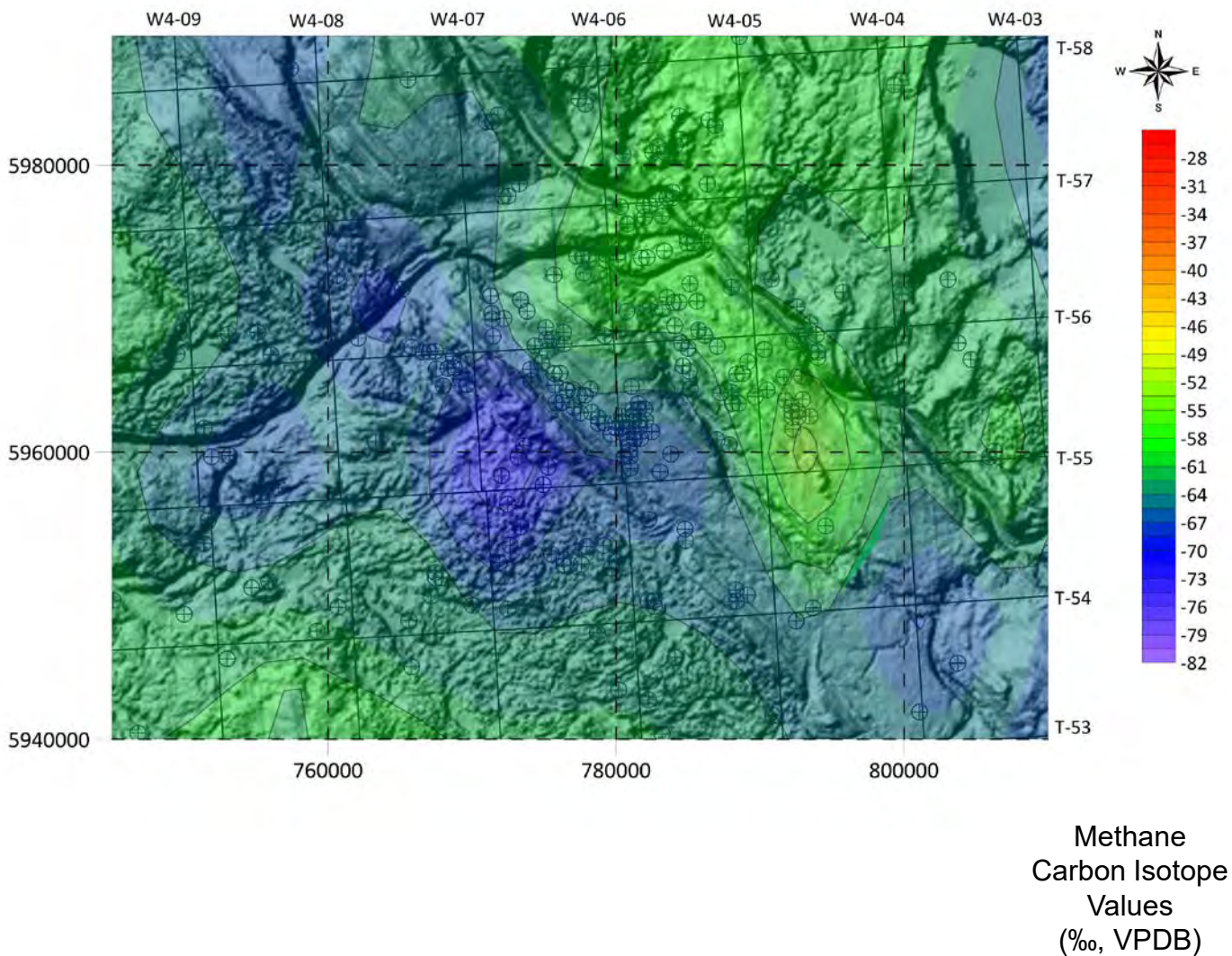
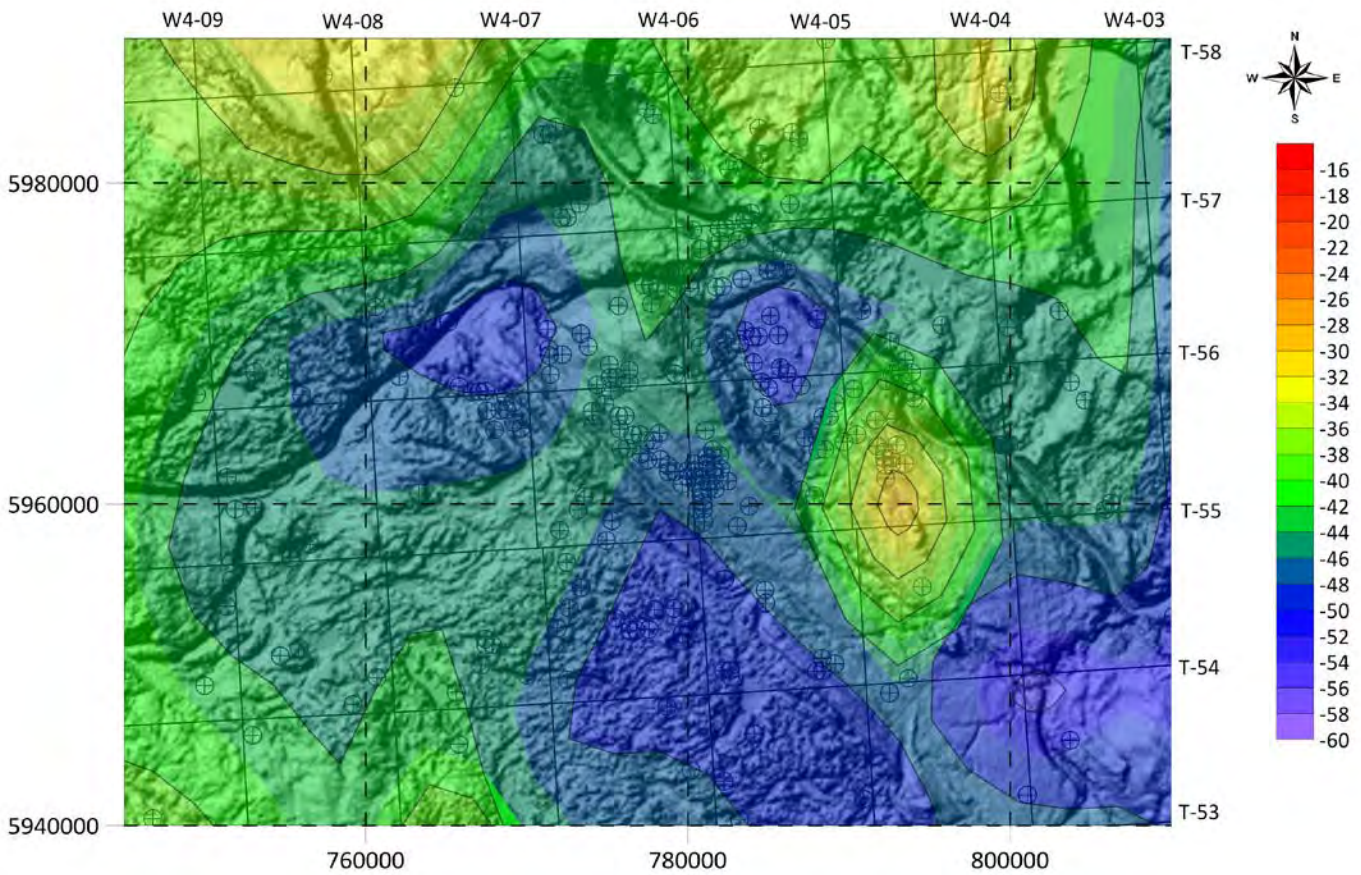




Fig. 25I. Contour Map of Ethane Carbon Isotope Values of SCV Lindbergh Zoom-in over Topographic Map



Ethane Carbon  
Isotope Values  
(‰, VPDB)

Fig. 25J. Contour Map of Propane Carbon Isotope Values of SCV Lindbergh Zoom-in over Topographic Map

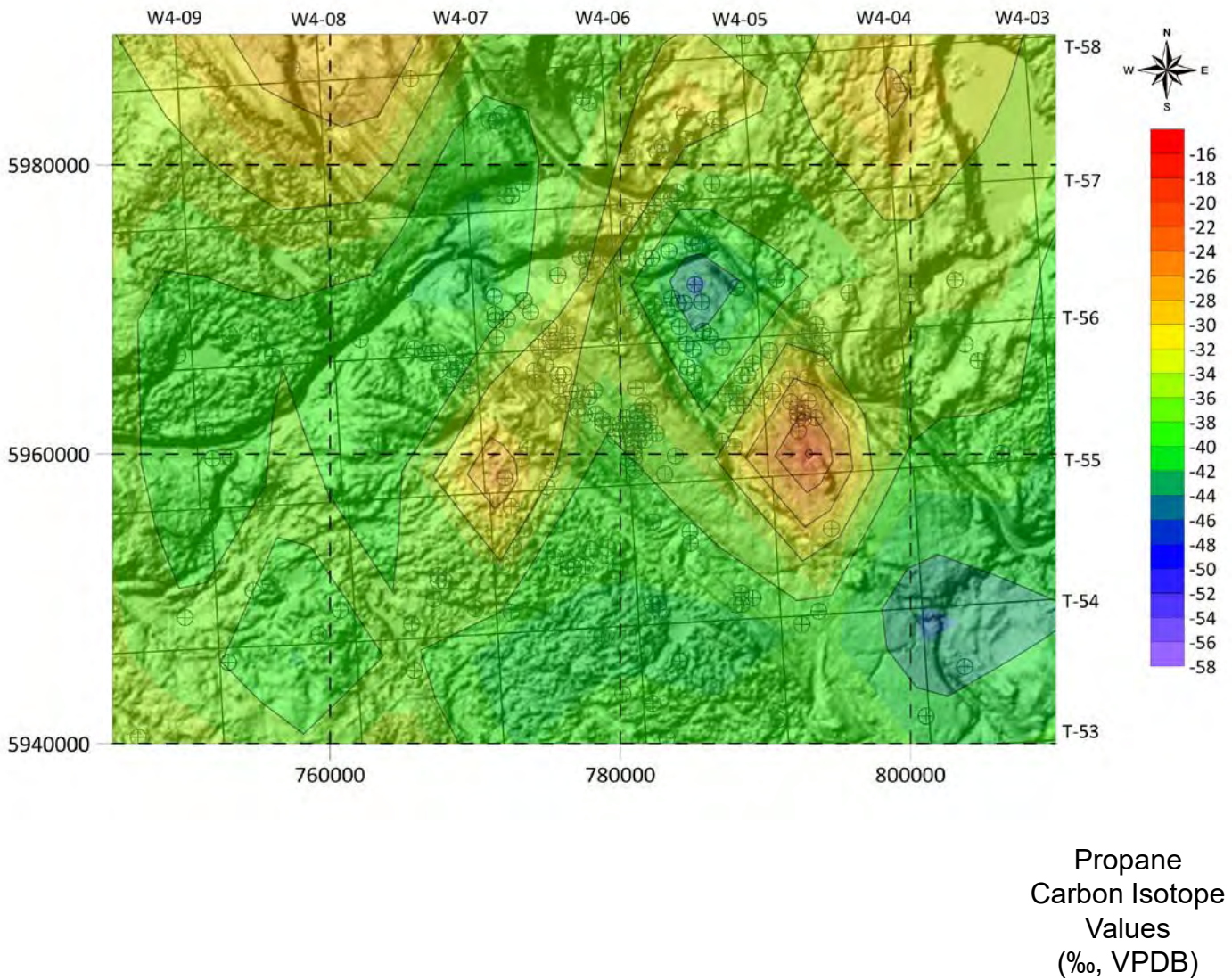




Fig. 25K. Contour Map of *n*-Butane Carbon Isotope Values of SCV Lindbergh Zoom-in over Topographic Map

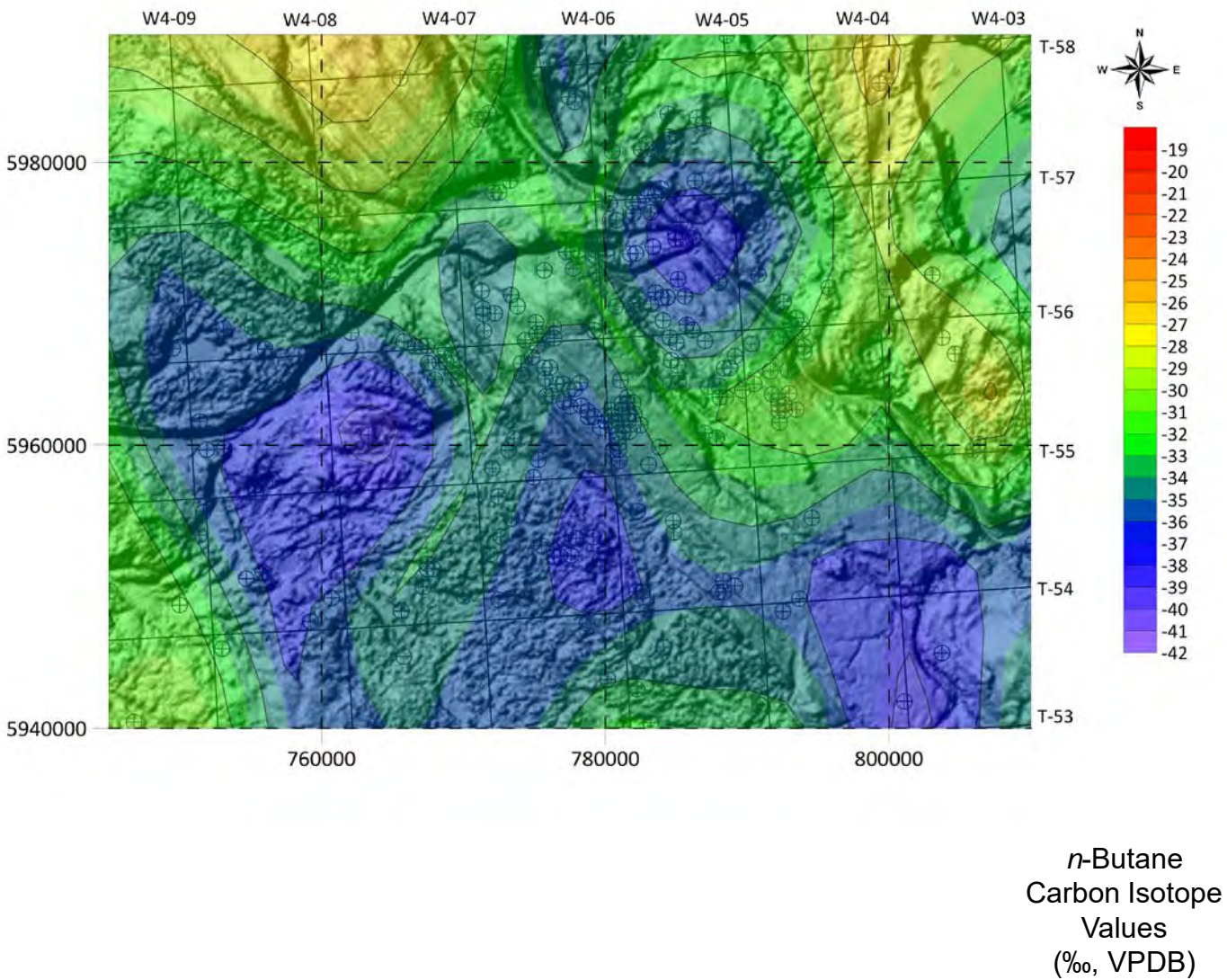
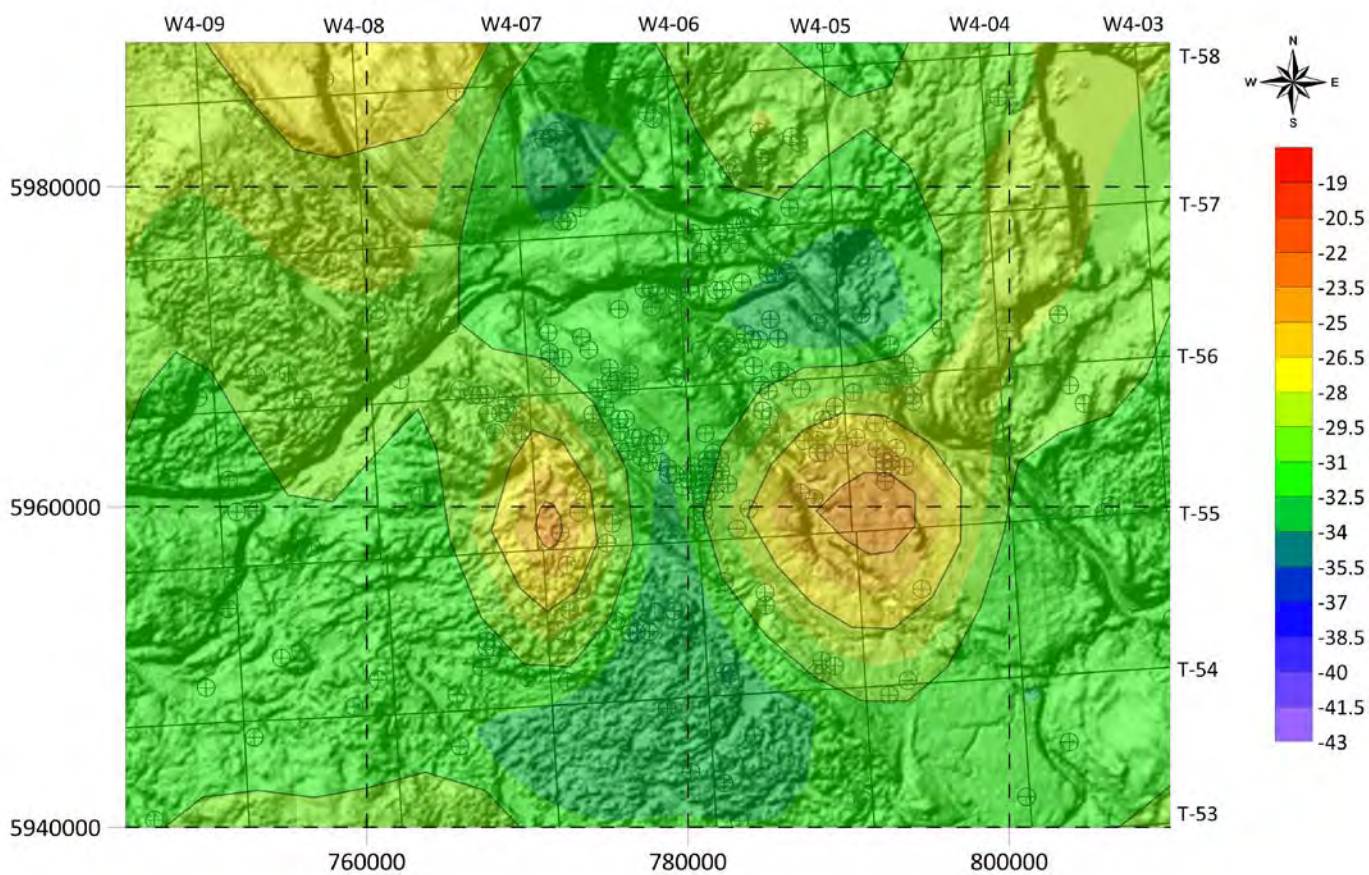


Fig. 25L. Contour Map of *i*-Butane Carbon Isotope Values of SCV Lindbergh Zoom-in over Topographic Map



*i*-Butane  
Carbon Isotope  
Values  
(‰, VPDB)



Fig. 25M. Contour Map of Carbon Dioxide Carbon Isotope Values of SCV Lindbergh Zoom-in over Topographic Map

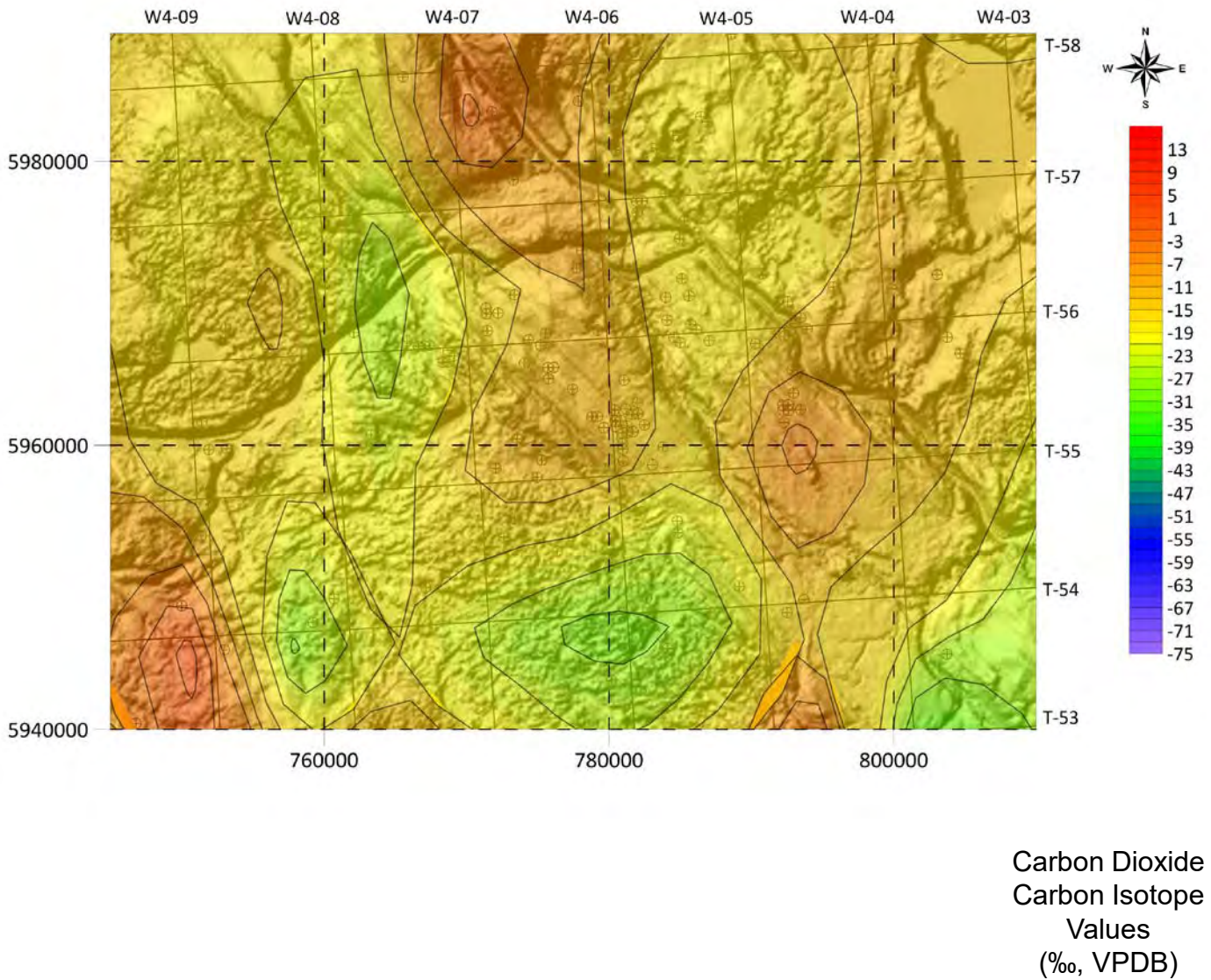


Fig. 26A. Map of Ground Migration (GM) Locations in the Lindbergh Zoom-in

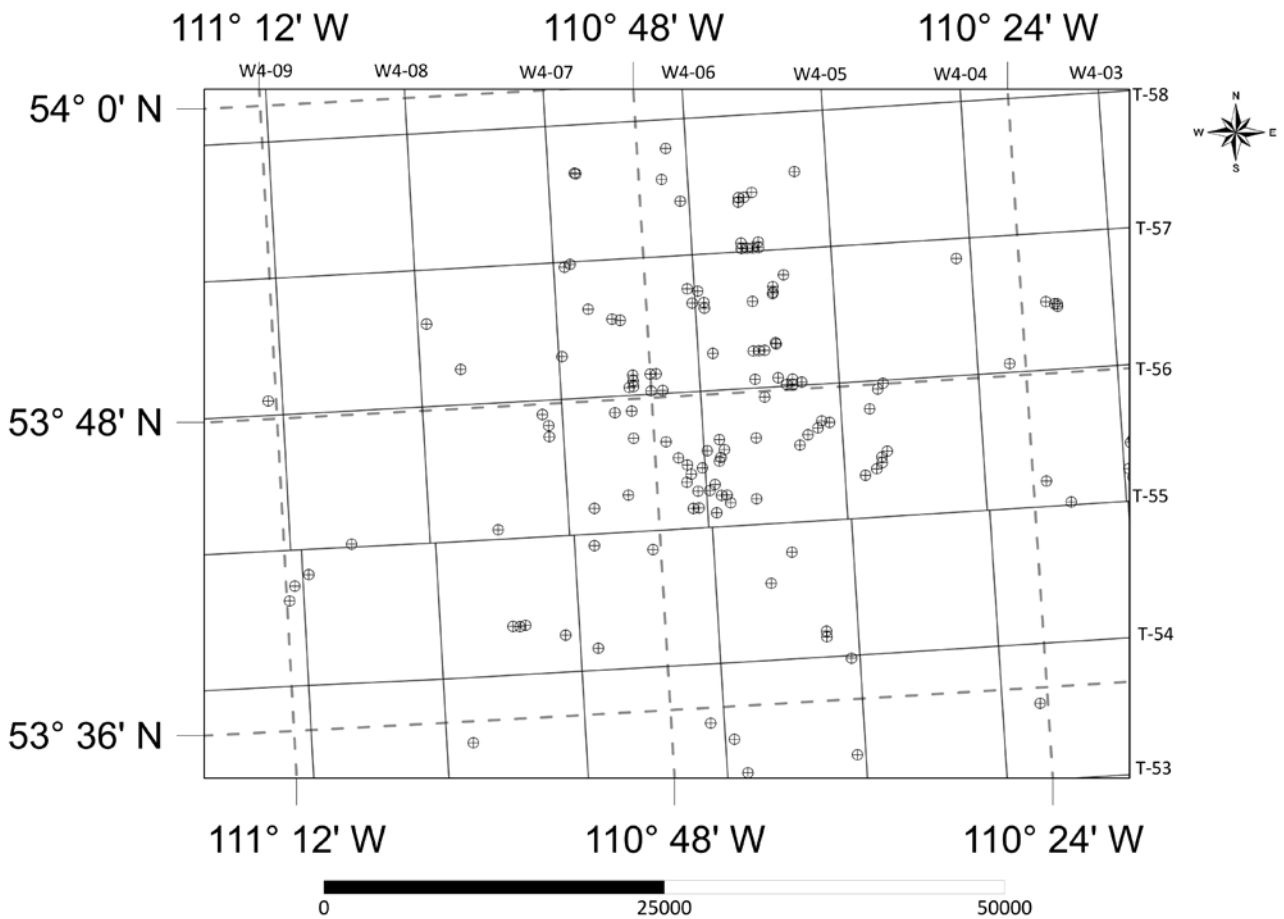




Fig. 26B. Contour Map of Methane Carbon Isotope Values of GM Lindbergh Zoom-in

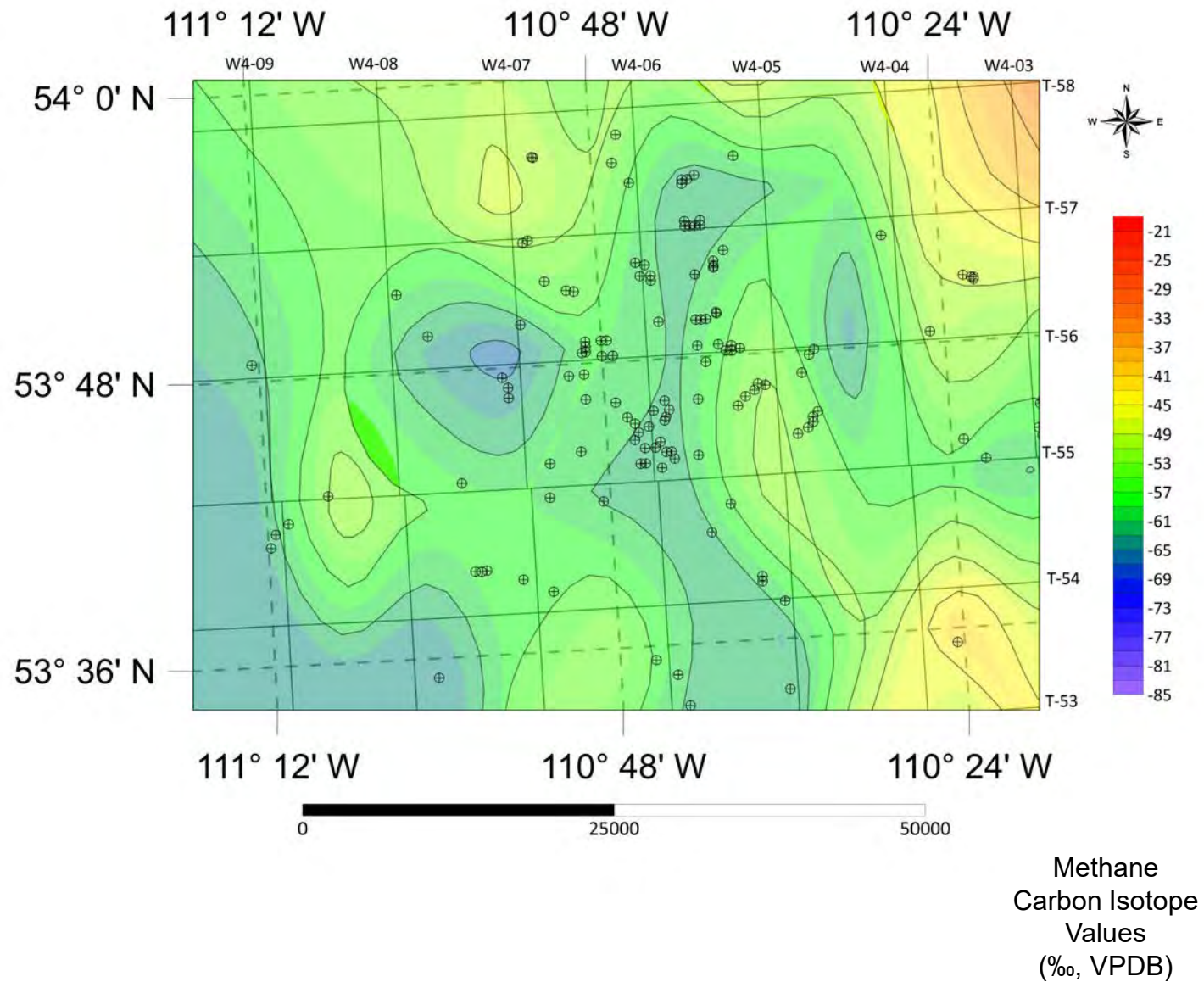


Fig. 26C. Contour Map of Ethane Carbon Isotope Values of GM Lindbergh Zoom-in

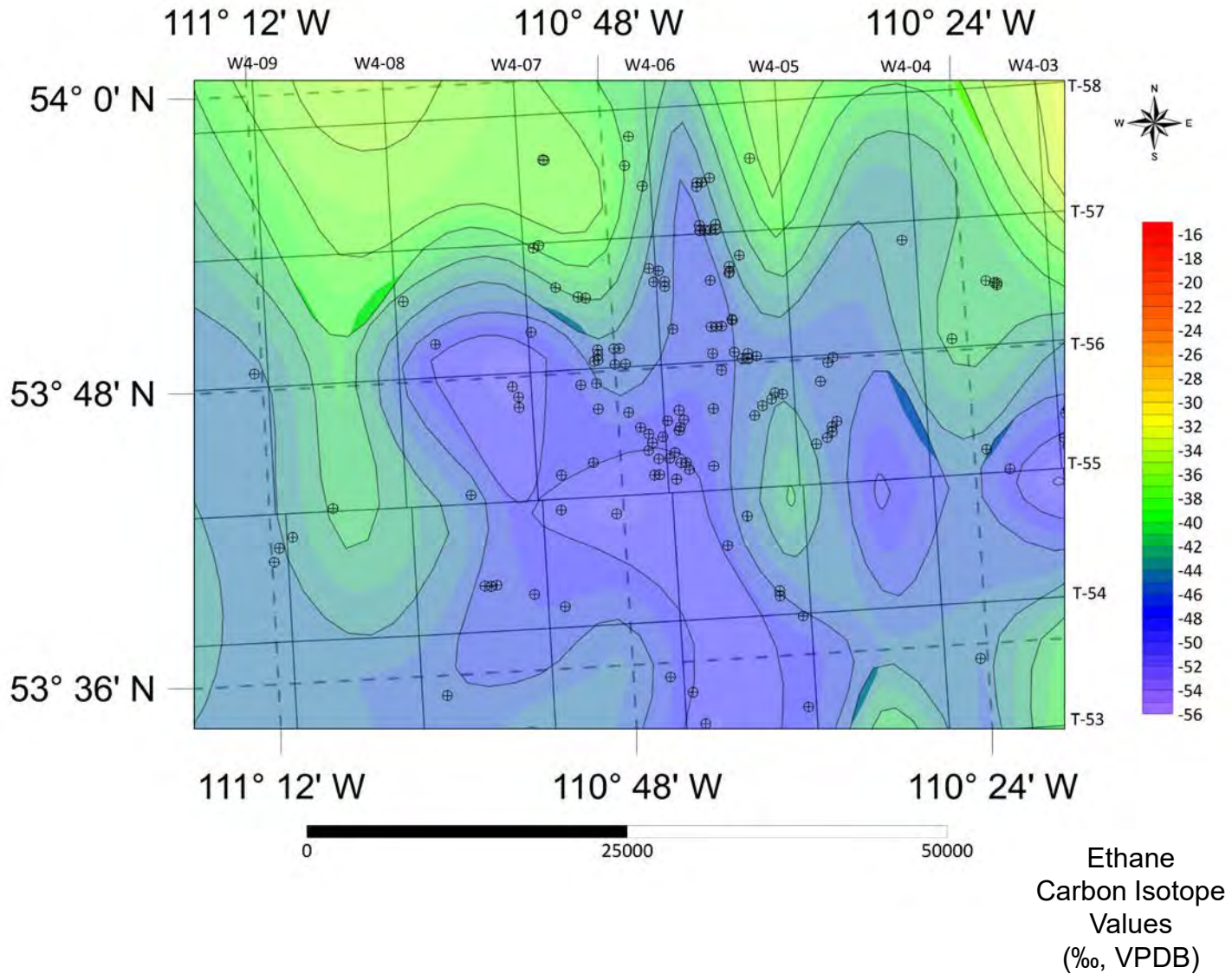




Fig. 26D. Contour Map of Propane Carbon Isotope Values of GM Lindbergh Zoom-in

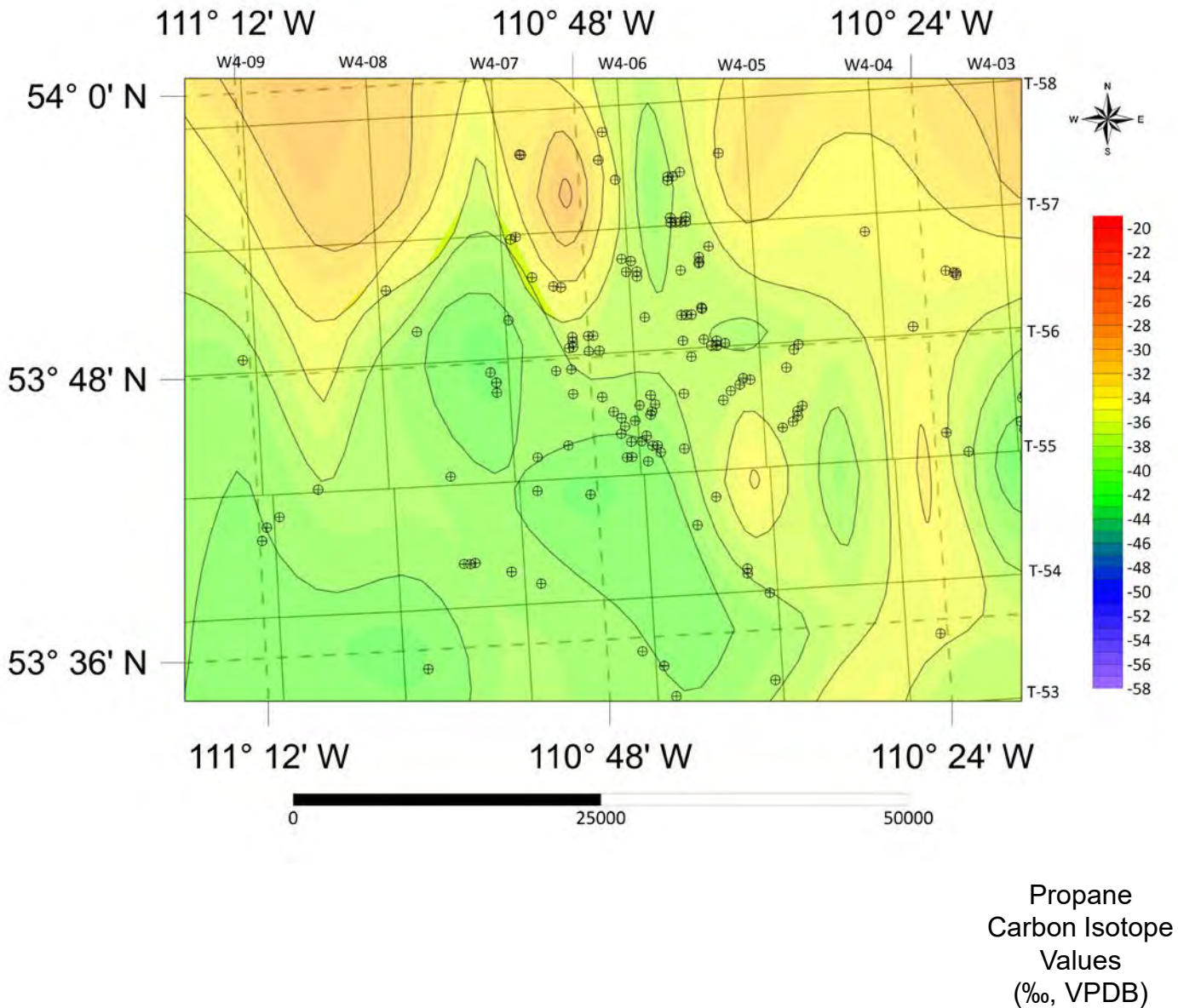


Fig. 26E. Contour Map of *n*-Butane Carbon Isotope Values of GM Lindbergh Zoom-in

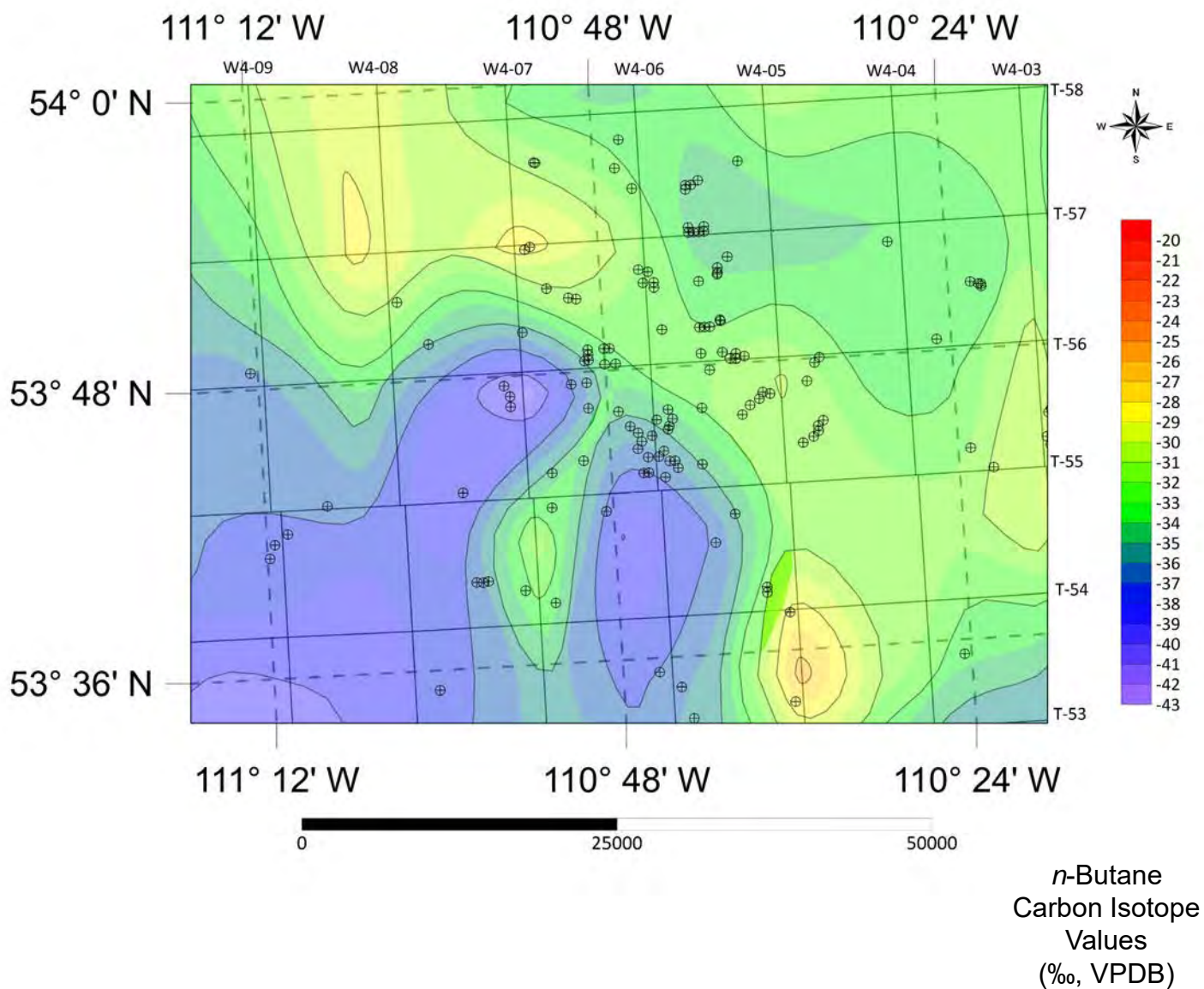




Fig. 26F. Contour Map of *i*-Butane Carbon Isotope Values of GM Lindbergh Zoom-in

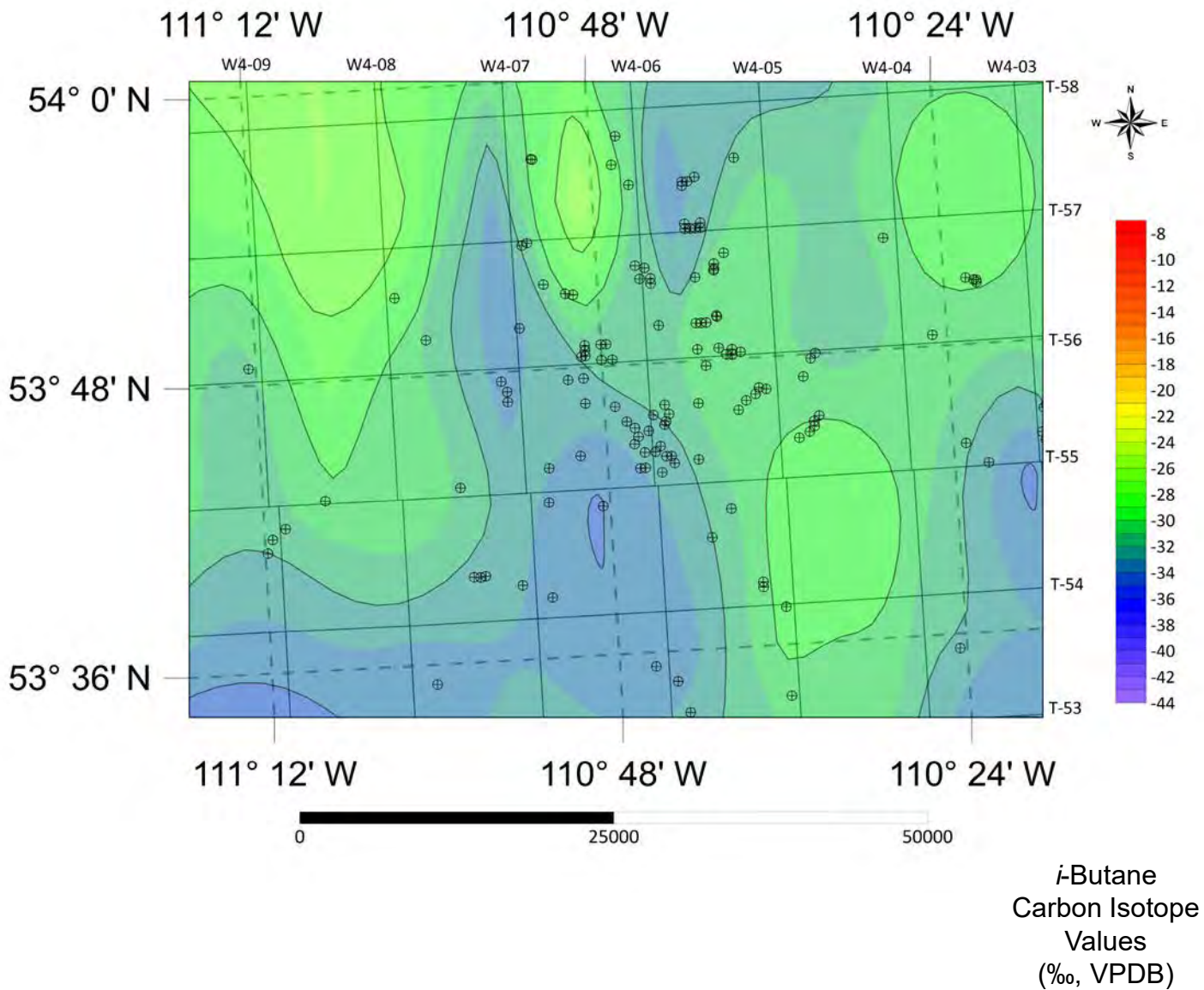


Fig. 26G. Contour Map of Carbon Dioxide Carbon Isotope Values of GM Lindbergh Zoom-in

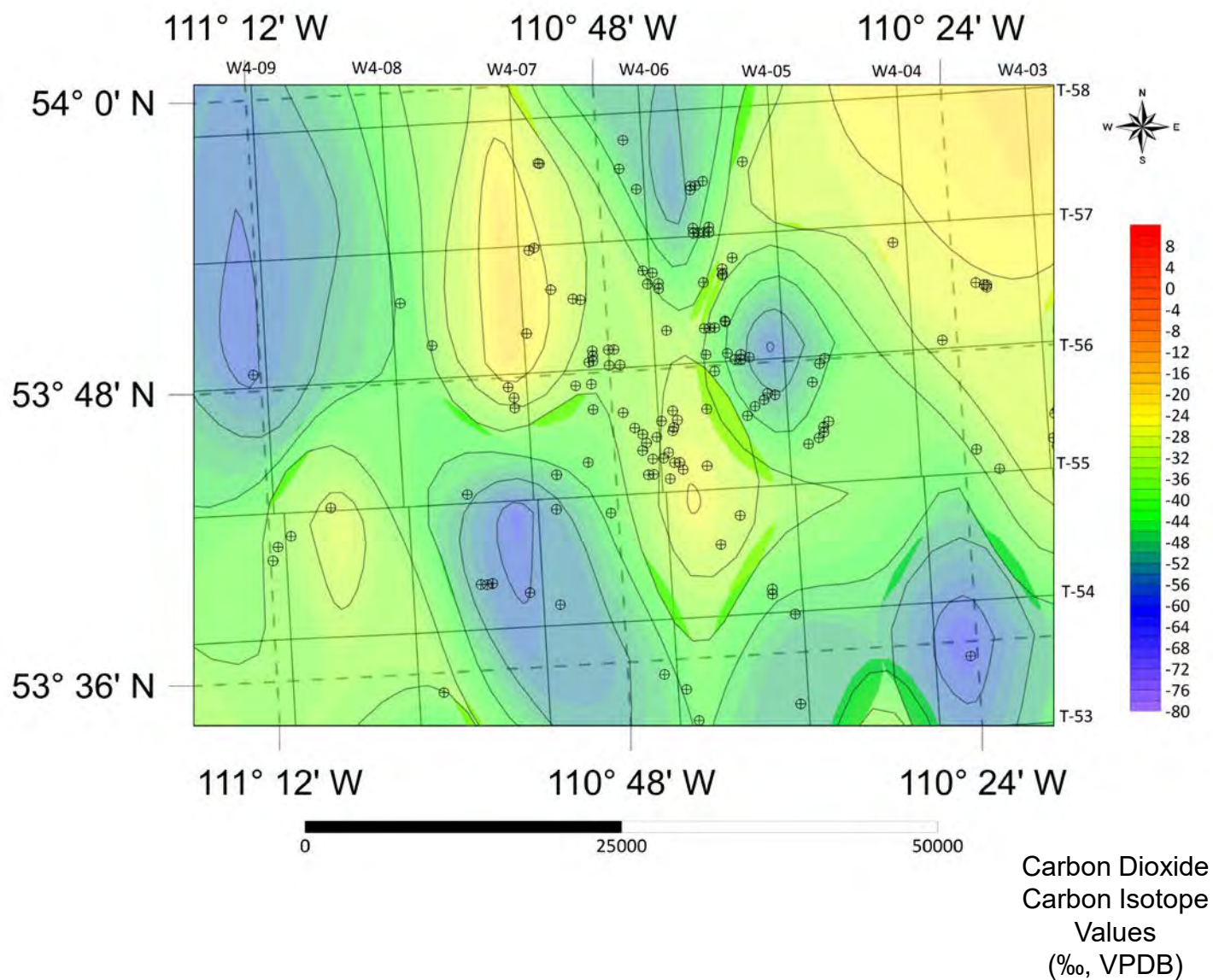




Fig. 26H. Contour Map of Methane Carbon Isotope Values of GM Lindbergh Zoom-in over Topographic Map

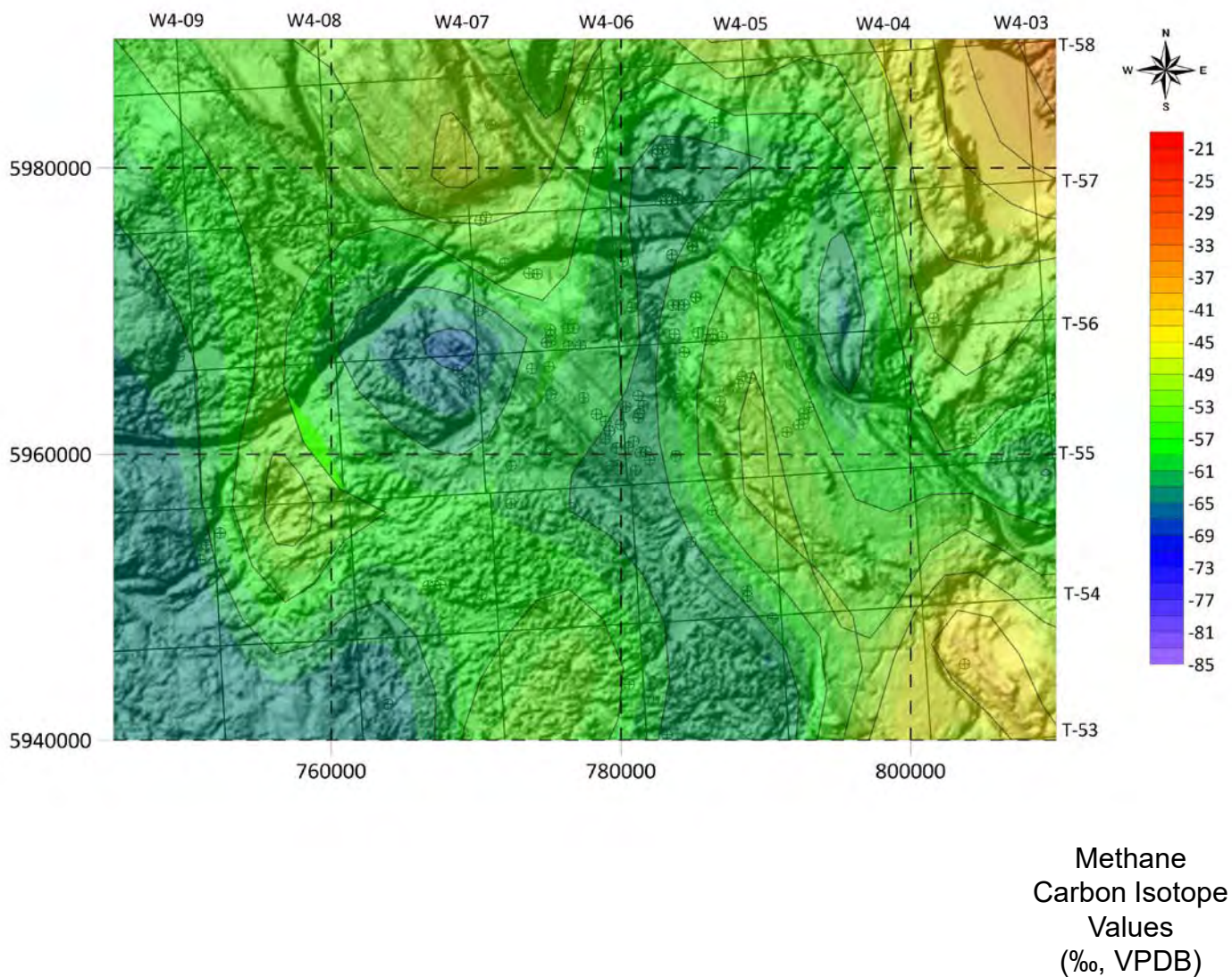
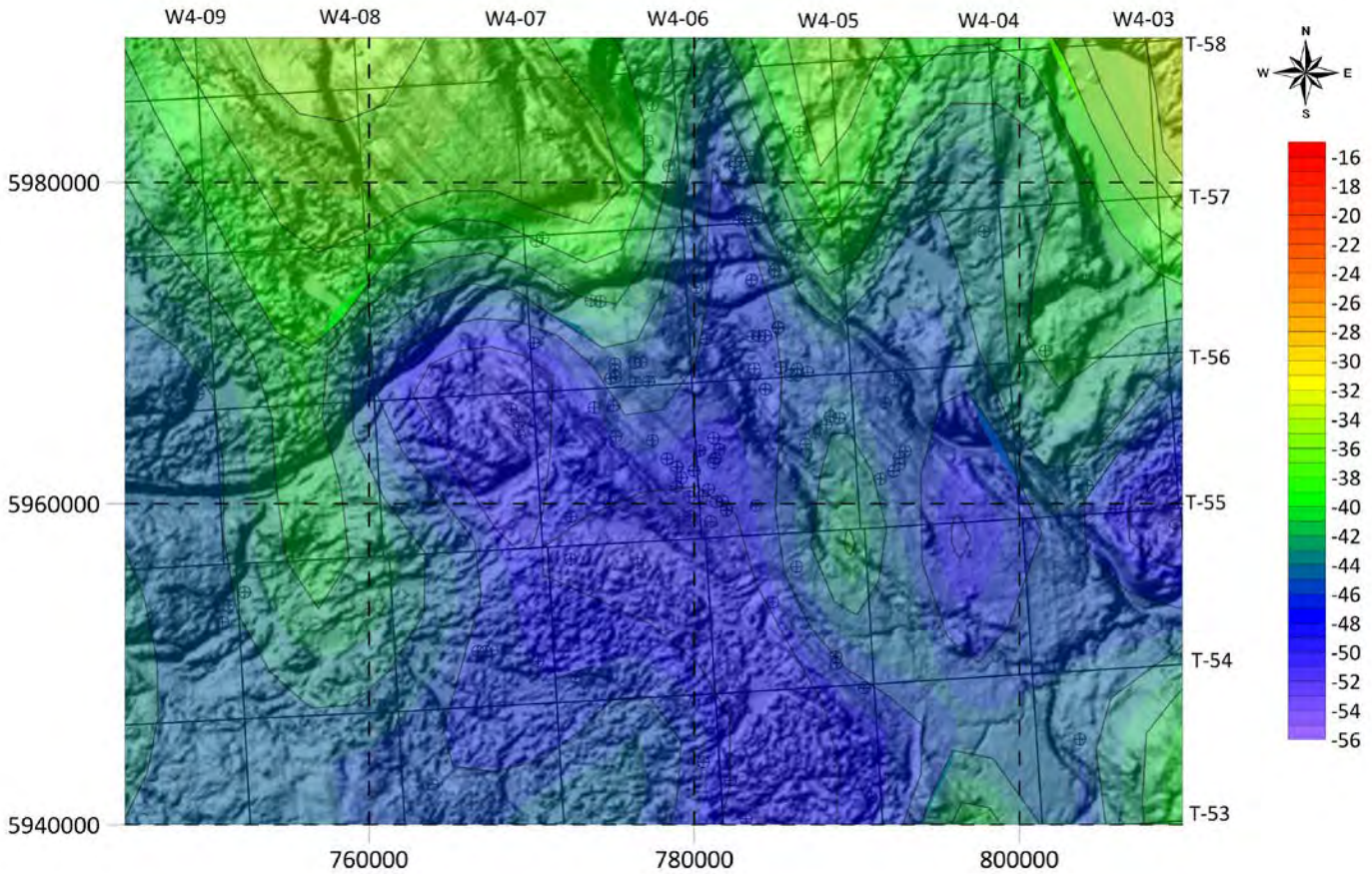


Fig. 26I. Contour Map of Ethane Carbon Isotope Values of GM Lindbergh Zoom-in over Topographic Map



Ethane Carbon  
Isotope Values  
(‰, VPDB)



Fig. 26J. Contour Map of Propane Carbon Isotope Values of GM Lindbergh Zoom-in over Topographic Map

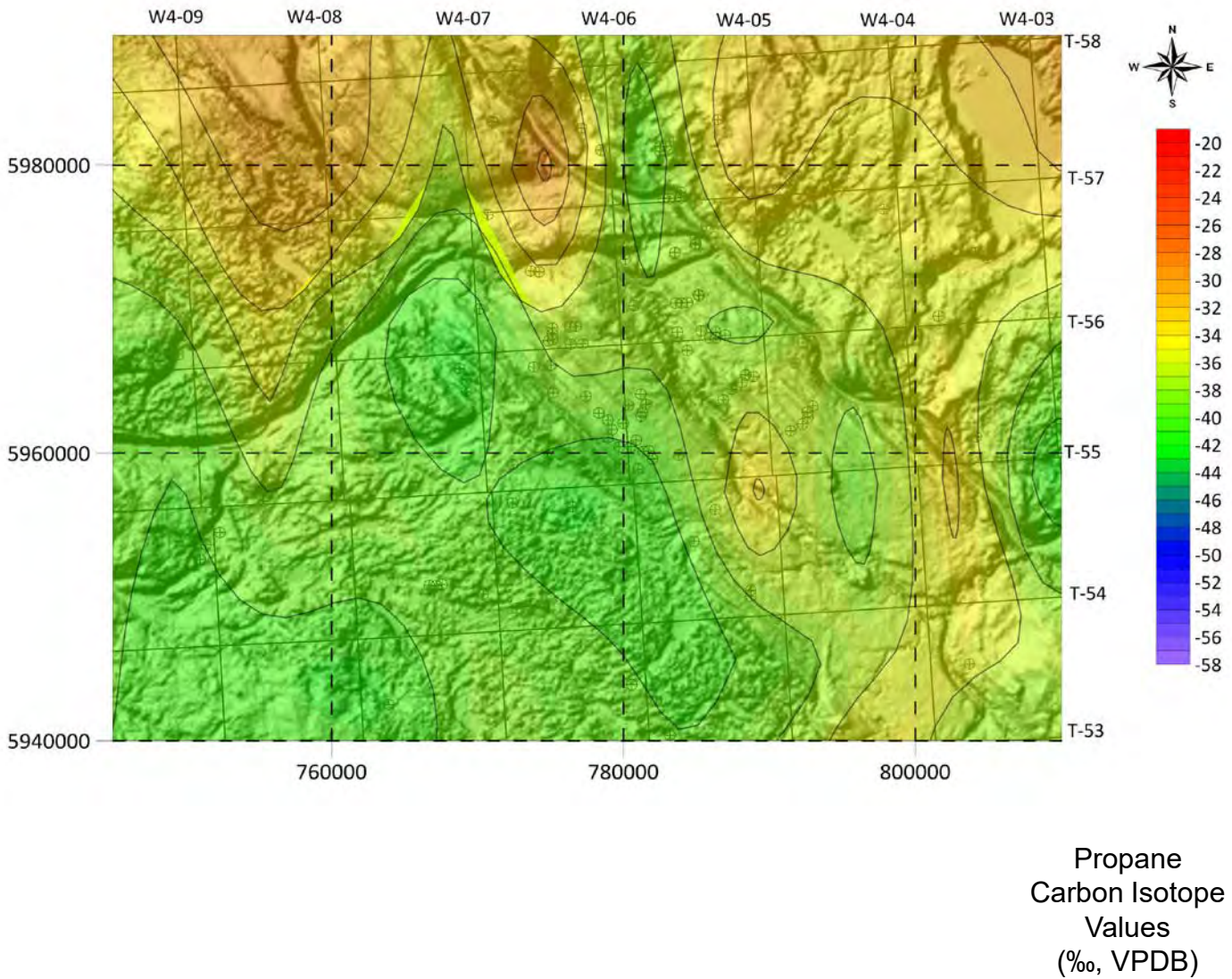


Fig. 26K. Contour Map of *n*-Butane Carbon Isotope Values of GM Lindbergh Zoom-in over Topographic Map

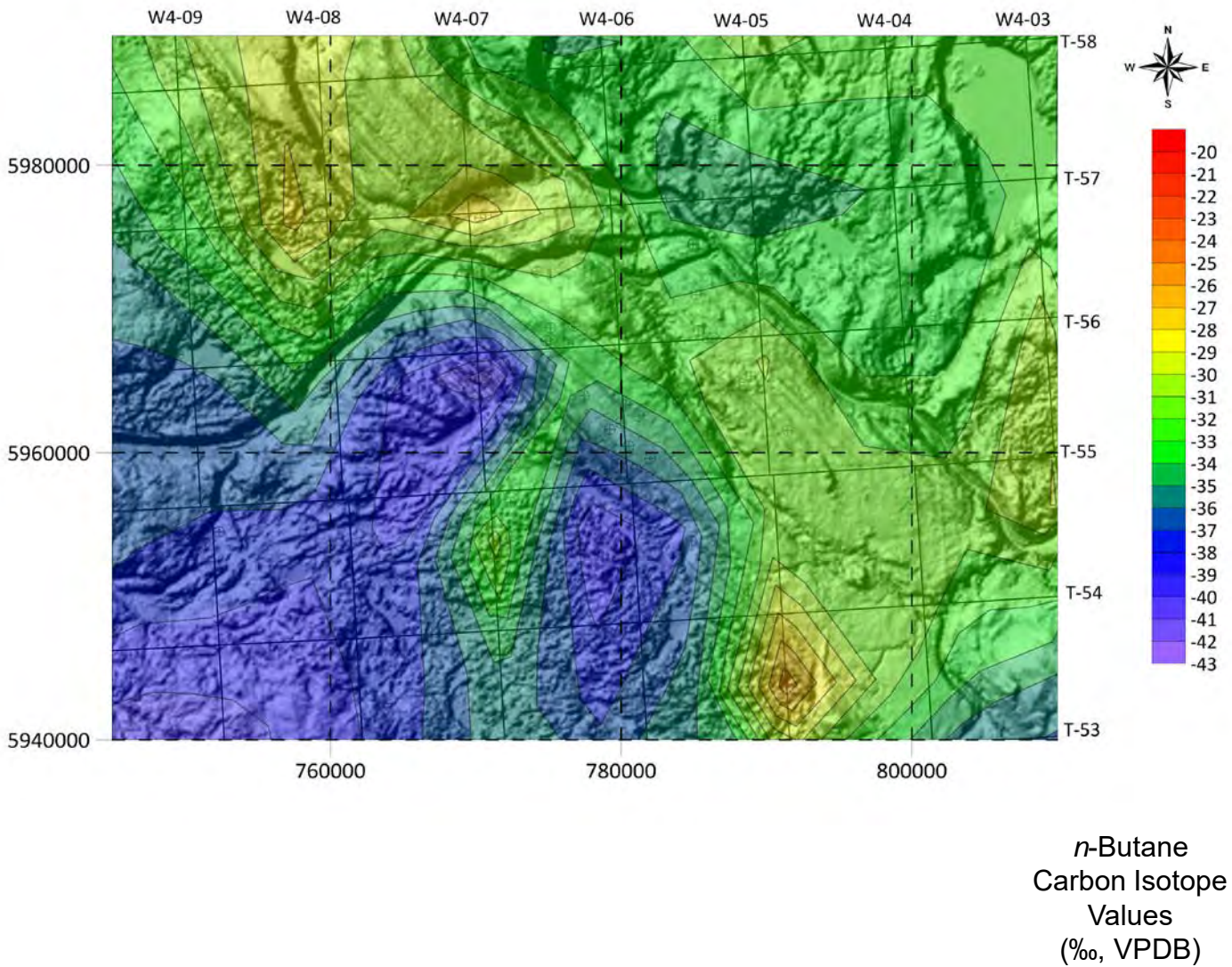
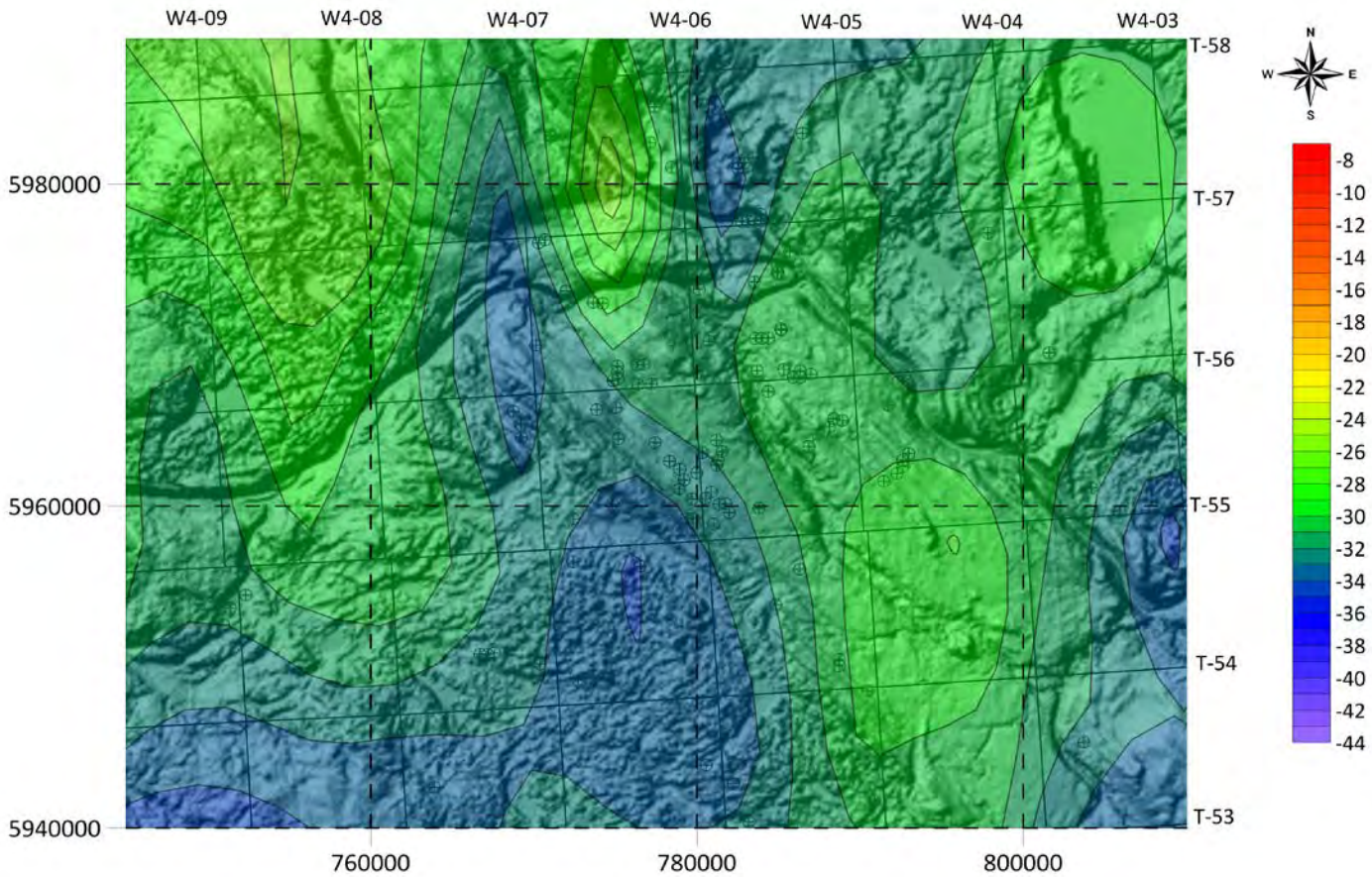




Fig. 26L. Contour Map of *i*-Butane Carbon Isotope Values of GM Lindbergh Zoom-in over Topographic Map



*i*-Butane  
Carbon Isotope  
Values  
(‰, VPDB)

Fig. 26M. Contour Map of Carbon Dioxide Carbon Isotope Values of GM Lindbergh Zoom-in over Topographic Map

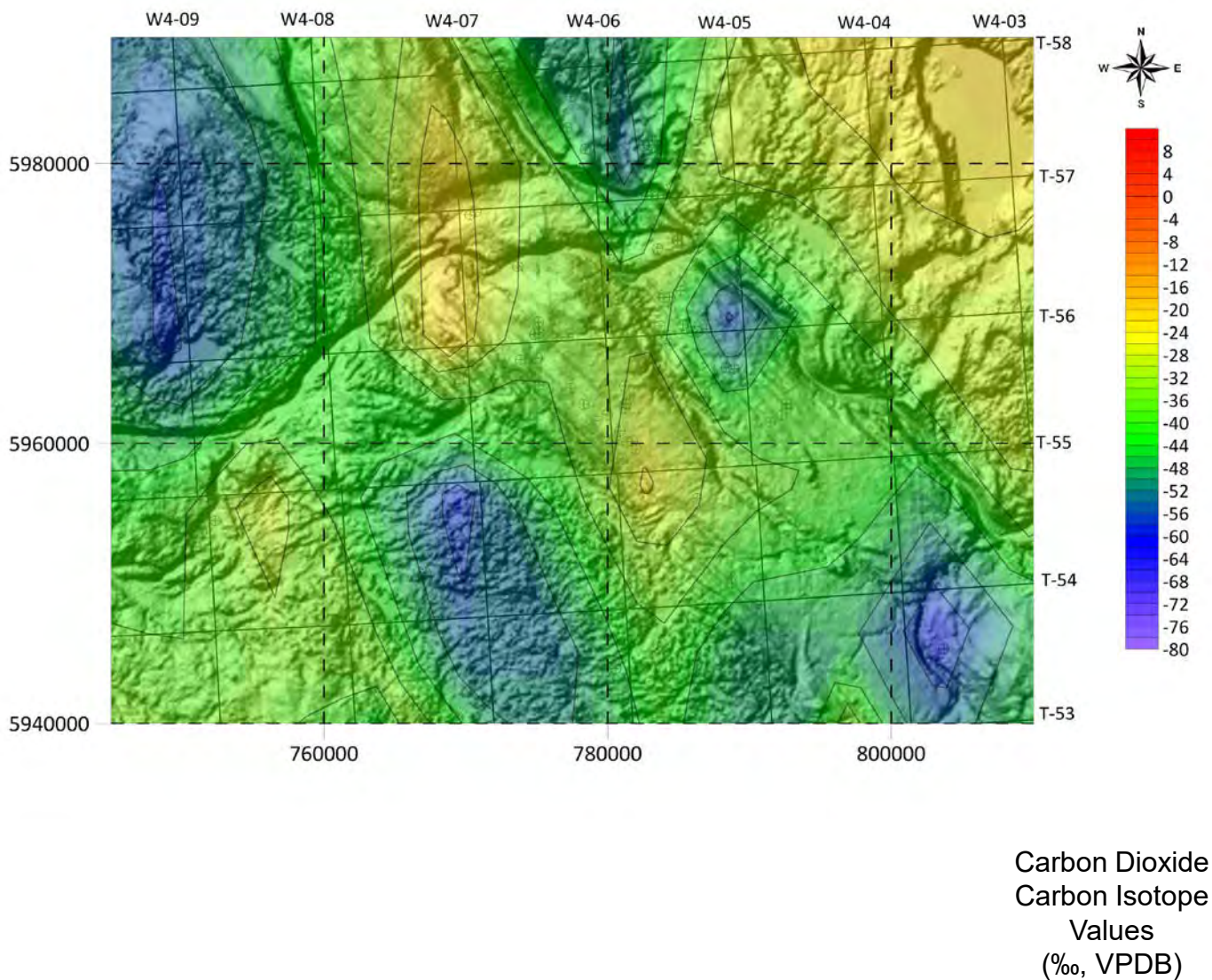




Fig. 27A. Map of surface casing vent (SCV) Locations in the Wildmere Zoom-in

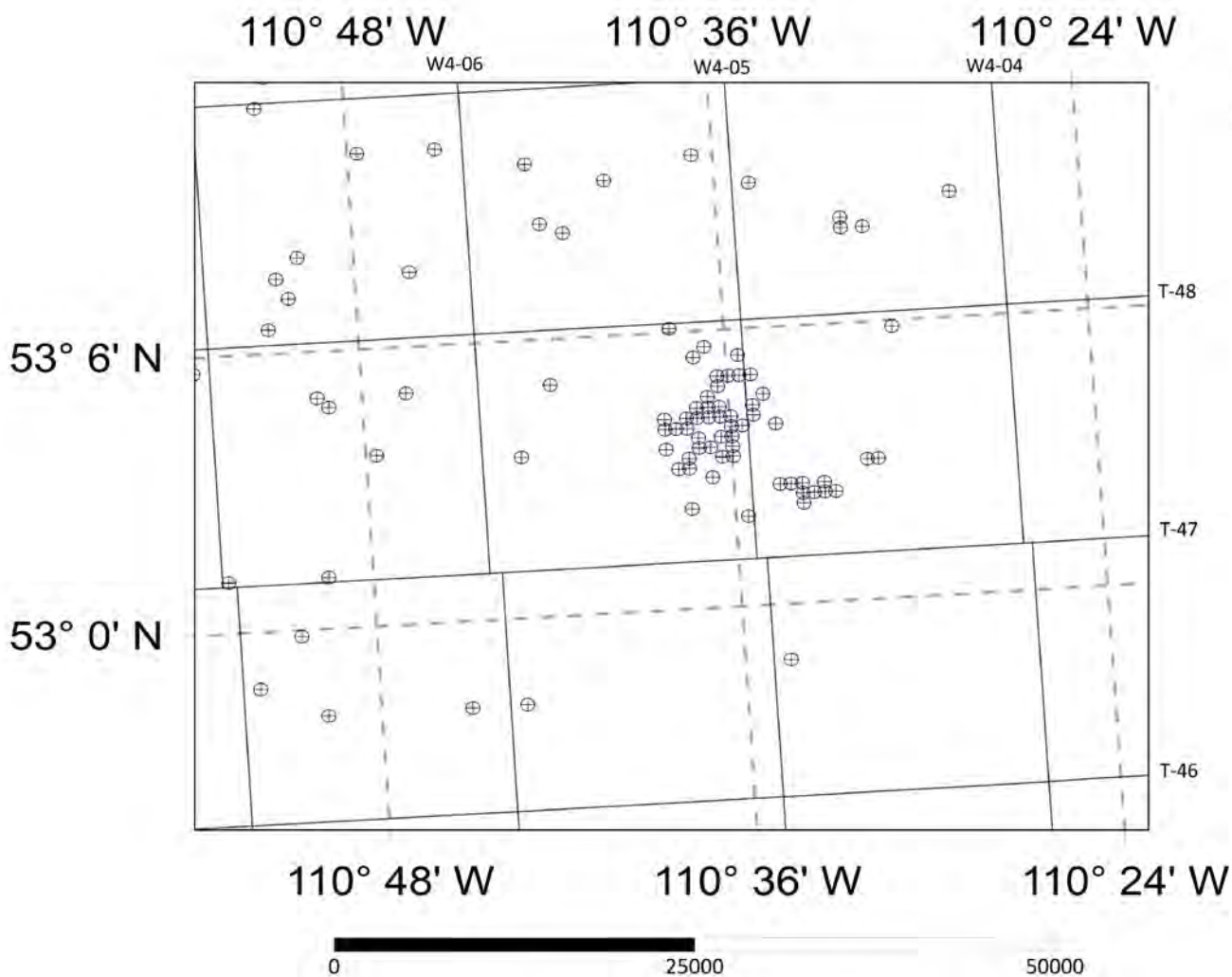


Fig. 27B. Contour Map of Methane Carbon Isotope Values of SCV Wildmere Zoom-in

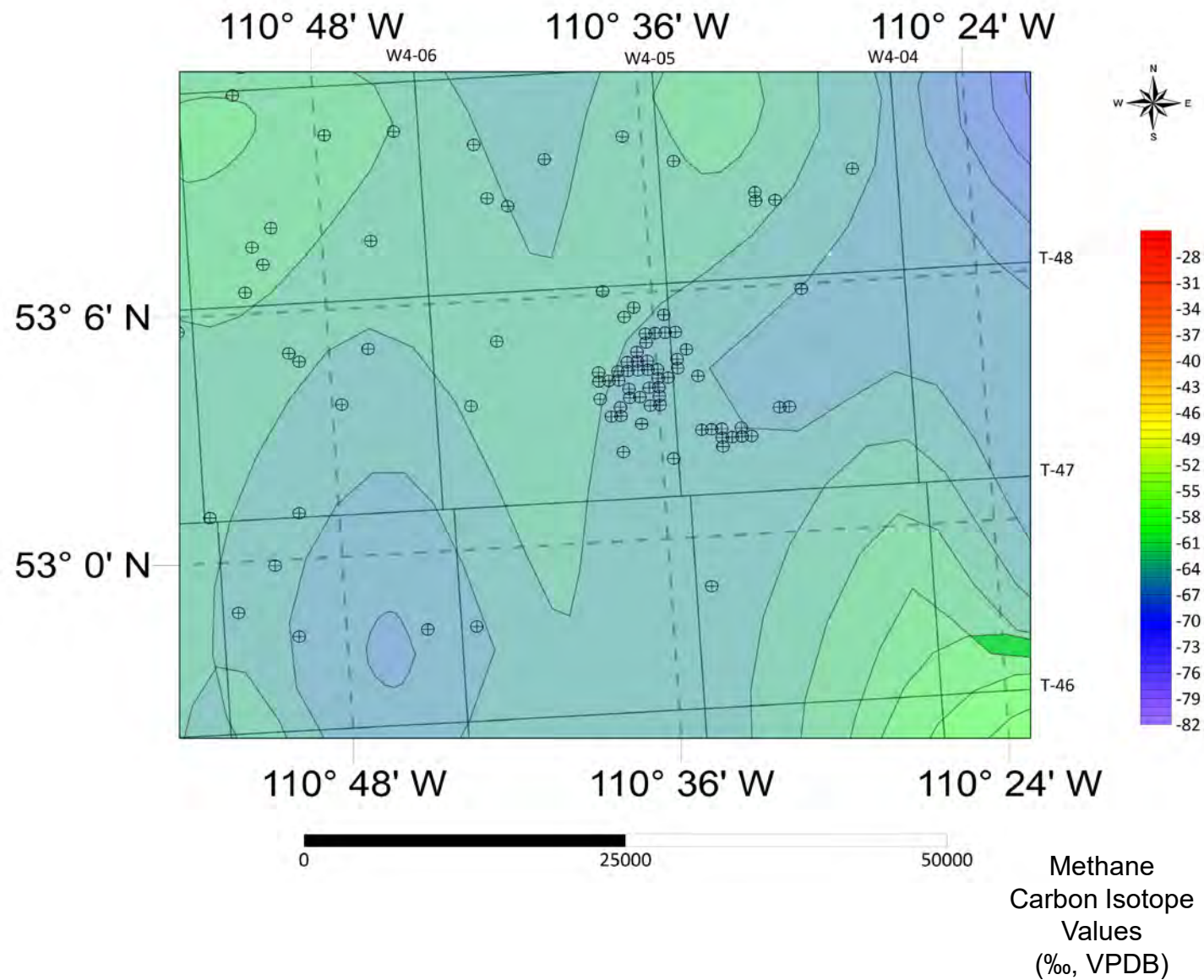




Fig. 27C. Contour Map of Ethane Carbon Isotope Values of SCV Wildmere Zoom-in

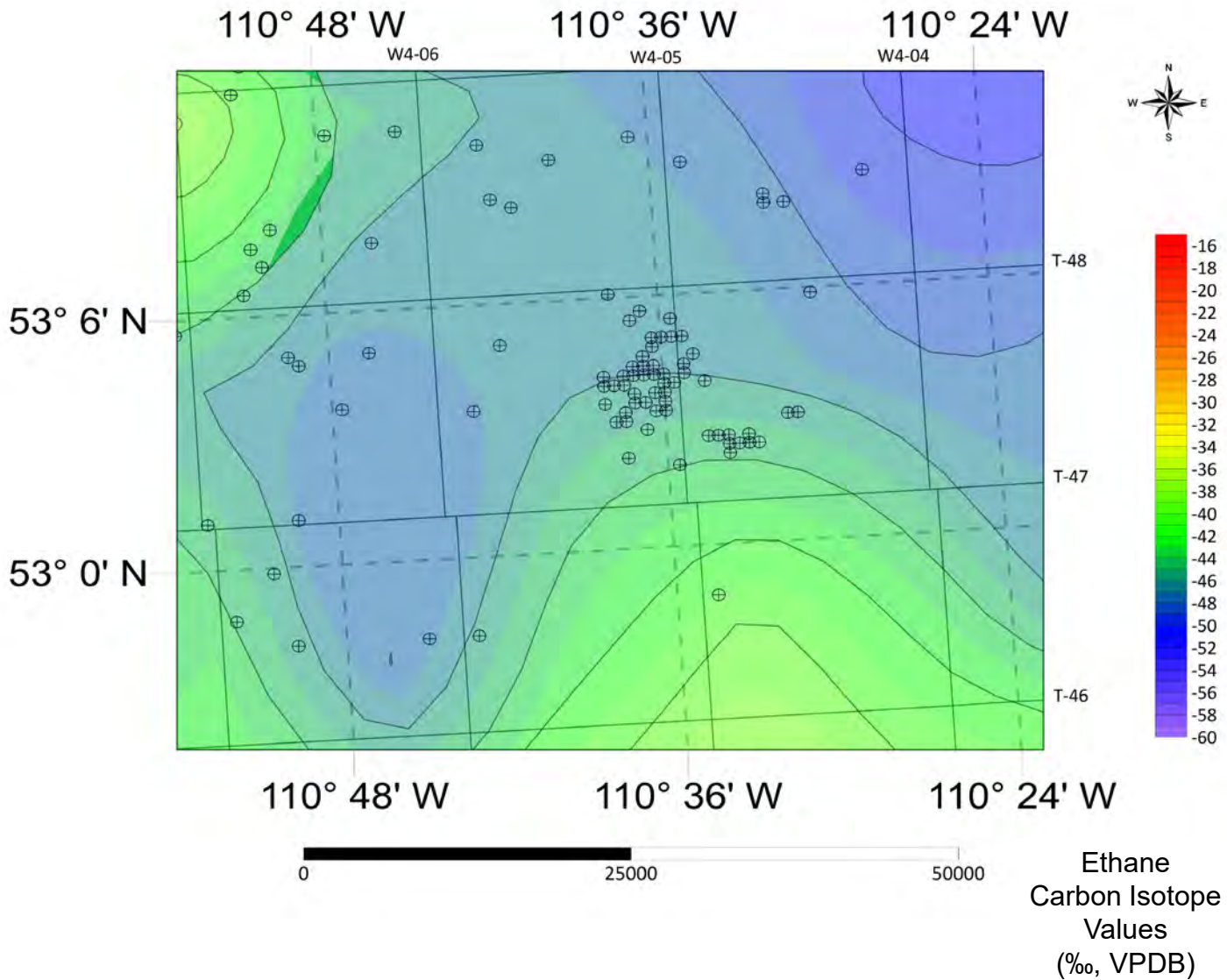


Fig. 27D. Contour Map of Propane Carbon Isotope Values of SCV Wildmere Zoom-in

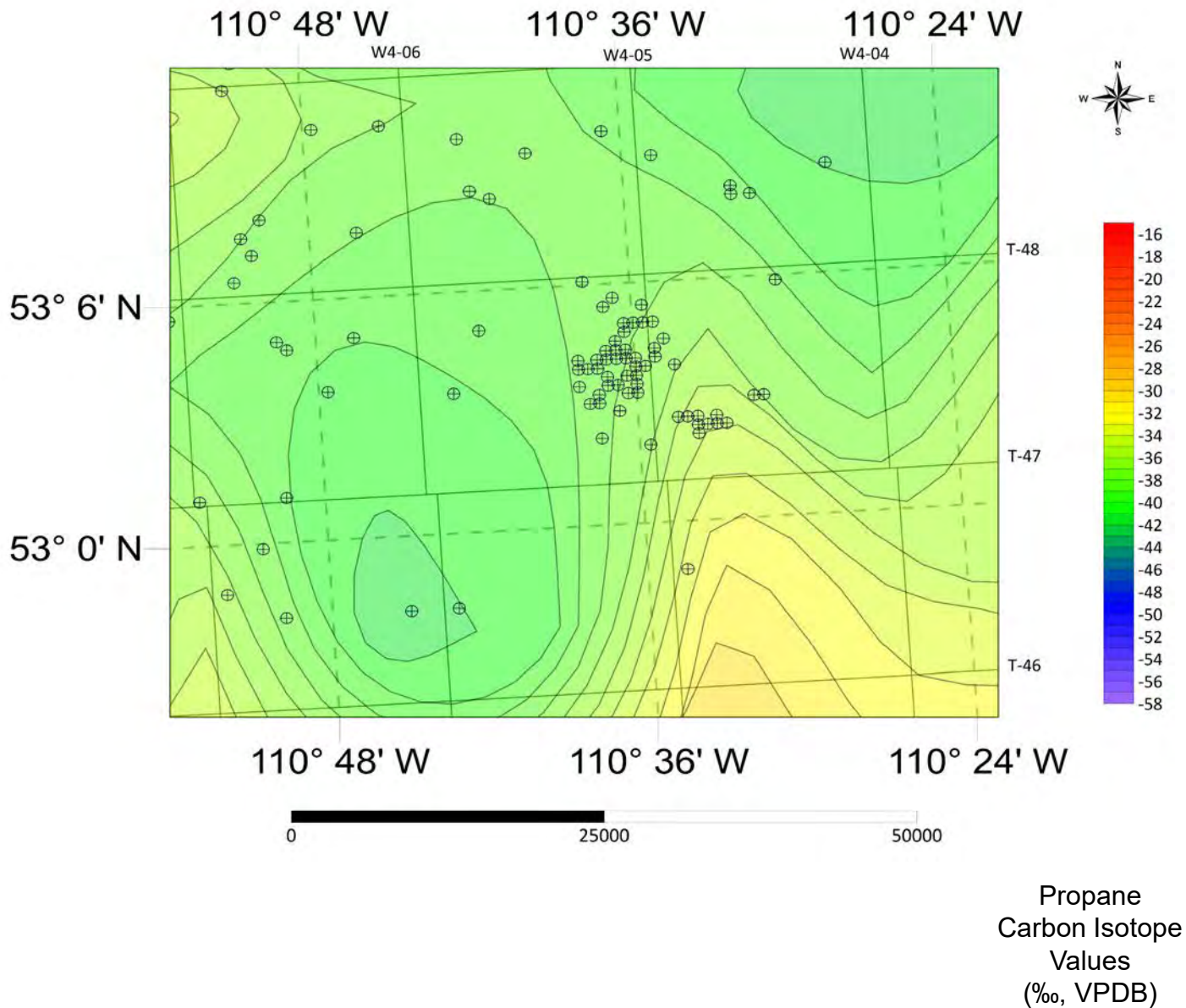




Fig. 27E. Contour Map of *n*-Butane Carbon Isotope Values of SCV Wildmere Zoom-in

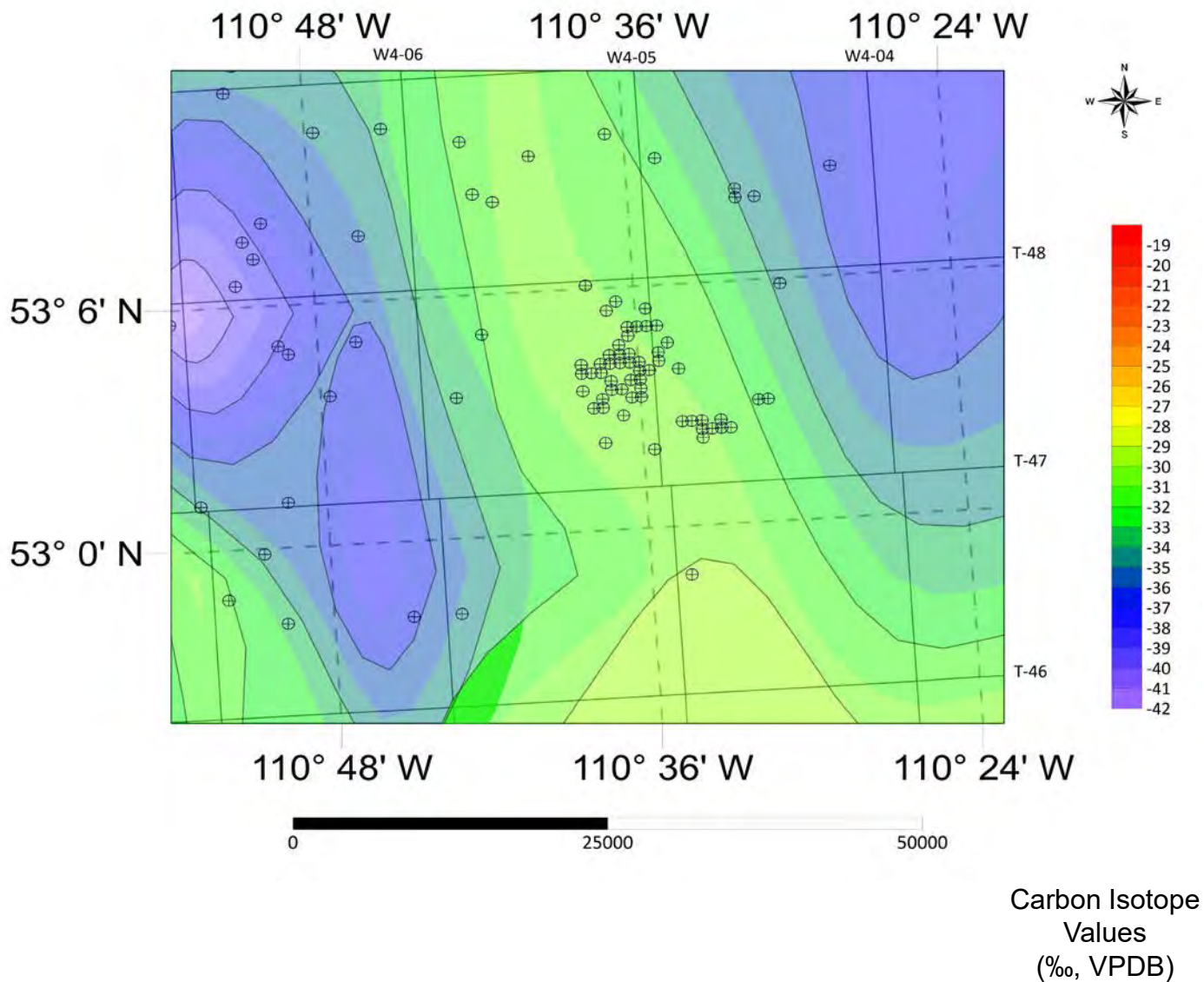


Fig. 27F. Contour Map of *i*-Butane Carbon Isotope Values of SCV Wildmere Zoom-in

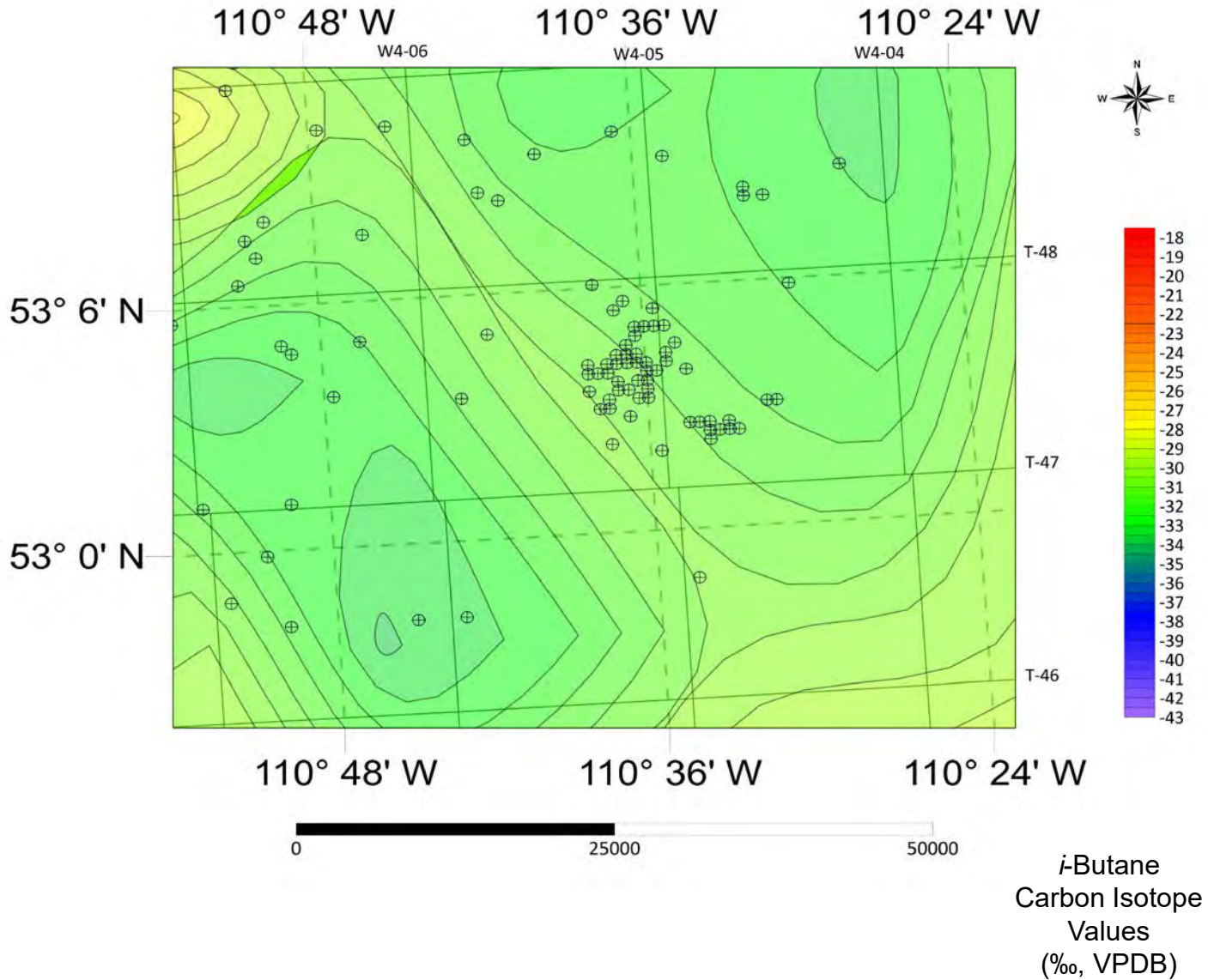




Fig. 27G. Contour Map of Carbon Dioxide Carbon Isotope Values of GM Wildmere Zoom-in

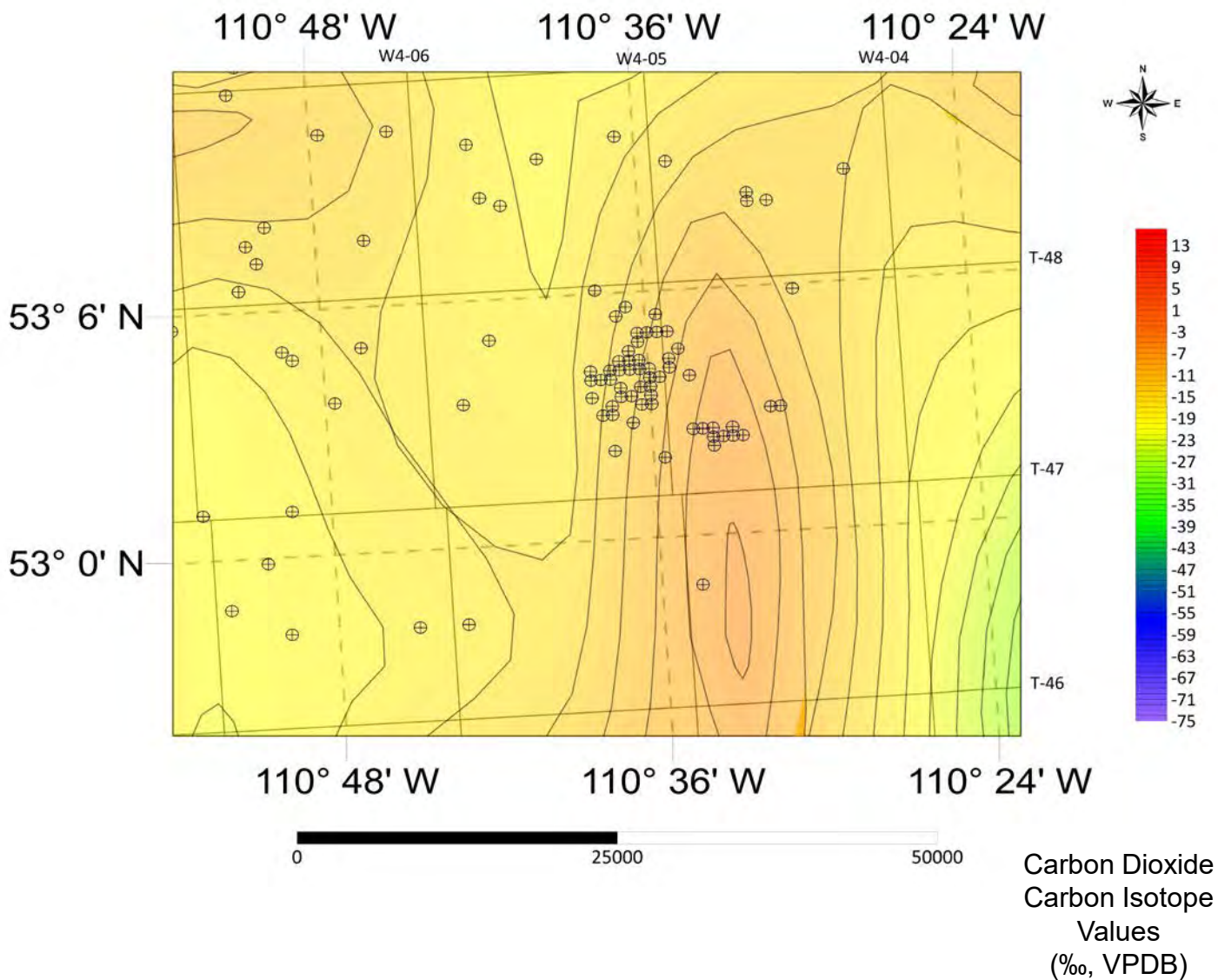


Fig. 27H. Contour Map of Methane Carbon Isotope Values of SCV Wildmere Zoom-in over Topographic Map

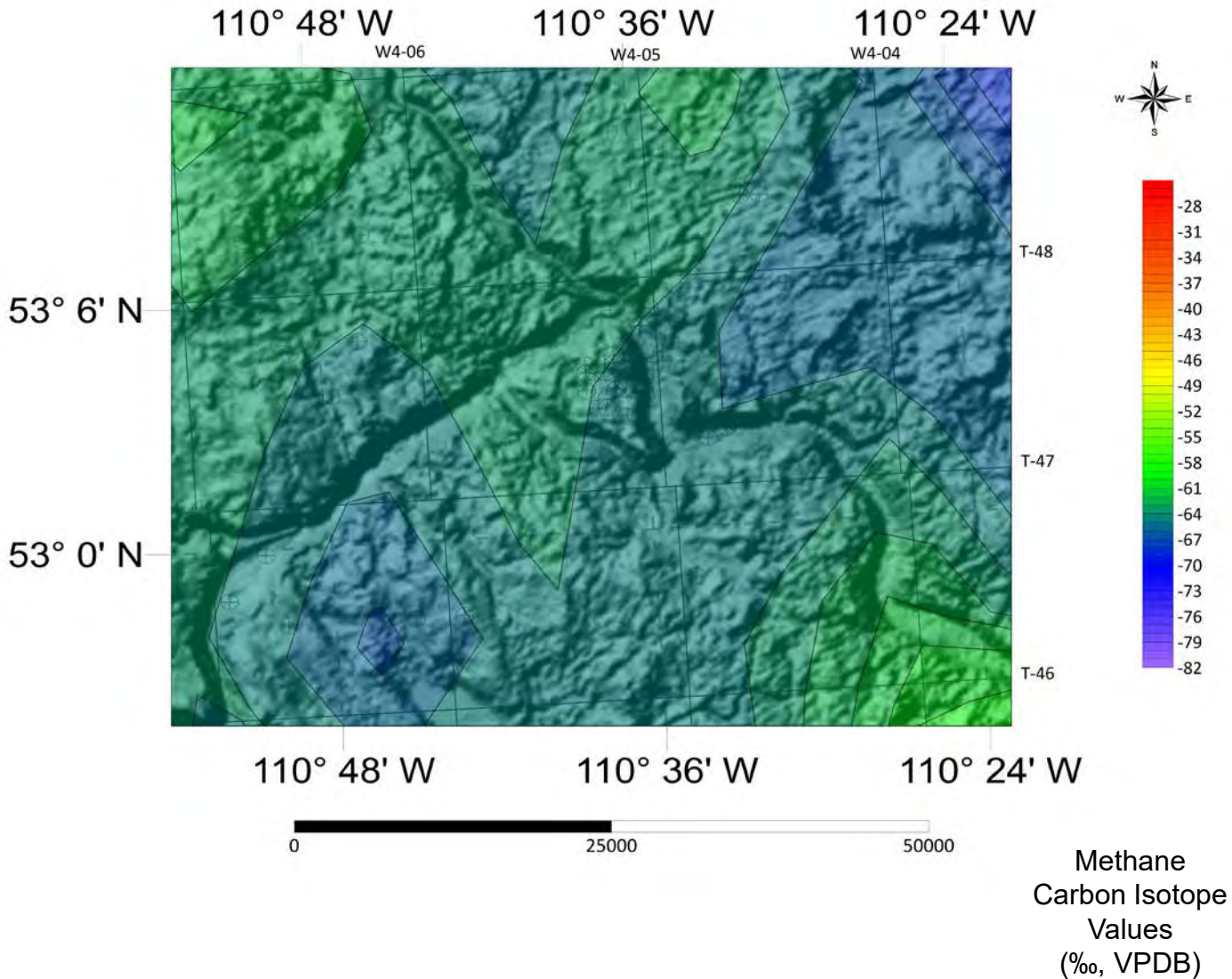




Fig. 27I. Contour Map of Ethane Carbon Isotope Values of SCV Wildmere Zoom-in over Topographic Map

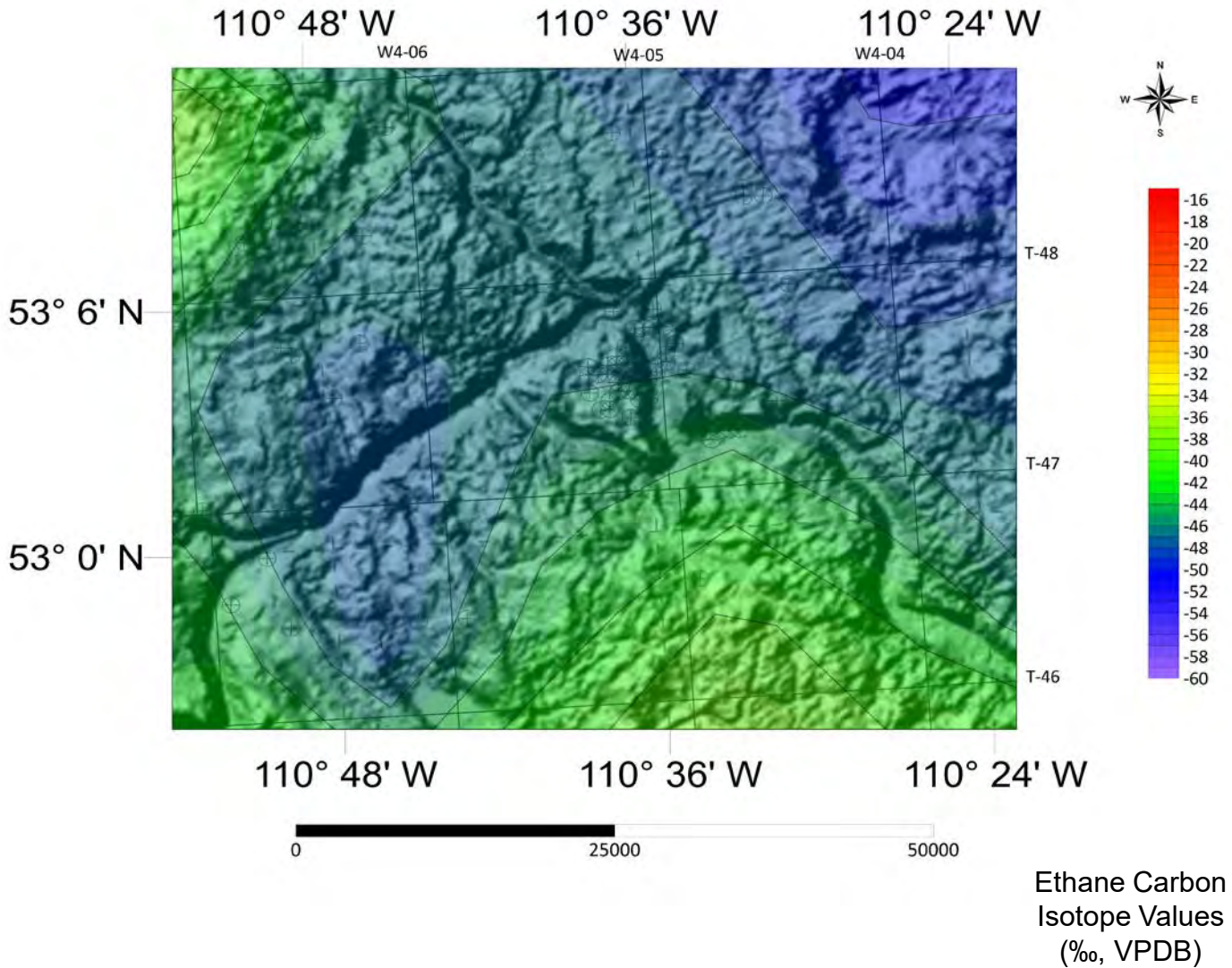


Fig. 27J. Contour Map of Propane Carbon Isotope Values of SCV Wildmere Zoom-in over Topographic Map

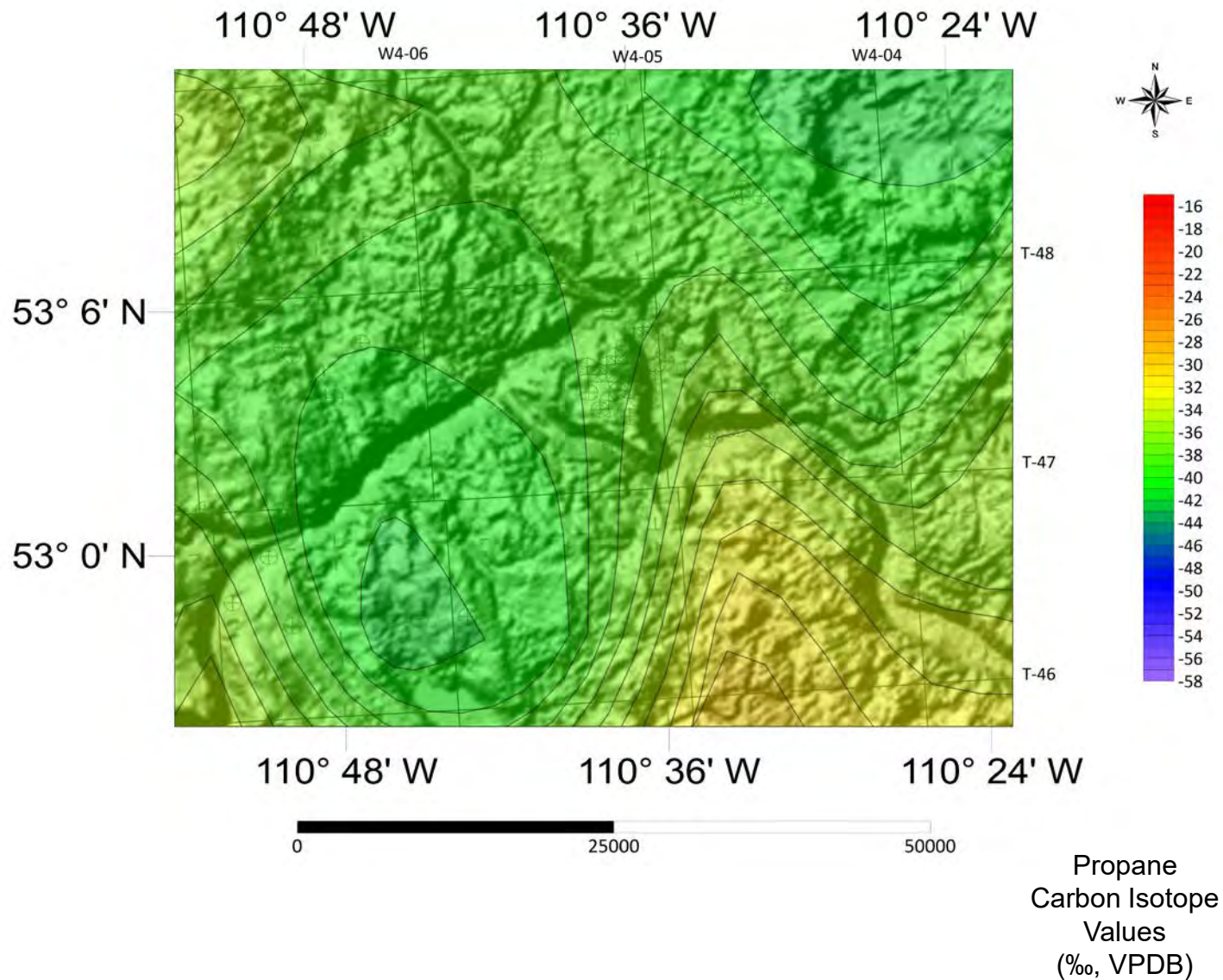




Fig. 27K. Contour Map of *n*-Butane Carbon Isotope Values of SCV Wildmere Zoom-in over Topographic Map

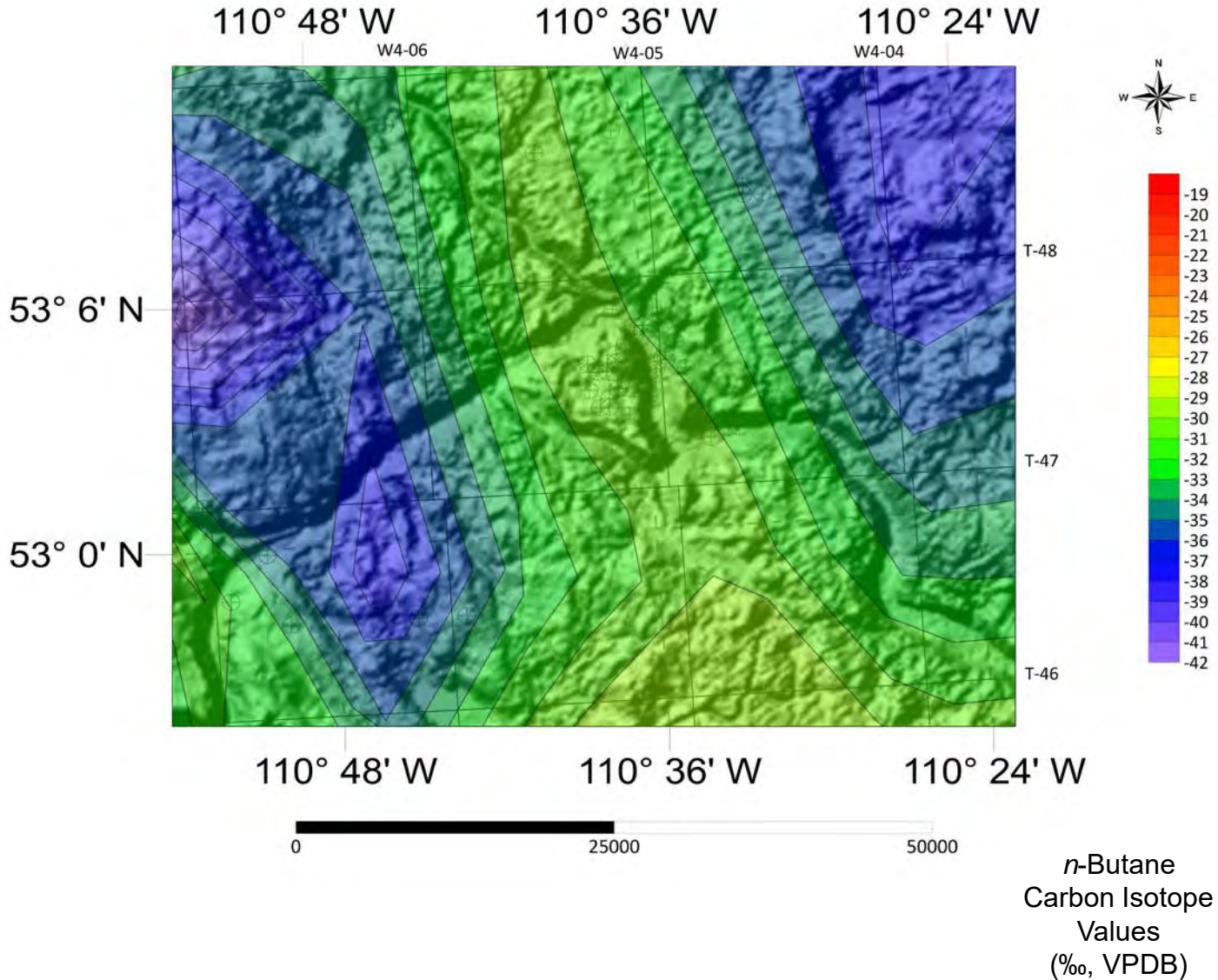


Fig. 27L. Contour Map of *i*-Butane Carbon Isotope Values of SCV Wildmere Zoom-in over Topographic Map

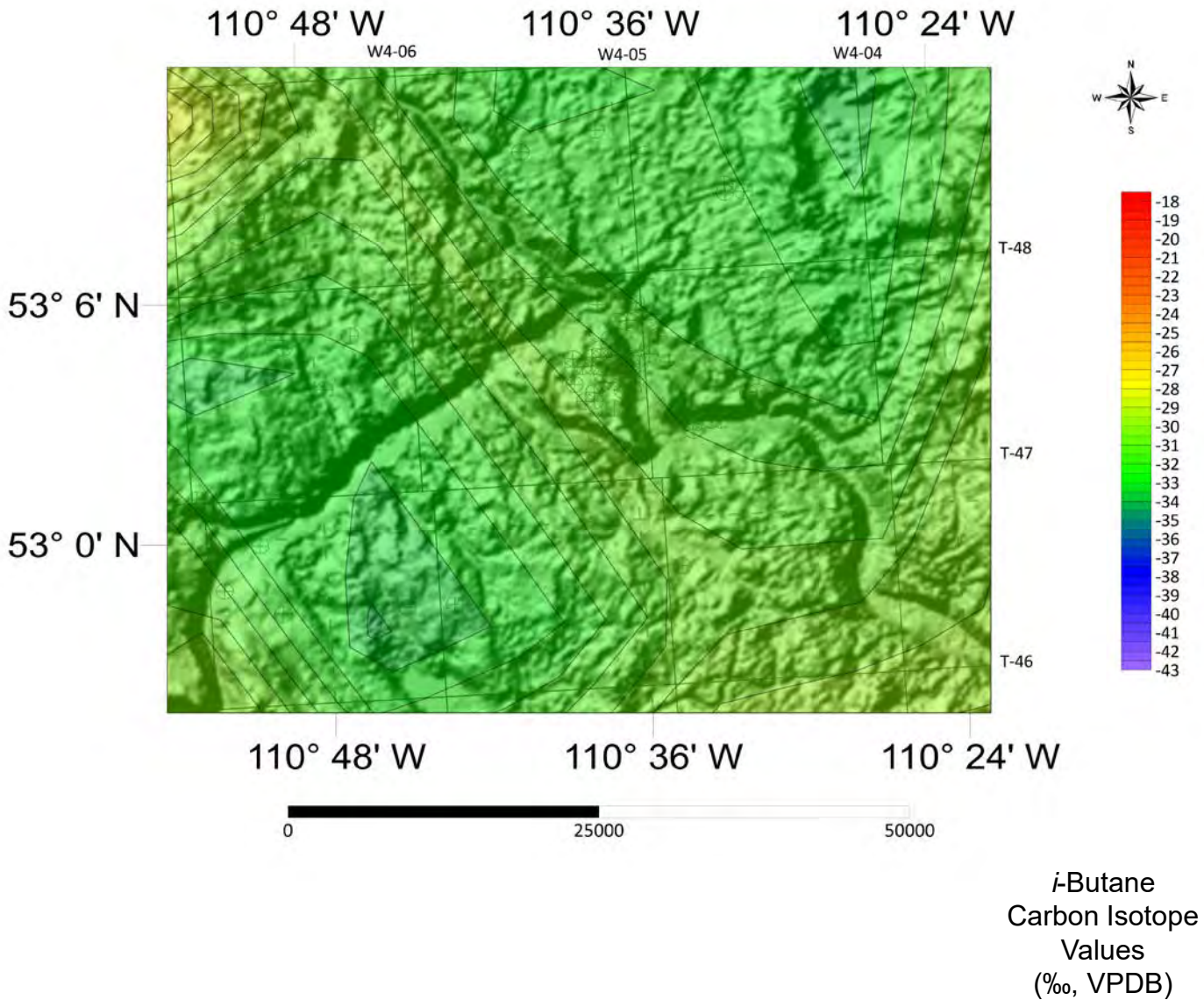




Fig. 27M. Contour Map of Carbon Dioxide Carbon Isotope Values of SCV Wildmere Zoom-in over Topographic Map

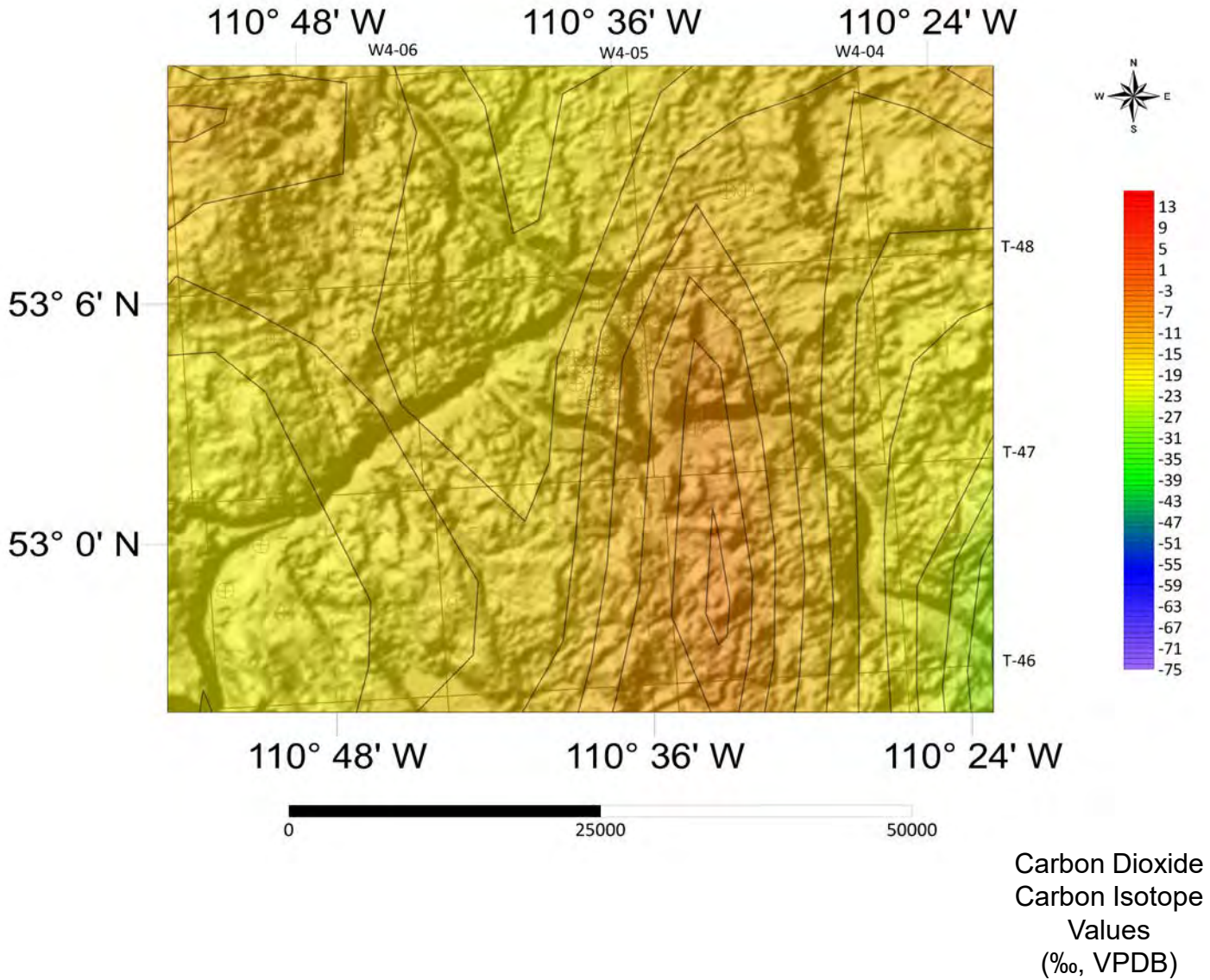


Fig. 28A. Map of Ground Migration (GM) Locations in the Wildmere Zoom-in

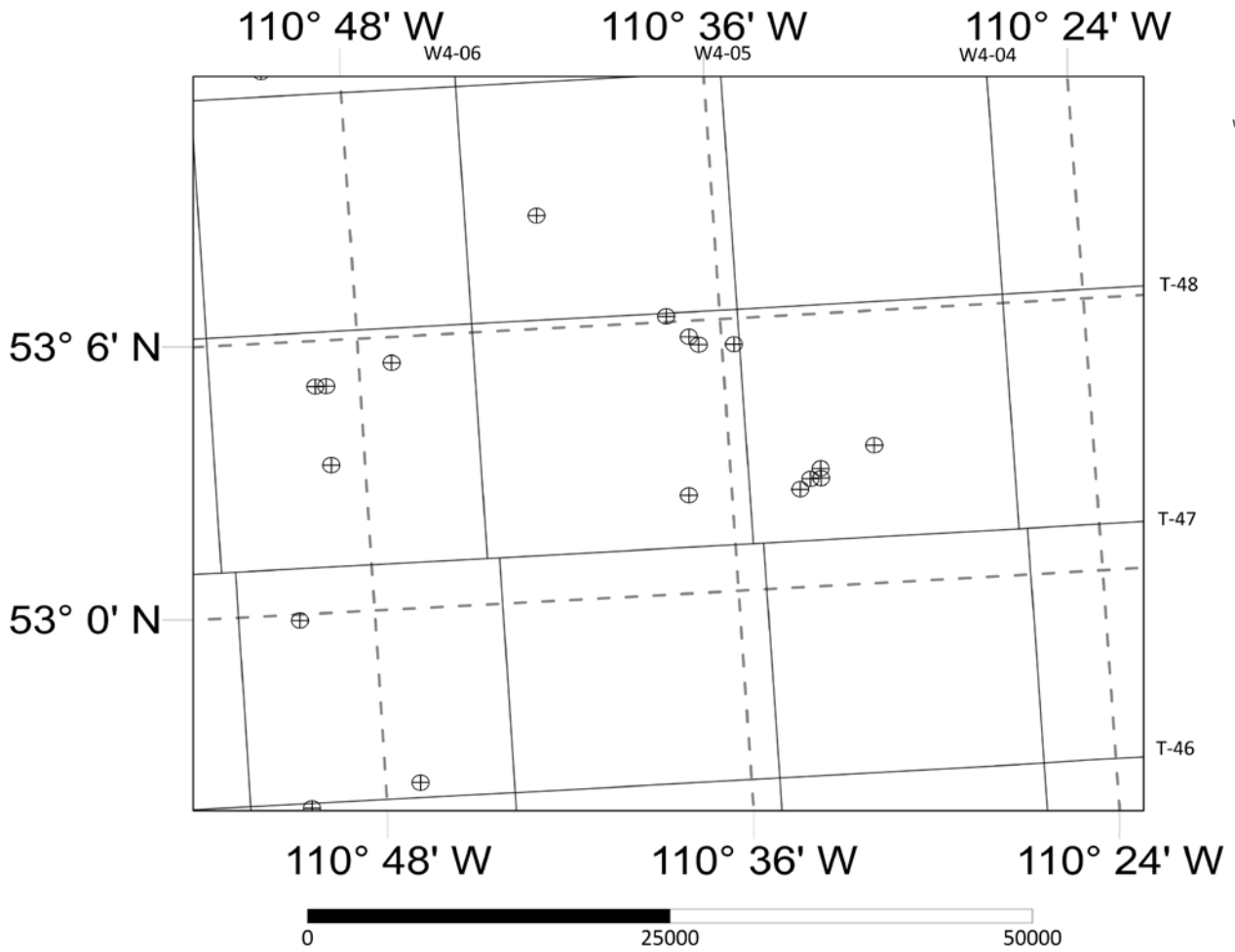




Fig. 28B. Contour Map of Methane Carbon Isotope Values of GM Wildmere Zoom-in

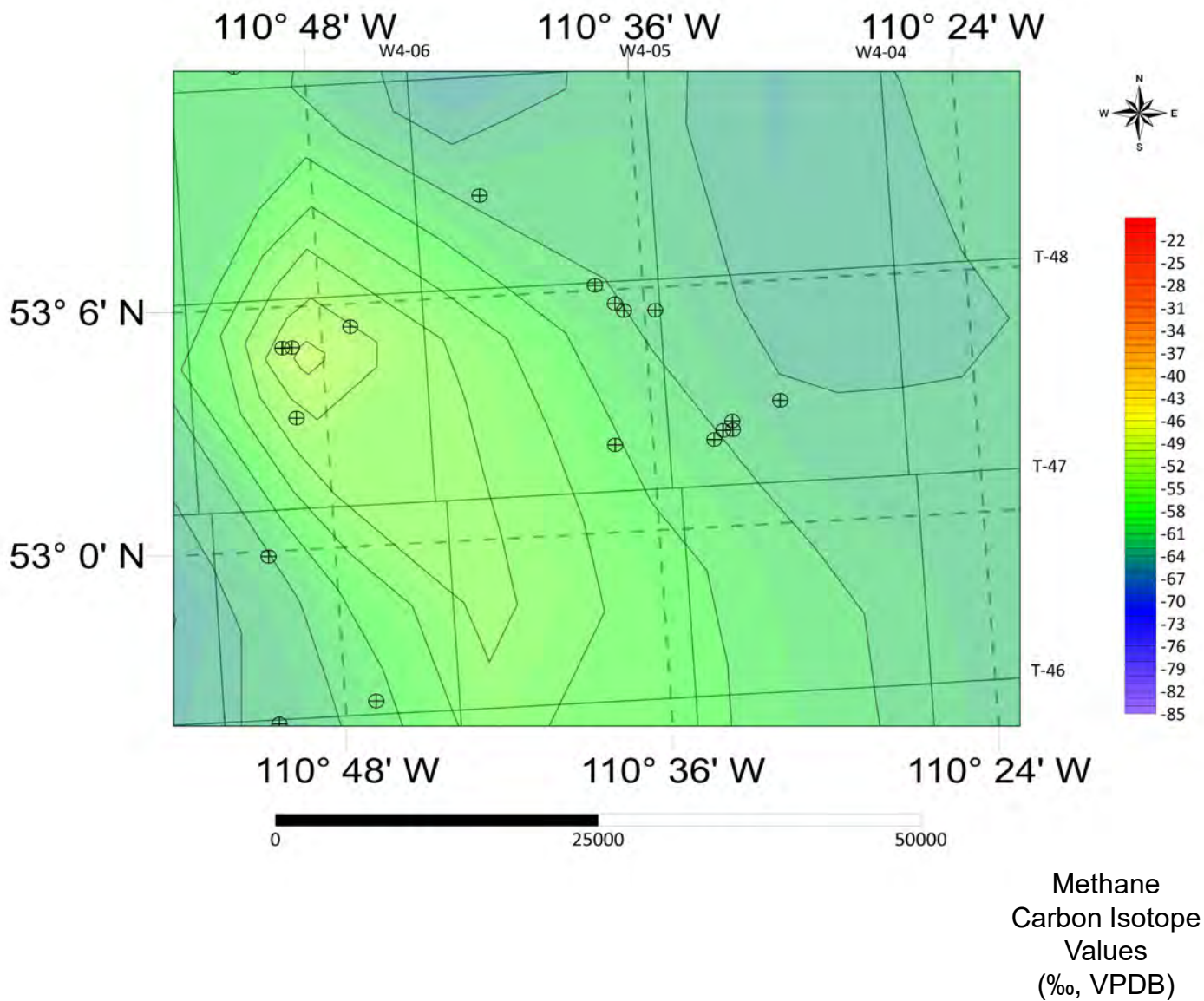


Fig. 28C. Contour Map of Ethane Carbon Isotope Values of GM Wildmere Zoom-in

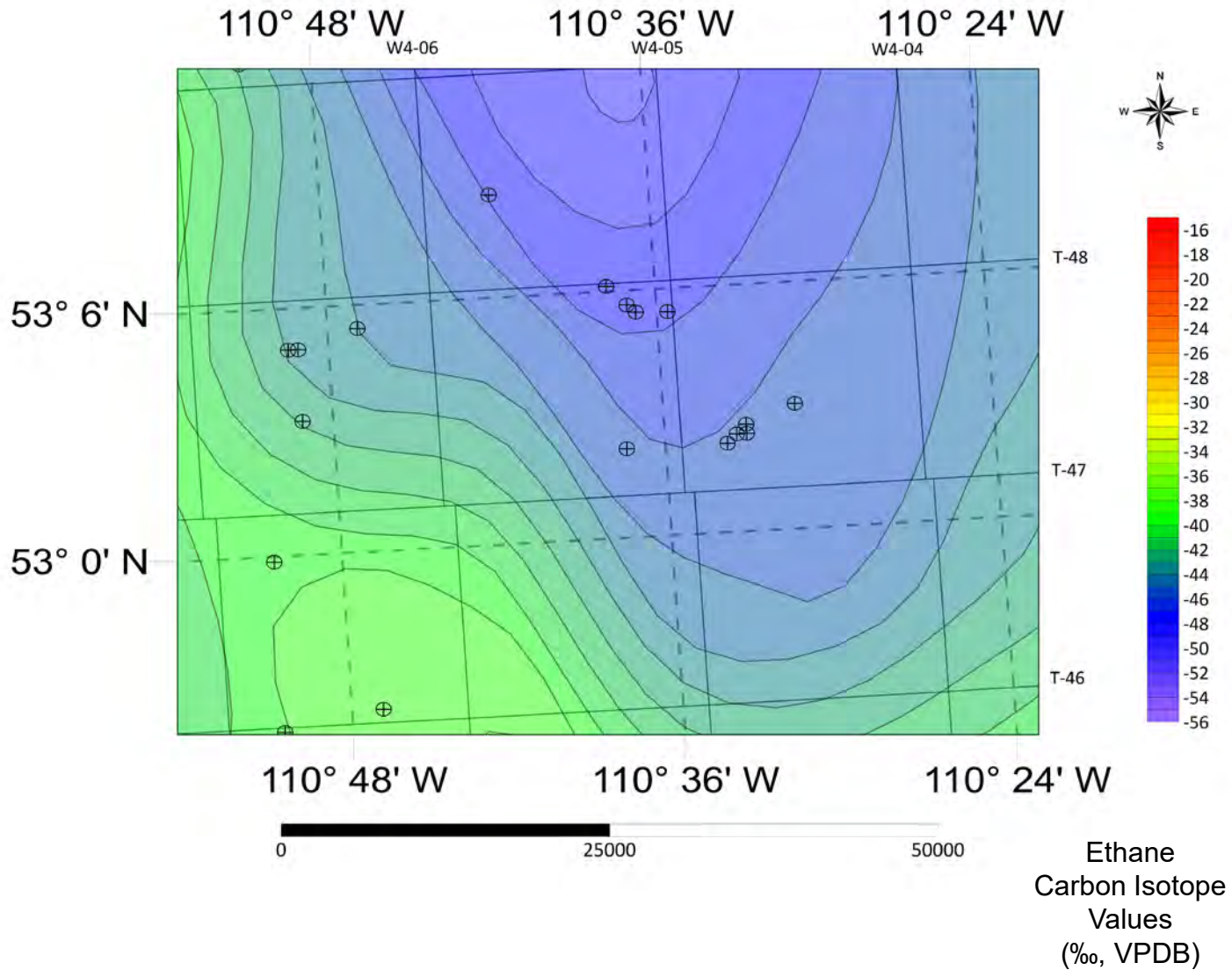




Fig. 28D. Contour Map of Propane Carbon Isotope Values of GM Wildmere Zoom-in

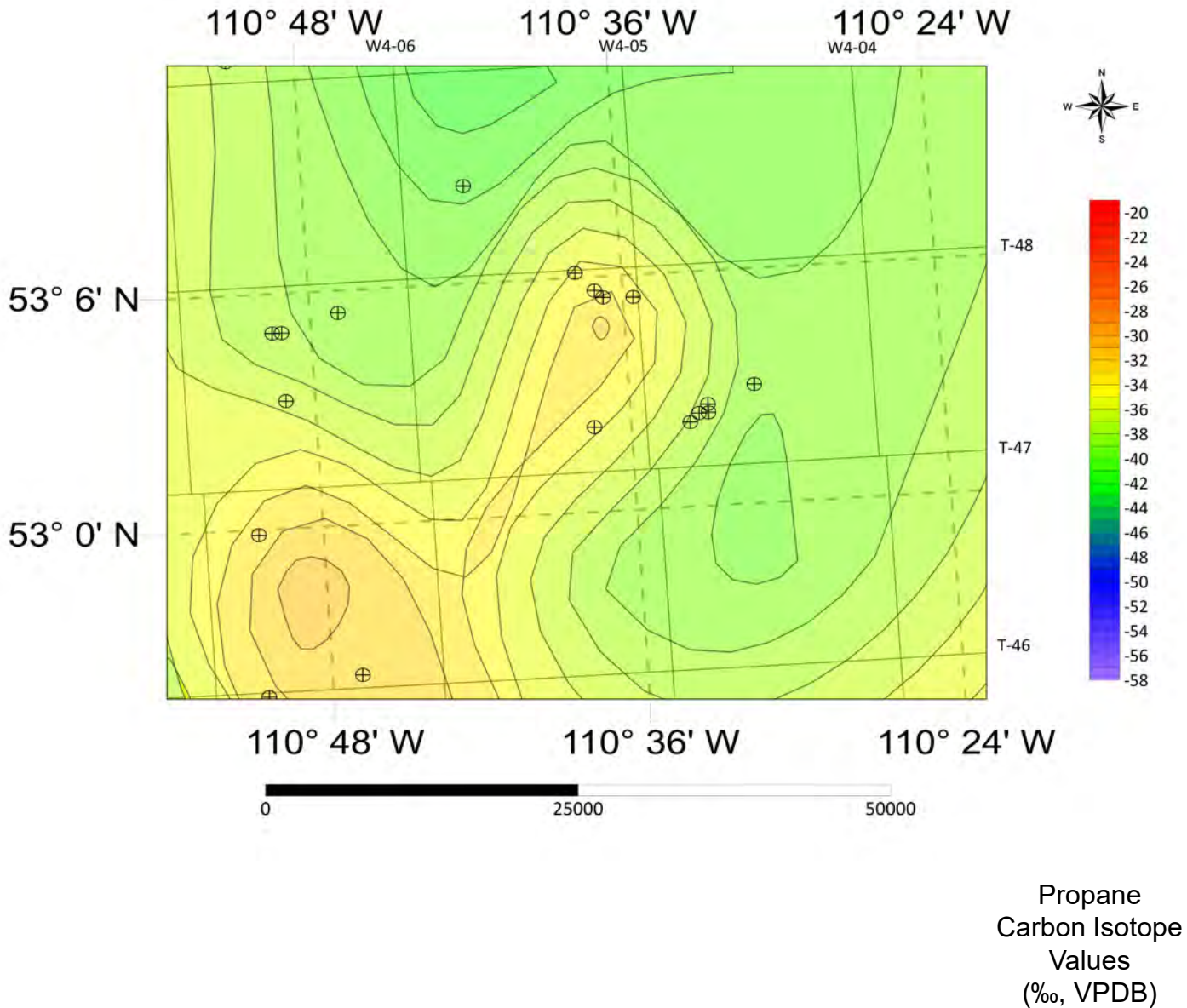


Fig. 28E. Contour Map of *n*-Butane Carbon Isotope Values of GM Wildmere Zoom-in

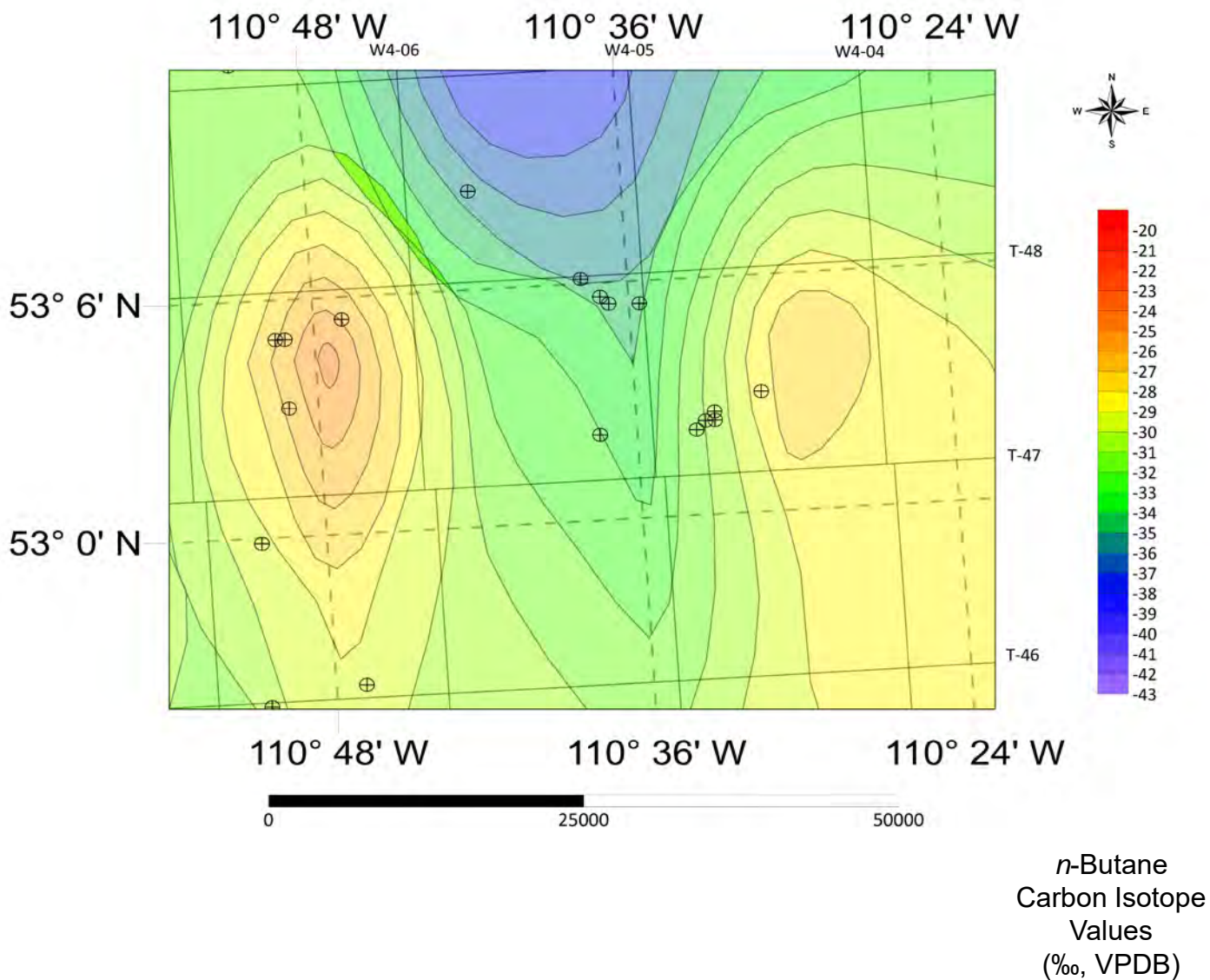




Fig. 28F. Contour Map of *i*-Butane Carbon Isotope Values of GM Wildmere Zoom-in

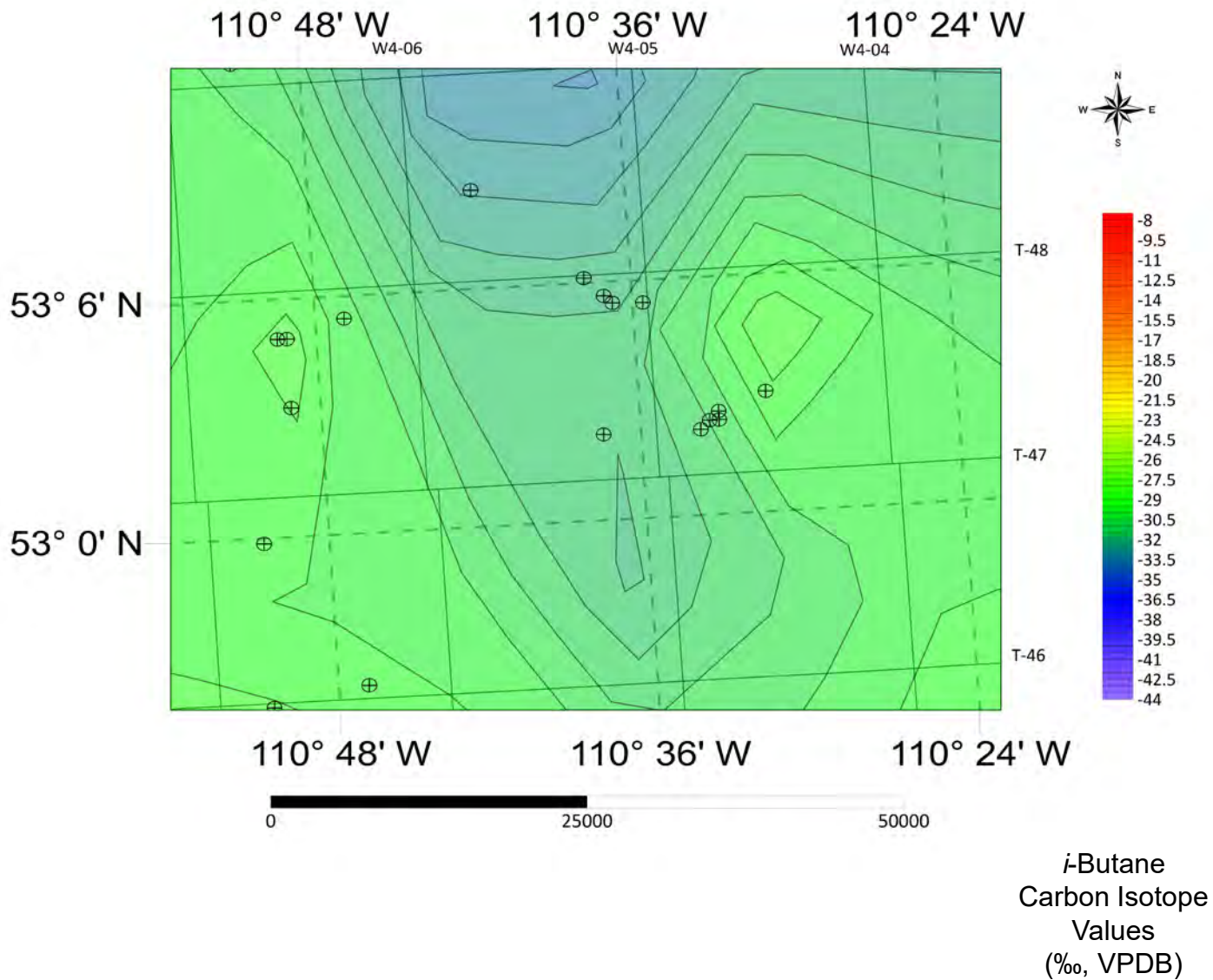


Fig. 28G. Contour Map of Carbon Dioxide Carbon Isotope Values of GM Wildmere Zoom-in

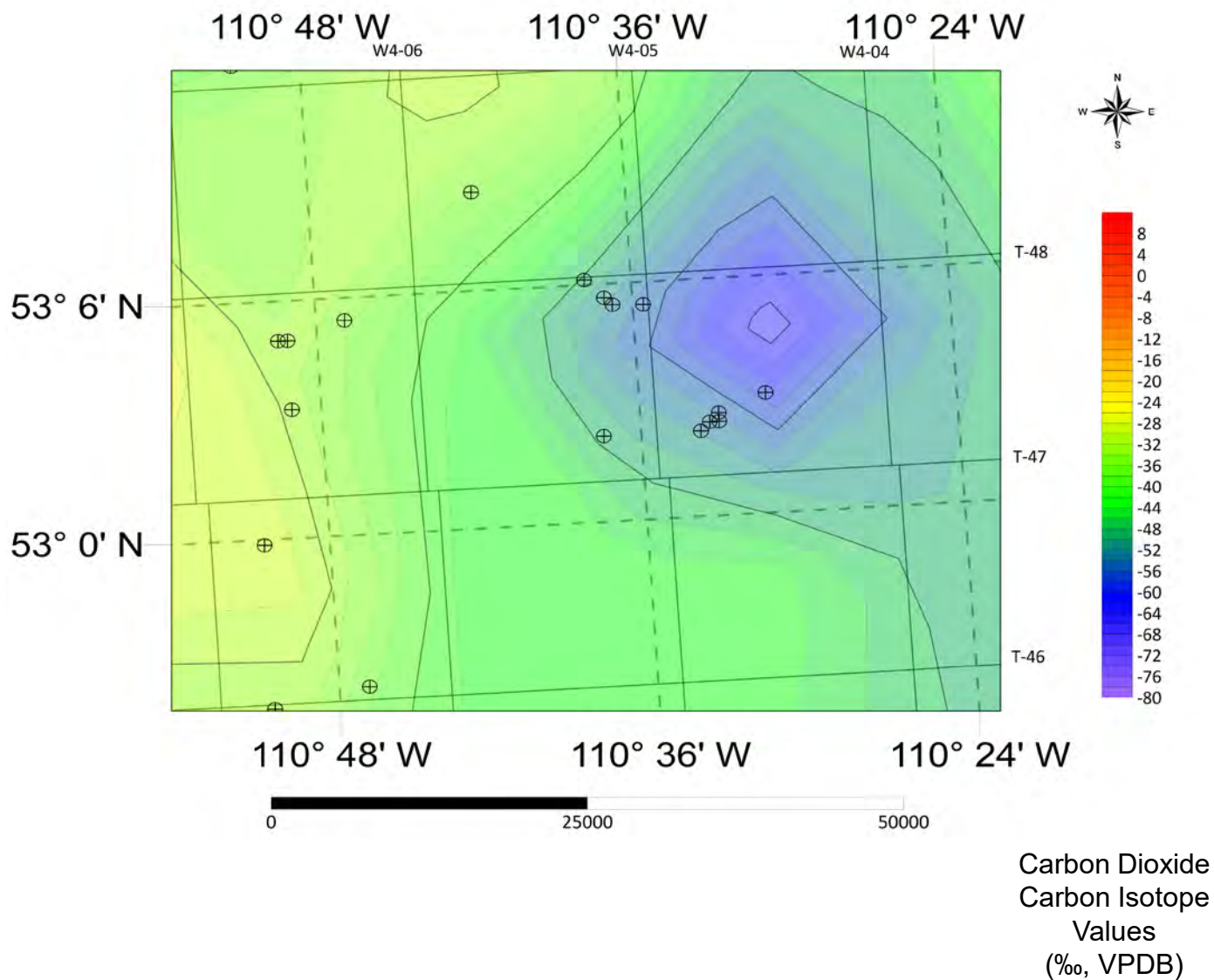




Fig. 28H. Contour Map of Methane Carbon Isotope Values of GM Wildmere Zoom-in over Topographic Map

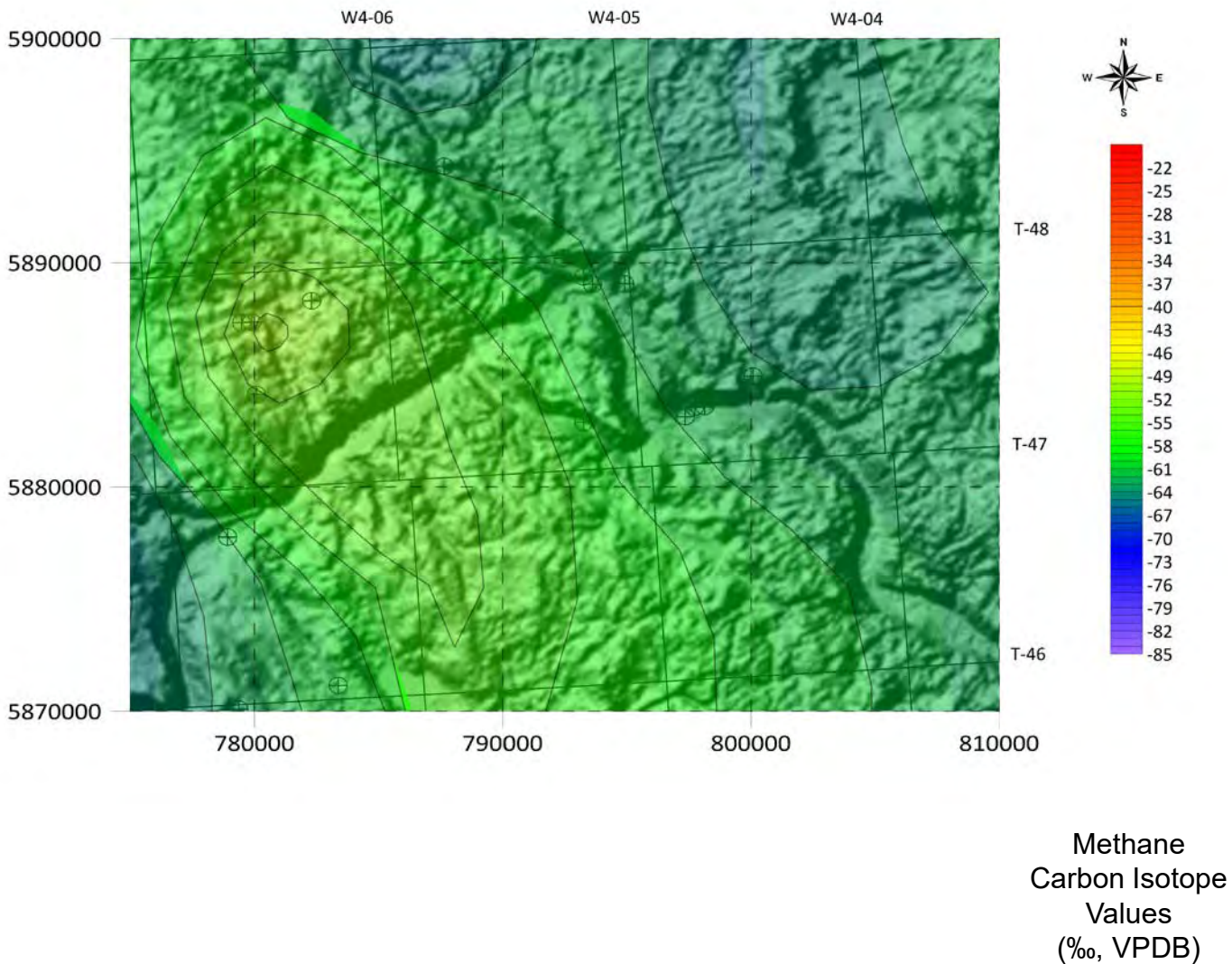


Fig. 28I. Contour Map of Ethane Carbon Isotope Values of GM Wildmere Zoom-in over Topographic Map

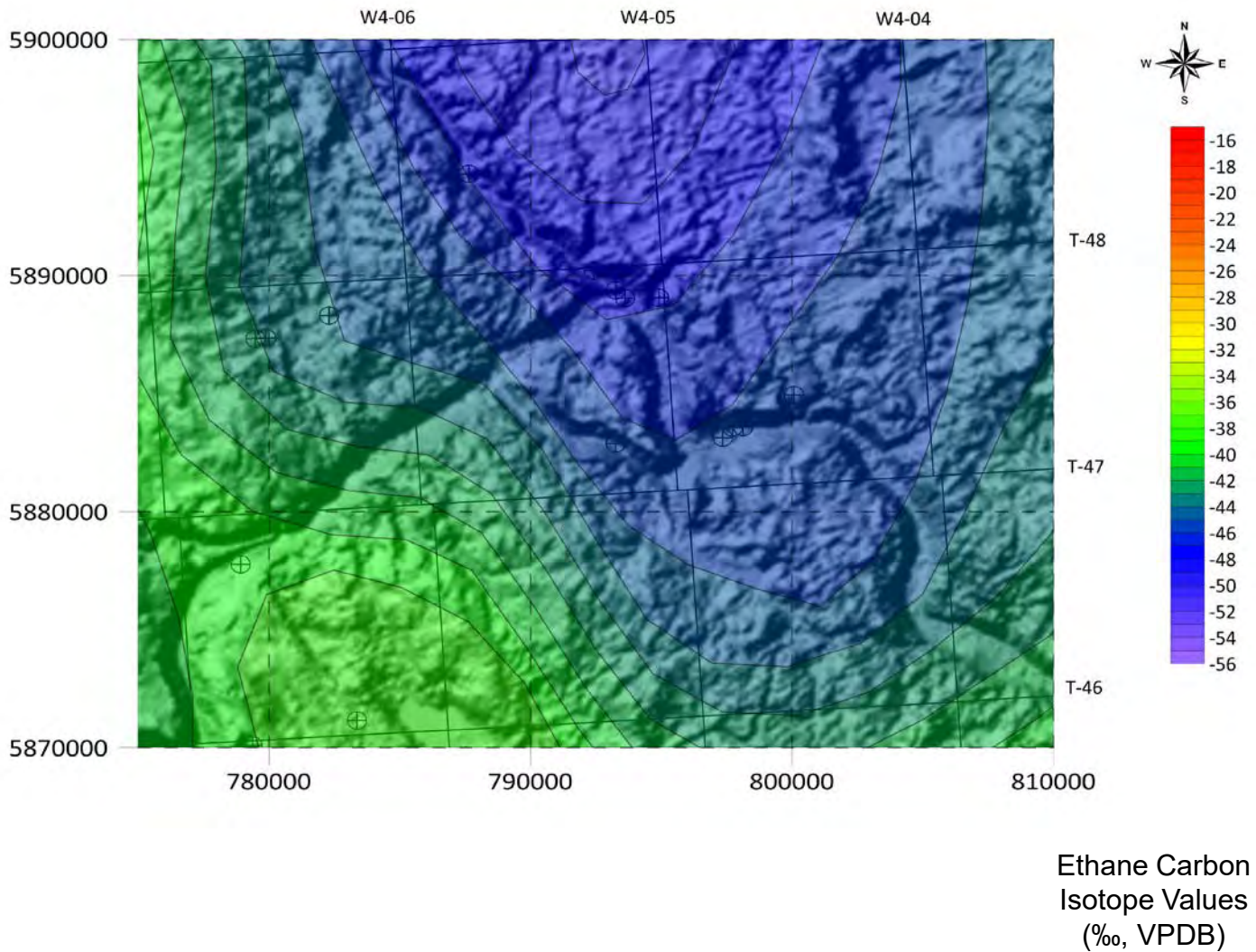




Fig. 28J. Contour Map of Propane Carbon Isotope Values of GM Wildmere Zoom-in over Topographic Map

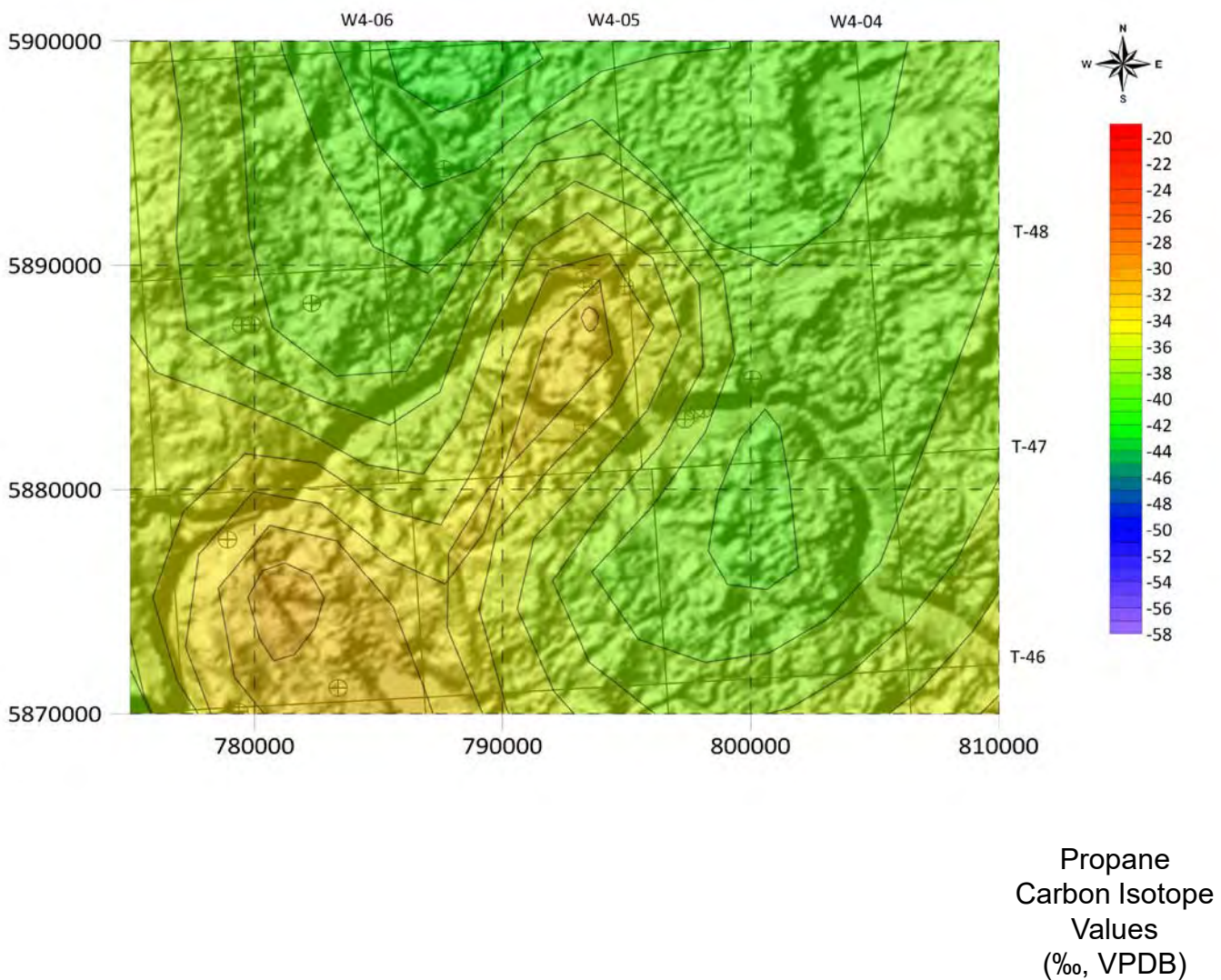


Fig. 28K. Contour Map of *n*-Butane Carbon Isotope Values of GM Wildmere Zoom-in over Topographic Map

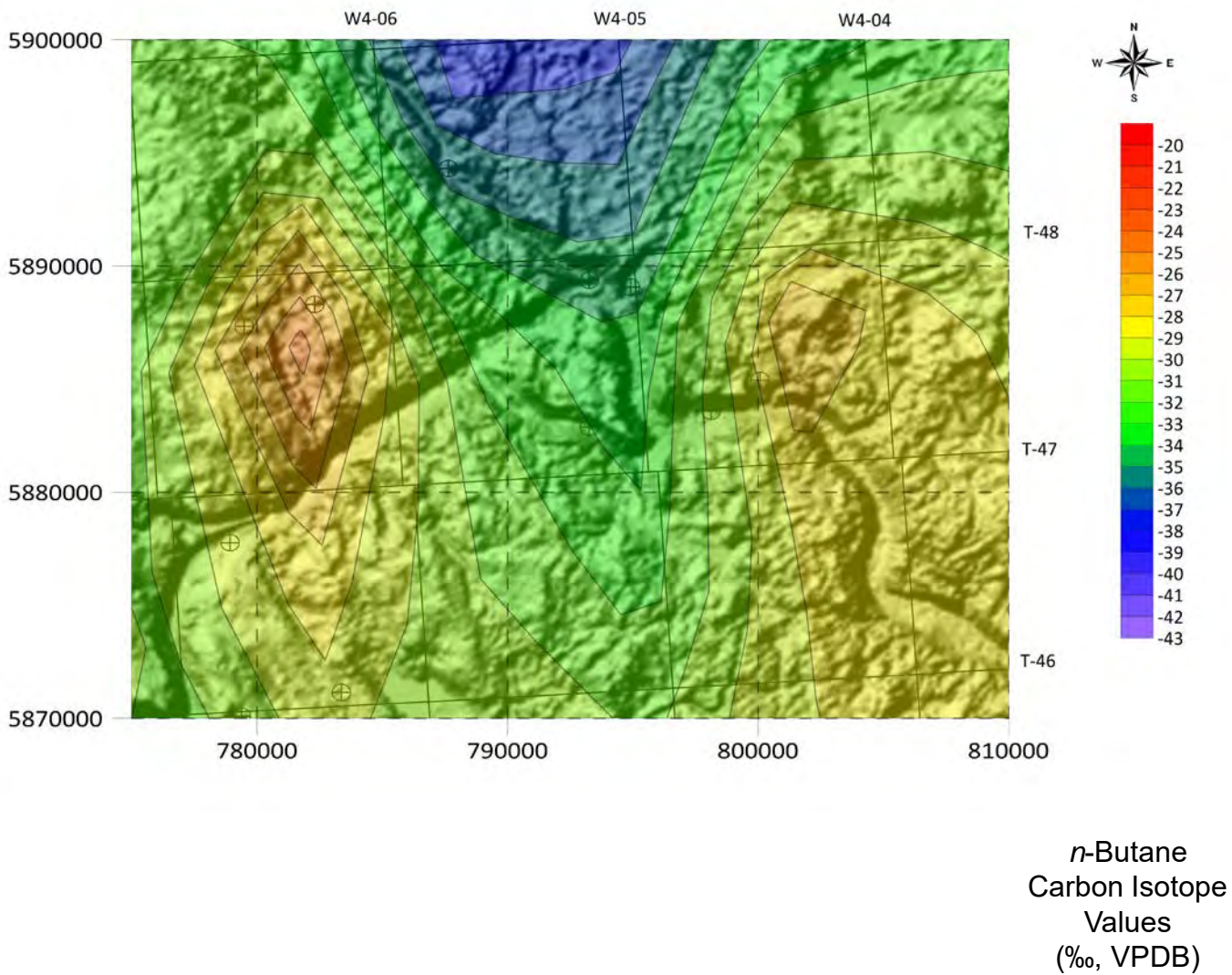




Fig. 28L. Contour Map of *i*-Butane Carbon Isotope Values of GM Wildmere Zoom-in over Topographic Map

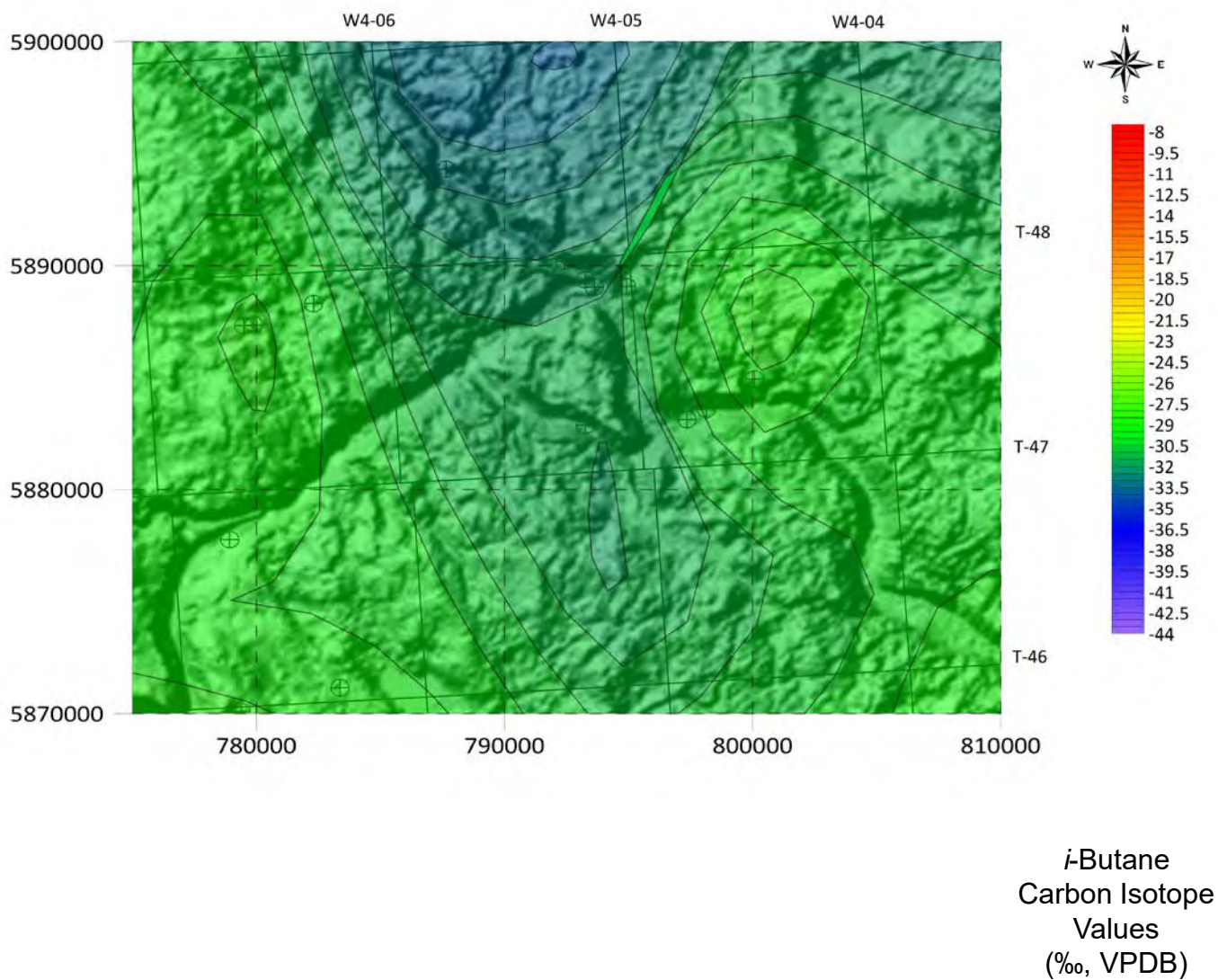


Fig. 28M. Contour Map of Carbon Dioxide Carbon Isotope Values of GM Wildmere Zoom-in over Topographic Map

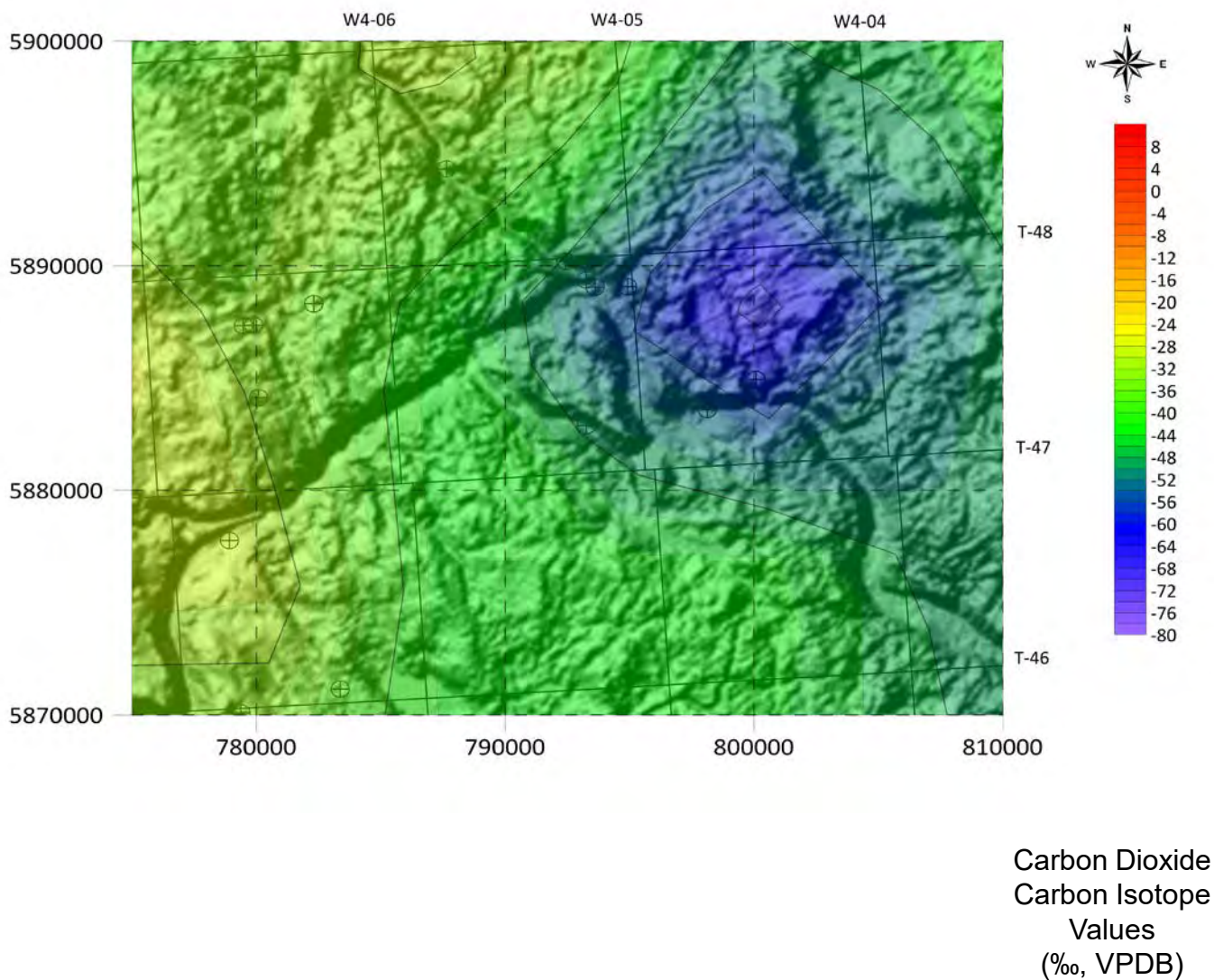




Fig. 29A. Map of Surface Casing Vent (SCV) Locations in the Beaver Dam Zoom-in

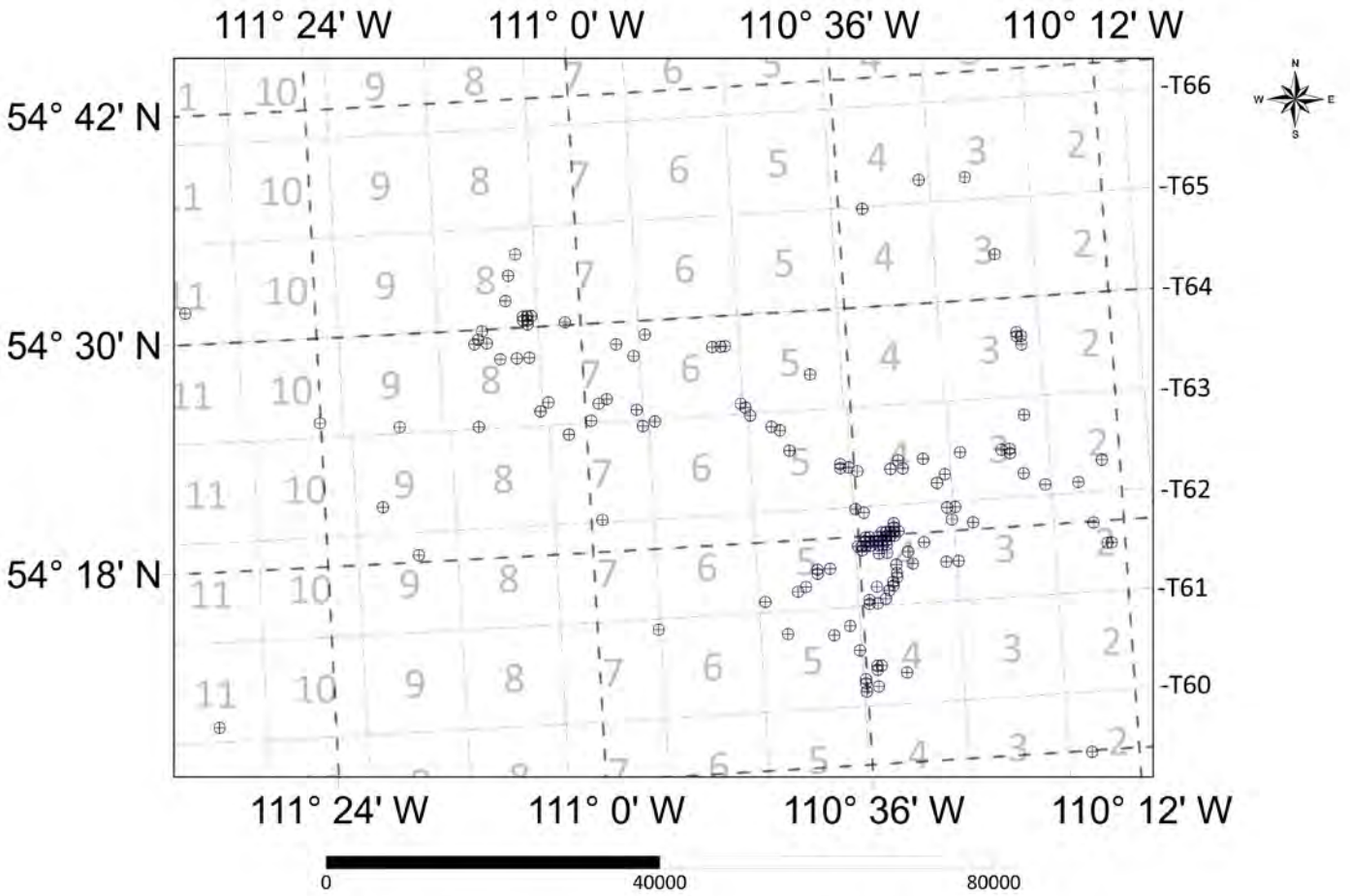


Fig. 29B. Contour Map of Methane Carbon Isotope Values of SCV Beaver Dam Zoom-in

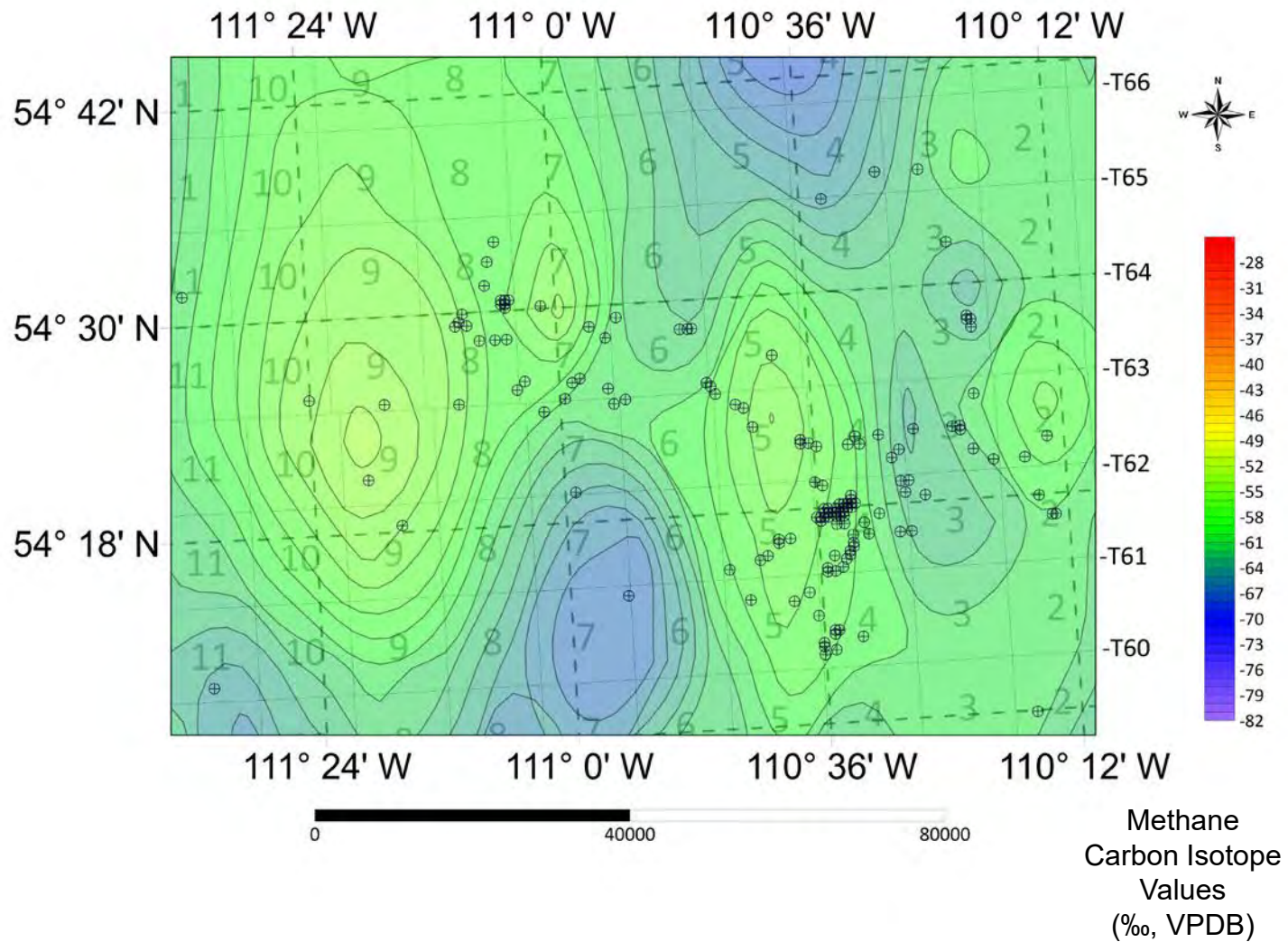




Fig. 29C. Contour Map of Ethane Carbon Isotope Values of SCV Beaver Dam Zoom-in

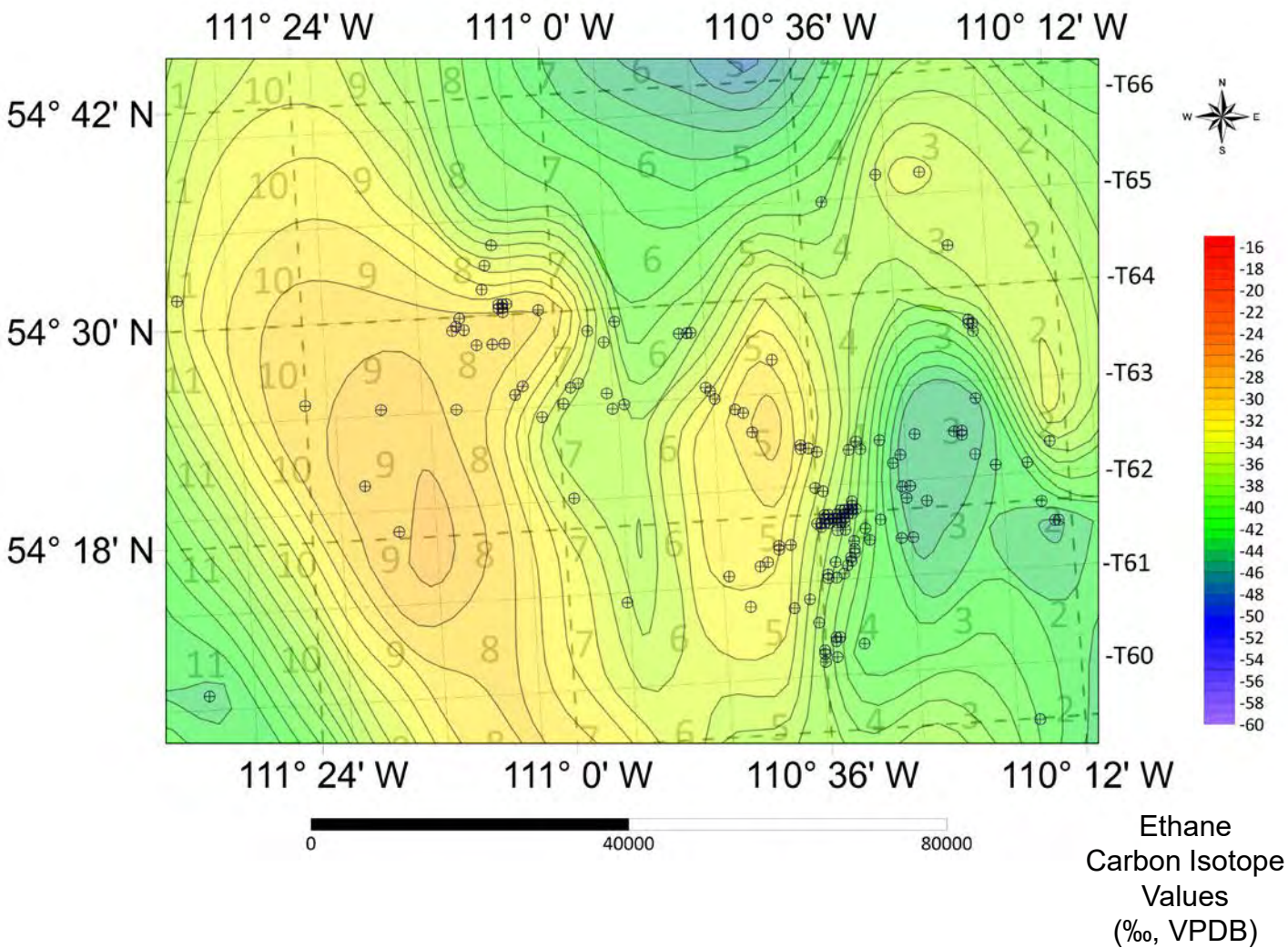


Fig. 29D. Contour Map of Propane Carbon Isotope Values of SCV Beaver Dam Zoom-in

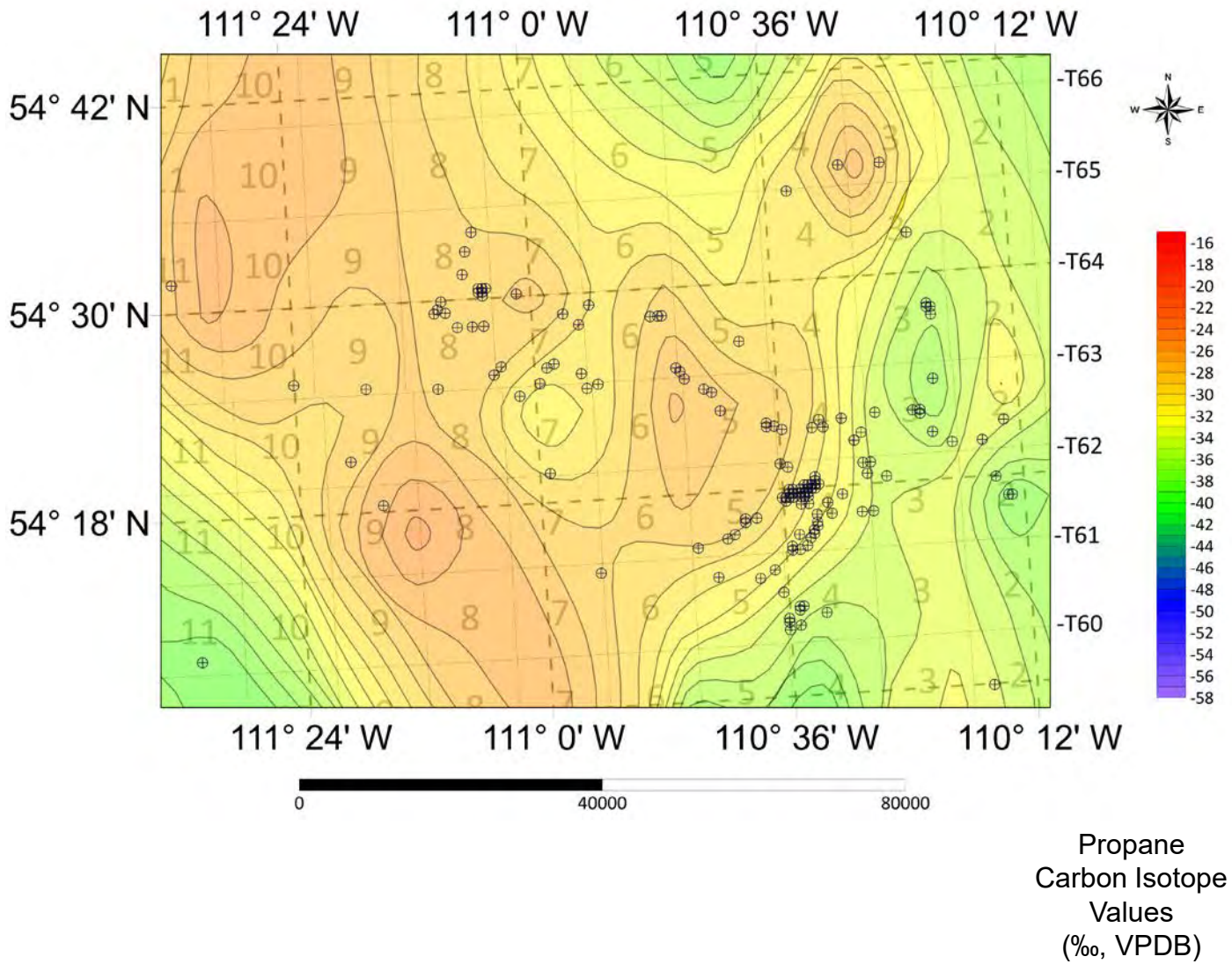




Fig. 29E. Contour Map of *n*-Butane Carbon Isotope Values of SCV Beaver Dam Zoom-in

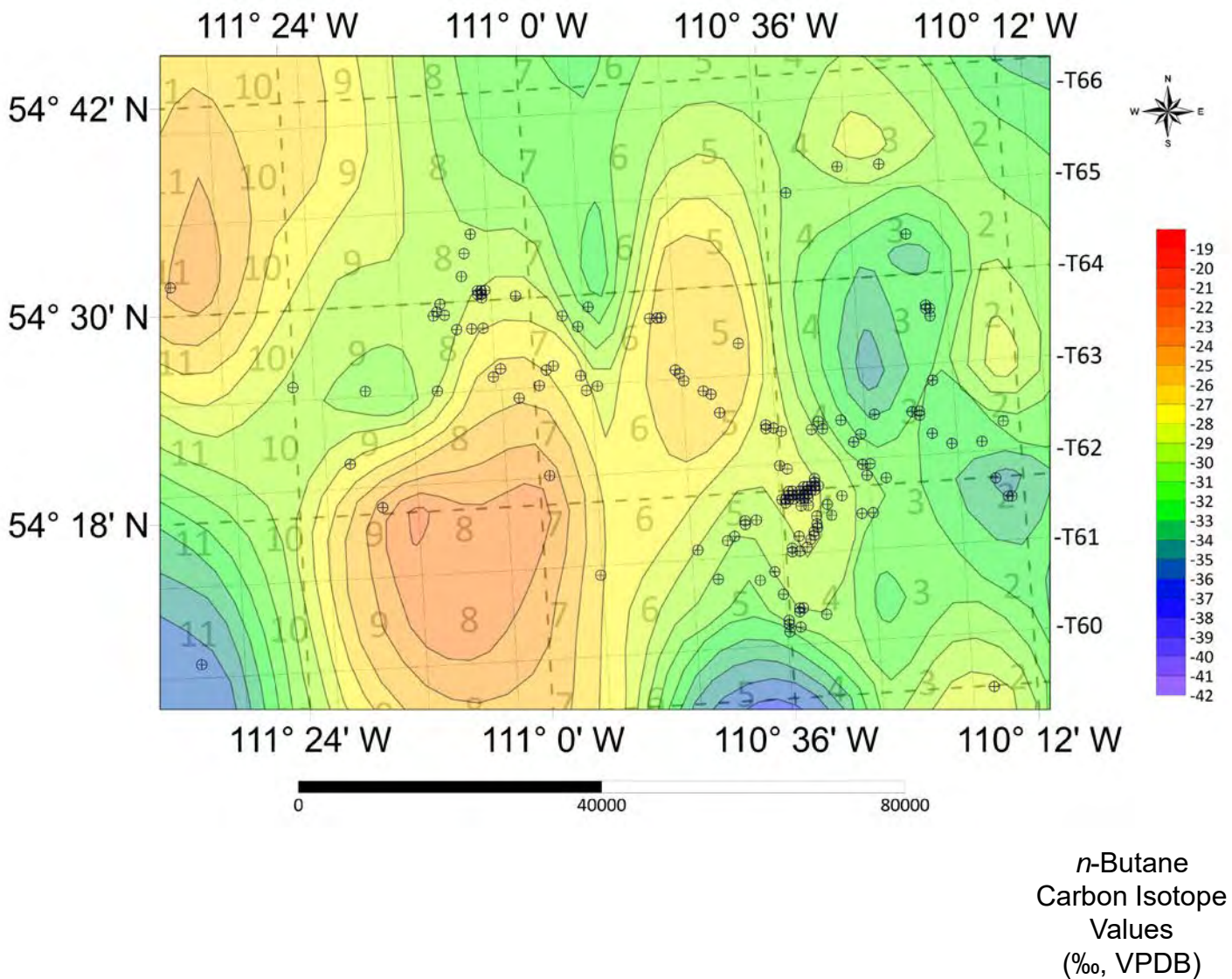


Fig. 29F. Contour Map of *i*-Butane Carbon Isotope Values of SCV Beaver Dam Zoom-in

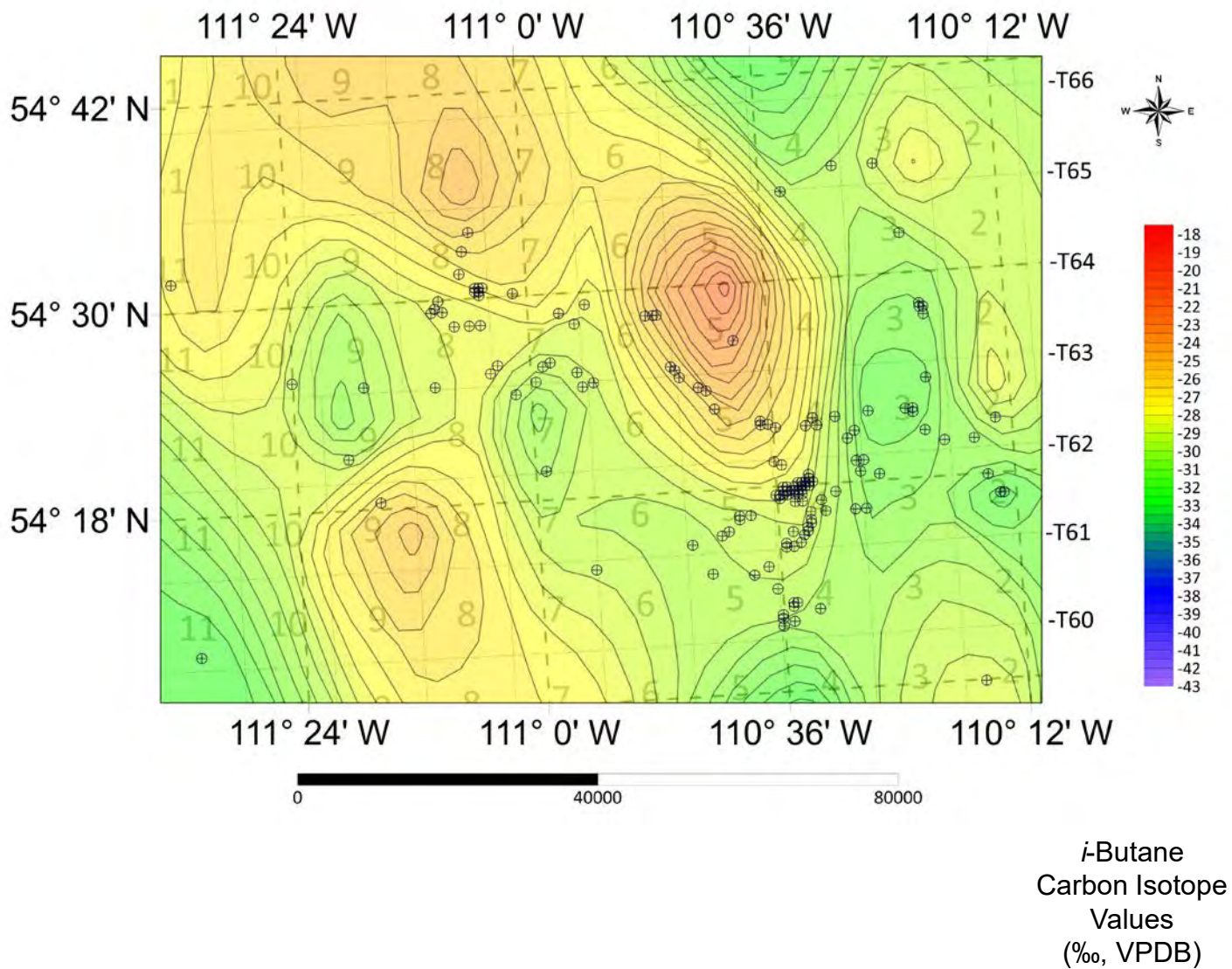




Fig. 29G. Contour Map of Carbon Dioxide Carbon Isotope Values of SCV Beaver Dam Zoom-in

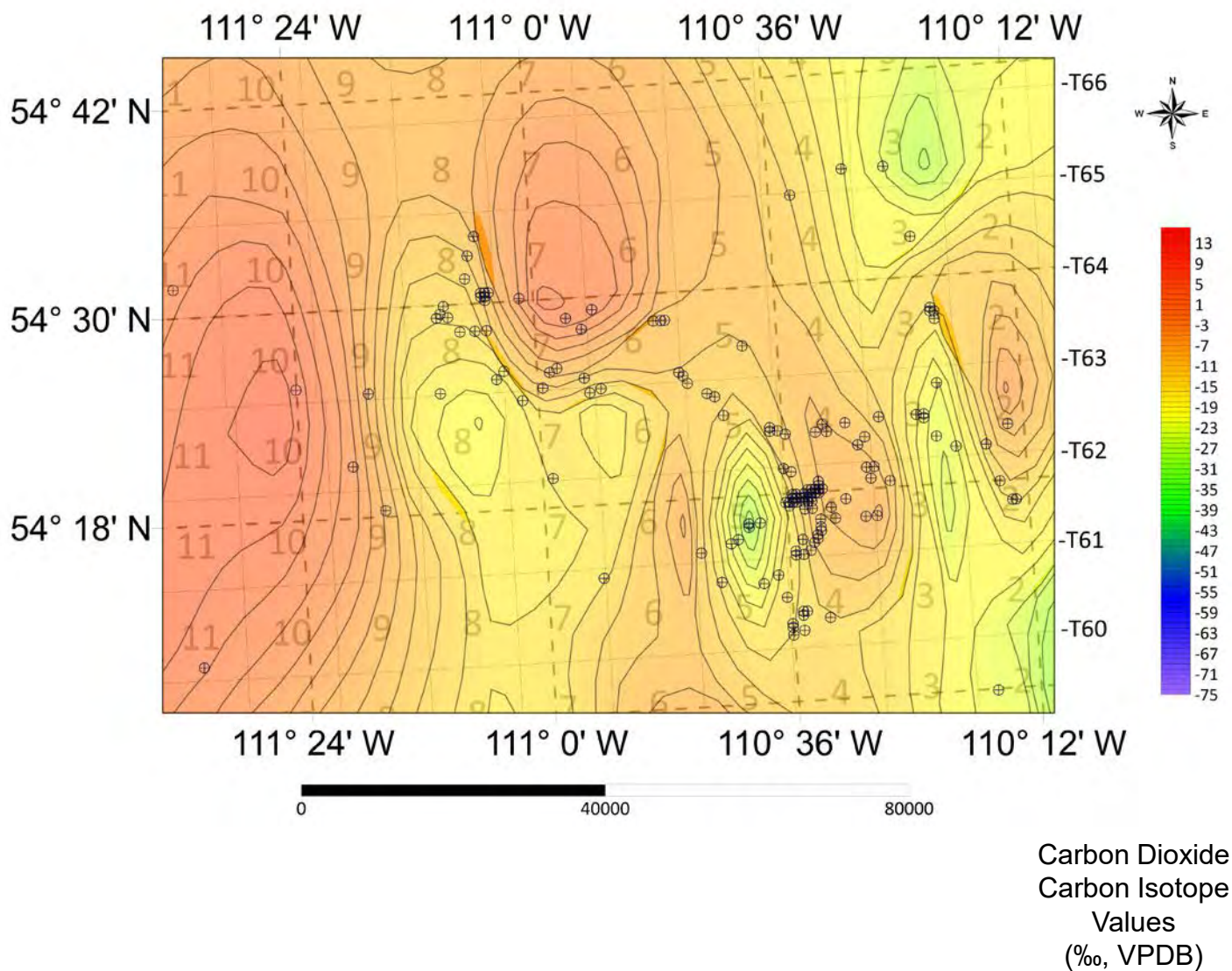


Fig. 29H. Contour Map of Methane Carbon Isotope Values of SCV Beaver Dam Zoom-in over Topographic Map

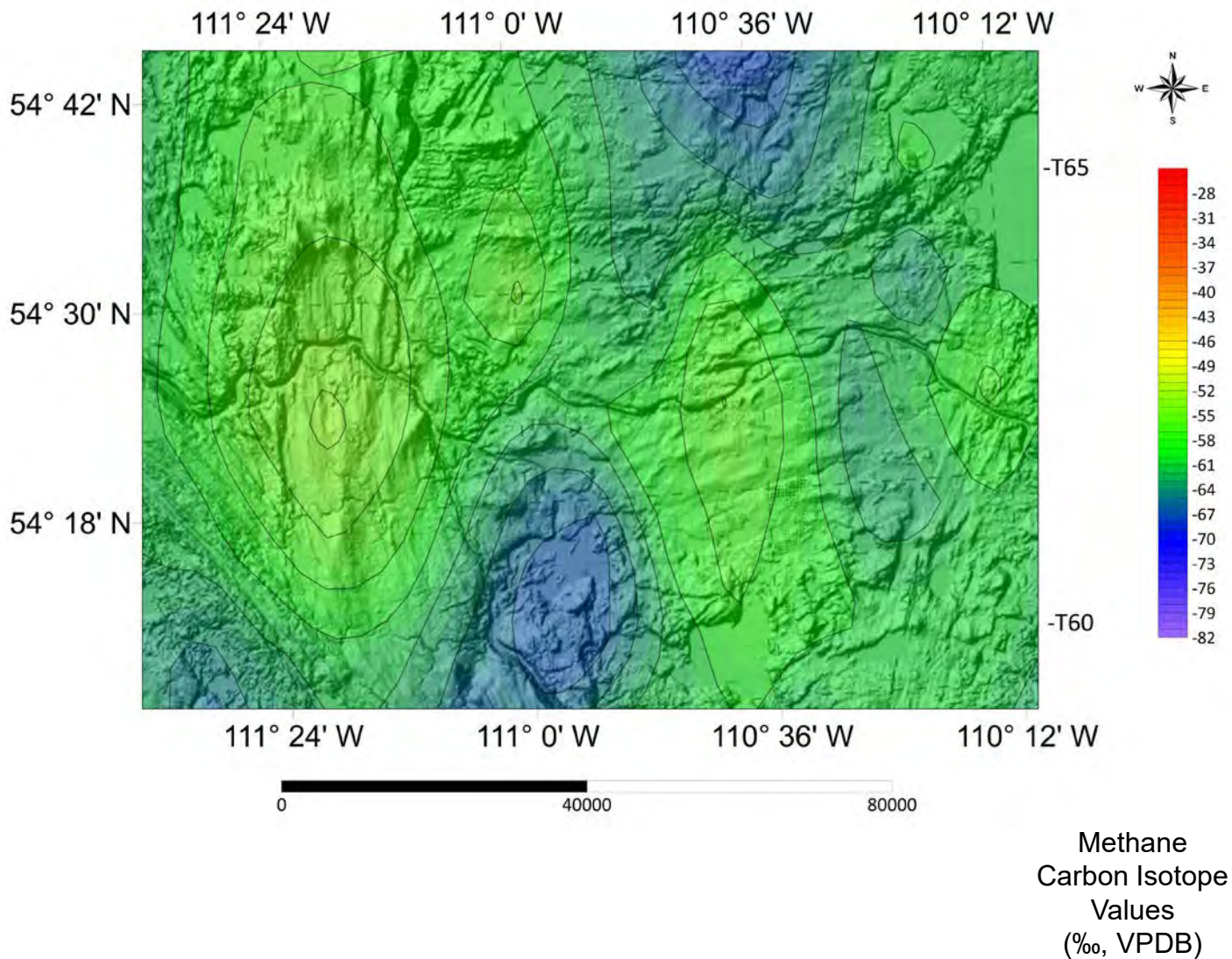




Fig. 9I. Contour Map of Ethane Carbon Isotope Values of SCV Beaver Dam Zoom-in over Topographic Map

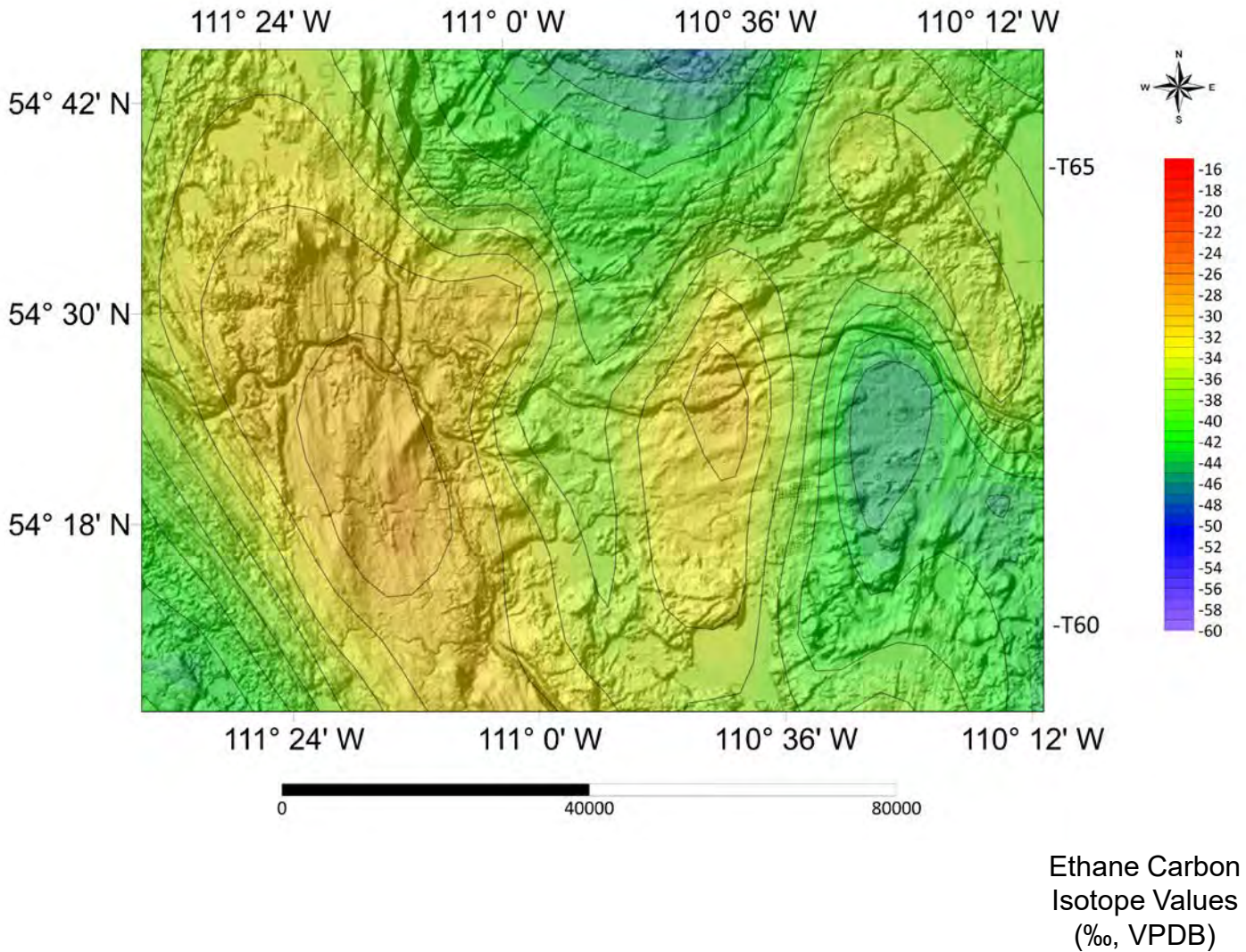


Fig. 9J. Contour Map of Propane Carbon Isotope Values of SCV Beaver Dam Zoom-in over Topographic Map

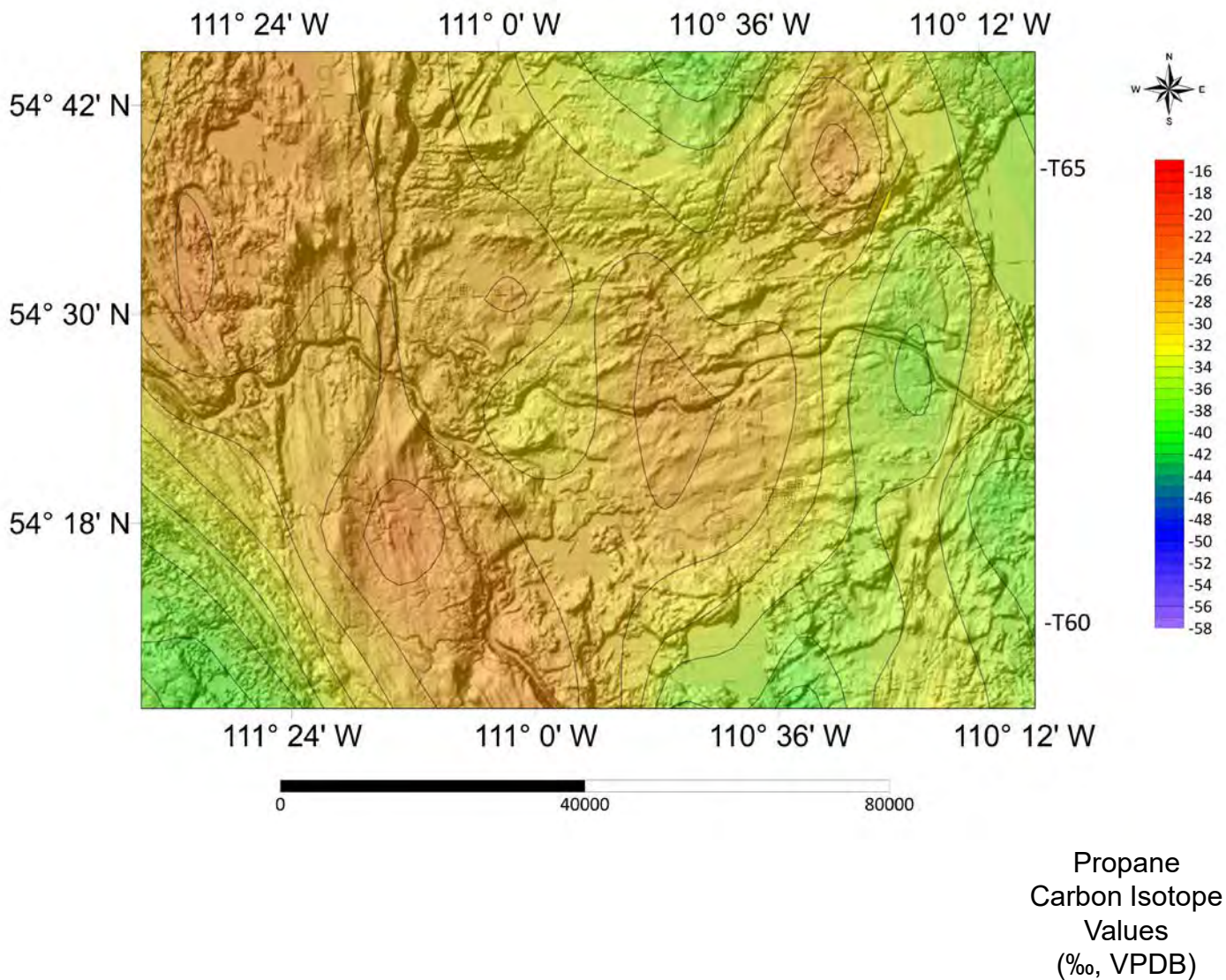




Fig. 9K. Contour Map of *n*-Butane Carbon Isotope Values of SCV Beaver Dam Zoom-in over Topographic Map

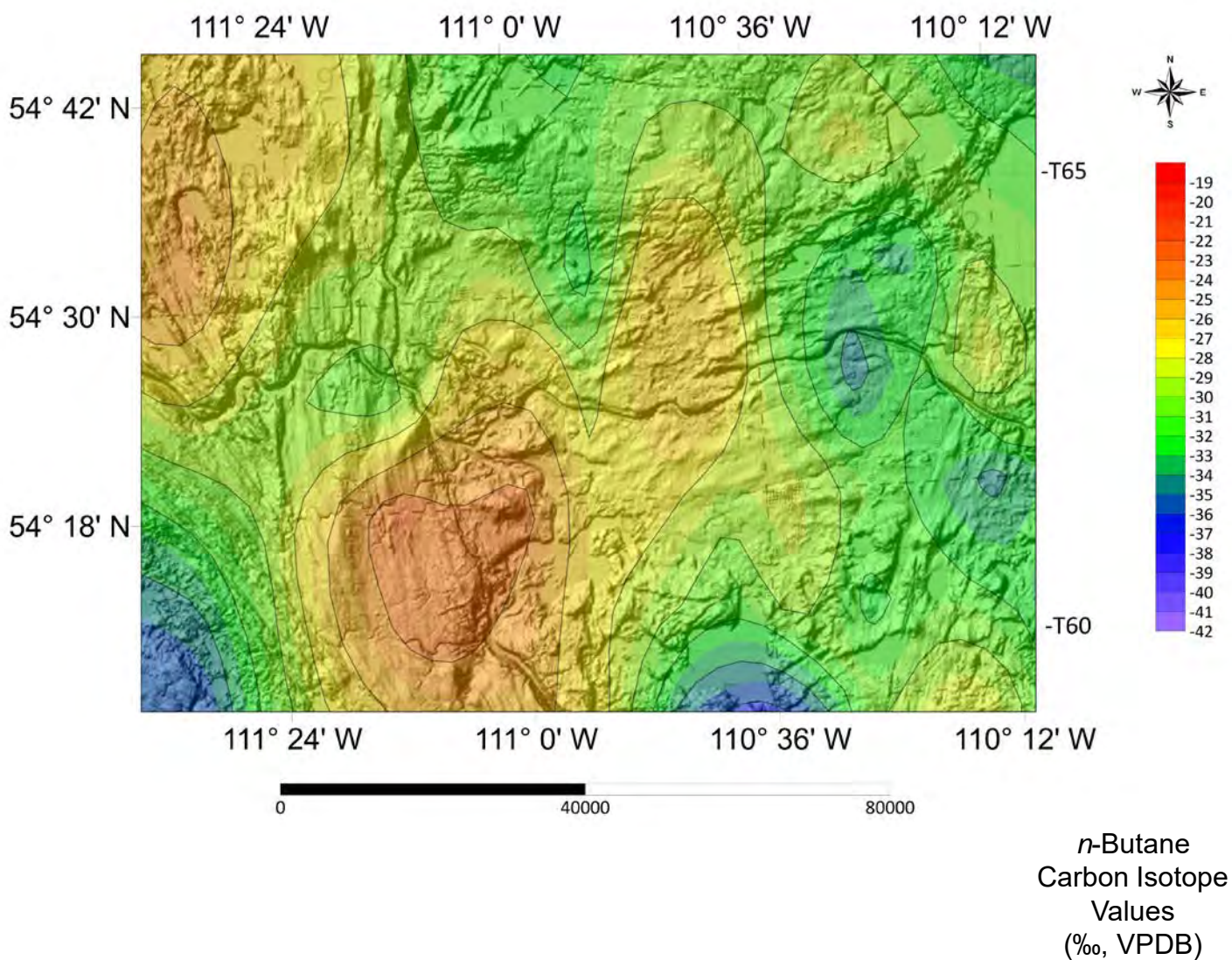


Fig. 9M. Contour Map of *i*-Butane Carbon Isotope Values of SCV Beaver Dam Zoom-in over Topographic Map

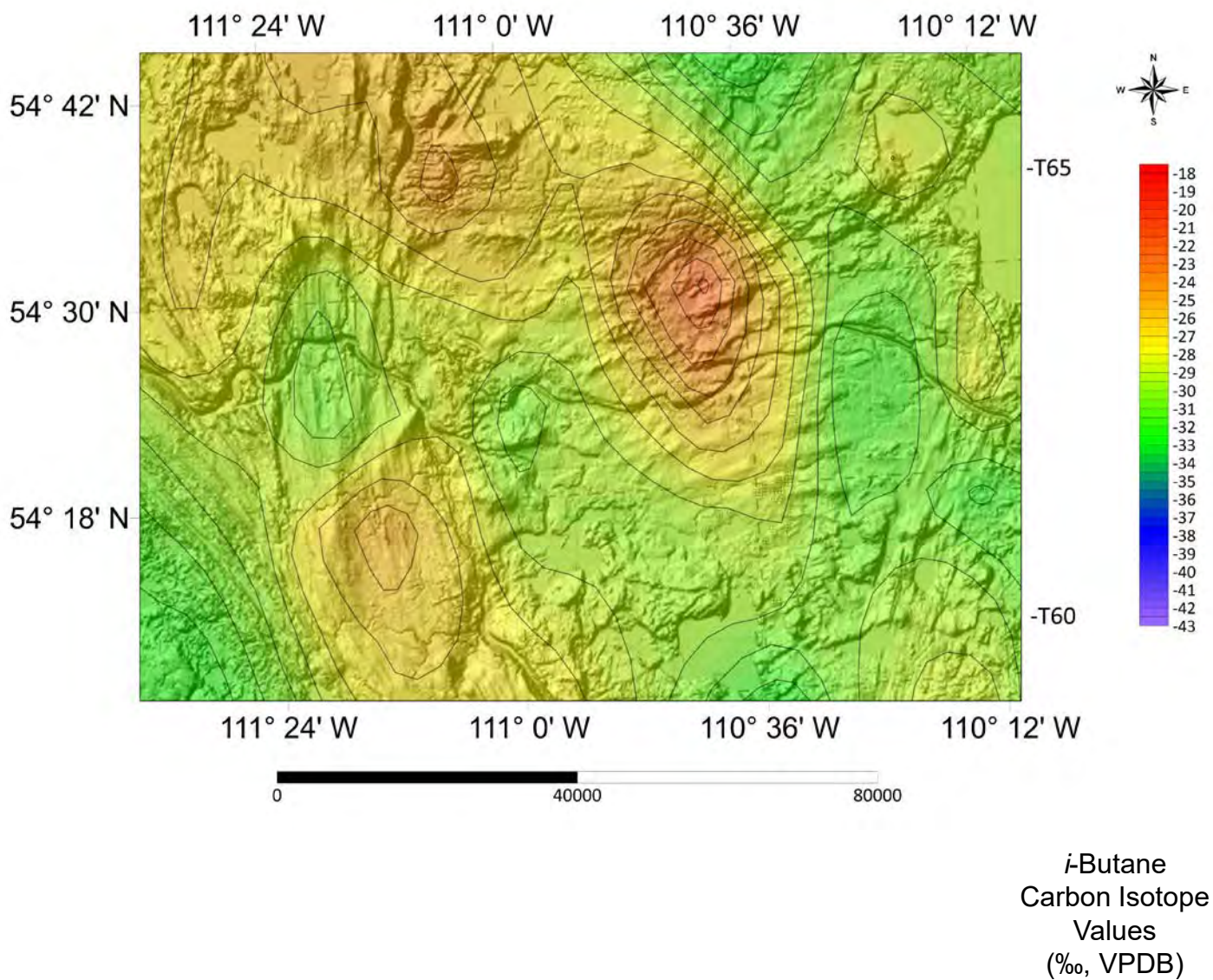




Fig. 9N. Contour Map of Carbon Dioxide Carbon Isotope Values of SCV Beaver Dam Zoom-in over Topographic Map

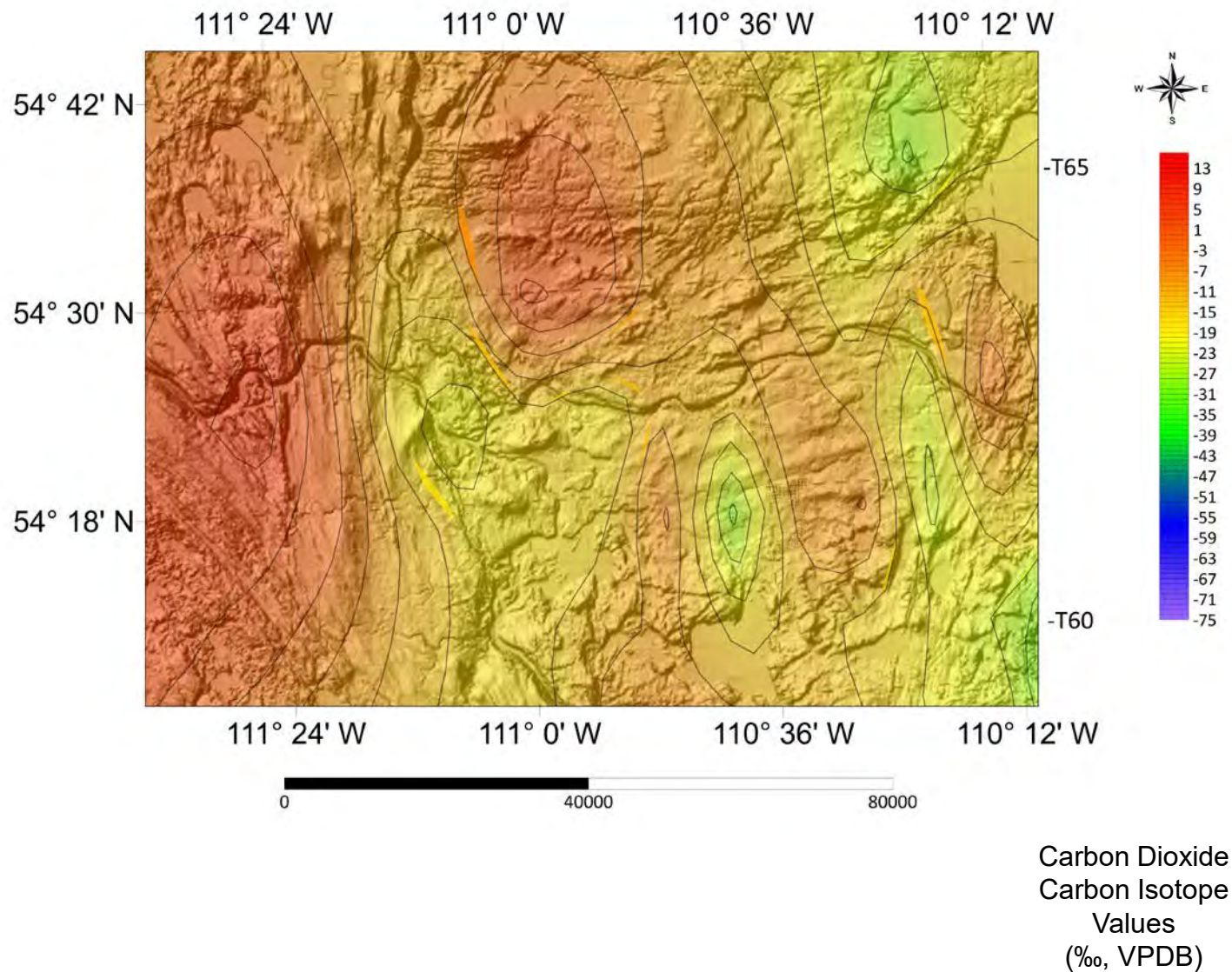


Fig. 30A. Map of Ground Migration (GM) Locations in the Beaver Dam Zoom-in

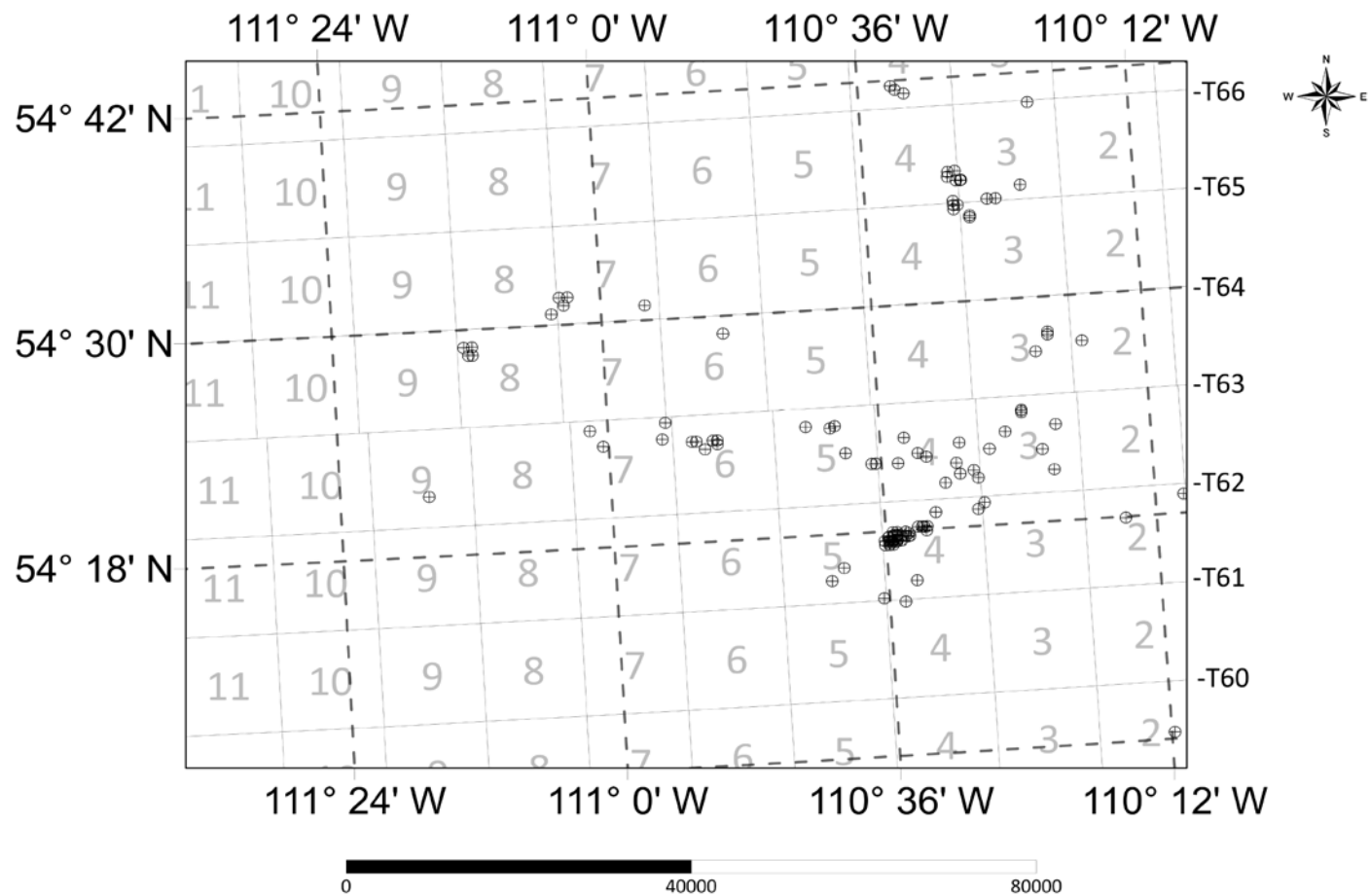




Fig. 30B. Contour Map of Methane Carbon Isotope Values of GM Beaver Dam Zoom-in

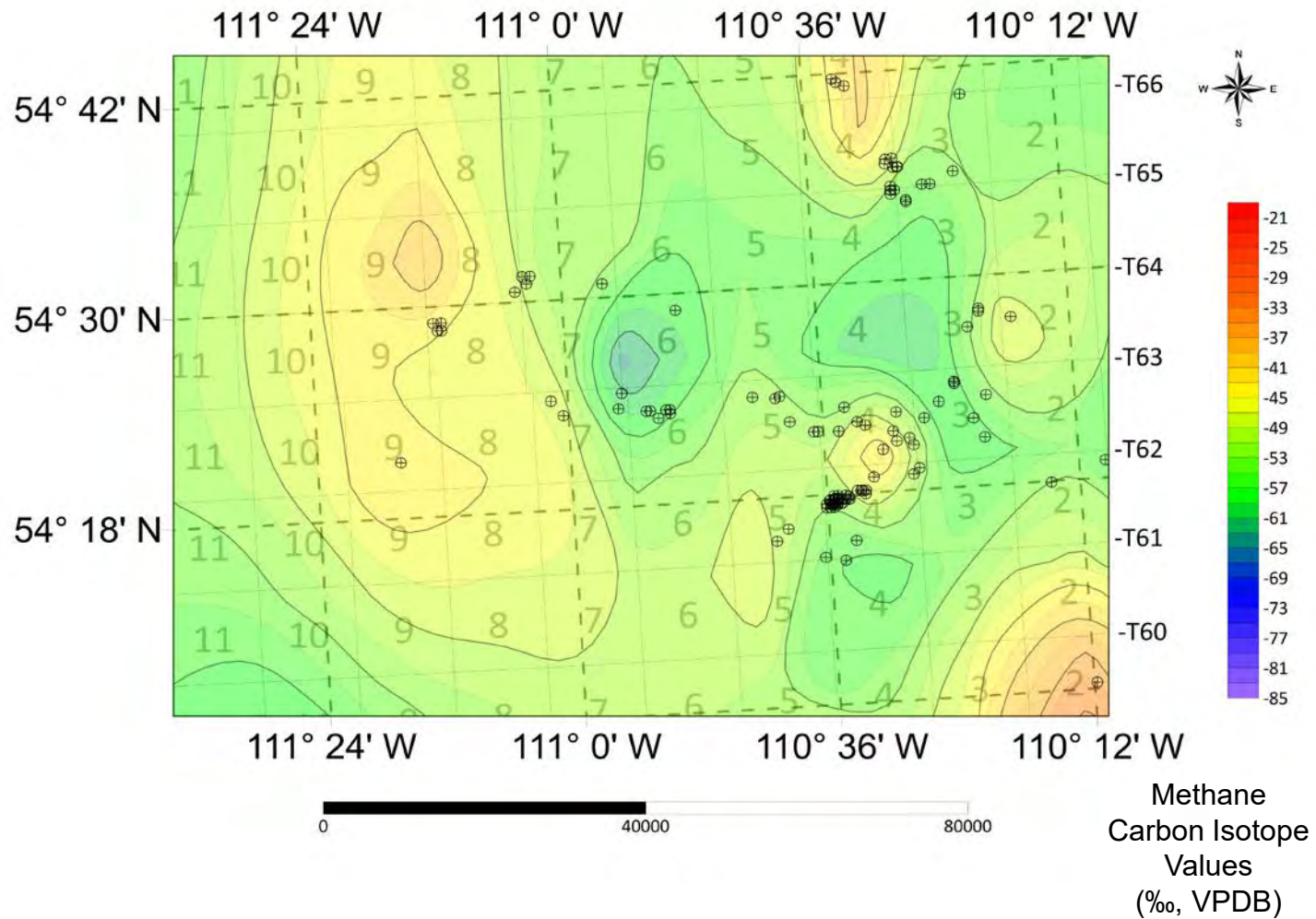


Fig. 30C. Contour Map of Ethane Carbon Isotope Values of GM Beaver Dam Zoom-in

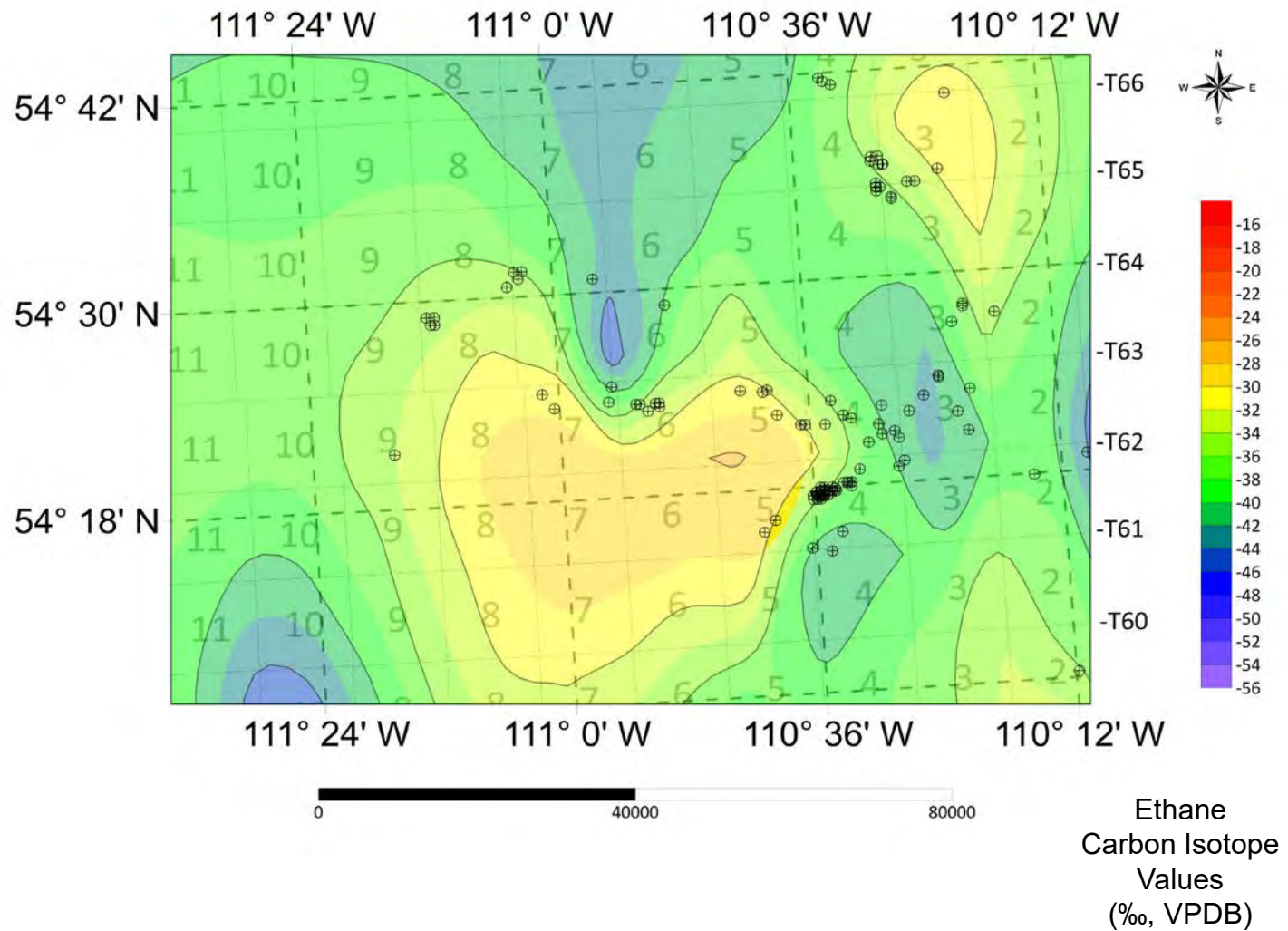




Fig. 30D. Contour Map of Propane Carbon Isotope Values of GM Beaver Dam Zoom-in

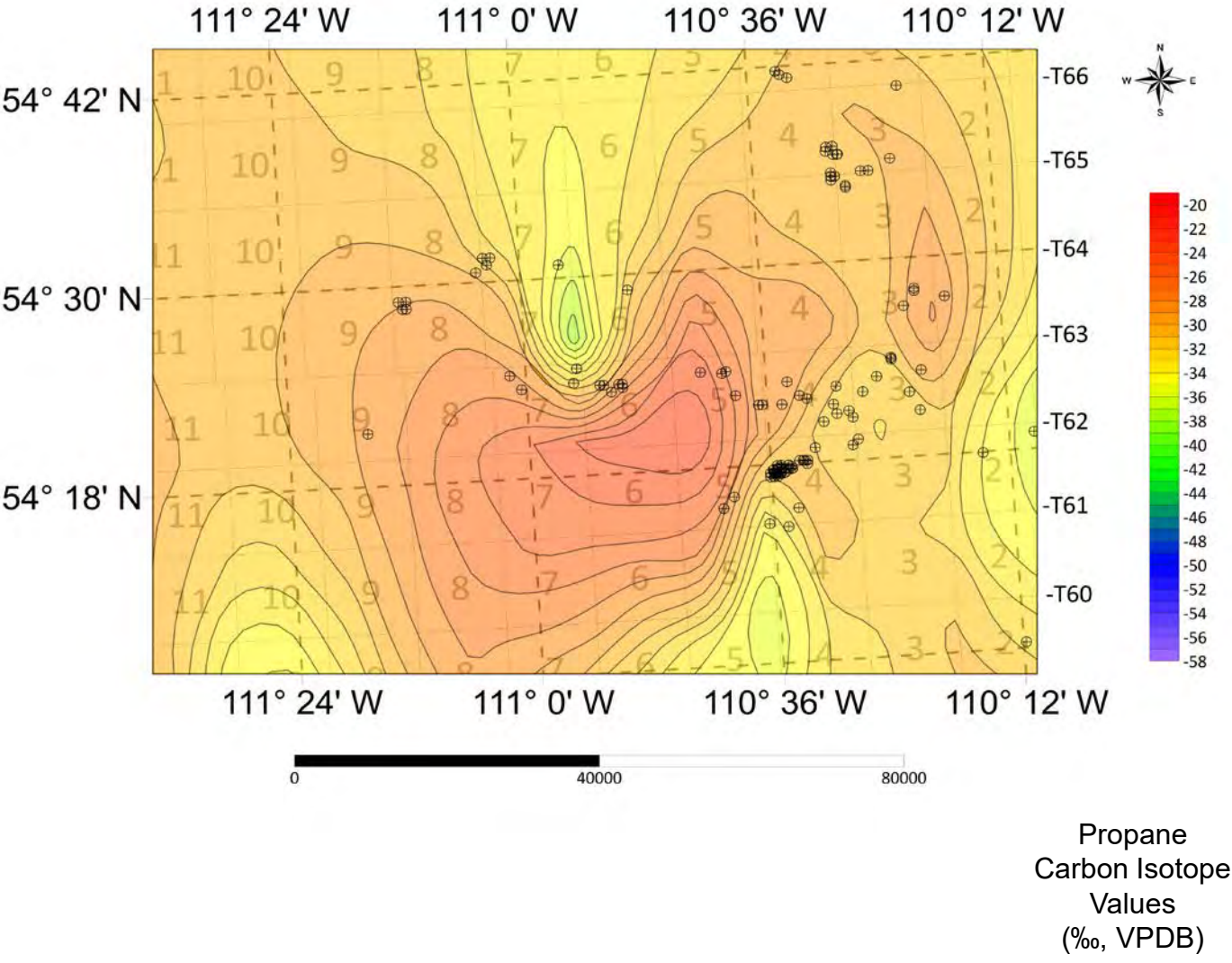
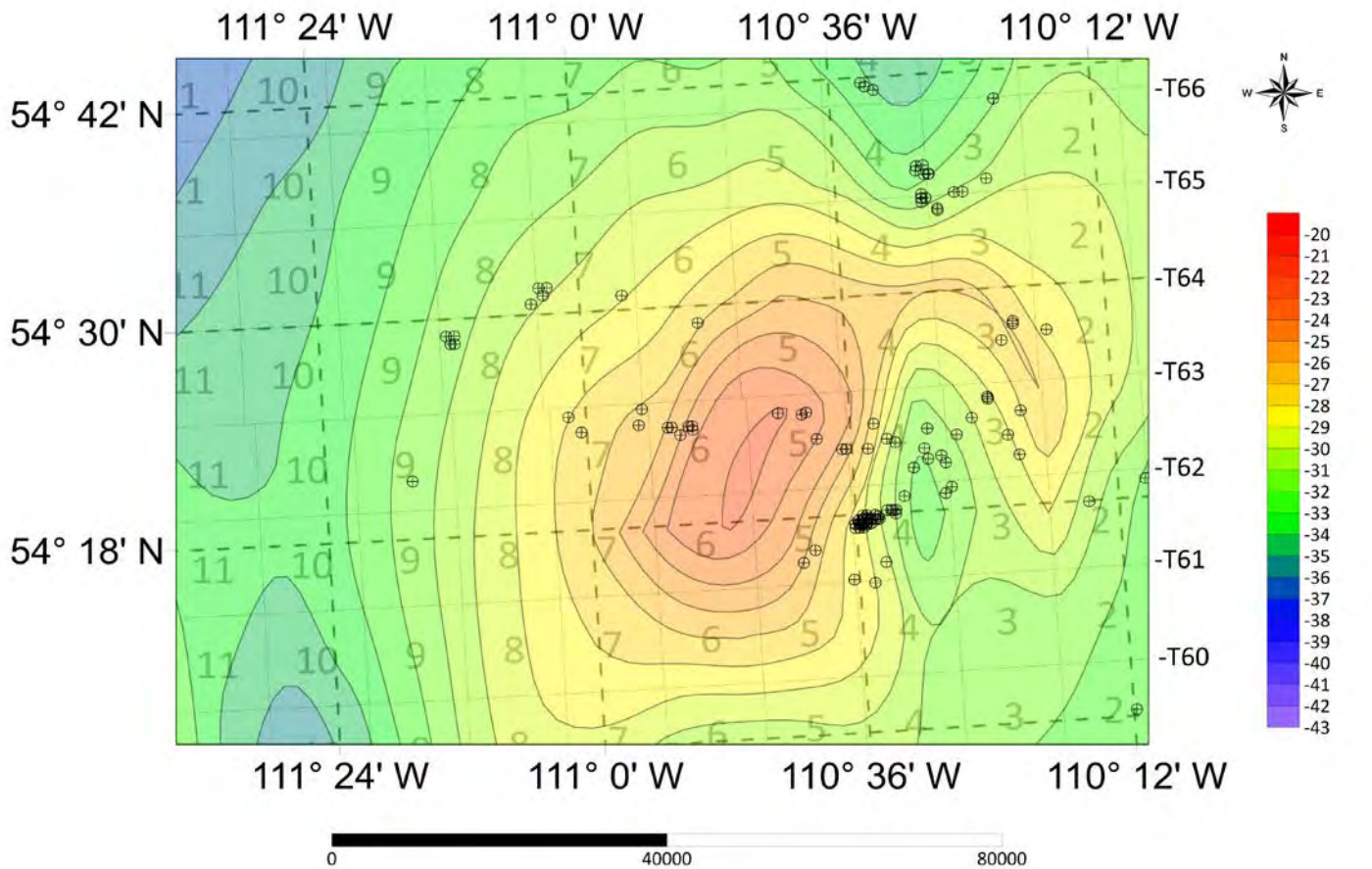


Fig. 30E. Contour Map of *n*-Butane Carbon Isotope Values of GM Beaver Dam Zoom-in



*n*-Butane  
Carbon Isotope  
Values  
(‰, VPDB)



Fig. 30F. Contour Map of *i*-Butane Carbon Isotope Values of GM Beaver Dam Zoom-in

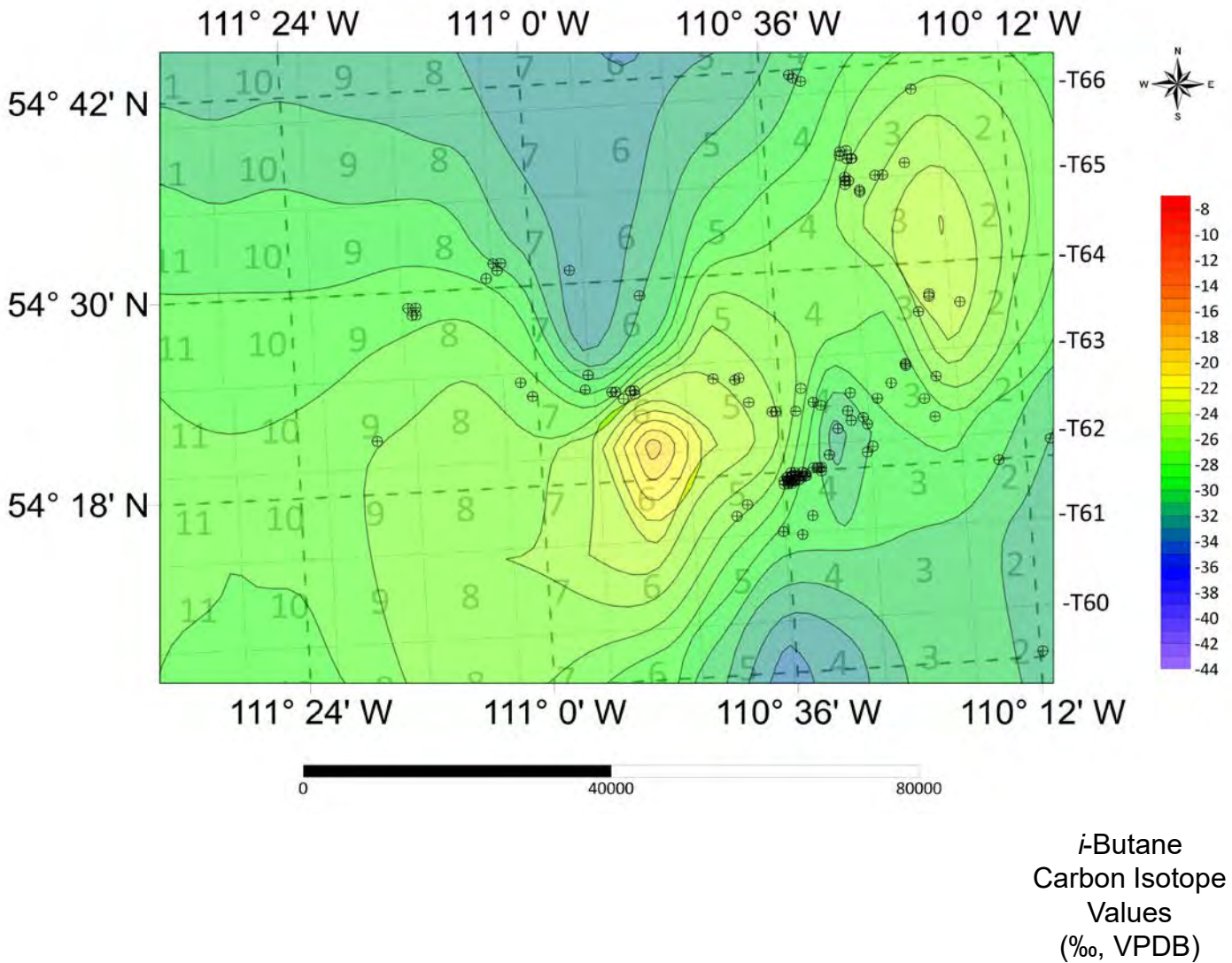
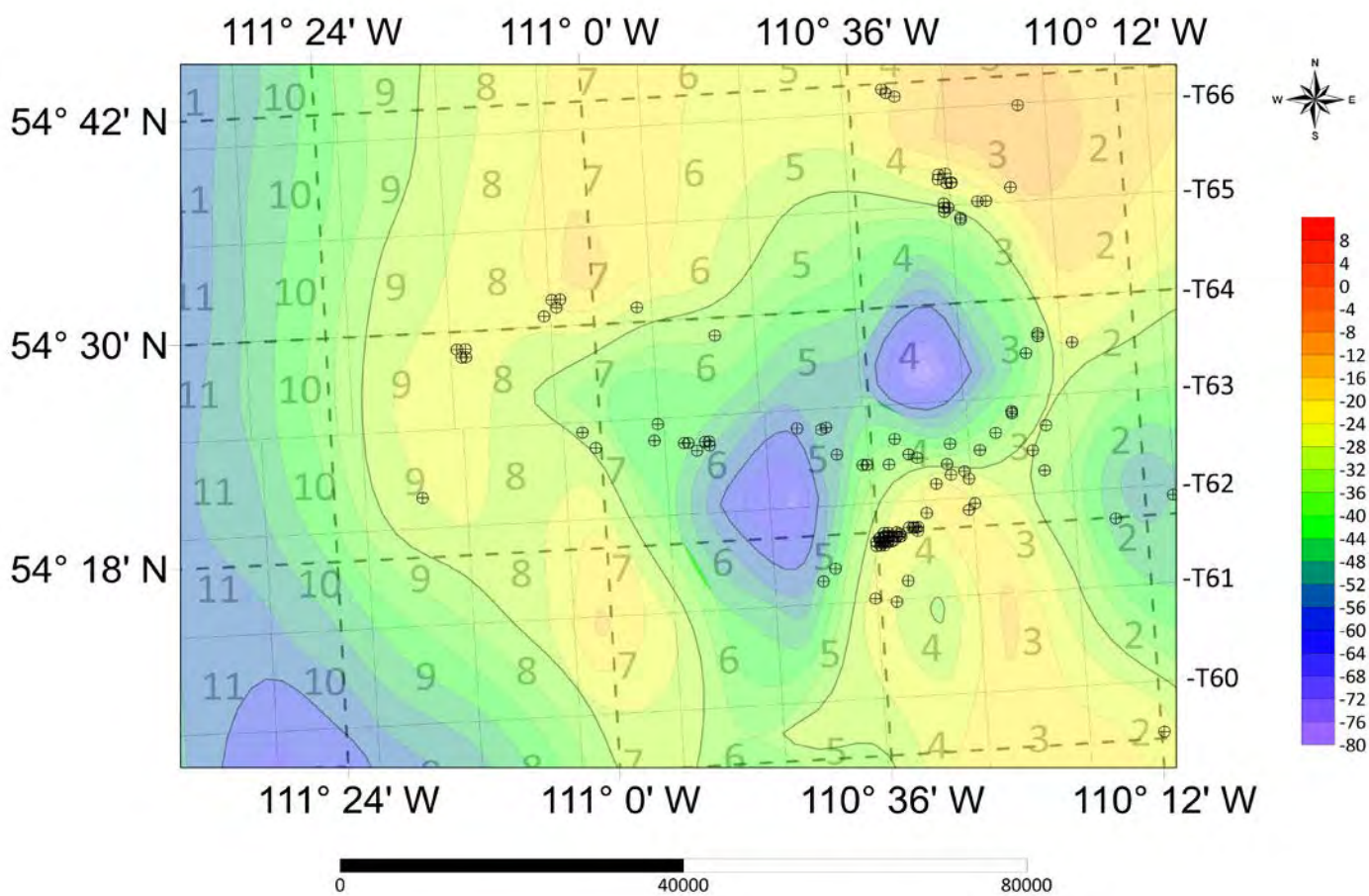


Fig. 30G. Contour Map of Carbon Dioxide Carbon Isotope Values of GM Beaver Dam Zoom-in



Carbon Dioxide  
Carbon Isotope  
Values  
(‰, VPDB)



Fig. 30H. Contour Map of Methane Carbon Isotope Values of GM Beaver Dam Zoom-in over Topographic Map

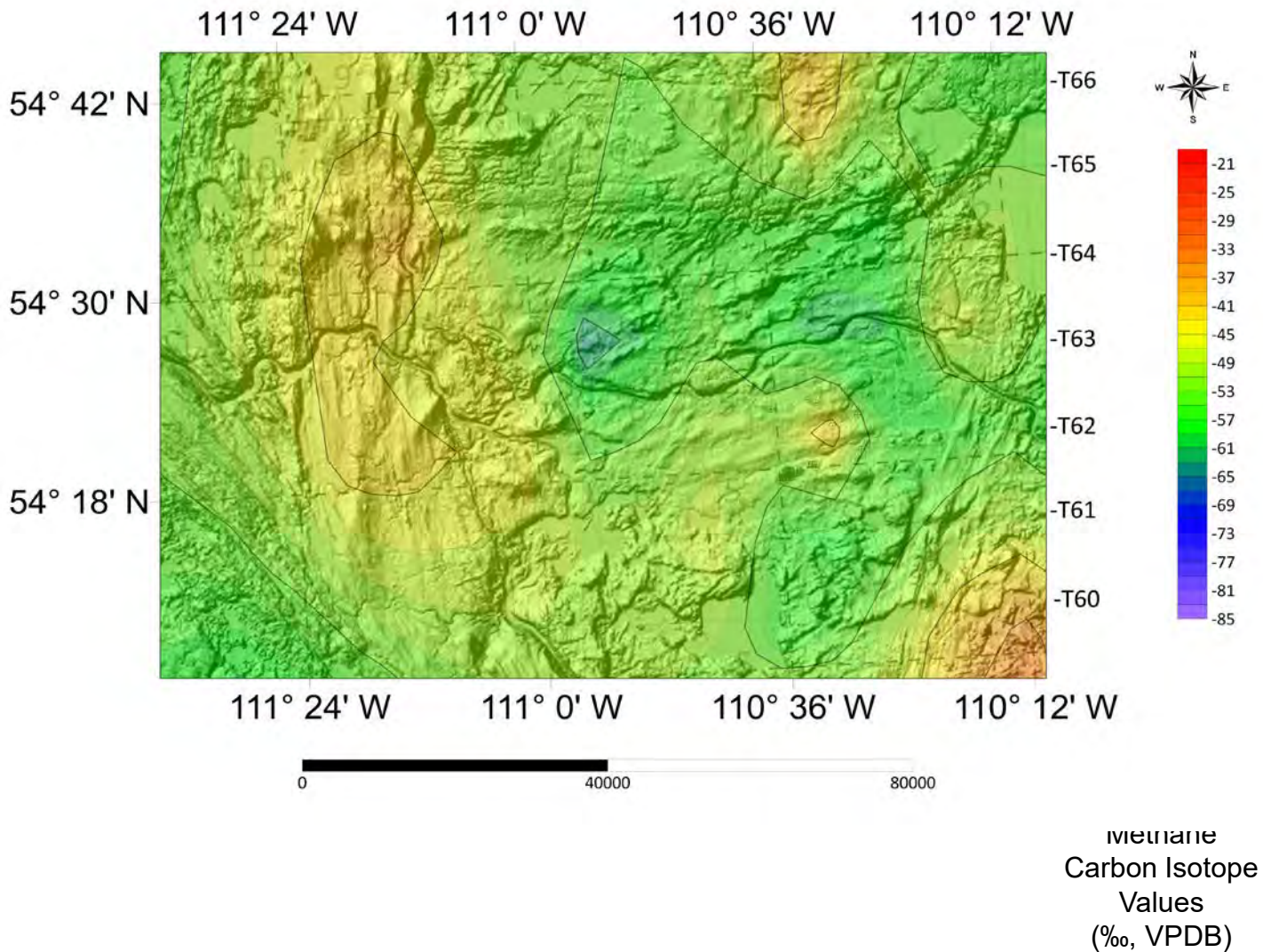
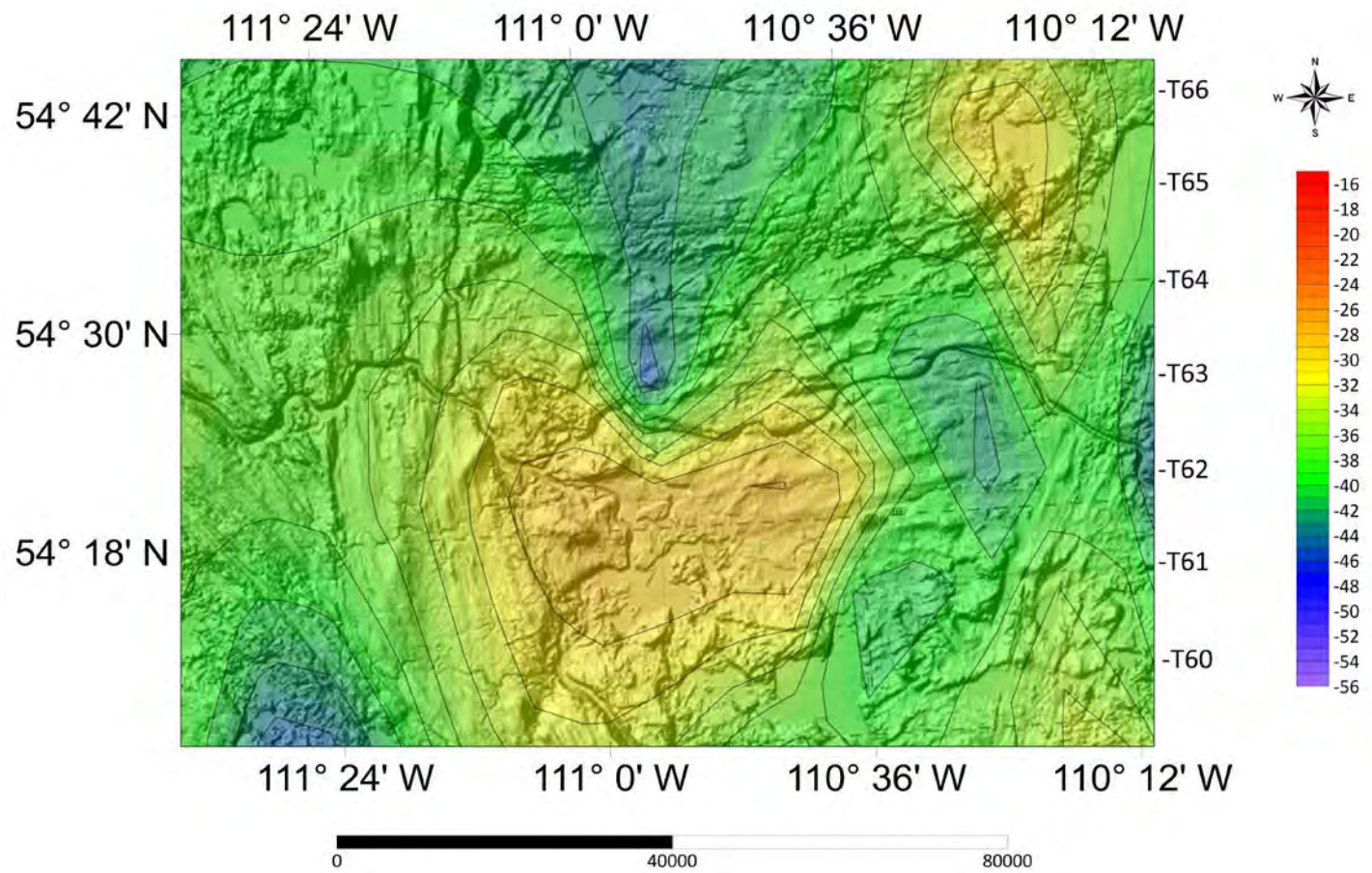


Fig. 30I. Contour Map of Ethane Carbon Isotope Values of GM Beaver Dam Zoom-in over Topographic Map



Ethane Carbon  
Isotope Values  
(‰, VPDB)



Fig. 30J. Contour Map of Propane Carbon Isotope Values of GM Beaver Dam Zoom-in over Topographic Map

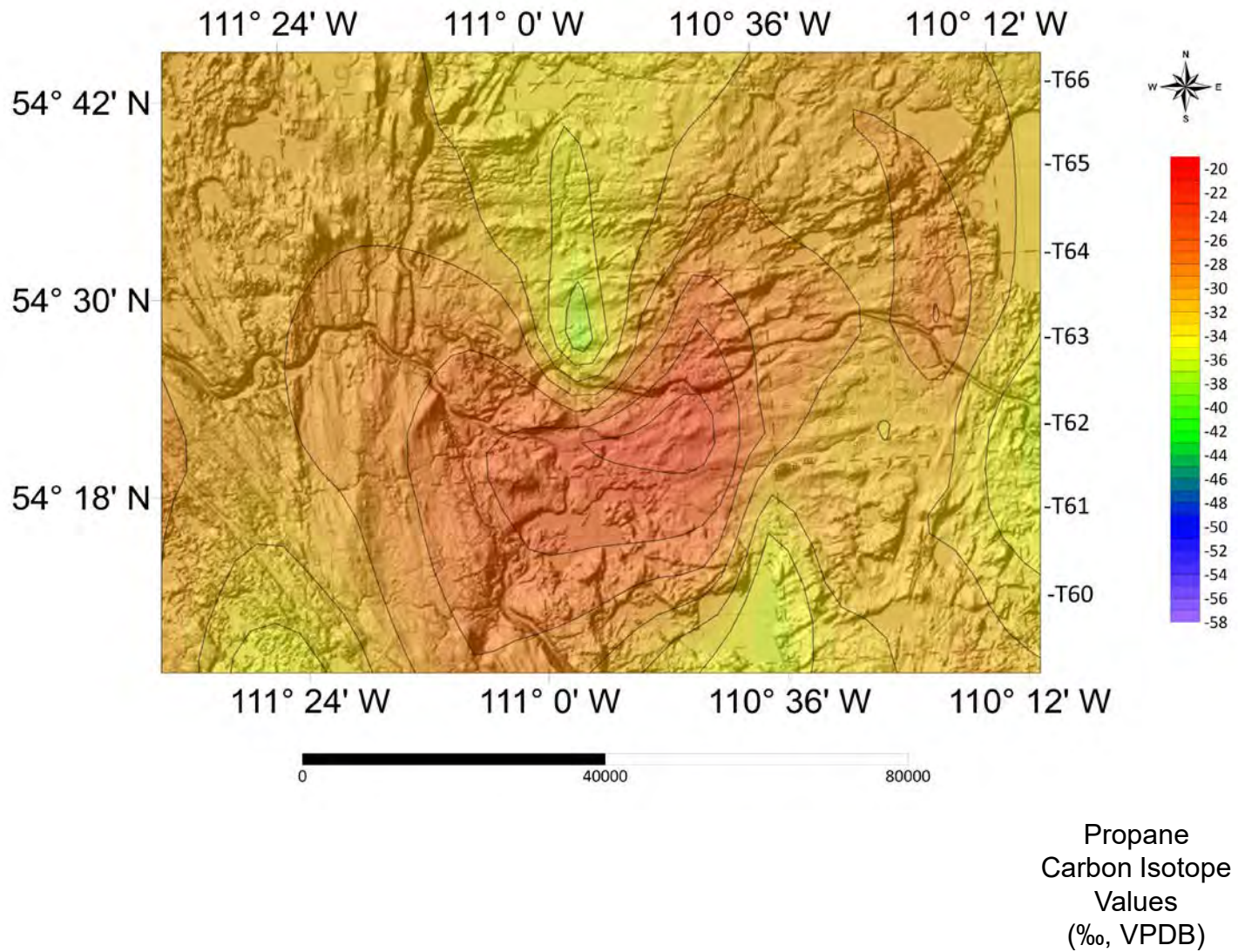


Fig. 30K. Contour Map of *n*-Butane Carbon Isotope Values of GM Beaver Dam Zoom-in over Topographic Map

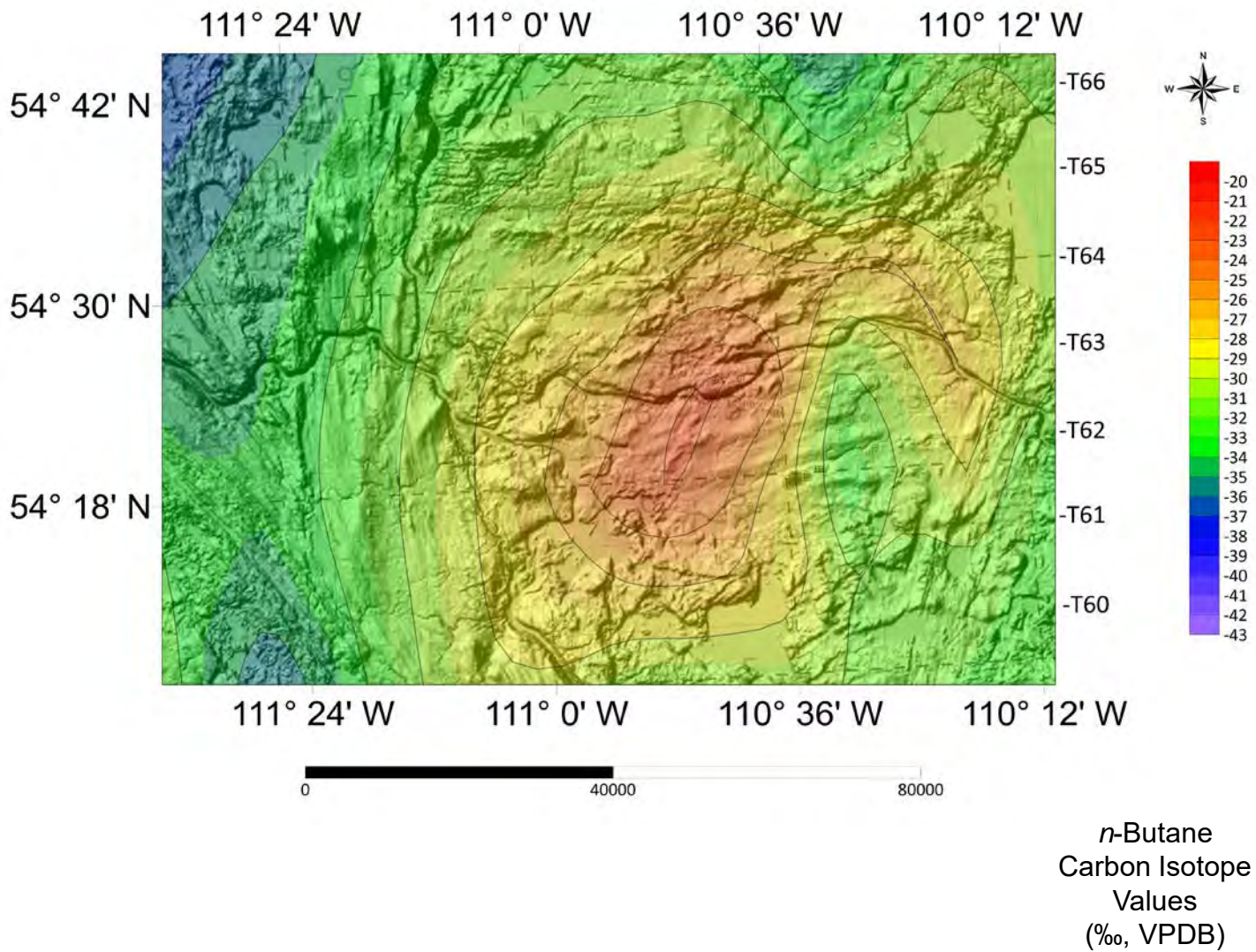




Fig. 30L. Contour Map of *i*-Butane Carbon Isotope Values of GM Beaver Dam Zoom-in over Topographic Map

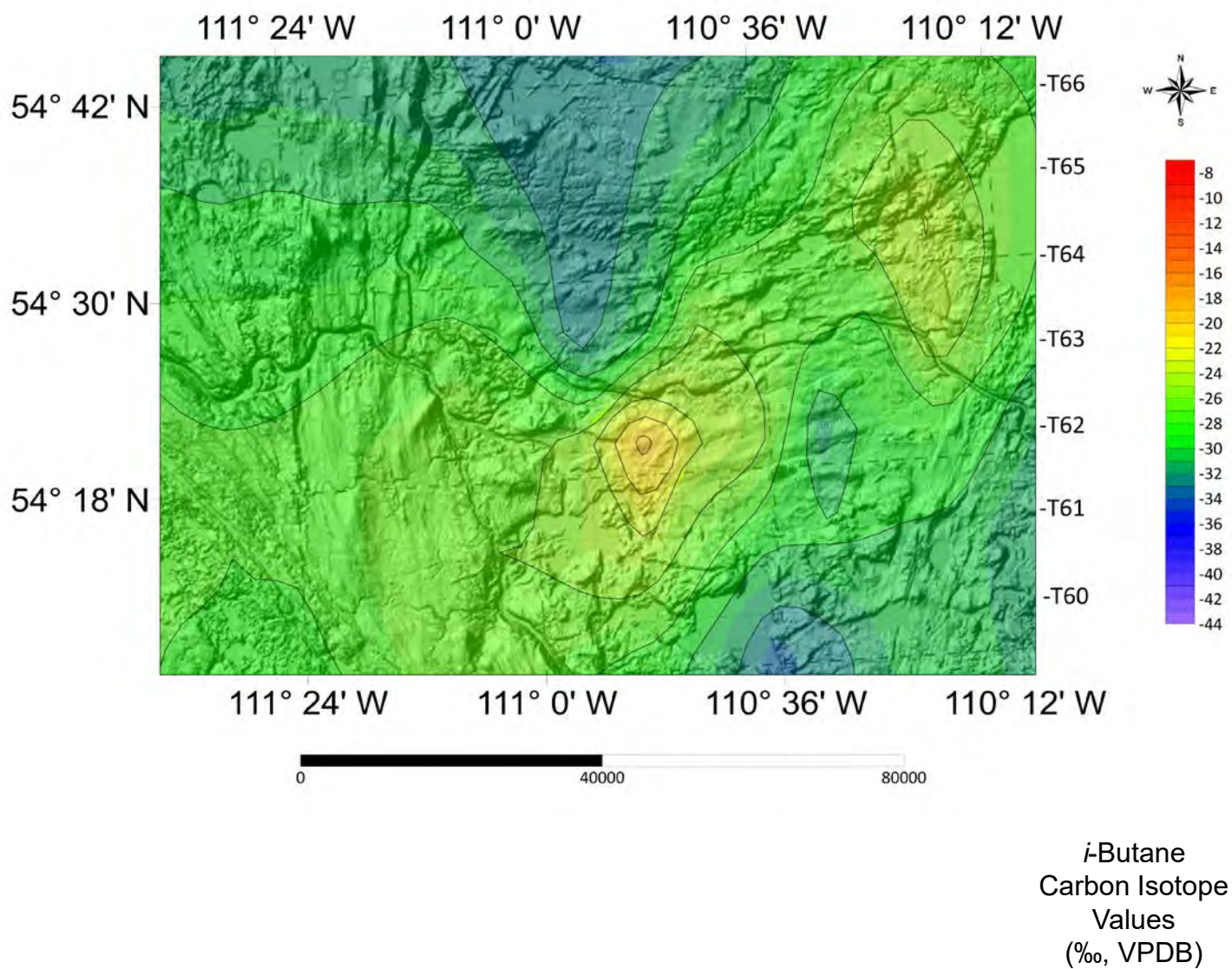
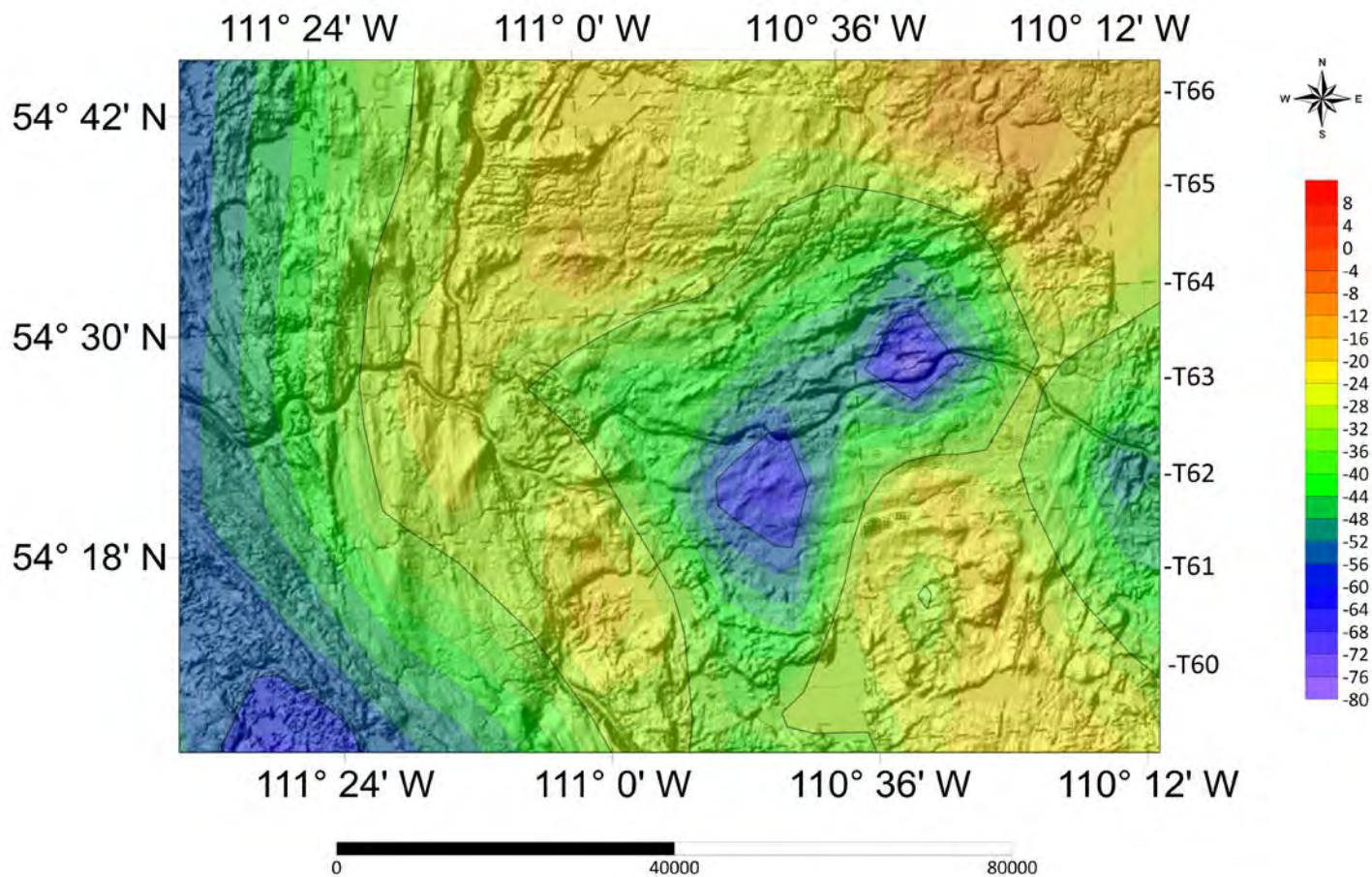


Fig. 30M. Contour Map of Carbon Dioxide Carbon Isotope Values of GM Beaver Dam Zoom-in over Topographic Map



Carbon Dioxide  
Carbon Isotope  
Values  
(‰, VPDB)



Fig. 31A. Map of Surface Casing Vent (SCV) Locations in the Pembina Zoom-in

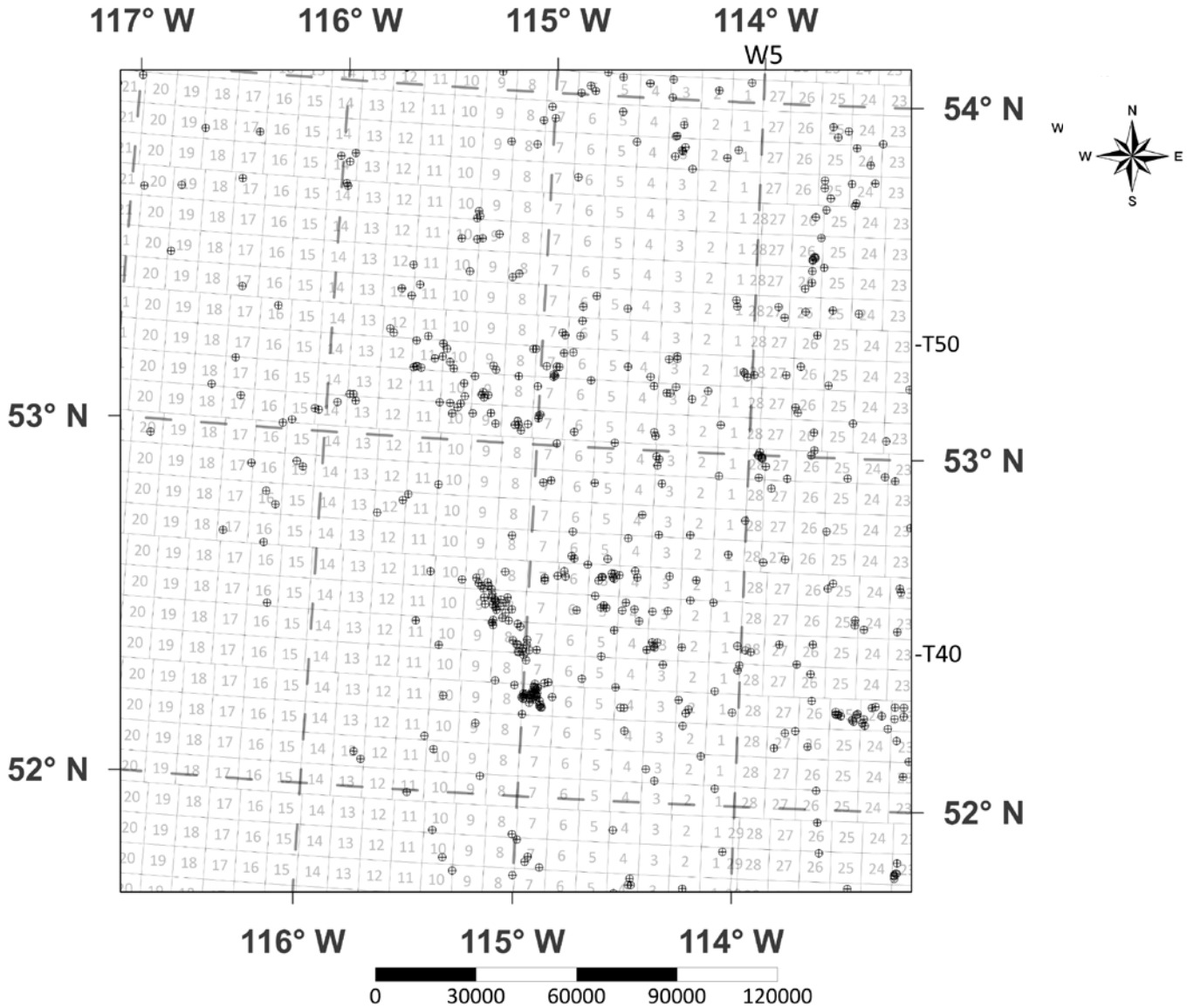


Fig. 31B. Contour Map of Methane Carbon Isotope Values of SCV Pembina Zoom-in

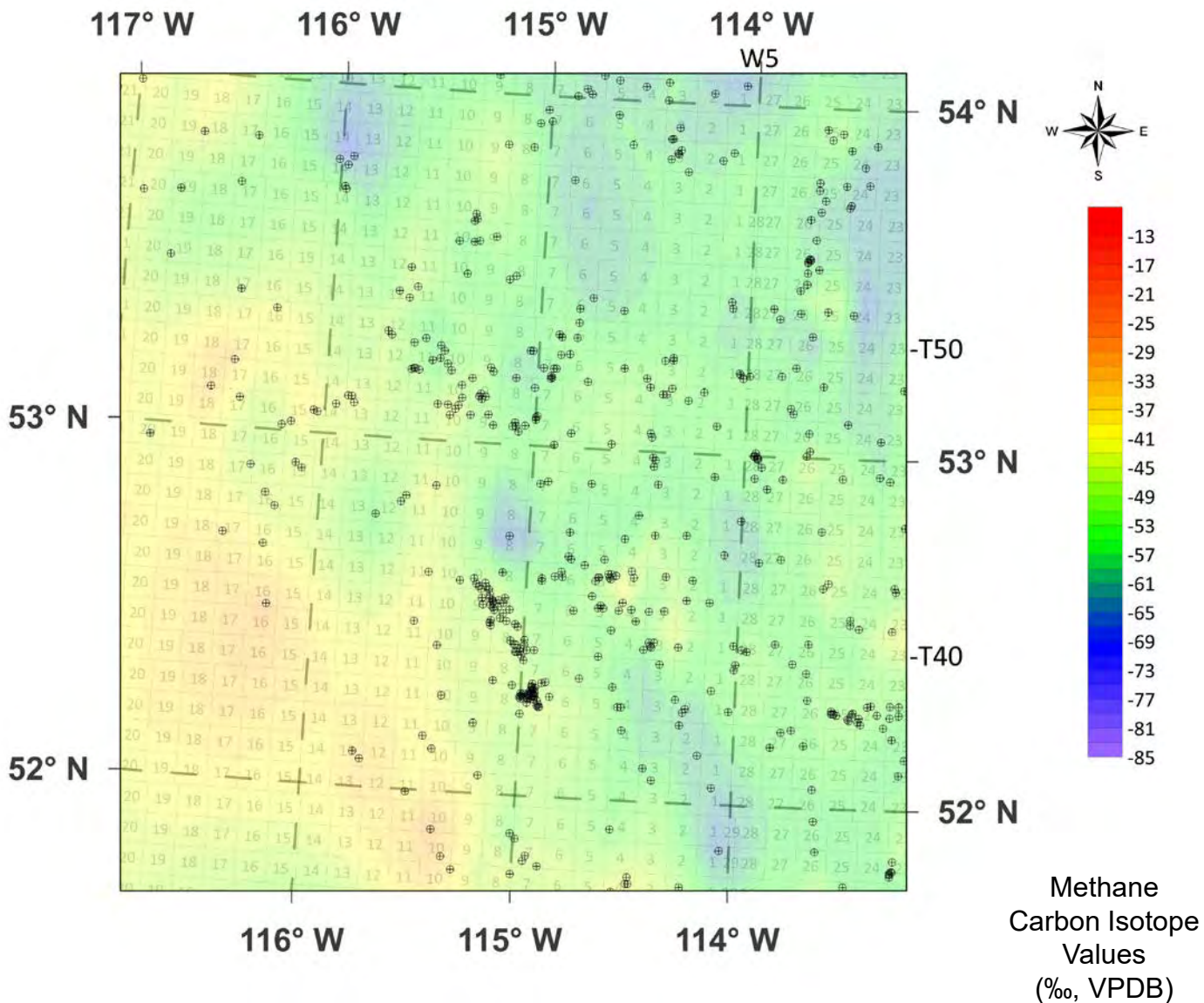




Fig. 31C. Contour Map of Ethane Carbon Isotope Values of SCV Pembina Zoom-in

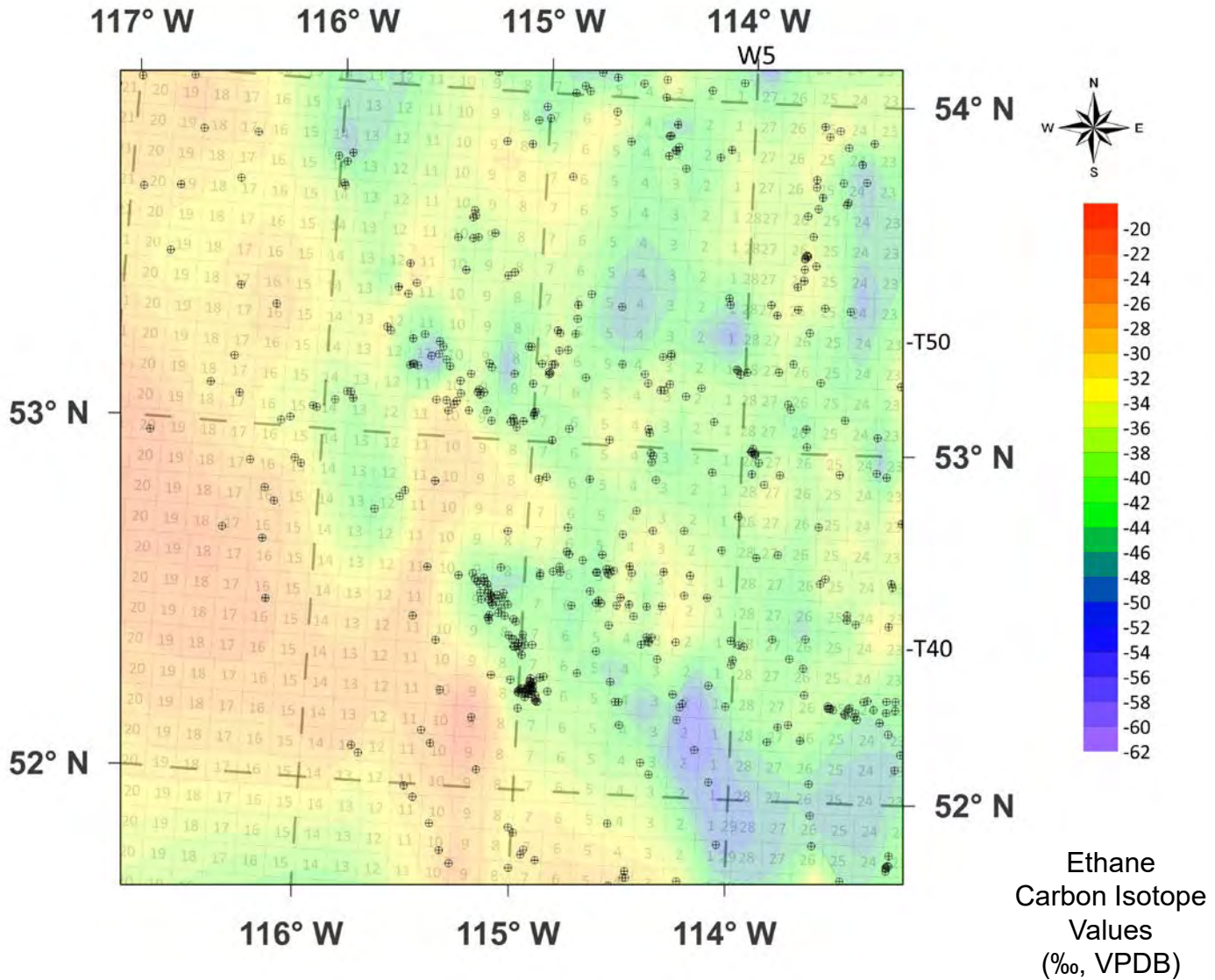


Fig. 31D. Contour Map of Propane Carbon Isotope Values of SCV Pembina Zoom-in

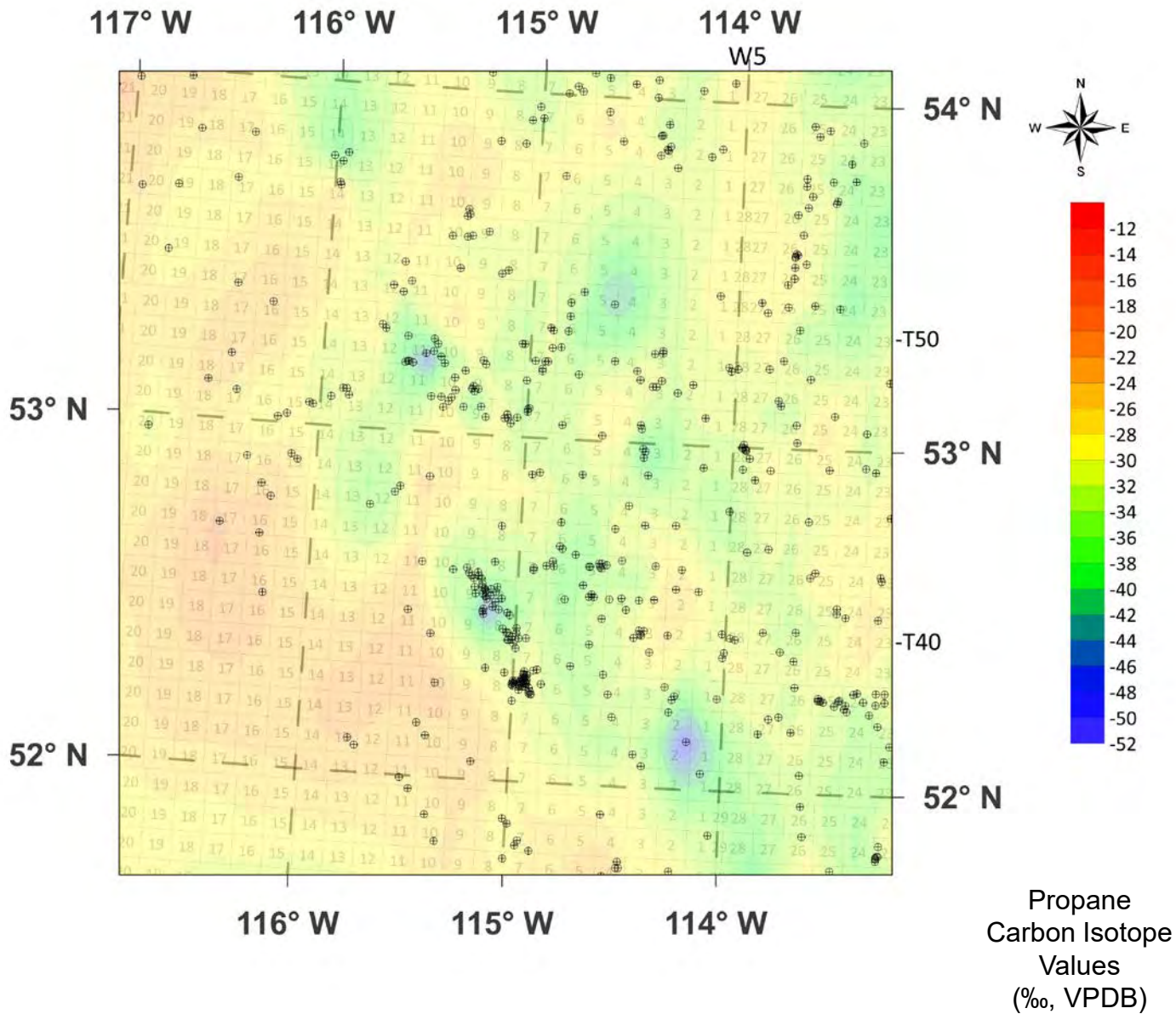




Fig. 31E. Contour Map of *n*-Butane Carbon Isotope Values of SCV Pembina Zoom-in

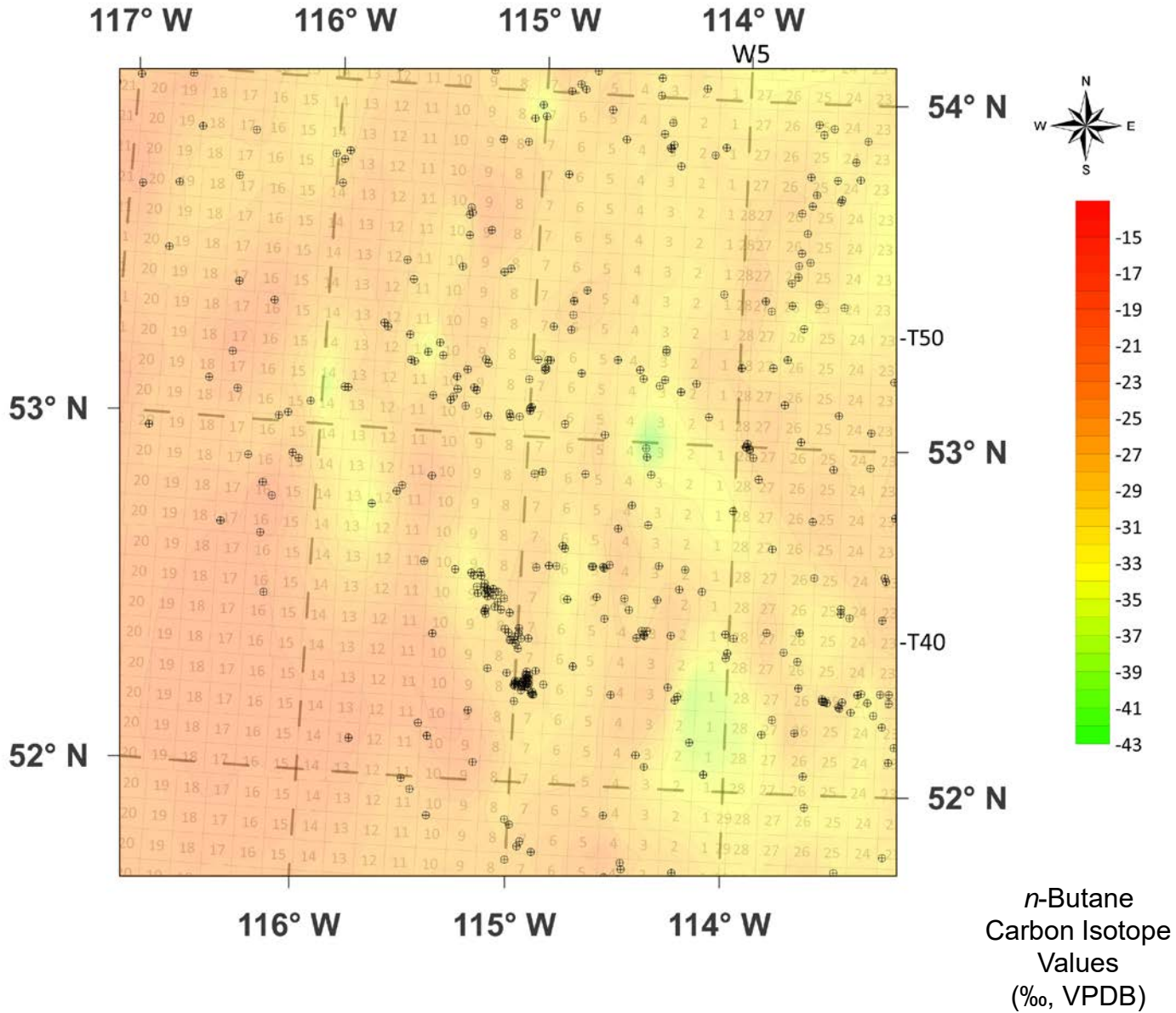


Fig. 31F. Contour Map of *i*-Butane Carbon Isotope Values of SCV Lloydminster Zoom-in

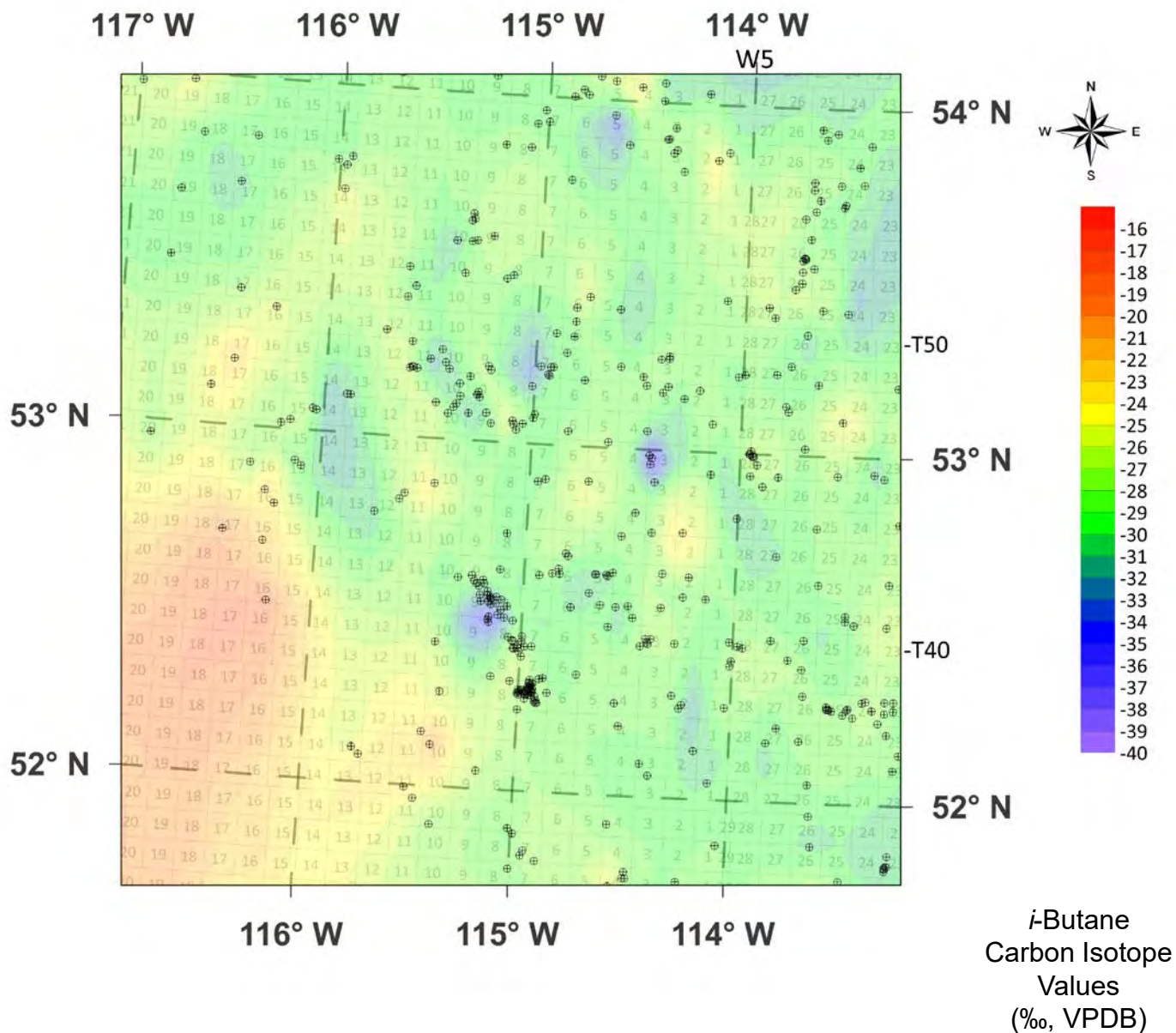




Fig. 31G. Contour Map of Carbon Dioxide Carbon Isotope Values of SCV Pembina Zoom-in

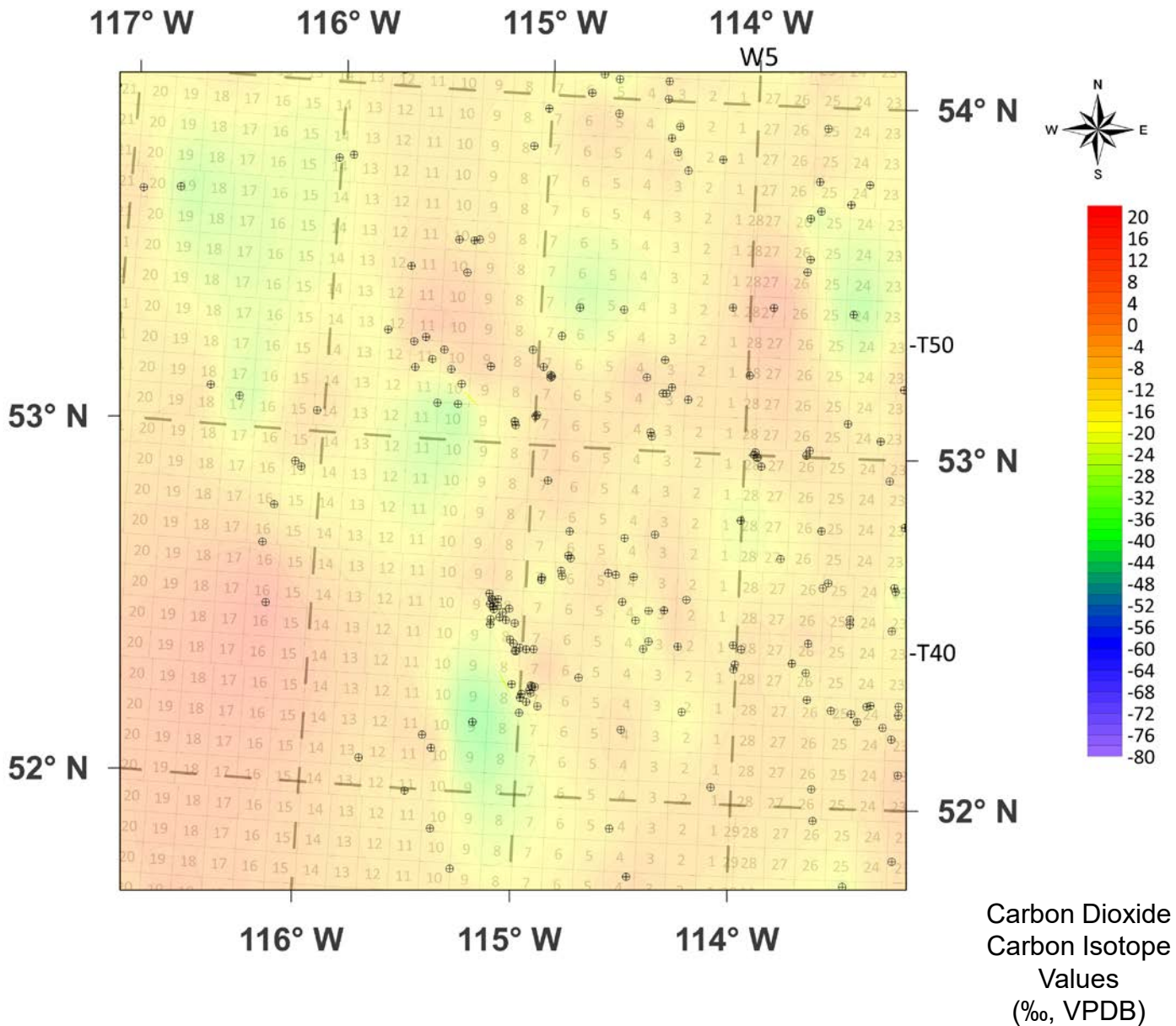


Fig. 31H. Contour Map of Methane Carbon Isotope Values of SCV Pembina Zoom-in over Topographic Map

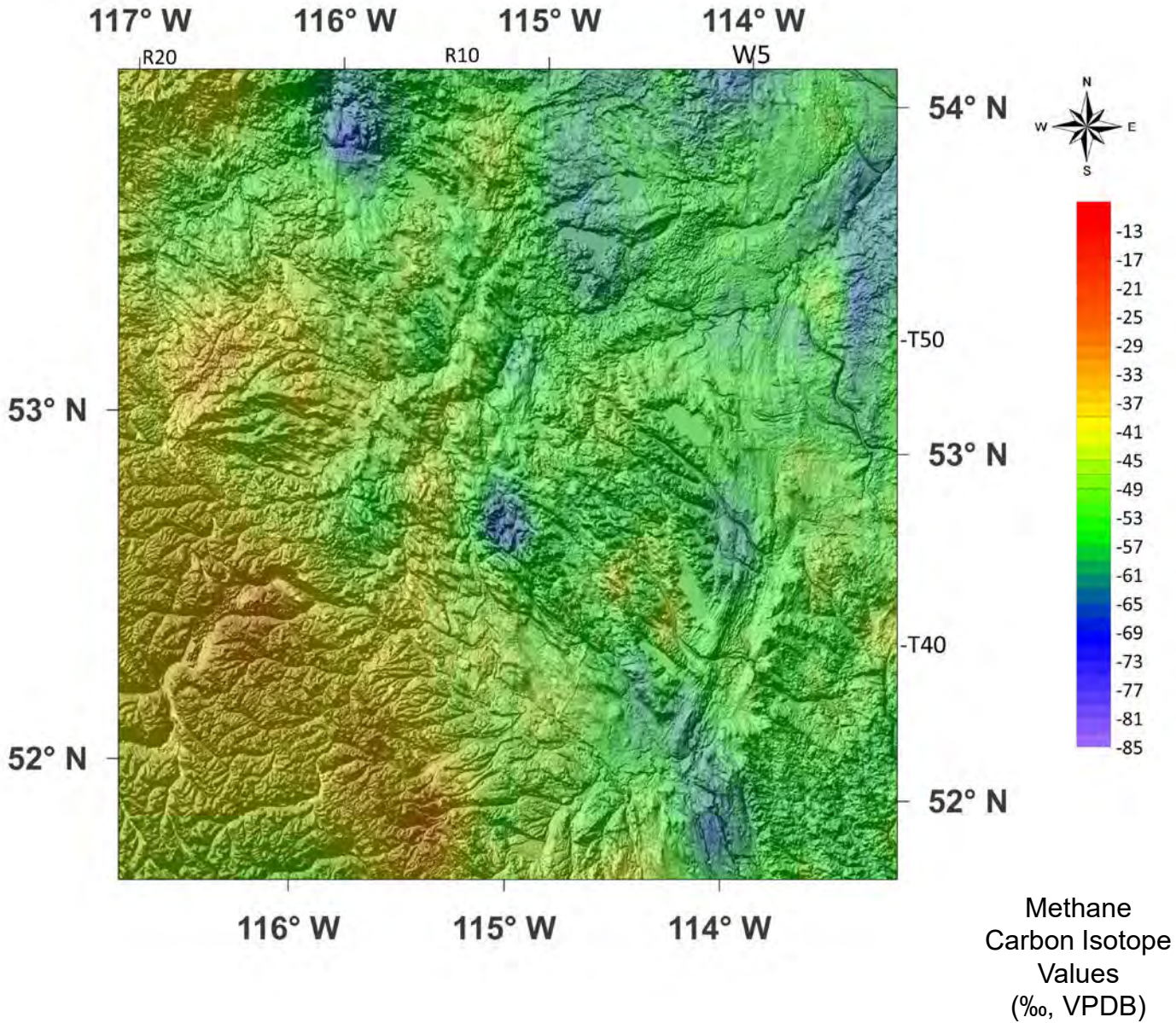




Fig. 31I. Contour Map of Ethane Carbon Isotope Values of SCV Pembina Zoom-in over Topographic Map

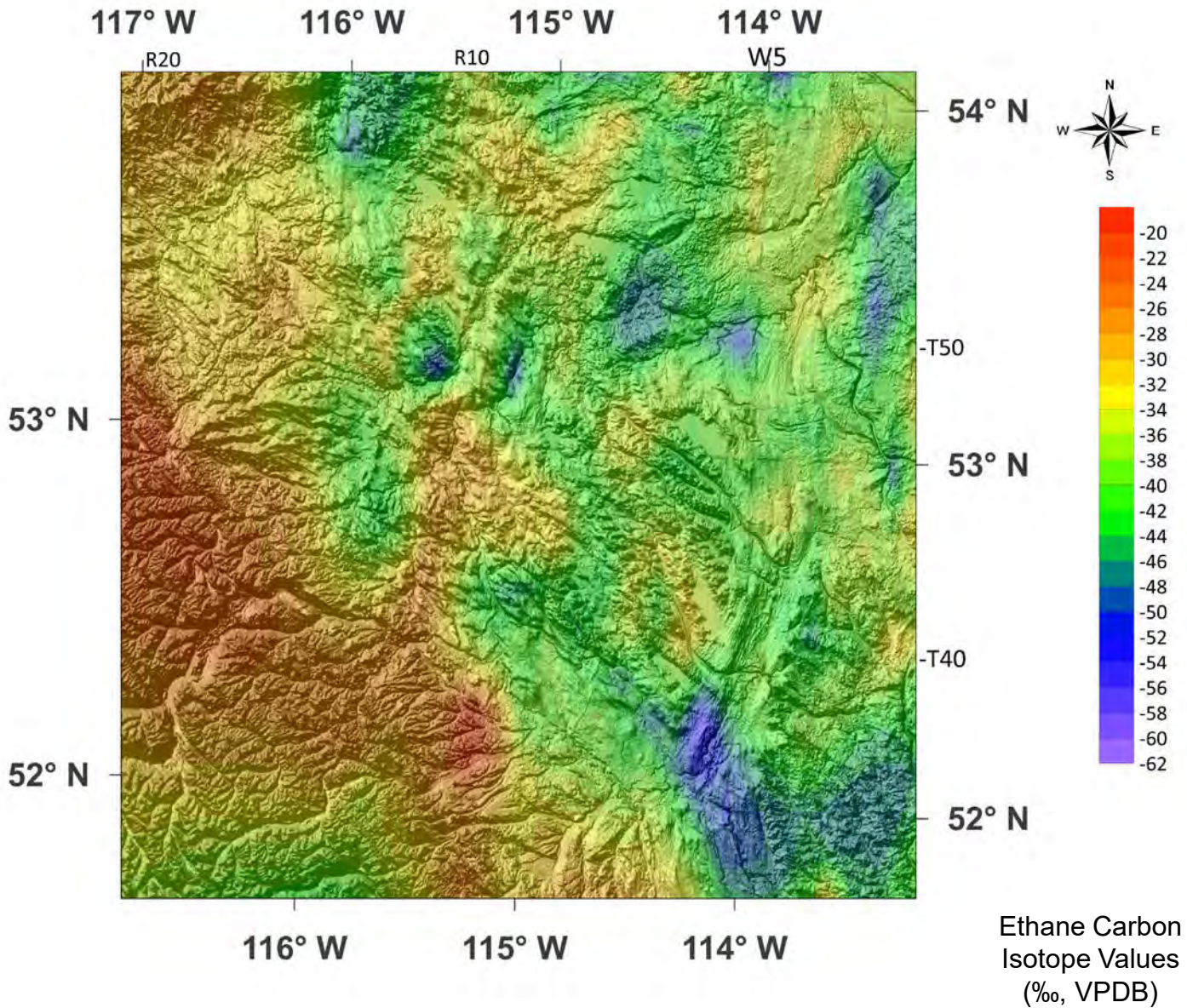




Fig. 31J. Contour Map of Propane Carbon Isotope Values of SCV Pembina Zoom-in over Topographic Map

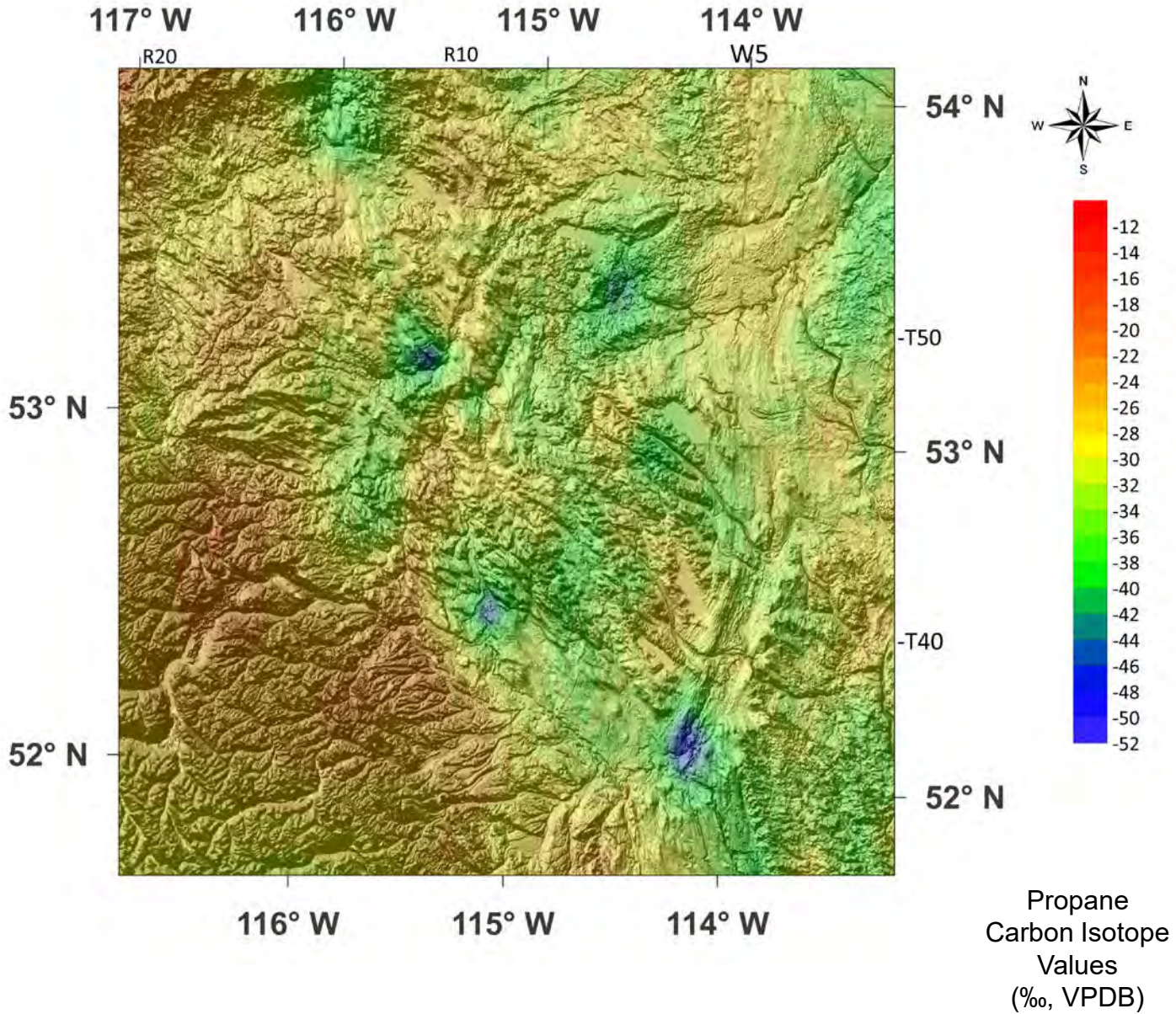




Fig. 31K. Contour Map of *n*-Butane Carbon Isotope Values of SCV Pembina Zoom-in over Topographic Map

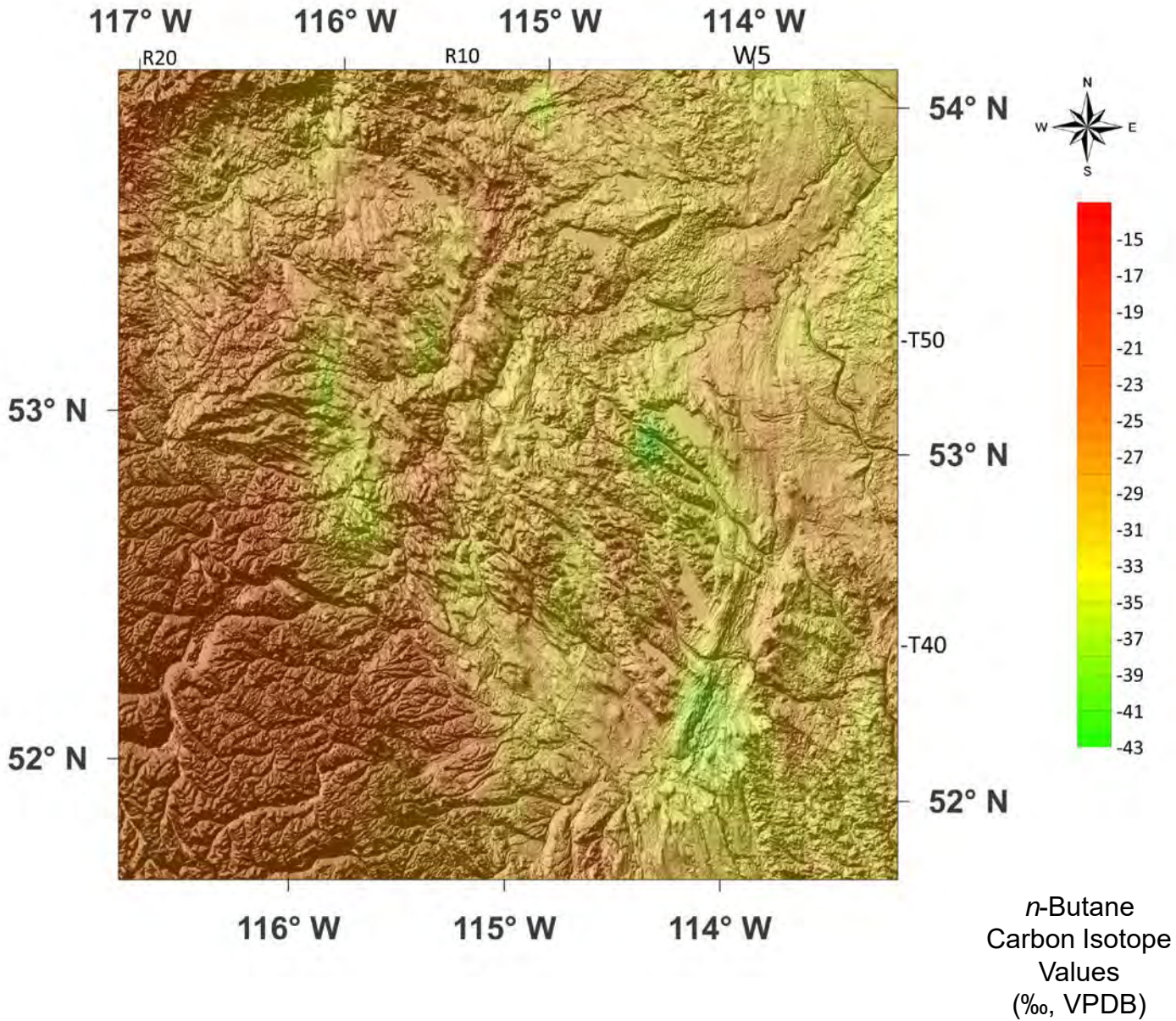




Fig. 31L. Contour Map of *i*-Butane Carbon Isotope Values of SCV Pembina Zoom-in over Topographic Map

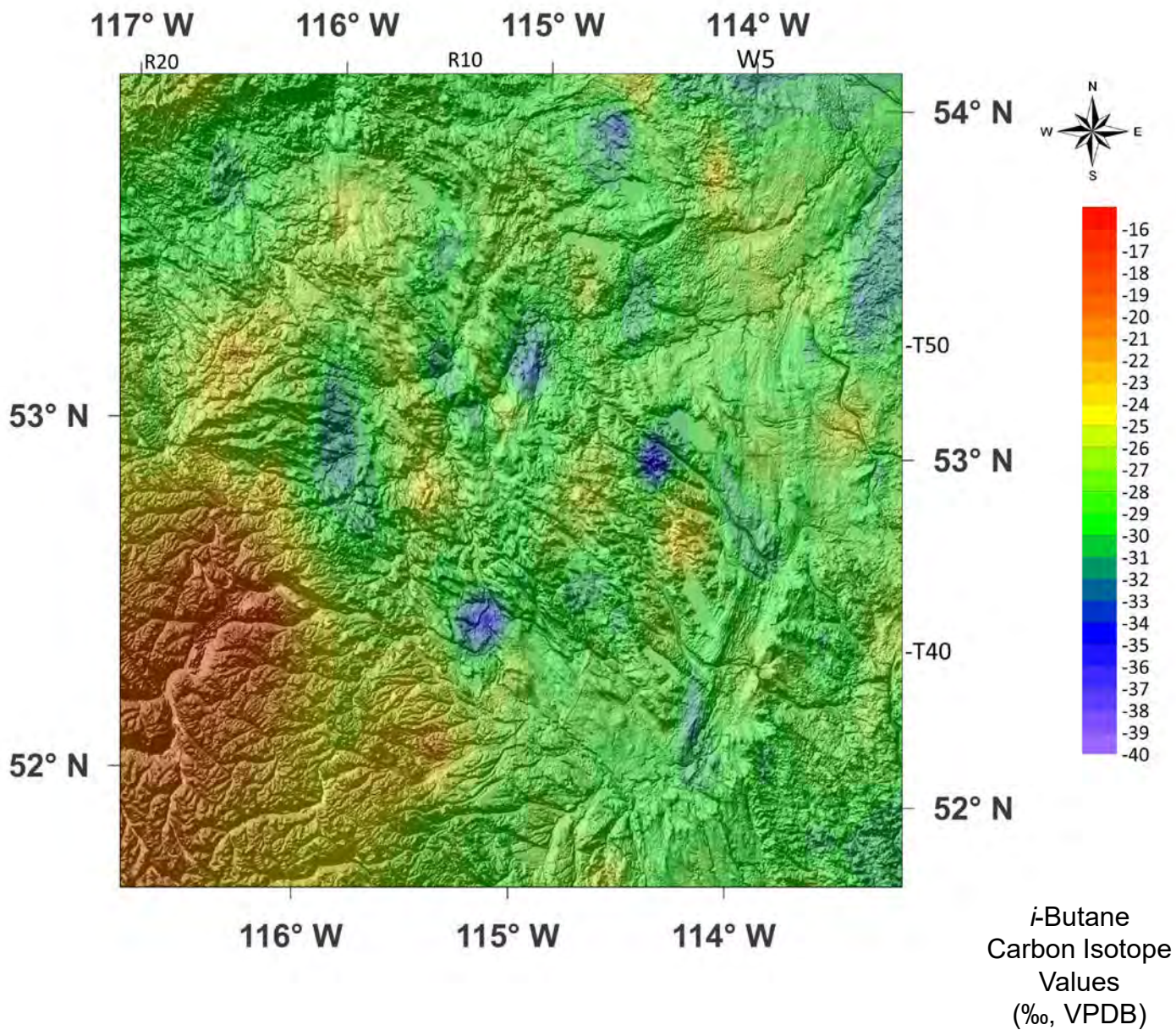




Fig. 31M. Contour Map of Carbon Dioxide Carbon Isotope Values of SCV Pembina Zoom-in over Topographic Map

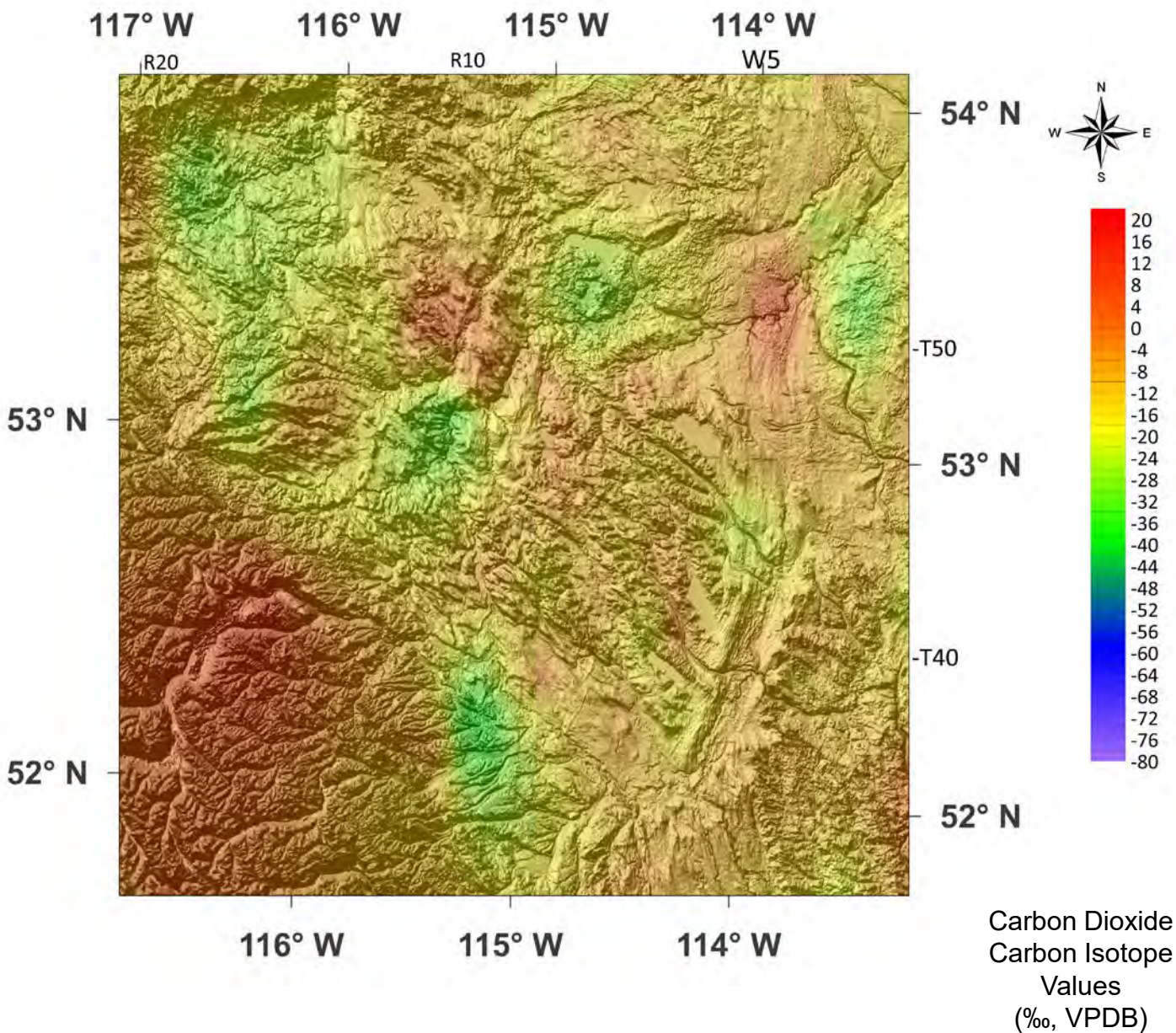


Fig. 32A. Map of Ground Migration (GM) Locations in the Pembina Zoom-in

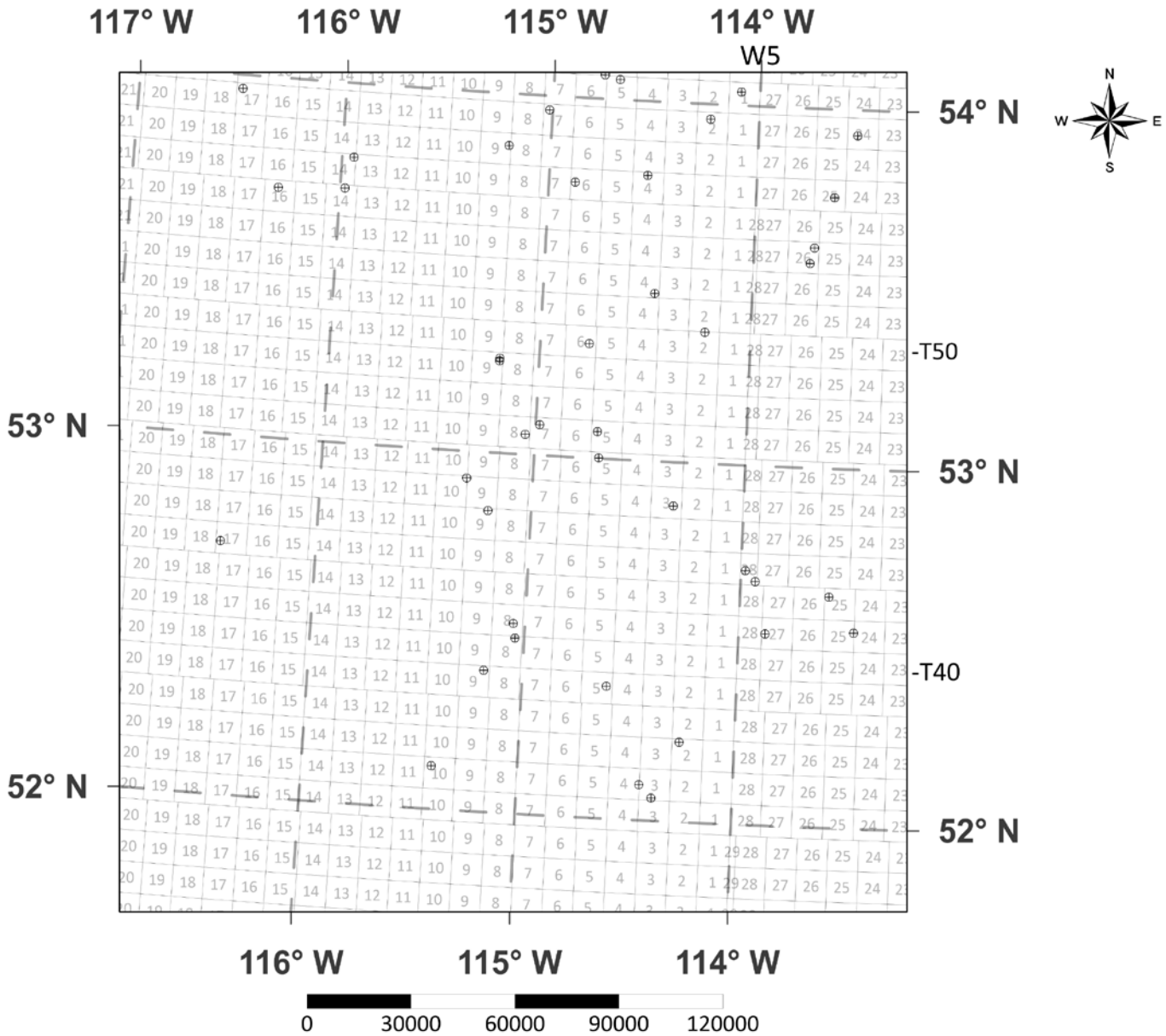




Fig. 32B. Contour Map of Methane Carbon Isotope Values of GM Pembina Zoom-in

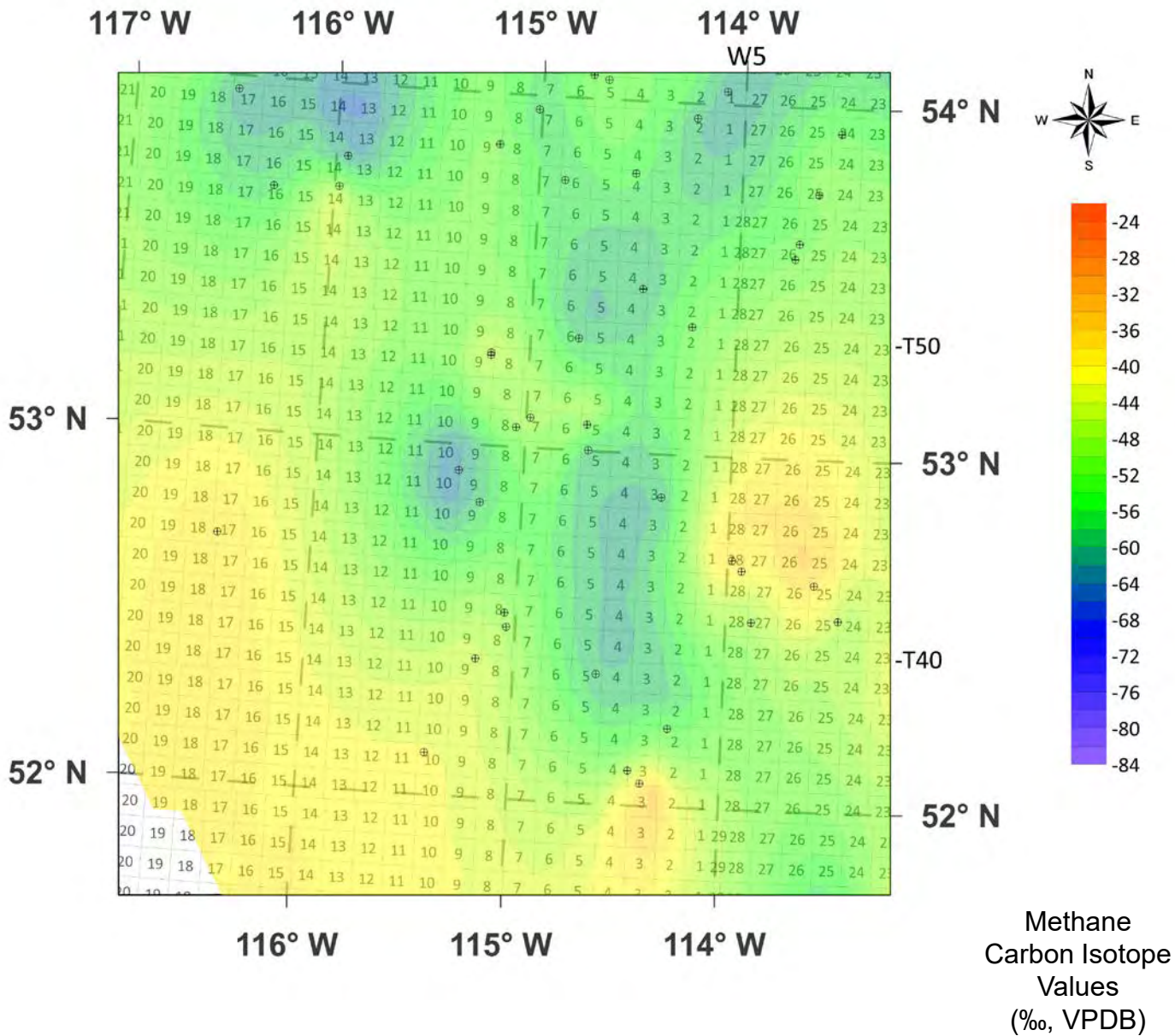


Fig. 32C. Contour Map of Ethane Carbon Isotope Values of GM Pembina Zoom-in

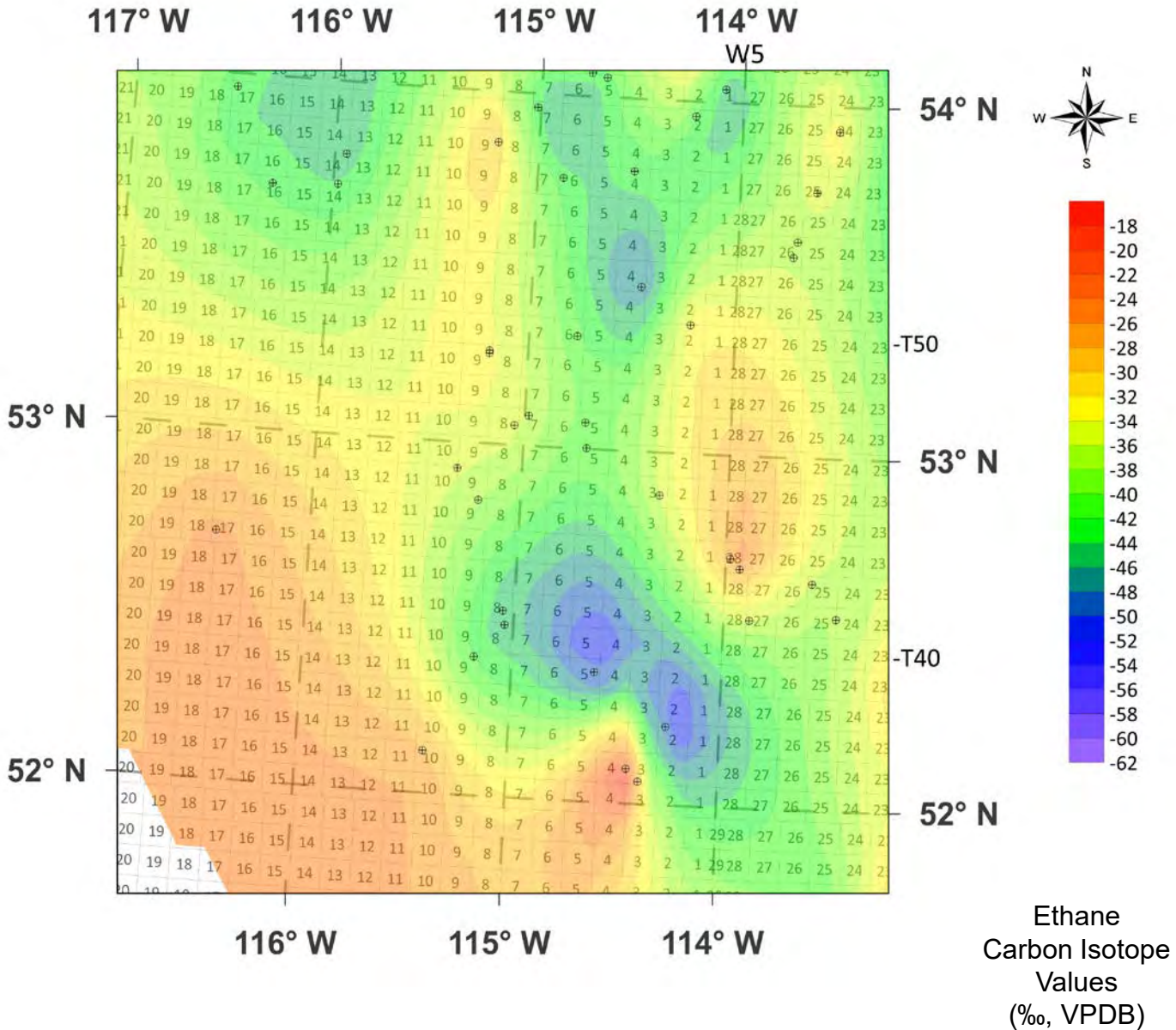




Fig. 32D. Contour Map of Propane Carbon Isotope Values of GM Pembina Zoom-in

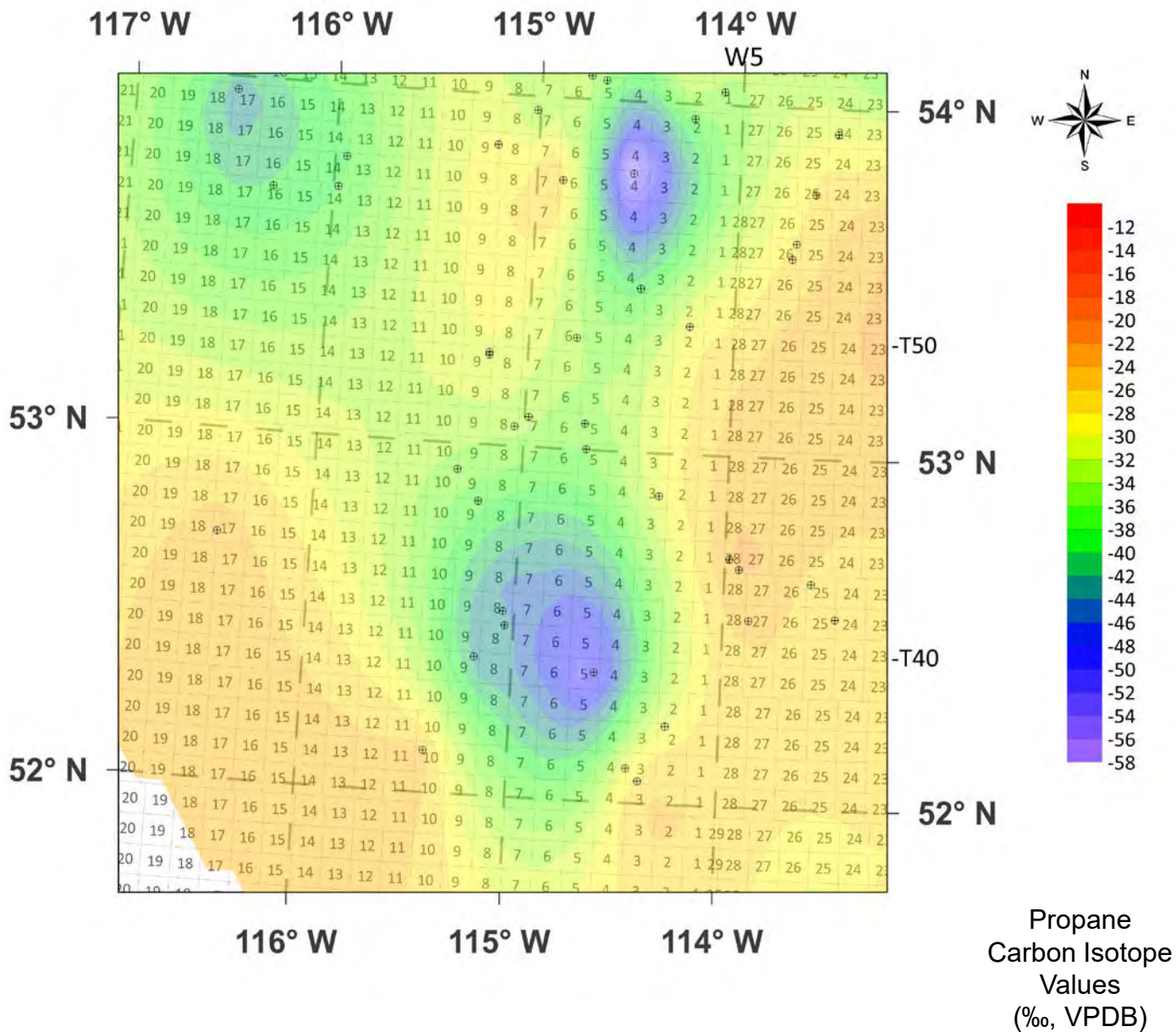


Fig. 32E. Contour Map of *n*-Butane Carbon Isotope Values of GM Pembina Zoom-in

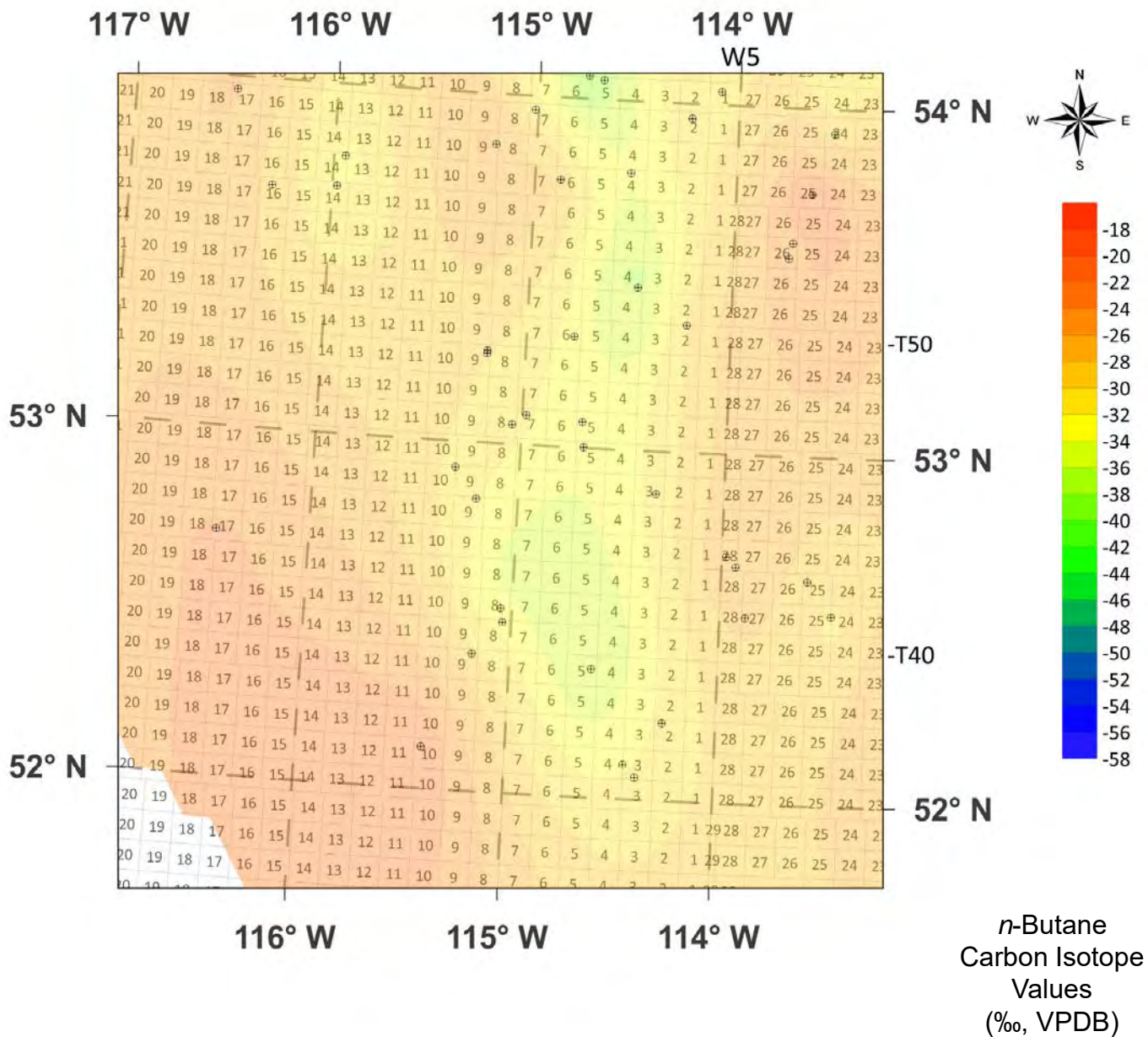




Fig. 32F. Contour Map of *i*-Butane Carbon Isotope Values of GM Pembina Zoom-in

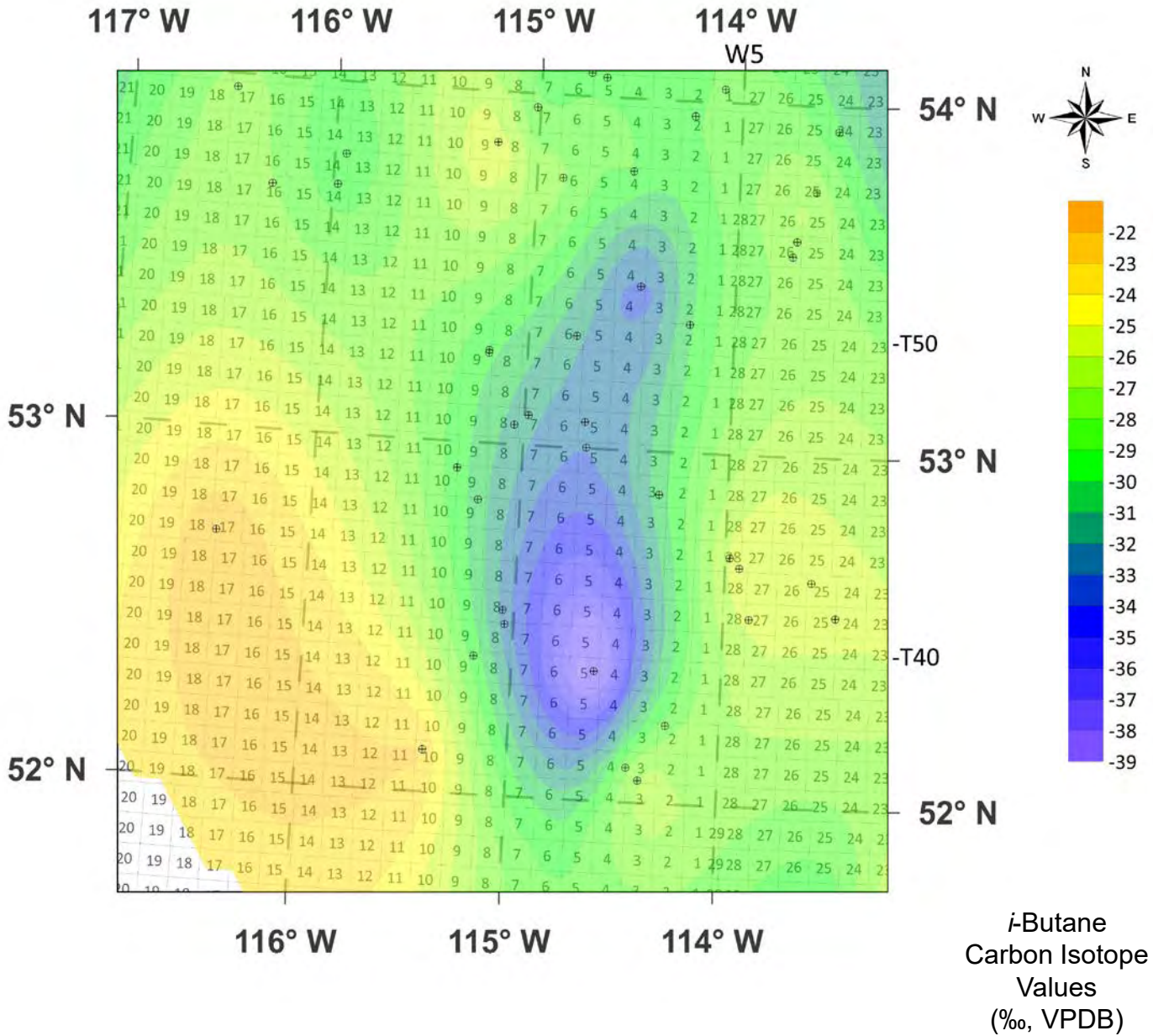


Fig. 32G. Contour Map of Carbon Dioxide Carbon Isotope Values of GM Pembina Zoom-in

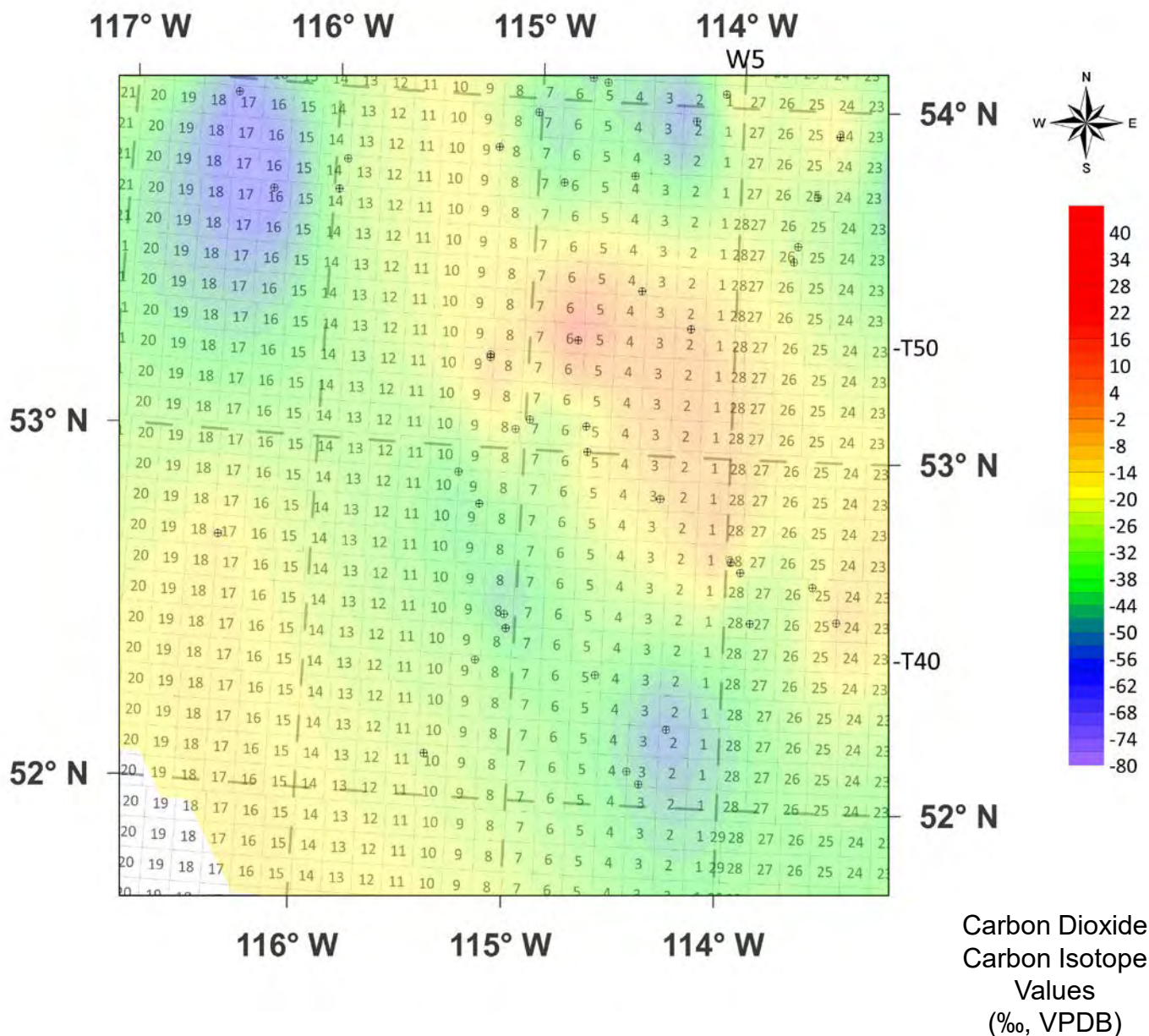




Fig. 32H. Contour Map of Methane Carbon Isotope Values of GM Pembina Zoom-in over Topographic Map

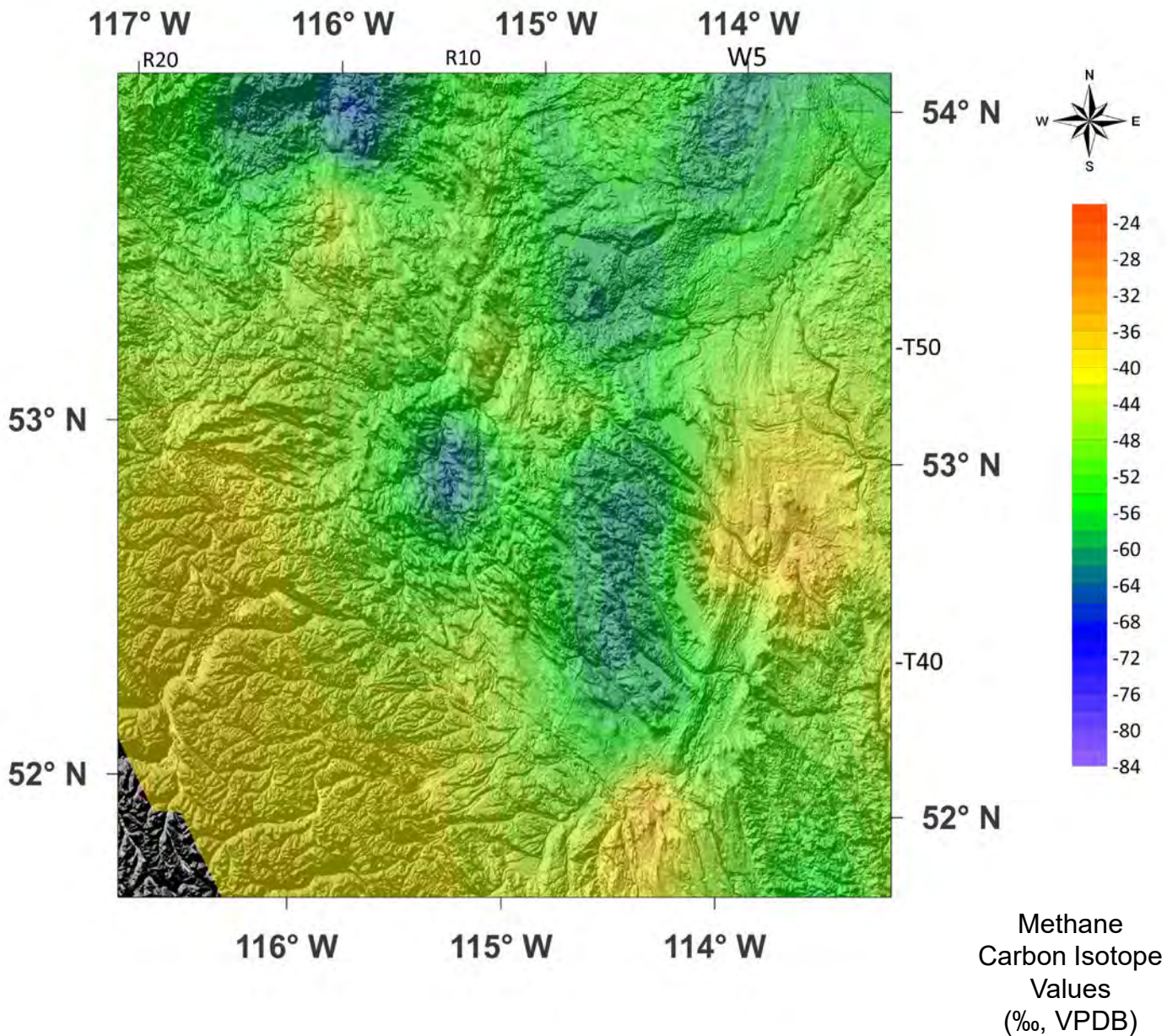




Fig. 32I. Contour Map of Ethane Carbon Isotope Values of GM Pembina Zoom-in over Topographic Map

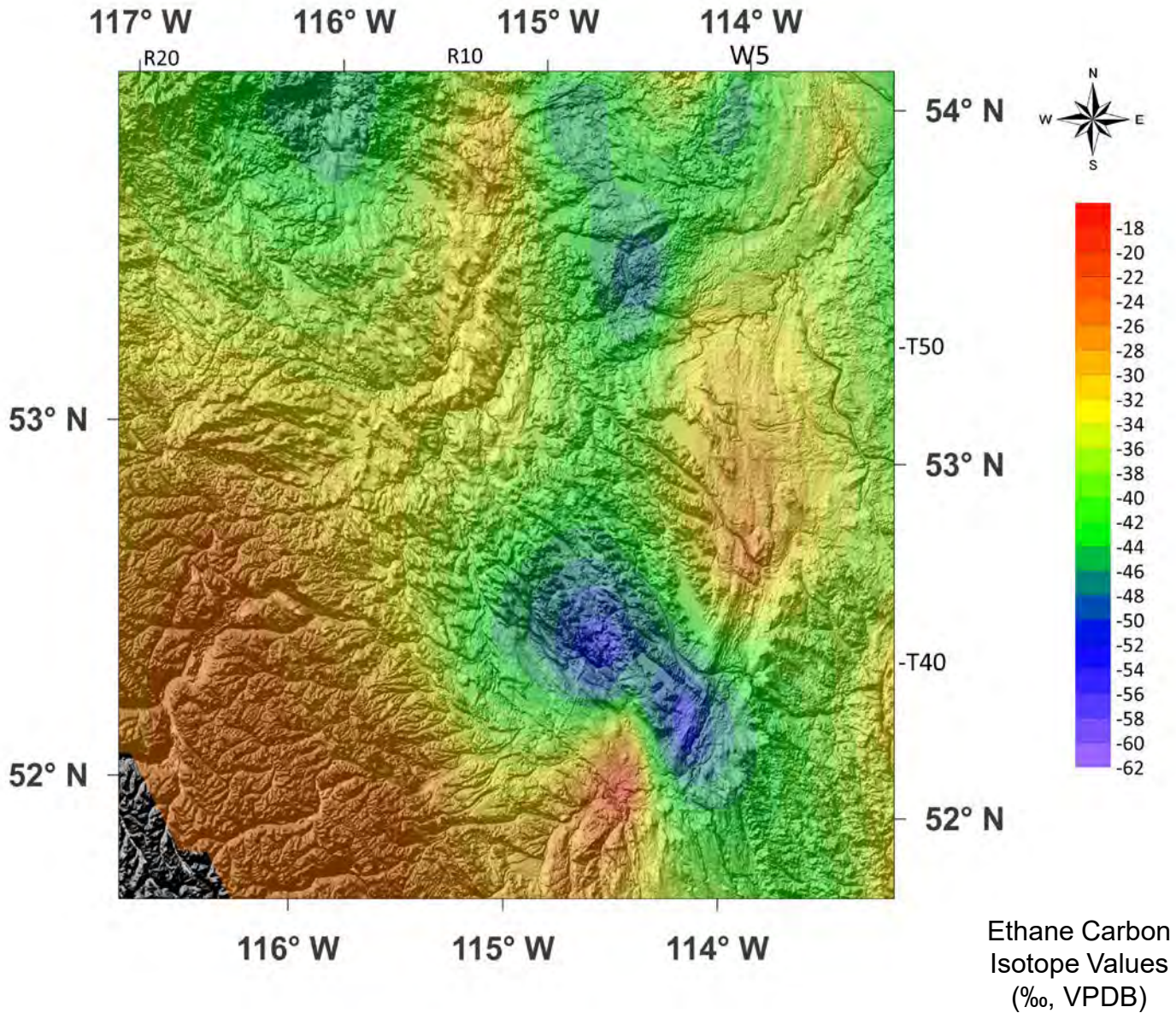




Fig. 32J. Contour Map of Propane Carbon Isotope Values of GM Pembina Zoom-in over Topographic Map

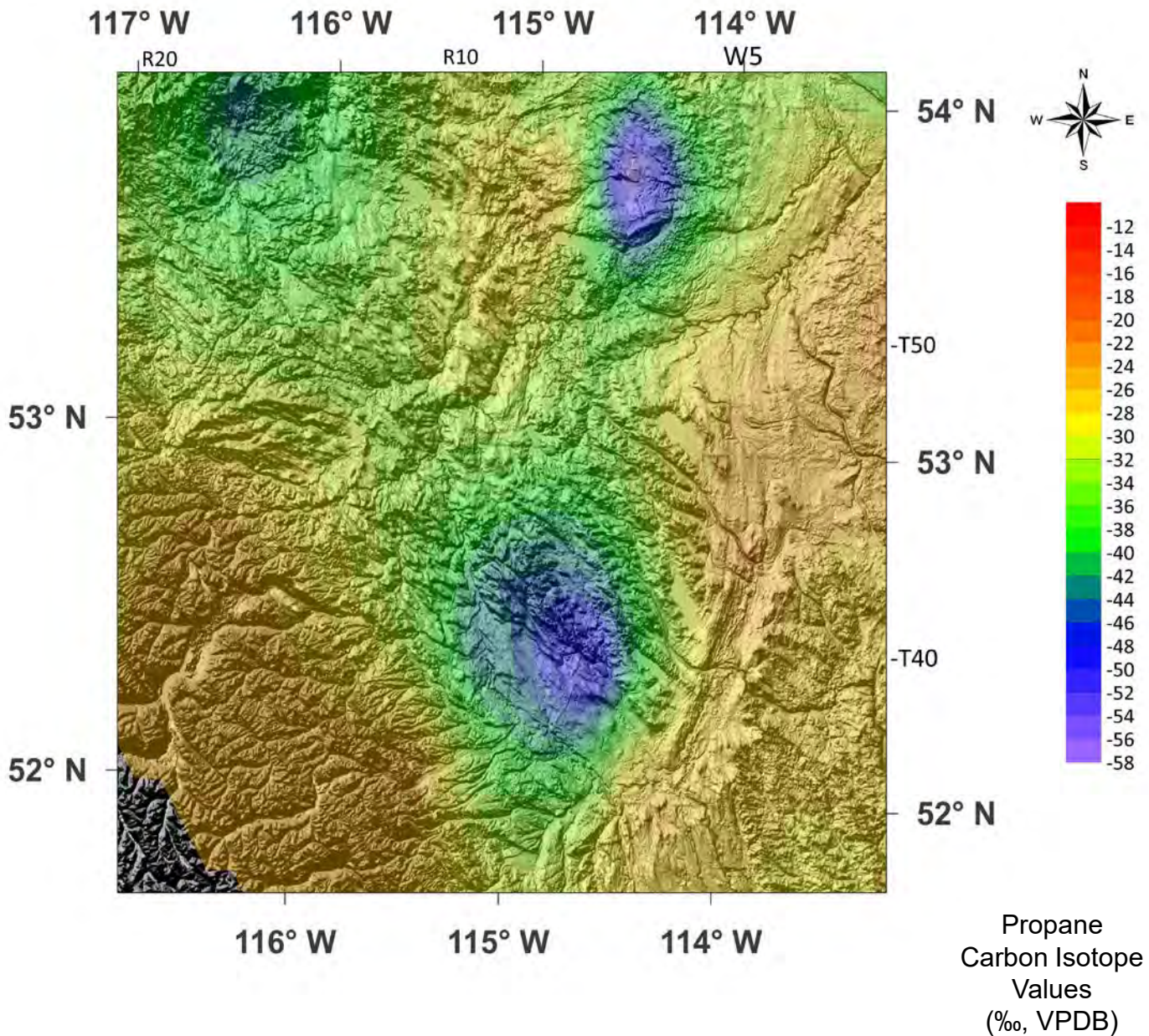




Fig. 32K. Contour Map of *n*-Butane Carbon Isotope Values of GM Pembina Zoom-in over Topographic Map

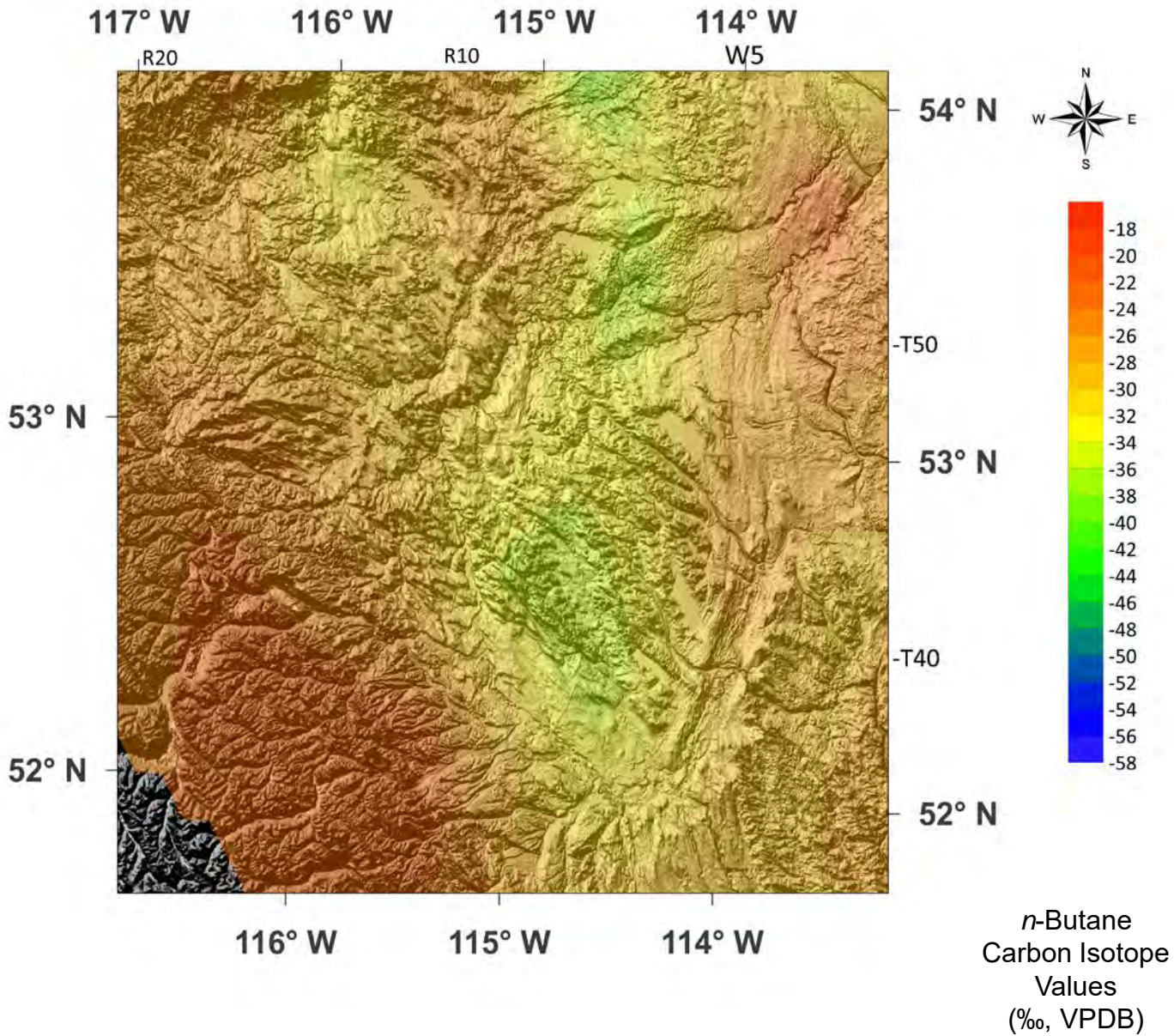




Fig. 32L. Contour Map of *i*-Butane Carbon Isotope Values of GM Pembina Zoom-in over Topographic Map

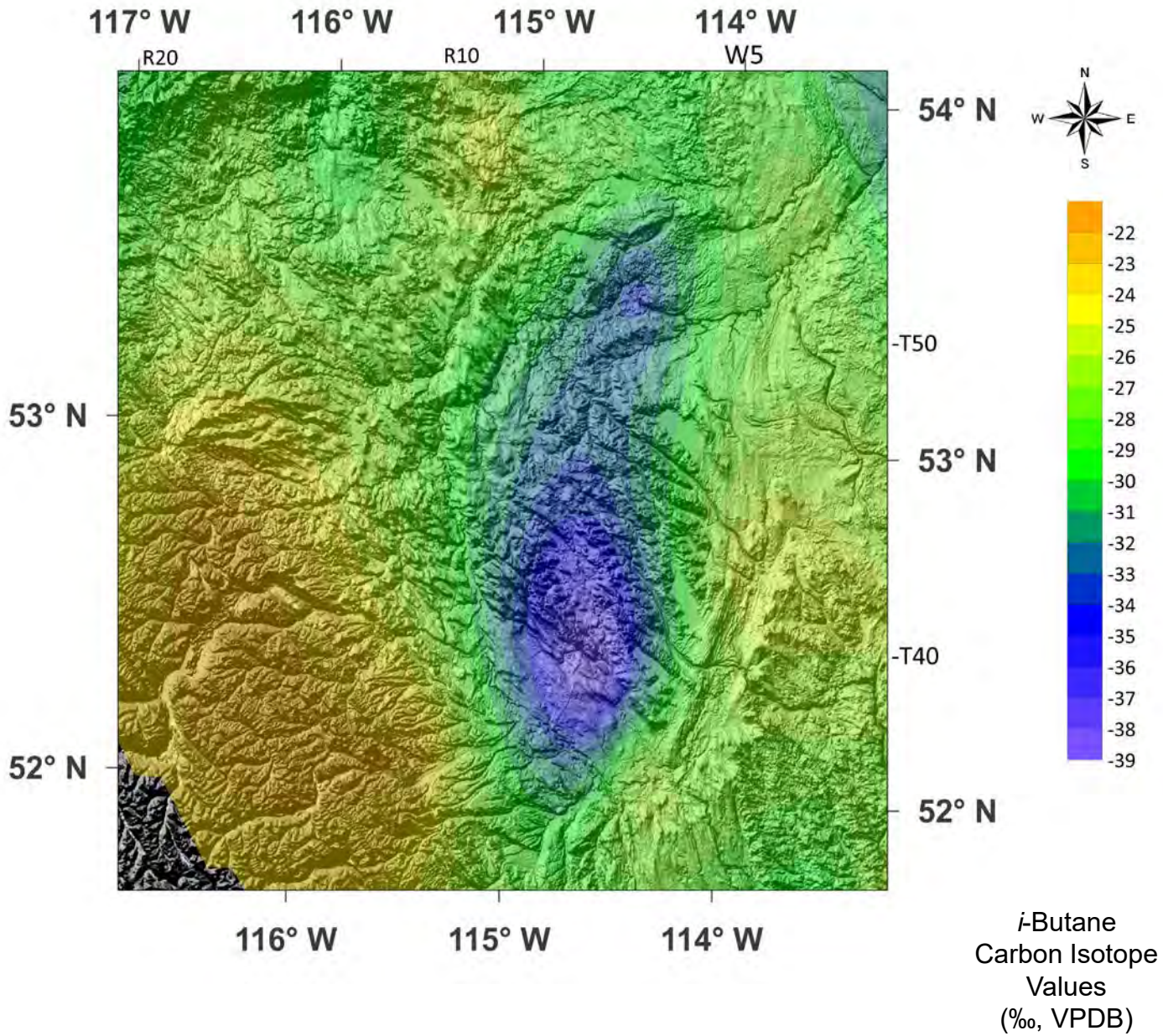




Fig. 32M. Contour Map of Carbon Dioxide Carbon Isotope Values of GM Pembina Zoom-in over Topographic Map

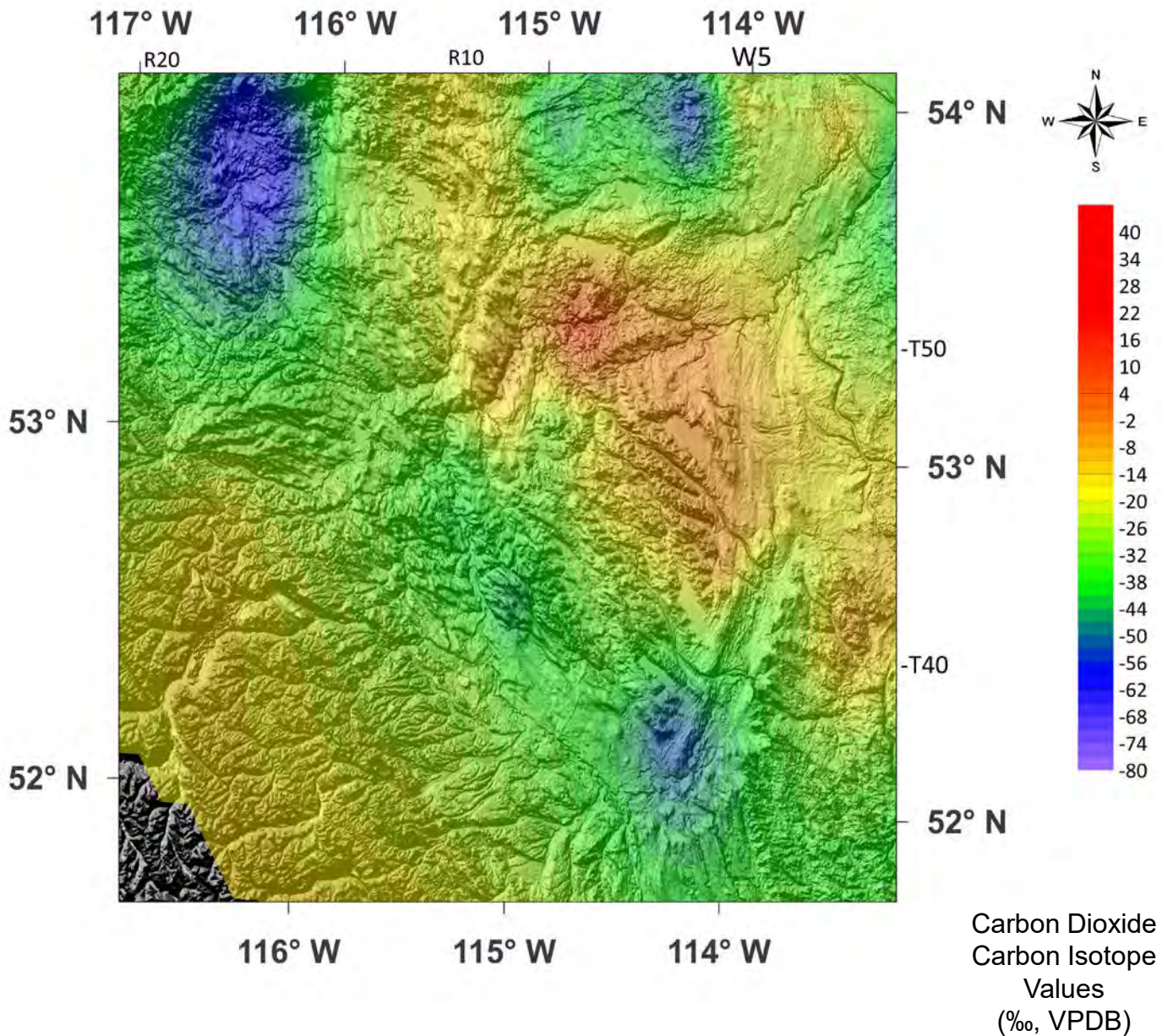
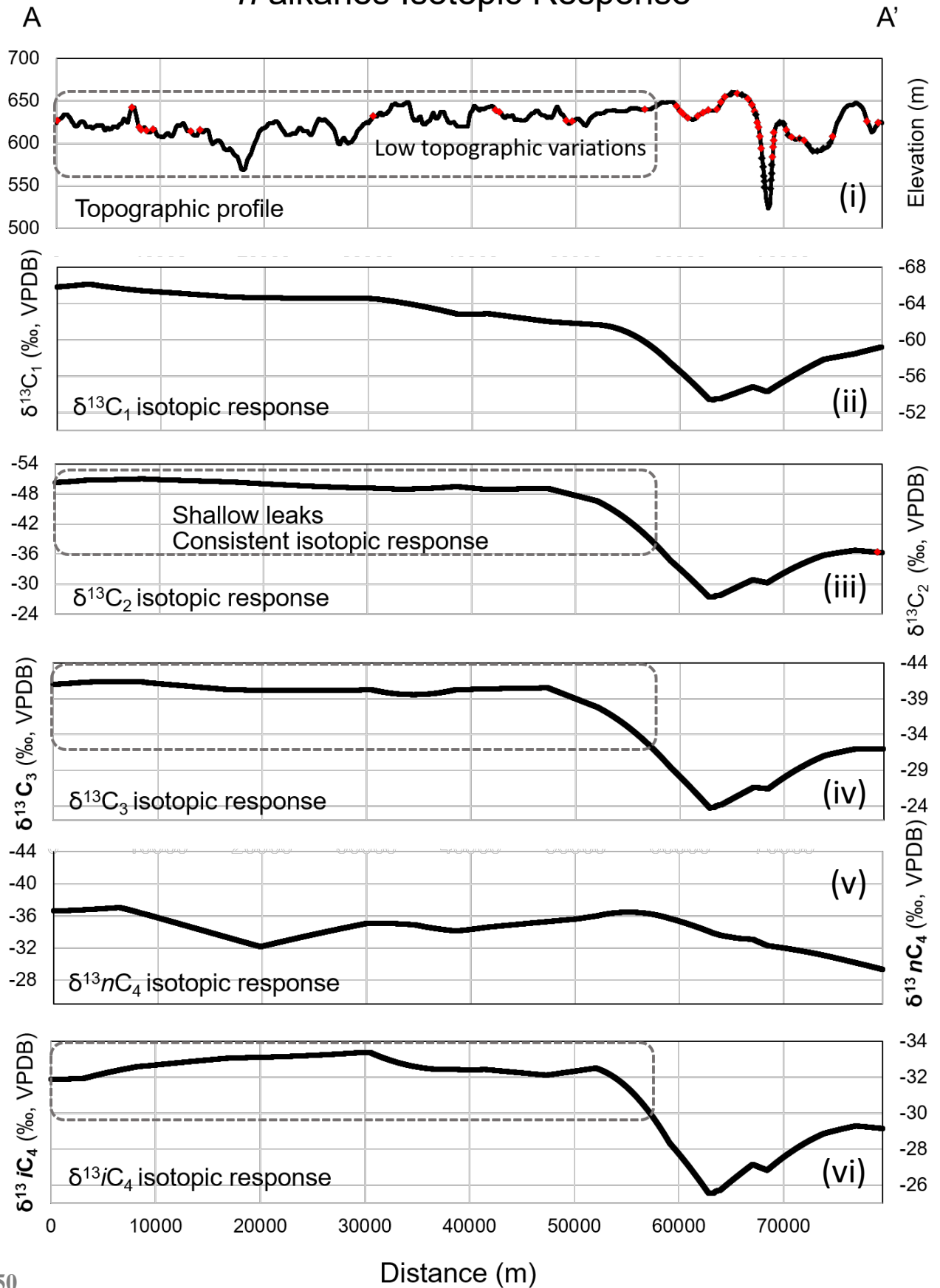






Fig. 33B. Cross Section A-A' Topography and *n*-alkanes Isotopic Response





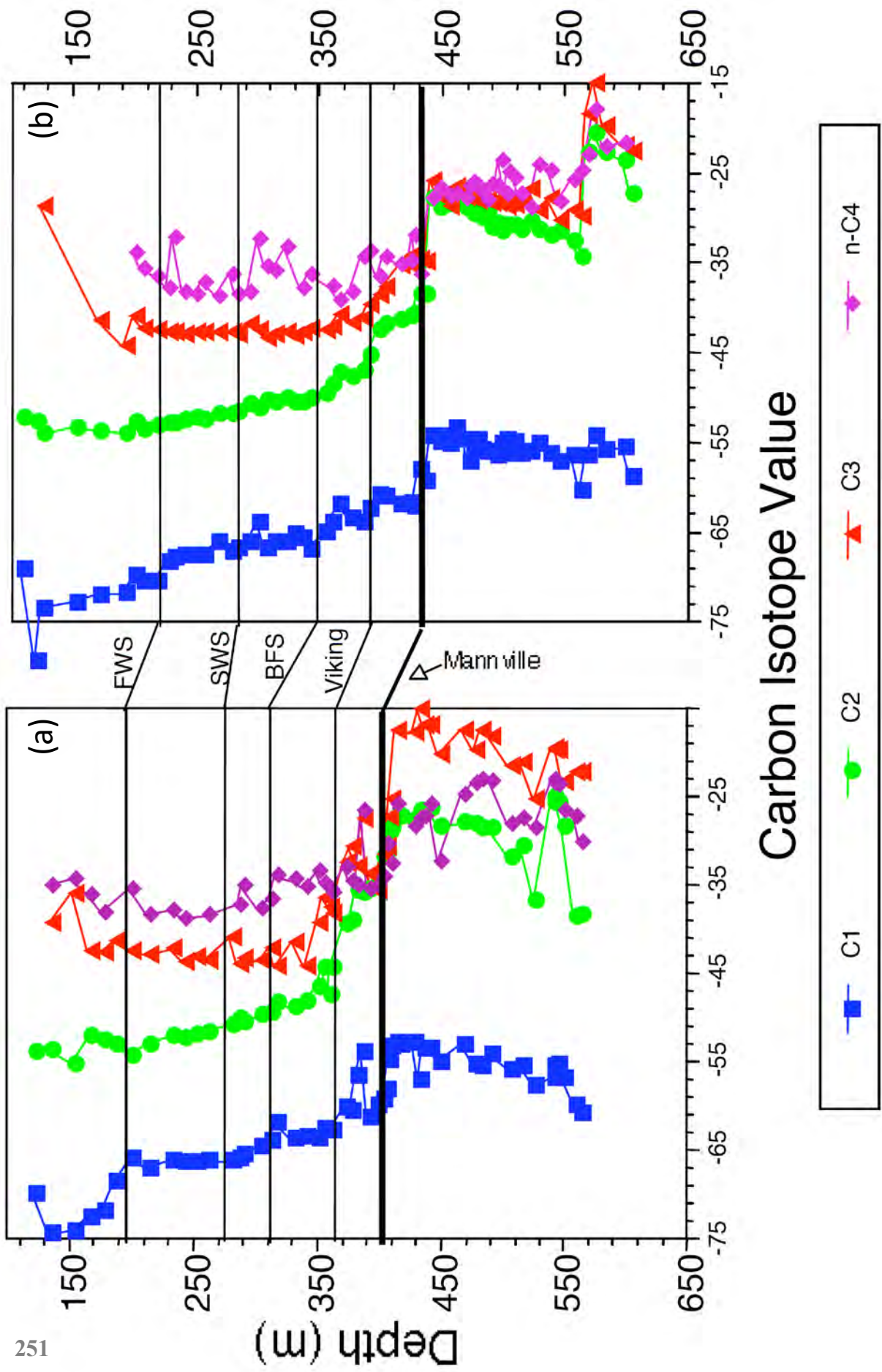


Fig. 34. Correlation of Isotope Mud-logs of Two Wells from the Lindberg Heavy Oil Field

Fig. 35A. Cross-plot of n-alkane production gases isotopic composition from W3

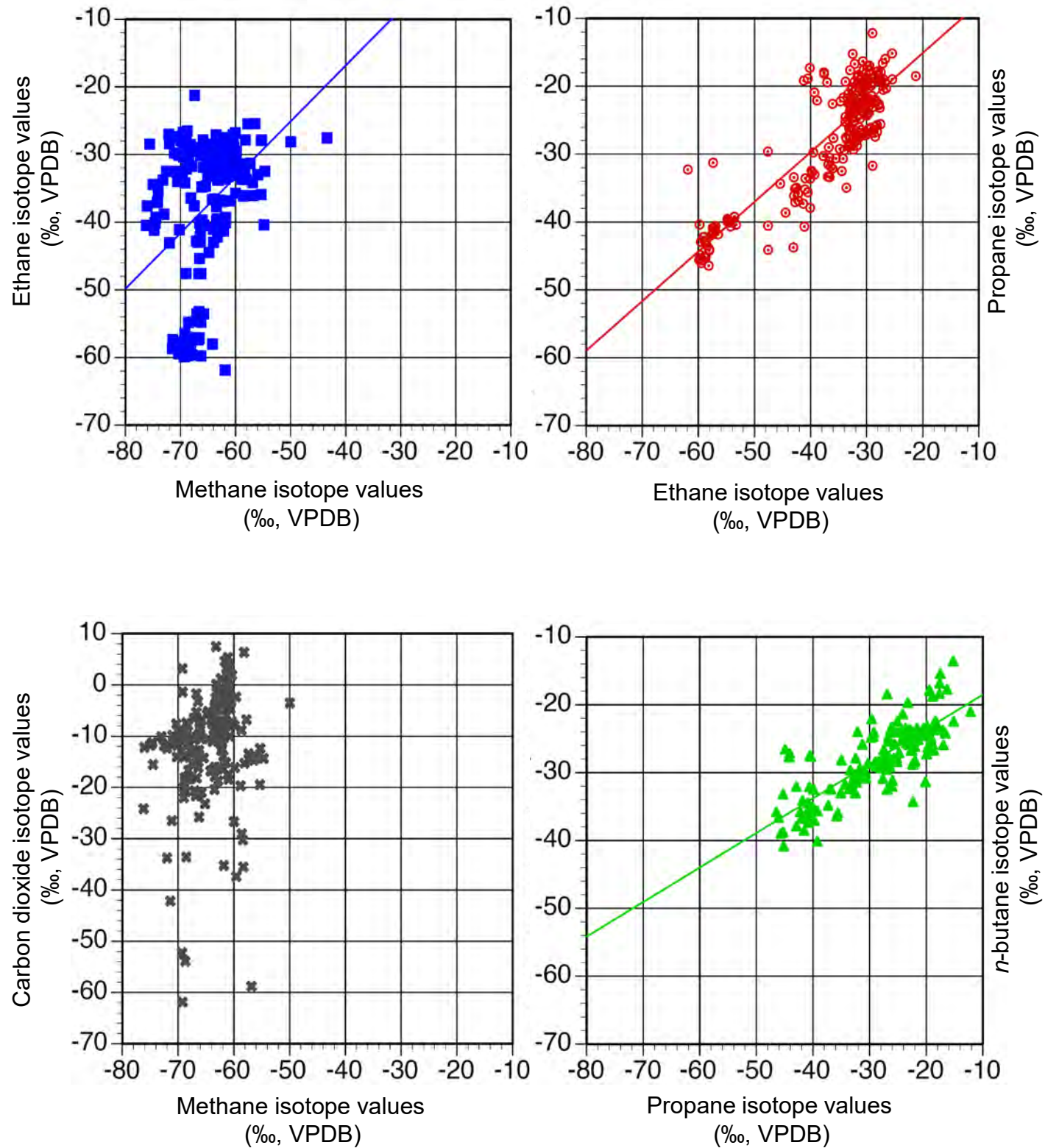




Fig. 35B. Cross-plot of n-alkane production gases isotopic composition from W4

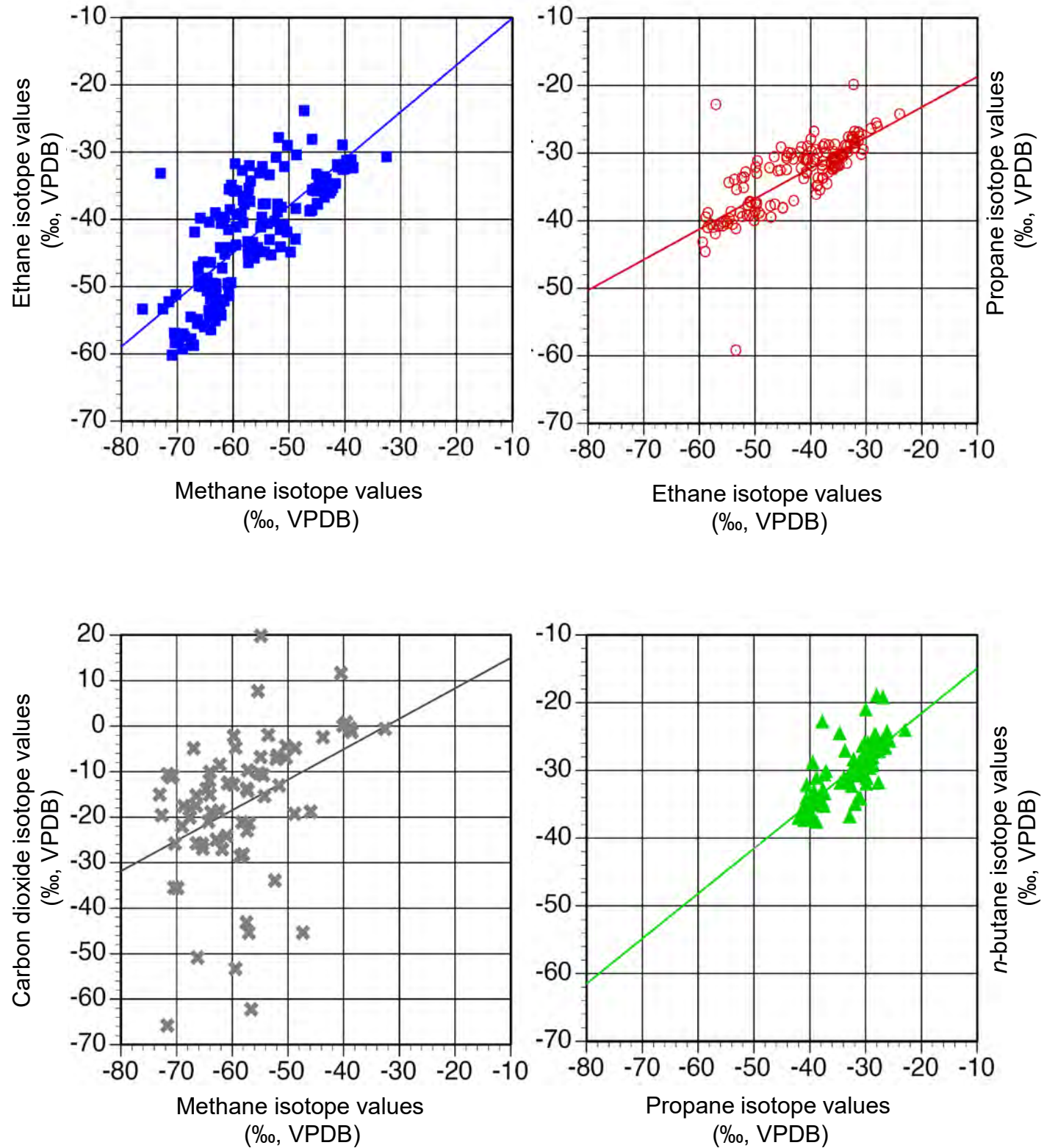


Fig. 35C. Cross-plot of n-alkane production gases isotopic composition from W5

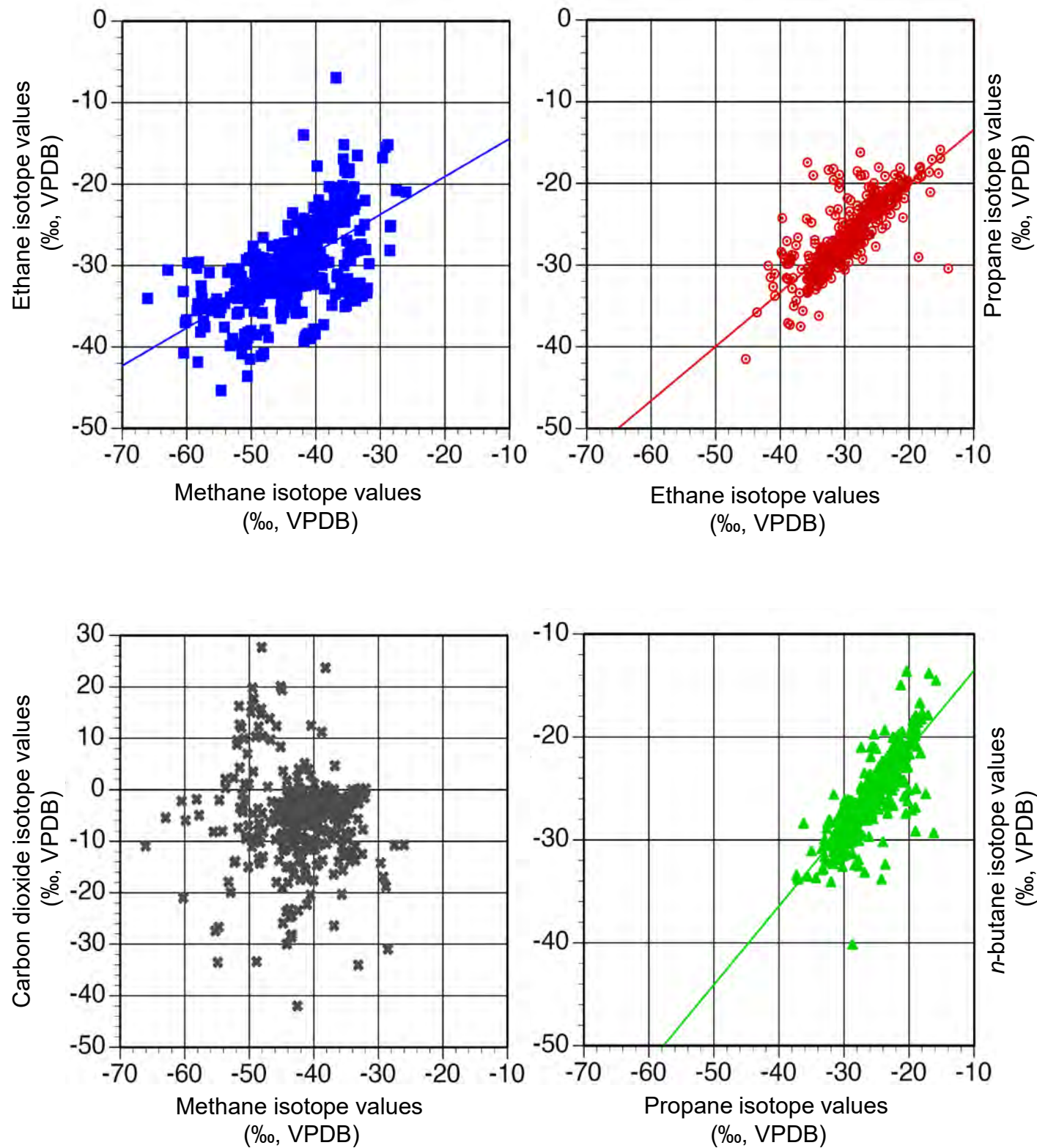




Fig. 35E. Cross-plot of n-alkane production gases isotopic composition from W6

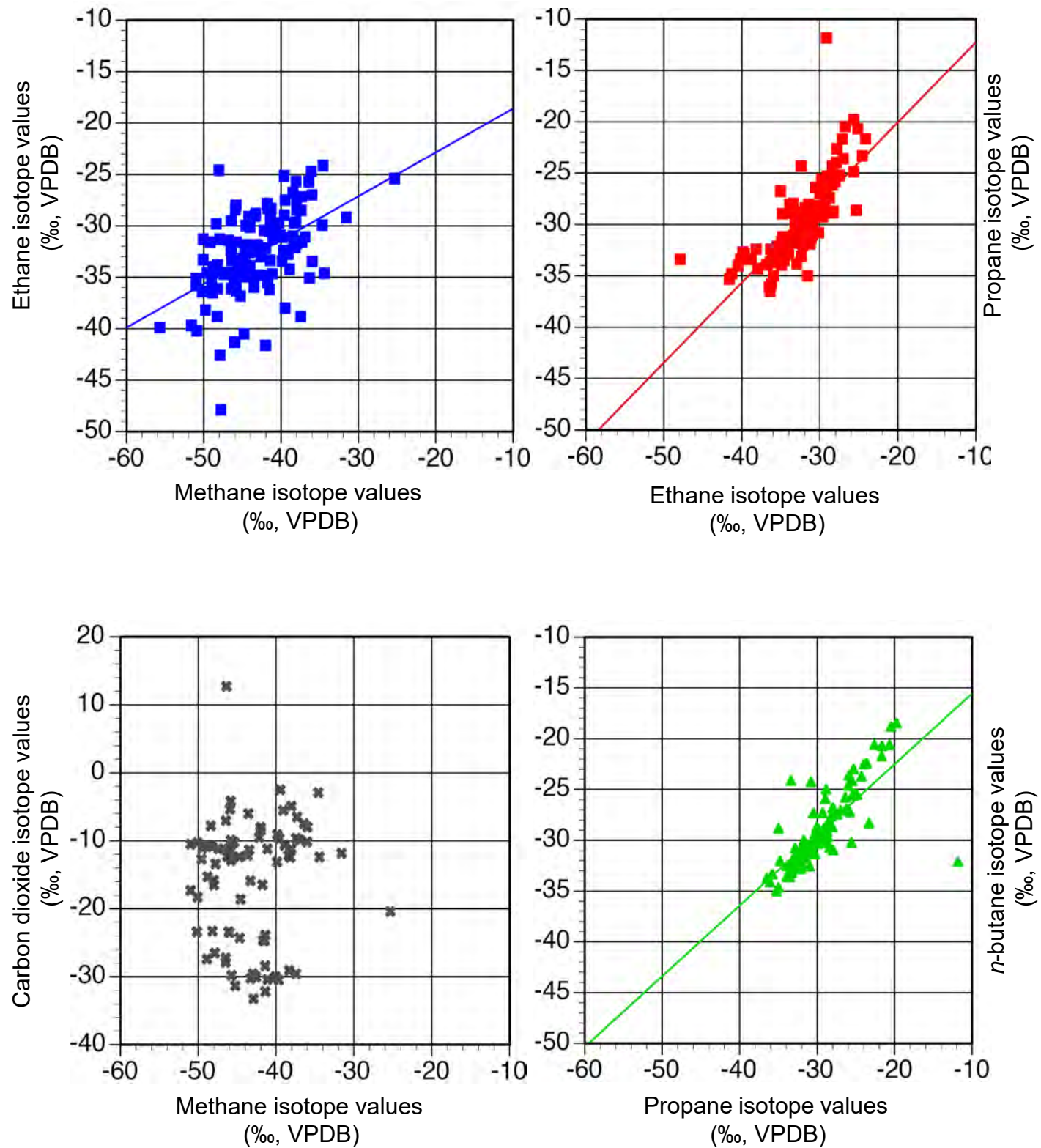


Fig. 35E. Cross-plot of n-alkane production gases isotopic composition from British Columbia

