

Arsenic in Warrior Field Coal

Shown with Sample Data Locations in Five Coal Groups

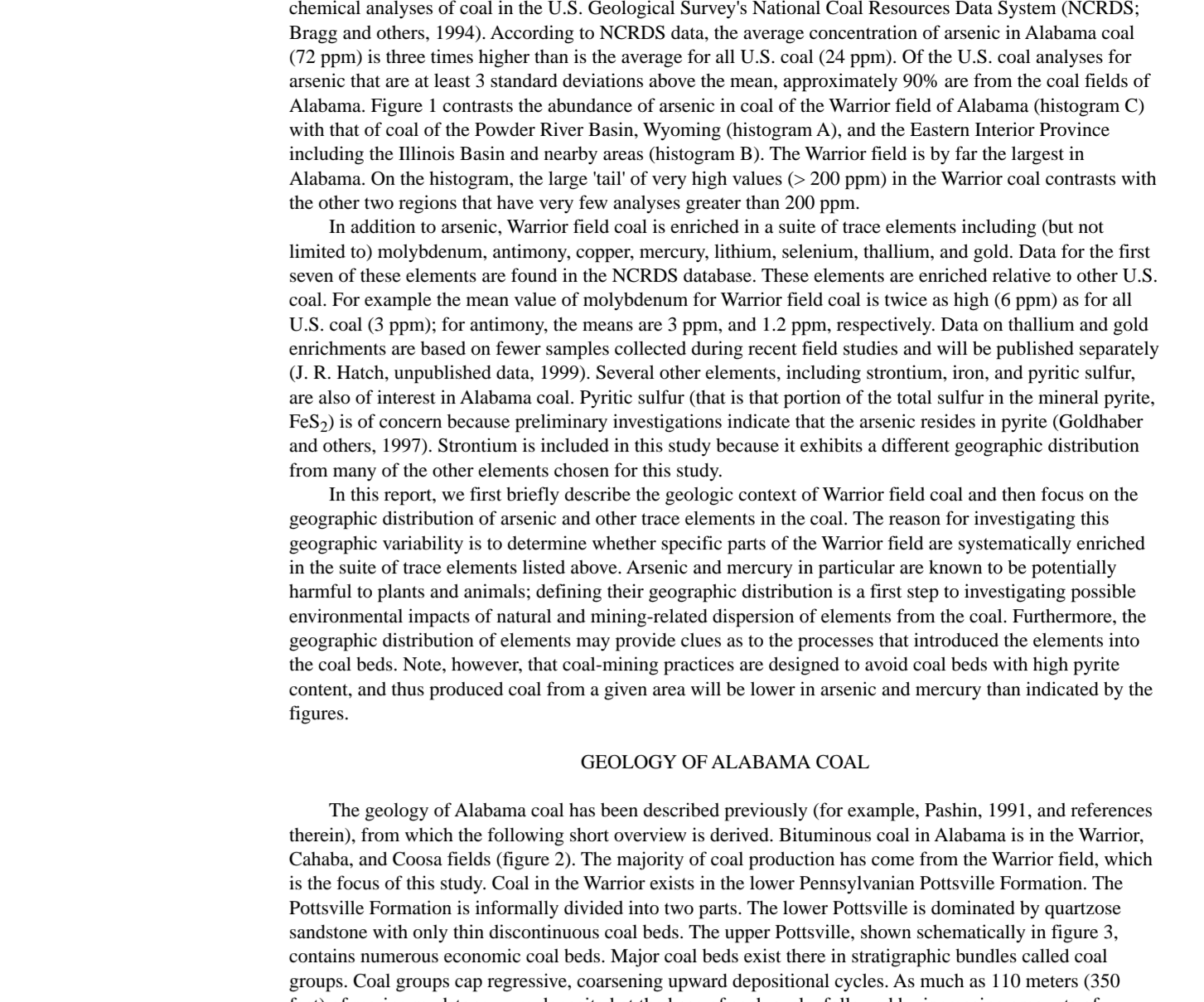
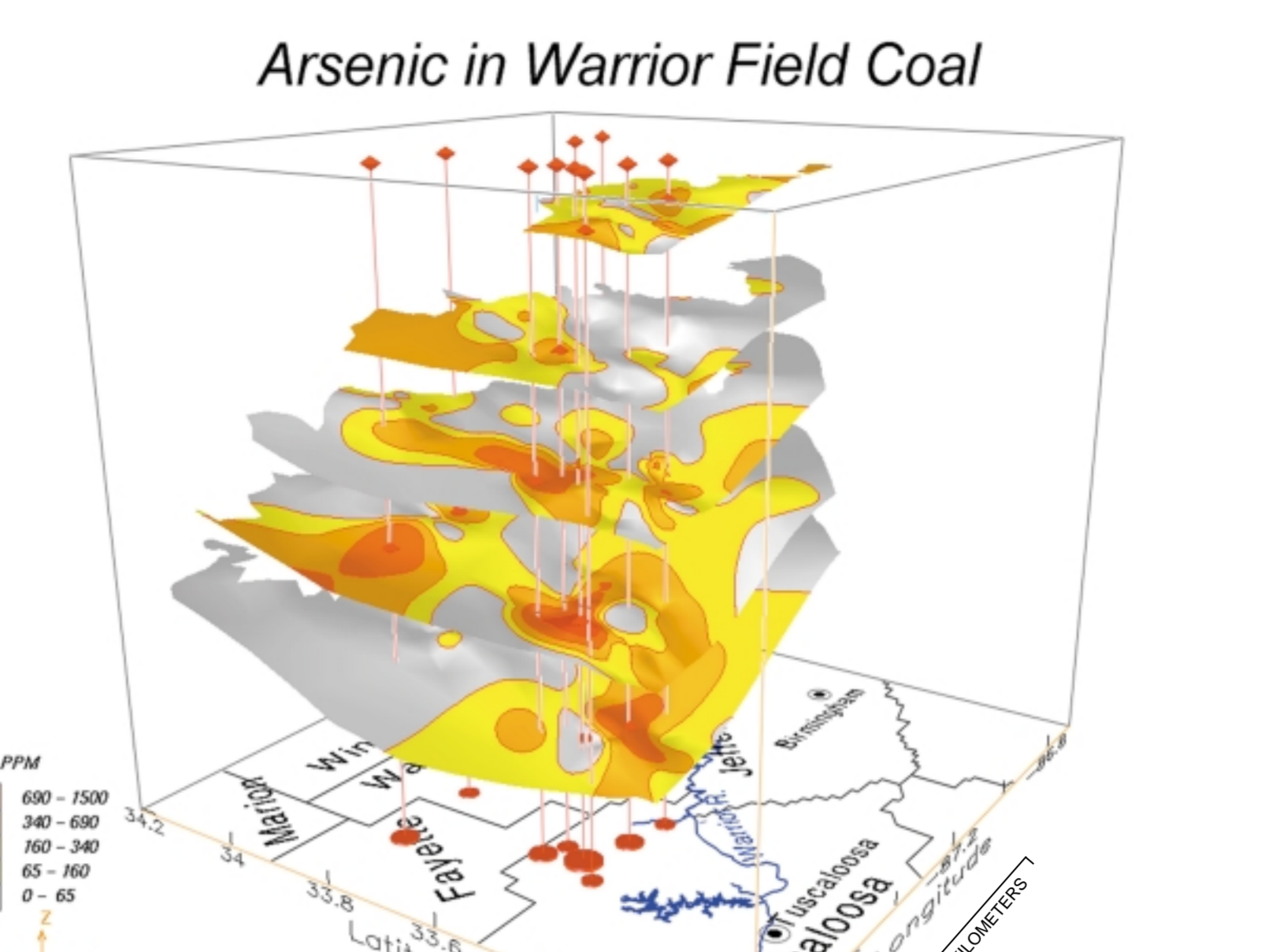
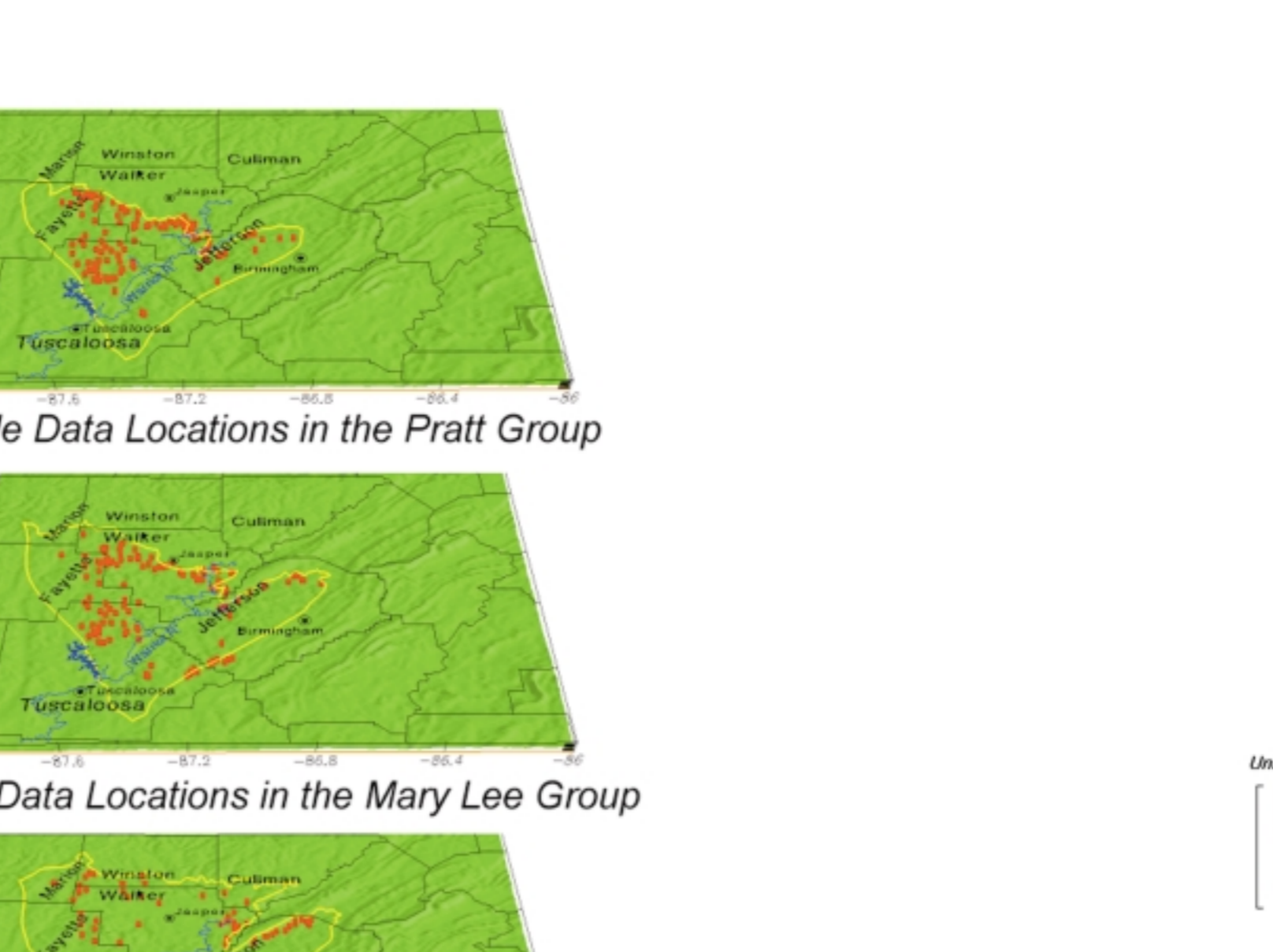
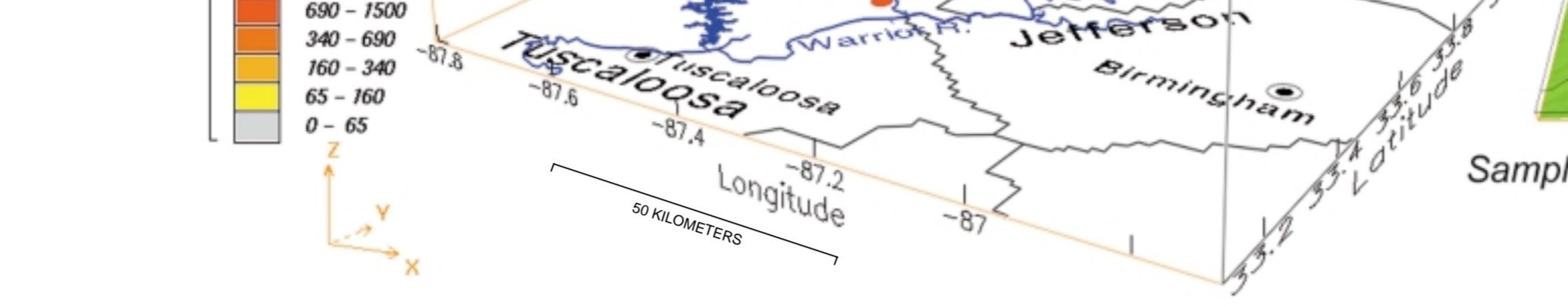
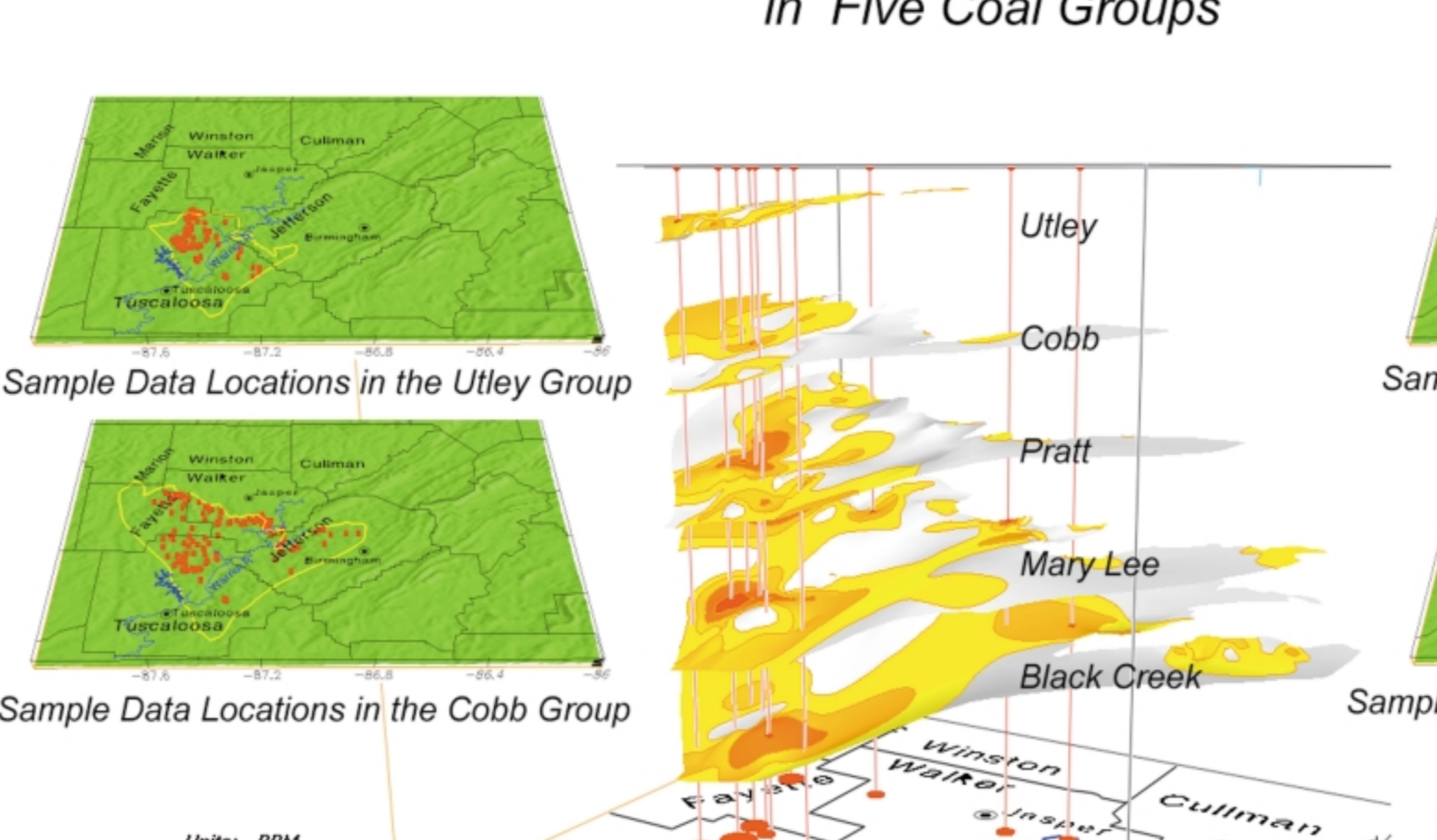
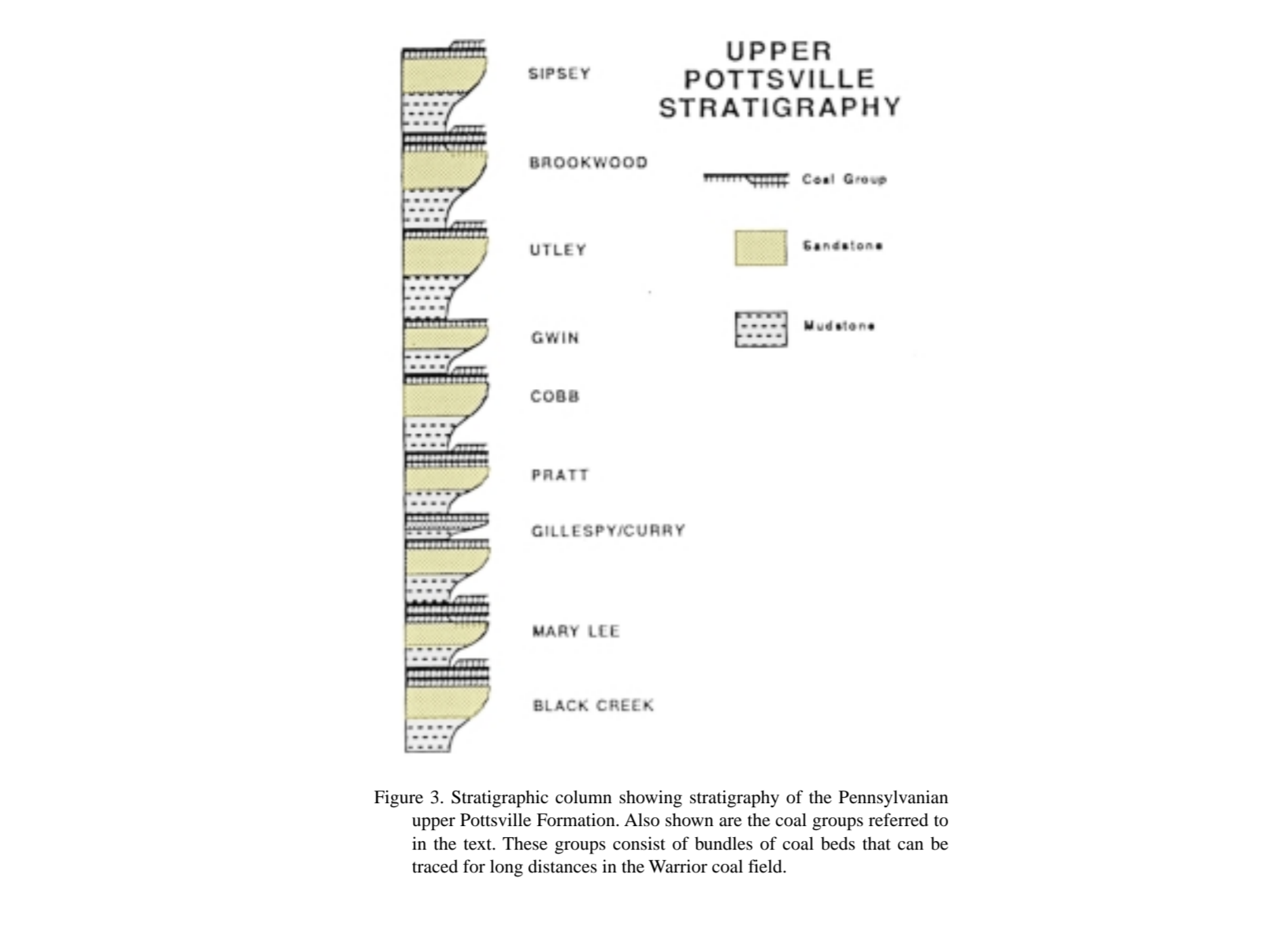
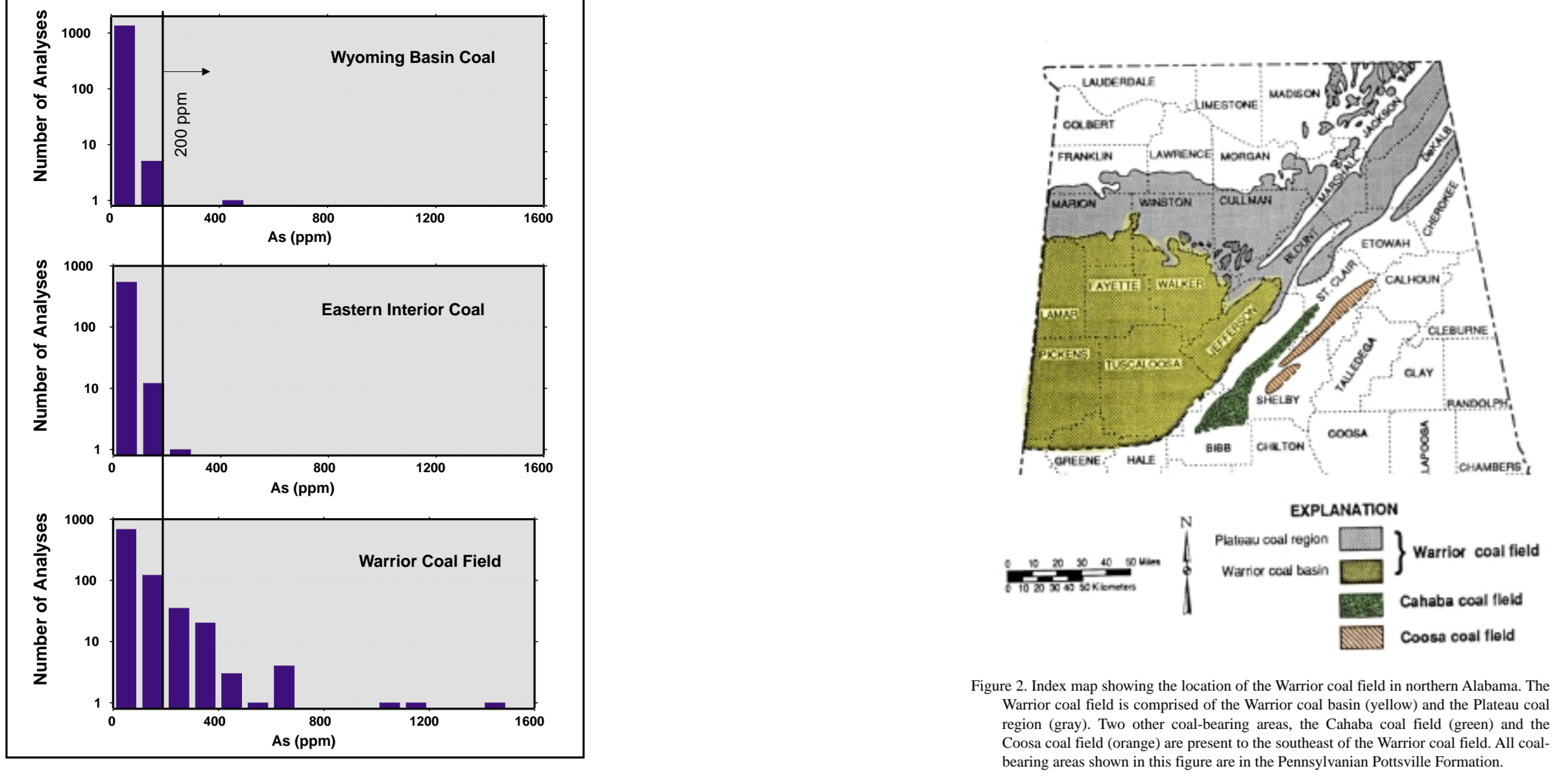


Figure 1. Histograms comparing arsenic in coal (ppm) for three coal groups: Wyoming Basin Coal, Eastern Interior Coal, and Warrior Coal Field. The histograms show the distribution of arsenic concentrations for each group. The Warrior Coal Field shows a higher concentration of arsenic compared to the other two groups.

Figure 2. Index map showing the location of the Warrior coal field in northern Alabama. The map includes labels for the Warrior coal field, Cahaba coal field, and Coosa coal field. It also shows the location of the Warrior coal field relative to the Alabama River and the Warrior coal field.

Figure 3. Stratigraphic column showing stratigraphy of the Pennsylvanian upper Permian Formation. The column includes labels for the Utley, Cobb, Pratt, Mary Lee, and Black Creek coal groups. The column also shows the location of the Warrior coal field relative to the Alabama River and the Warrior coal field.

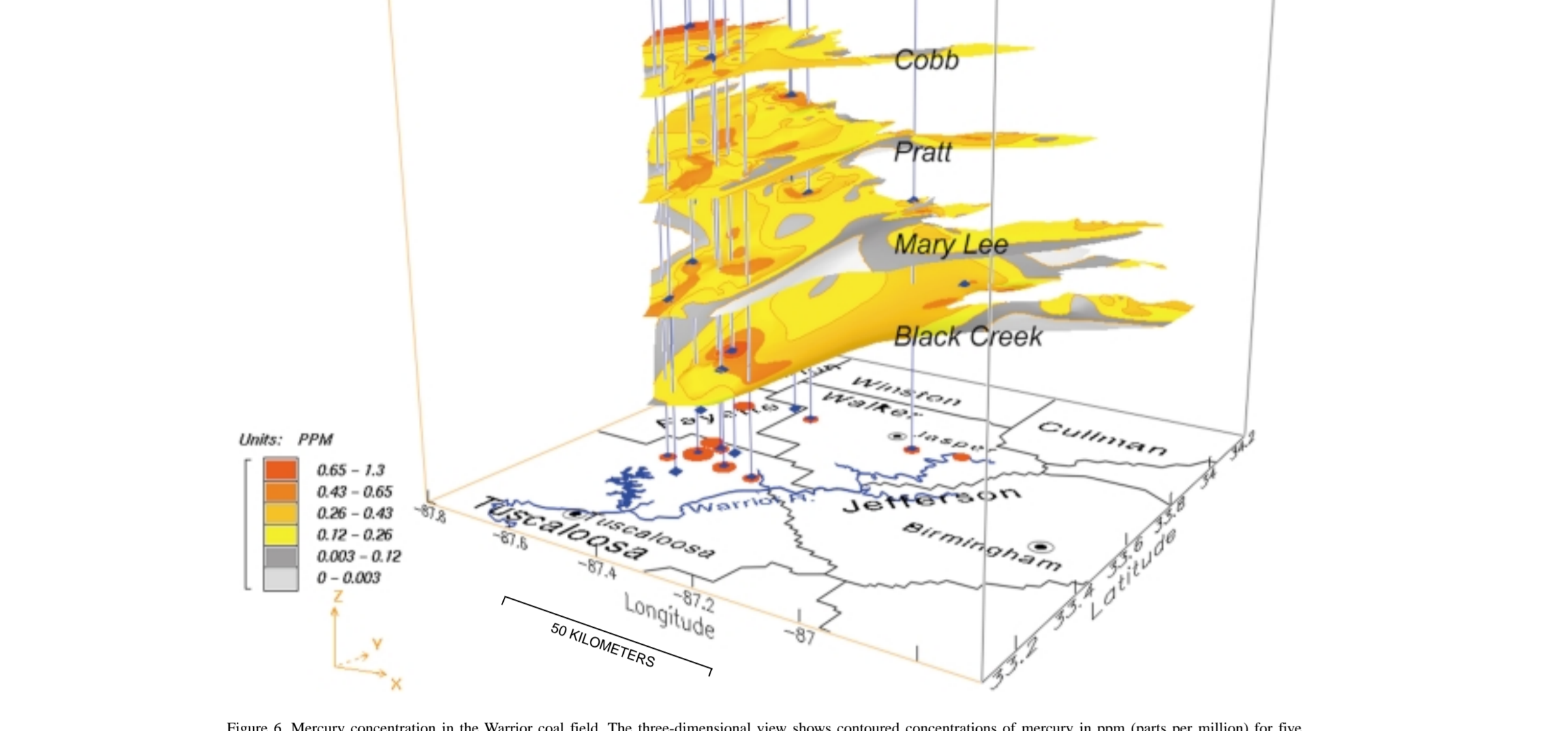
Figure 4. Arsenic concentration in the Warrior coal field. The three-dimensional view shows constrained concentrations of arsenic in ppm (parts per million) for five different coal groups. The view is toward the northeast. Vertical dimension is not drawn to scale. The two-dimensional views show sample control points for each coal group. The sample locations for figures 4-5 are the same as shown in figure 4. See appendix for description of how this figure was constructed.

Figure 5. Arsenic in the Warrior coal field. The 3D view shows constrained concentrations of arsenic in ppm (parts per million) for five different coal groups. The view is toward the northeast. Vertical dimension is not drawn to scale. The two-dimensional views show sample control points for each coal group. The sample locations for figures 5-6 are the same as shown in figure 4. See appendix for description of how this figure was constructed.

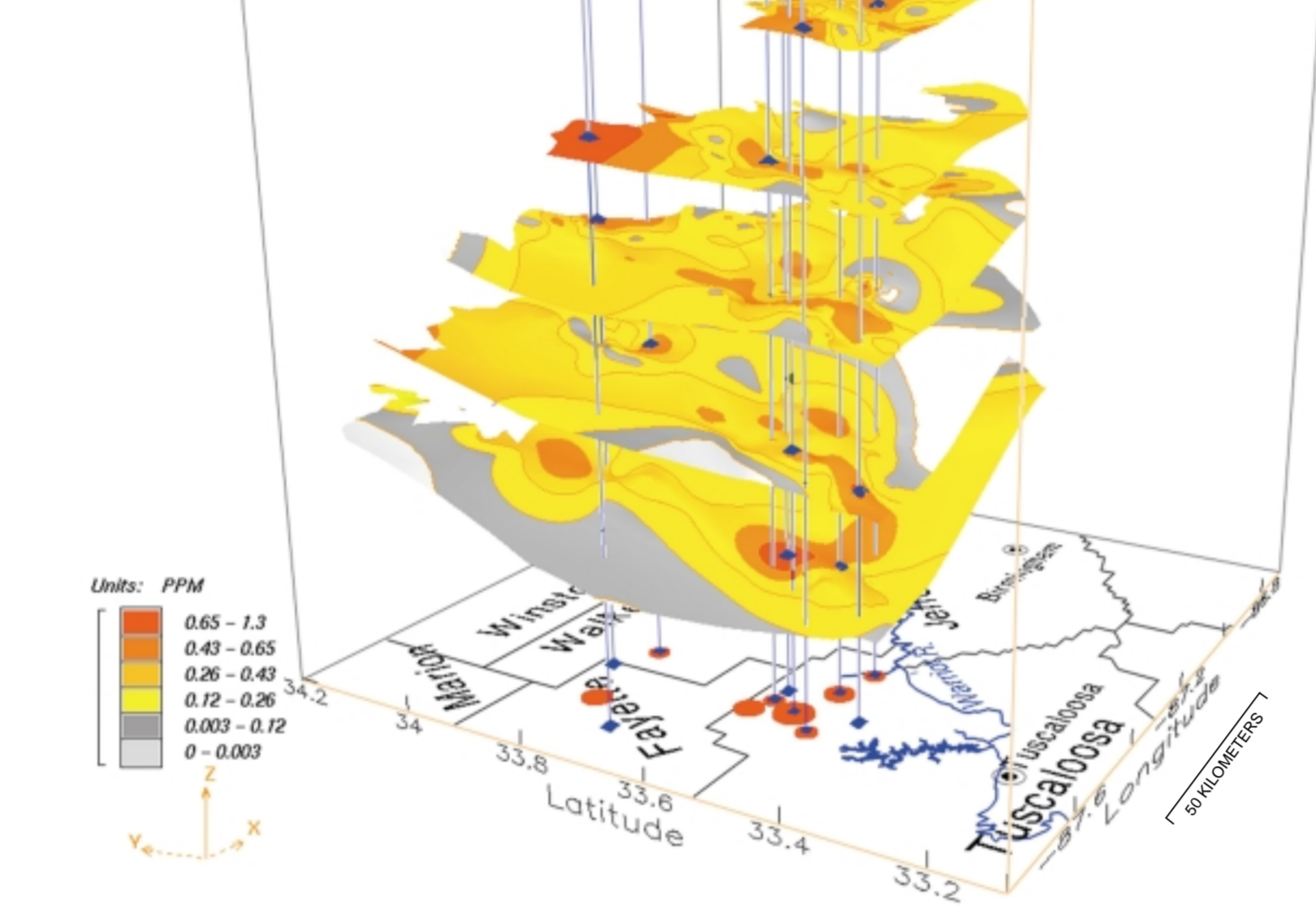
Figure 6. Arsenic in the Warrior coal field. The 3D view shows constrained concentrations of arsenic in ppm (parts per million) for five different coal groups. The view is toward the northeast. Vertical dimension is not drawn to scale. The two-dimensional views show sample control points for each coal group. The sample locations for figures 6-7 are the same as shown in figure 4. See appendix for description of how this figure was constructed.

Figure 7. Arsenic in the Warrior coal field. The 3D view shows constrained concentrations of arsenic in ppm (parts per million) for five different coal groups. The view is toward the northeast. Vertical dimension is not drawn to scale. The two-dimensional views show sample control points for each coal group. The sample locations for figures 7-8 are the same as shown in figure 4. See appendix for description of how this figure was constructed.

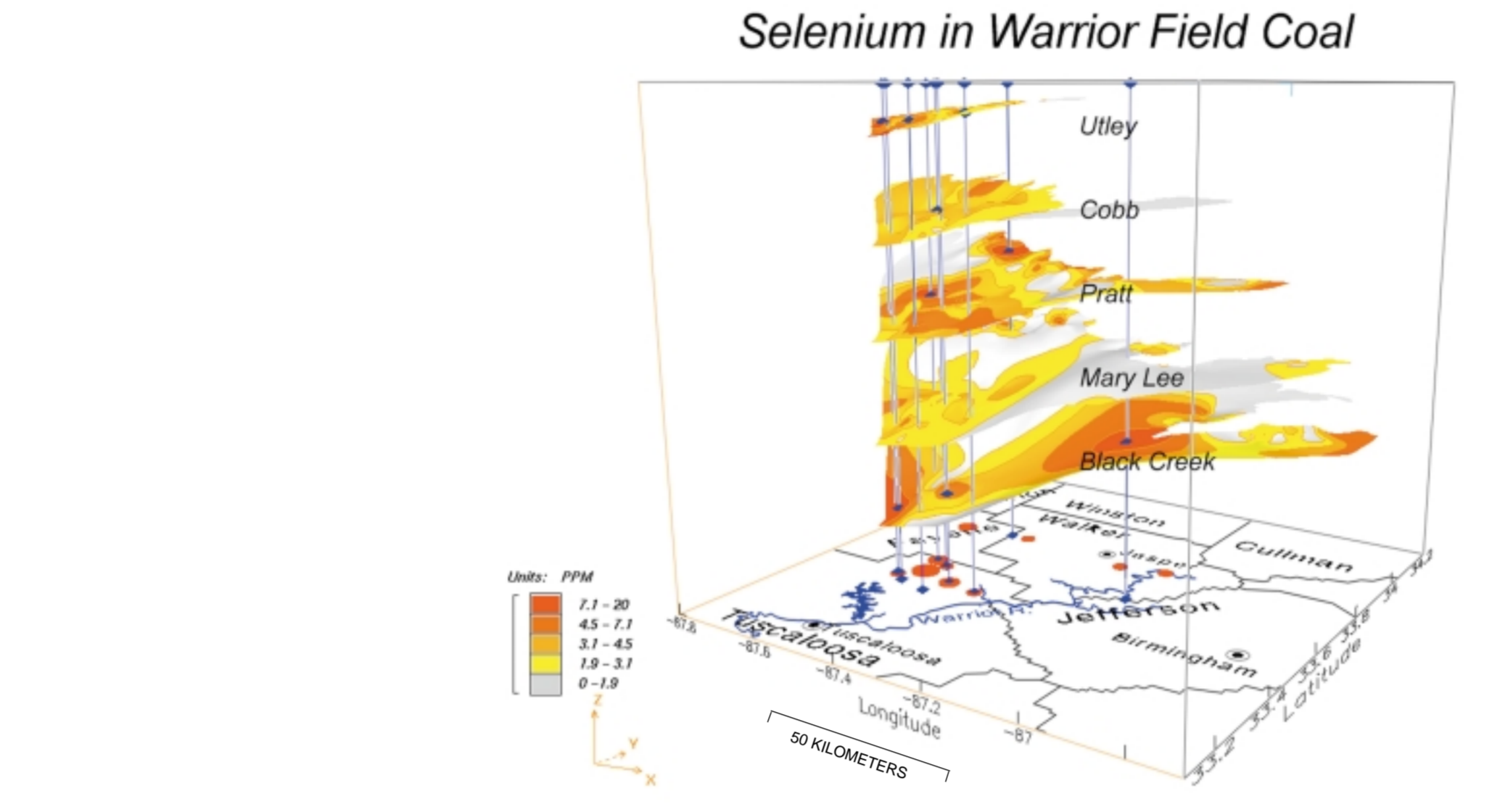
Mercury in Warrior Field Coal



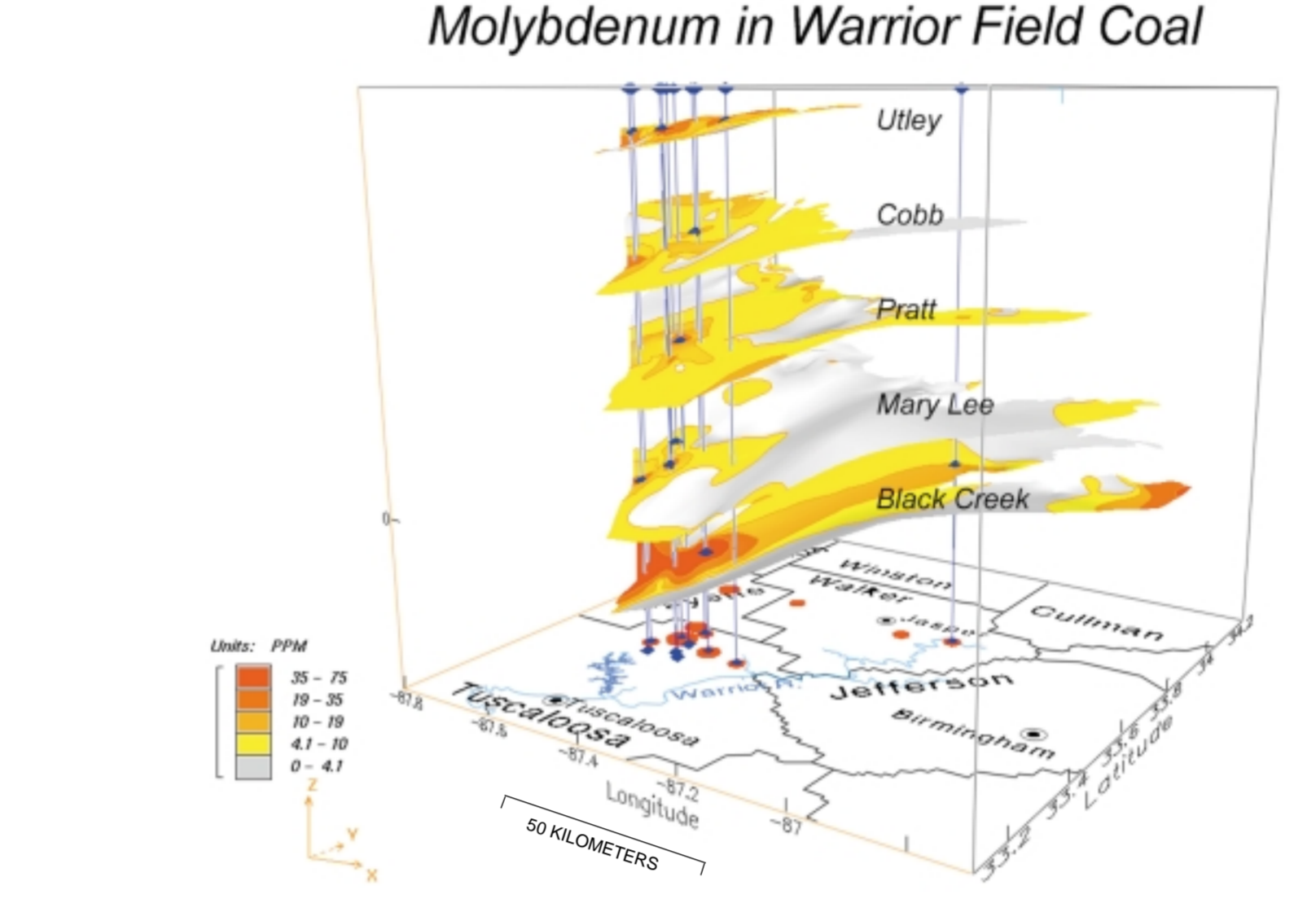
Mercury in Warrior Field Coal



Selenium in Warrior Field Coal



Molybdenum in Warrior Field Coal



Antimony in Warrior Field Coal

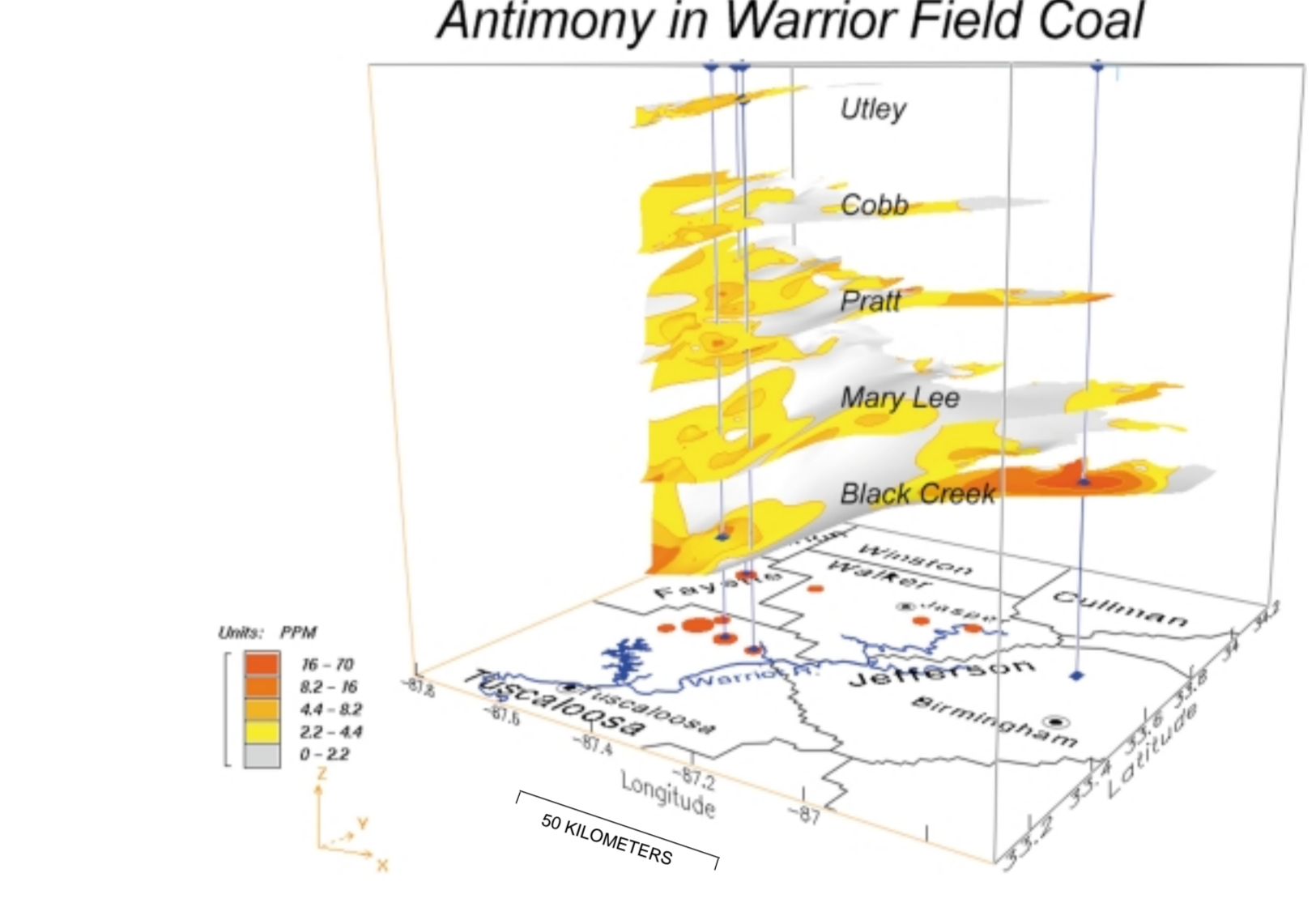


Figure 8. Mercury concentration in the Warrior coal field. The three-dimensional view shows constrained concentrations of mercury in ppm (parts per million) for five different coal groups. The view is toward the northeast. Vertical dimension is not drawn to scale. The two-dimensional views show sample control points for each coal group. The sample locations for figures 8-9 are the same as shown in figure 4. See appendix for description of how this figure was constructed.

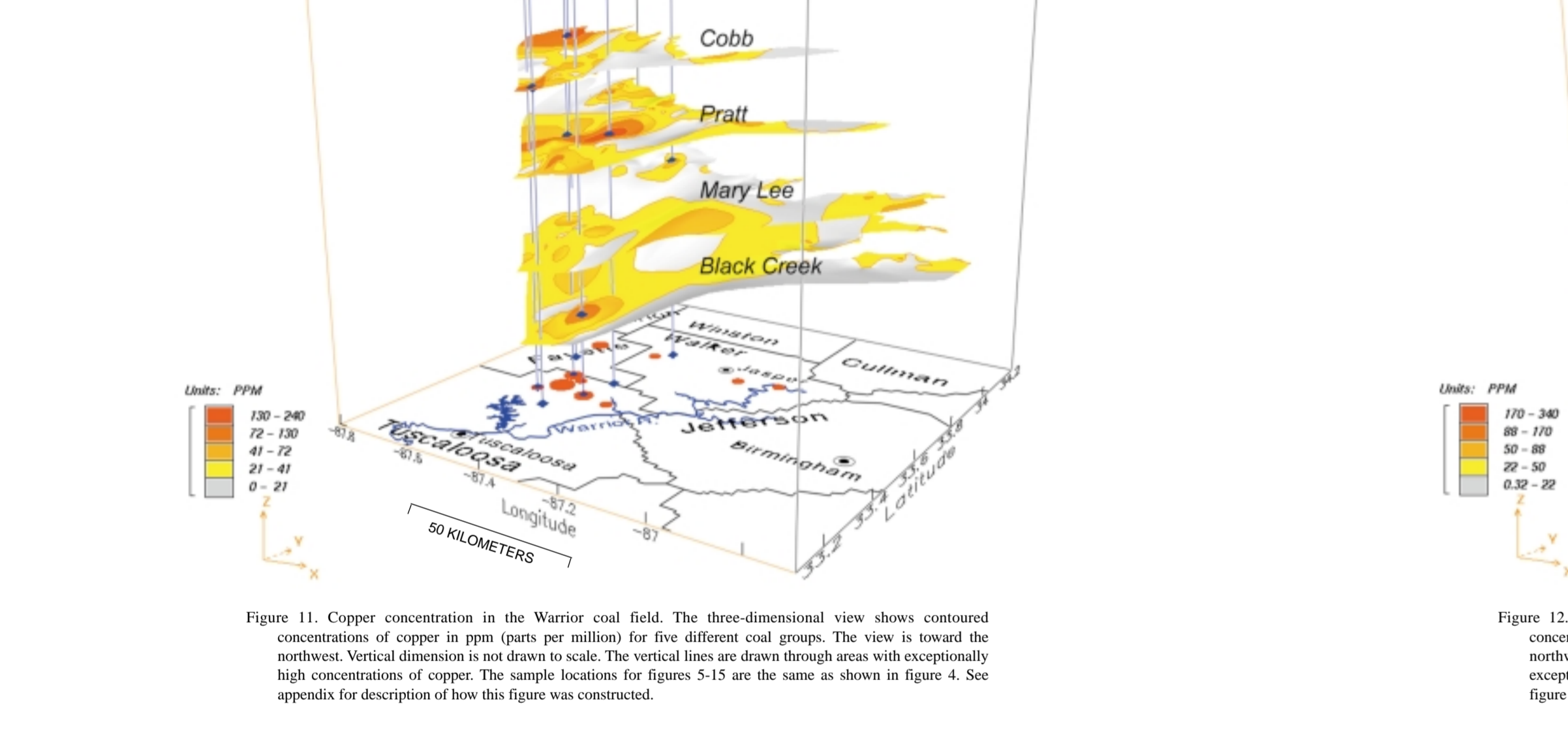
Figure 9. Mercury concentration in the Warrior coal field. The three-dimensional view shows constrained concentrations of mercury in ppm (parts per million) for five different coal groups. The view is toward the northeast. Vertical dimension is not drawn to scale. The two-dimensional views show sample control points for each coal group. The sample locations for figures 9-10 are the same as shown in figure 4. See appendix for description of how this figure was constructed.

Figure 10. Selenium concentration in the Warrior coal field. The three-dimensional view shows constrained concentrations of selenium in ppm (parts per million) for five different coal groups. The view is toward the northeast. Vertical dimension is not drawn to scale. The two-dimensional views show sample control points for each coal group. The sample locations for figures 10-11 are the same as shown in figure 4. See appendix for description of how this figure was constructed.

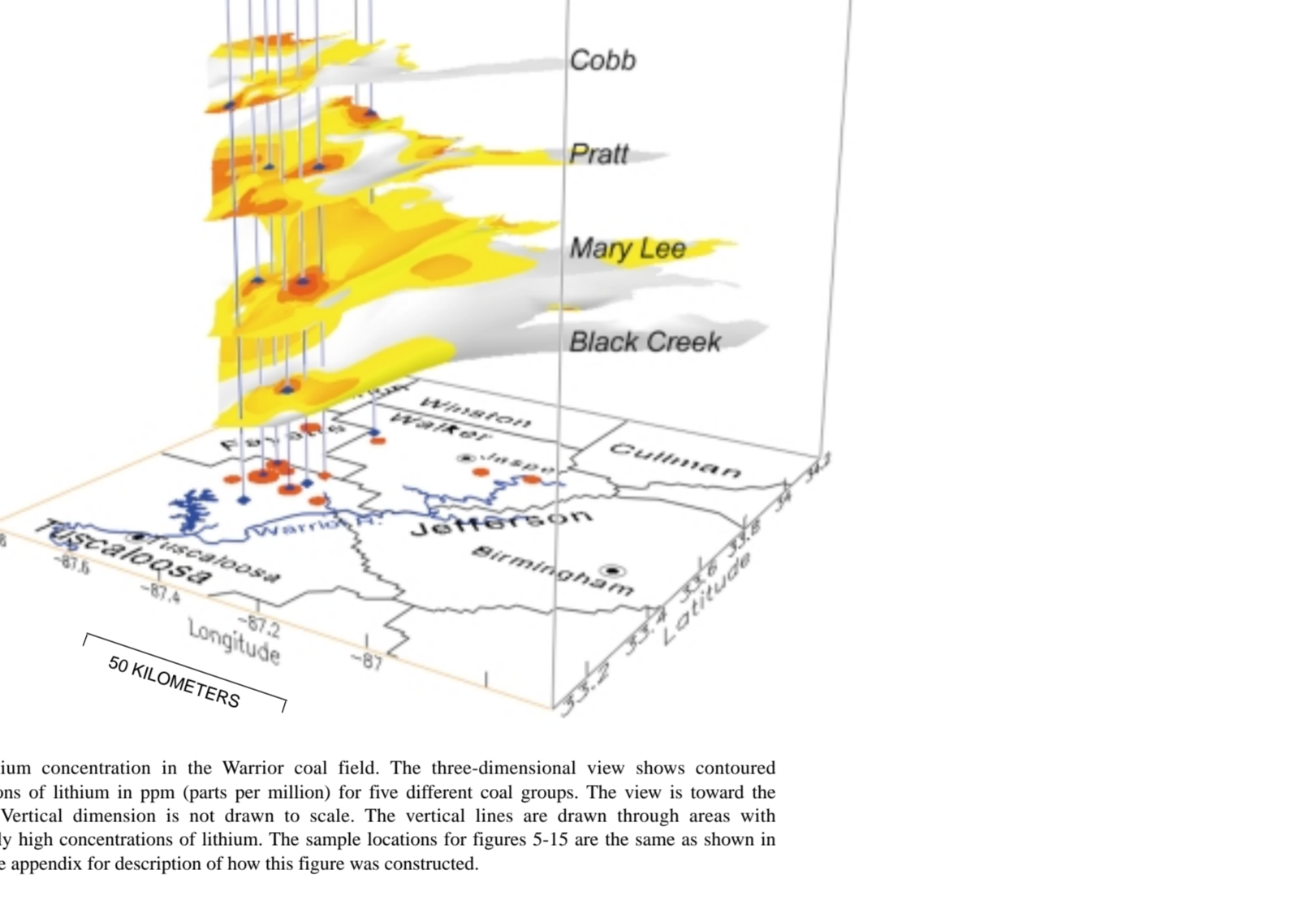
Figure 11. Molybdenum concentration in the Warrior coal field. The three-dimensional view shows constrained concentrations of molybdenum in ppm (parts per million) for five different coal groups. The view is toward the northeast. Vertical dimension is not drawn to scale. The two-dimensional views show sample control points for each coal group. The sample locations for figures 11-12 are the same as shown in figure 4. See appendix for description of how this figure was constructed.

Figure 12. Antimony concentration in the Warrior coal field. The three-dimensional view shows constrained concentrations of antimony in ppm (parts per million) for five different coal groups. The view is toward the northeast. Vertical dimension is not drawn to scale. The two-dimensional views show sample control points for each coal group. The sample locations for figures 12-13 are the same as shown in figure 4. See appendix for description of how this figure was constructed.

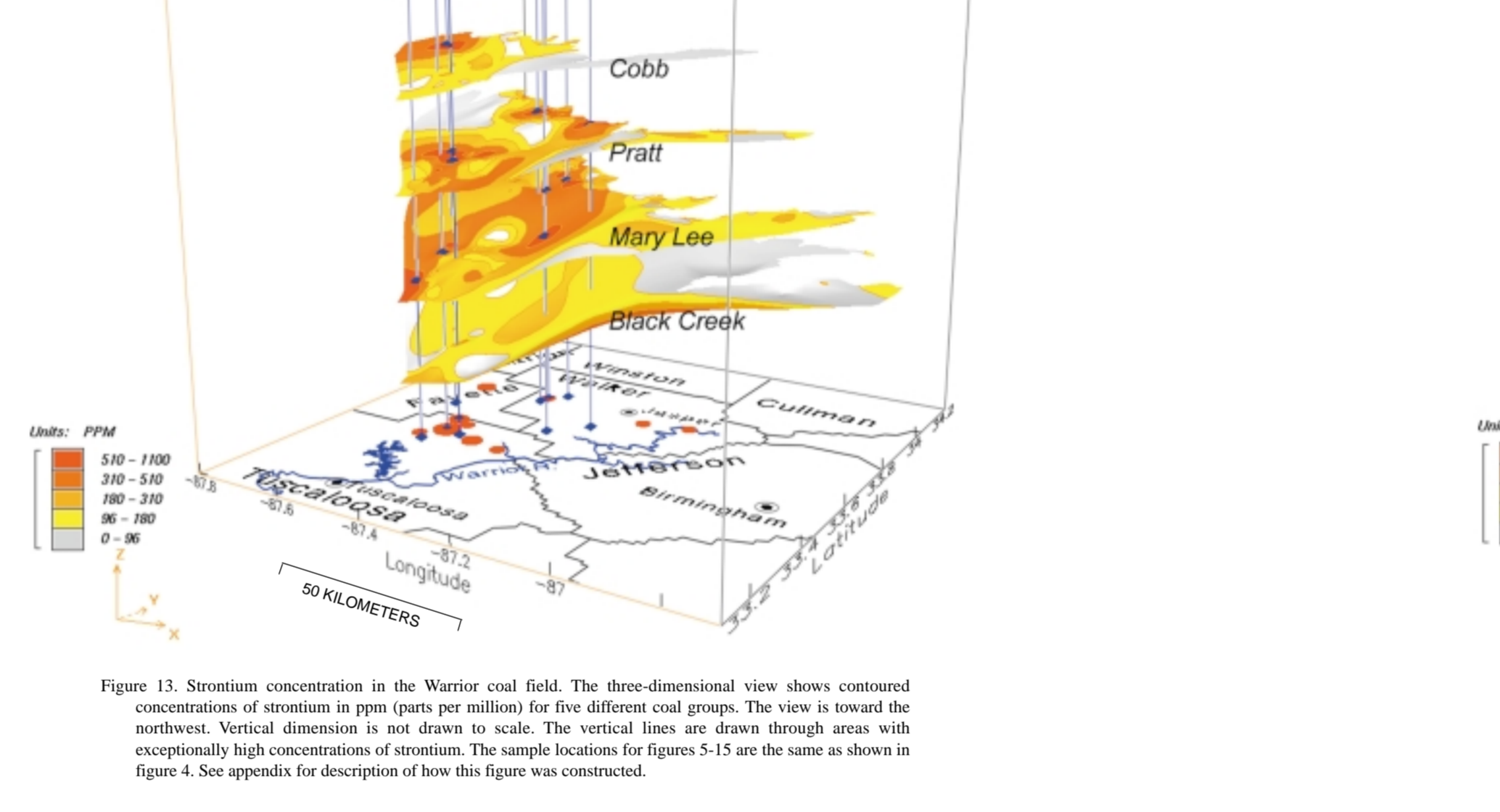
Copper in Warrior Field Coal



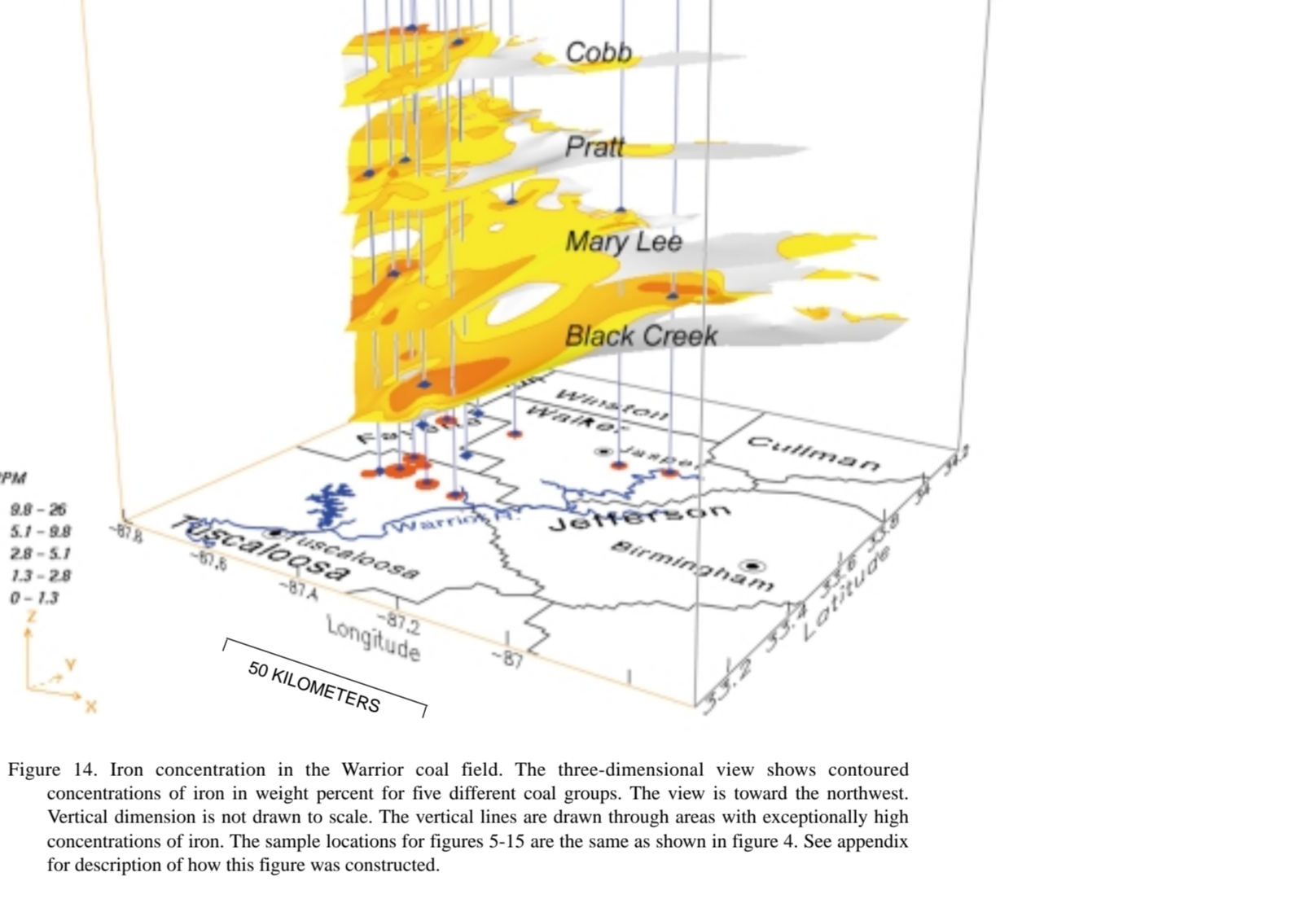
Lithium in Warrior Field Coal



Strontium in Warrior Field Coal



Iron in Warrior Field Coal



Pyritic Sulfur in Warrior Field Coal

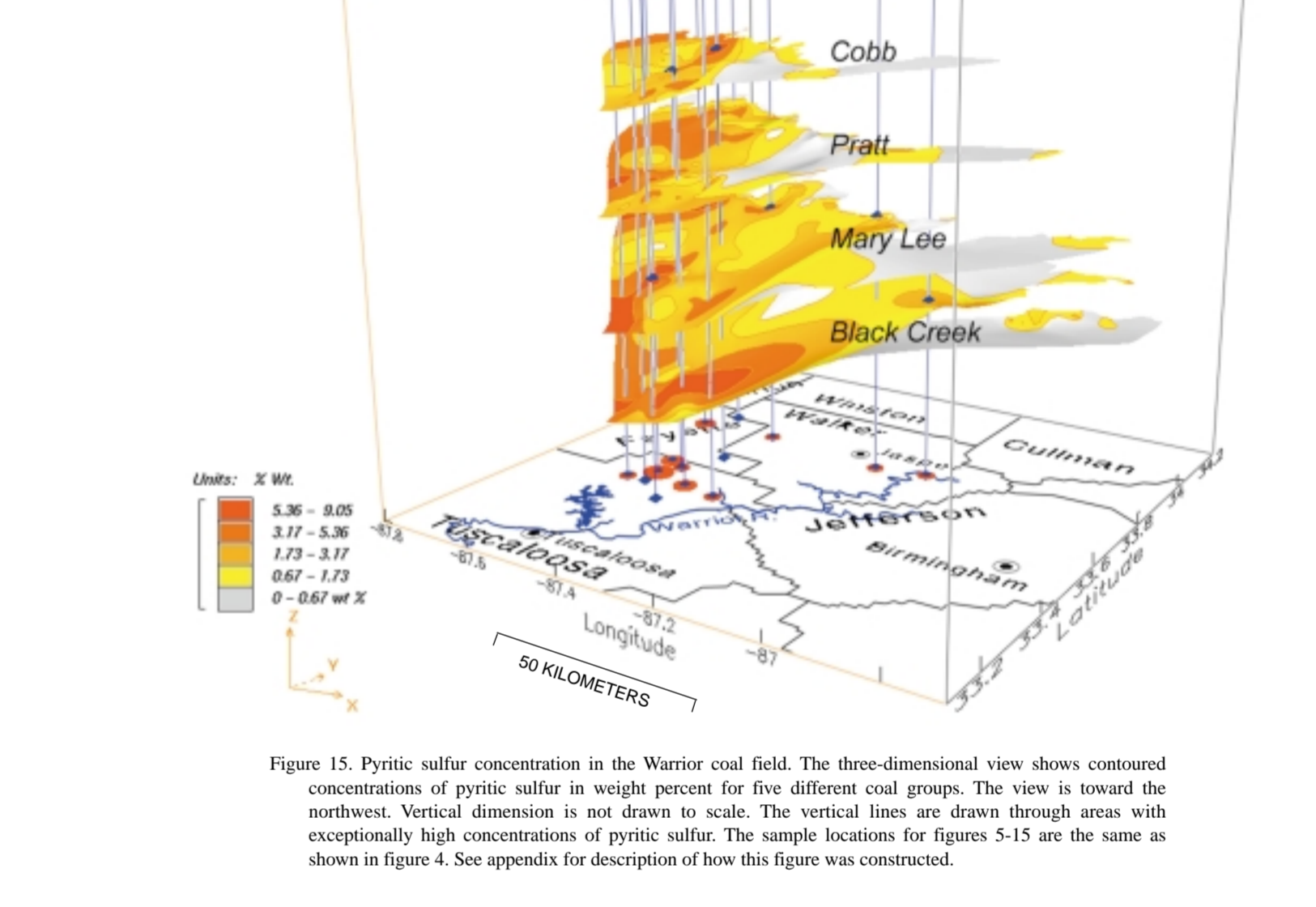


Figure 13. Copper concentration in the Warrior coal field. The three-dimensional view shows constrained concentrations of copper in ppm (parts per million) for five different coal groups. The view is toward the northeast. Vertical dimension is not drawn to scale. The two-dimensional views show sample control points for each coal group. The sample locations for figures 13-14 are the same as shown in figure 4. See appendix for description of how this figure was constructed.

Figure 14. Lithium concentration in the Warrior coal field. The three-dimensional view shows constrained concentrations of lithium in ppm (parts per million) for five different coal groups. The view is toward the northeast. Vertical dimension is not drawn to scale. The two-dimensional views show sample control points for each coal group. The sample locations for figures 14-15 are the same as shown in figure 4. See appendix for description of how this figure was constructed.

Figure 15. Strontium concentration in the Warrior coal field. The three-dimensional view shows constrained concentrations of strontium in ppm (parts per million) for five different coal groups. The view is toward the northeast. Vertical dimension is not drawn to scale. The two-dimensional views show sample control points for each coal group. The sample locations for figures 15-16 are the same as shown in figure 4. See appendix for description of how this figure was constructed.

Figure 16. Iron concentration in the Warrior coal field. The three-dimensional view shows constrained concentrations of iron in ppm (parts per million) for five different coal groups. The view is toward the northeast. Vertical dimension is not drawn to scale. The two-dimensional views show sample control points for each coal group. The sample locations for figures 16-17 are the same as shown in figure 4. See appendix for description of how this figure was constructed.

Figure 17. Pyritic sulfur concentration in the Warrior coal field. The three-dimensional view shows constrained concentrations of pyritic sulfur in ppm (parts per million) for five different coal groups. The view is toward the northeast. Vertical dimension is not drawn to scale. The two-dimensional views show sample control points for each coal group. The sample locations for figures 17-18 are the same as shown in figure 4. See appendix for description of how this figure was constructed.

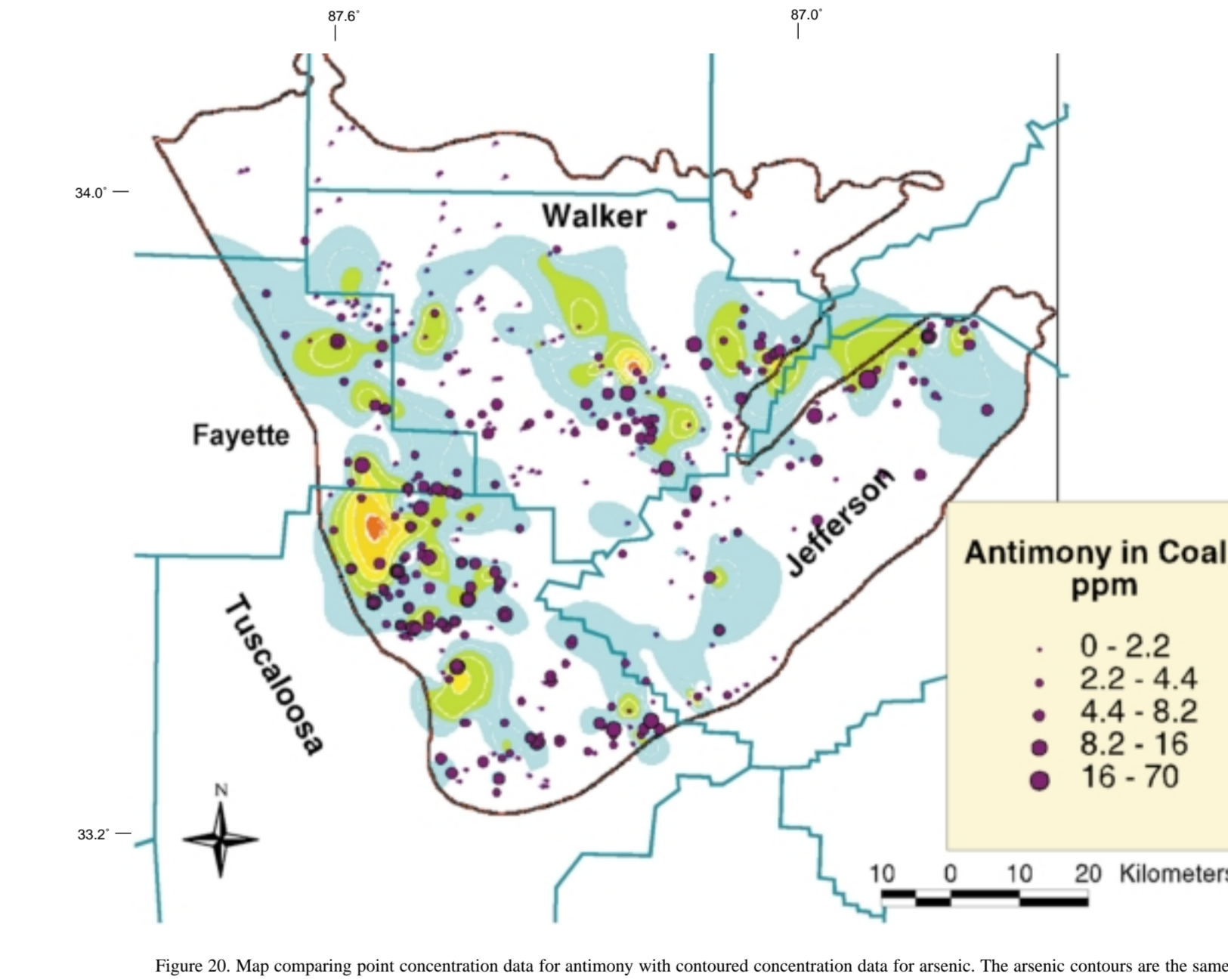
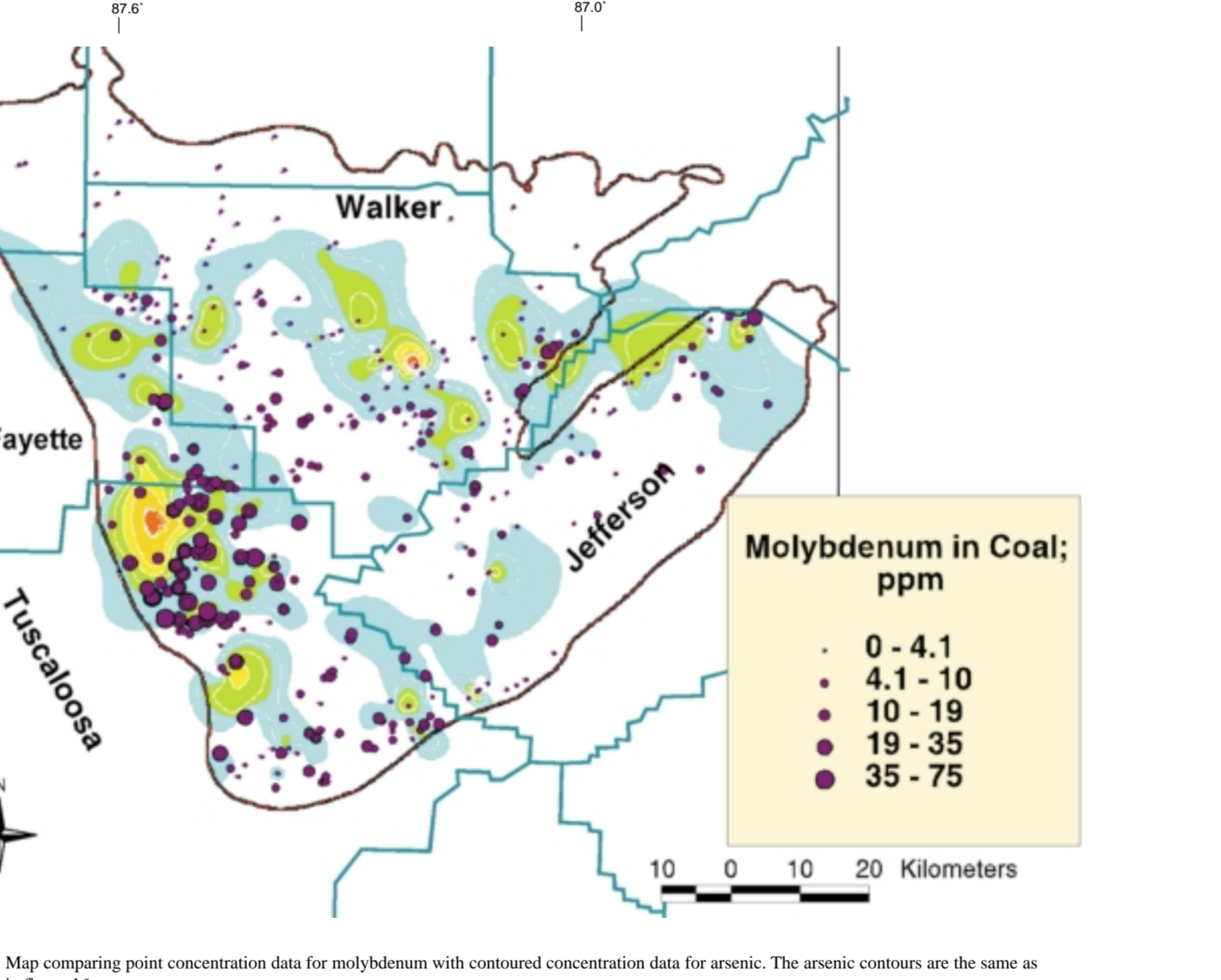
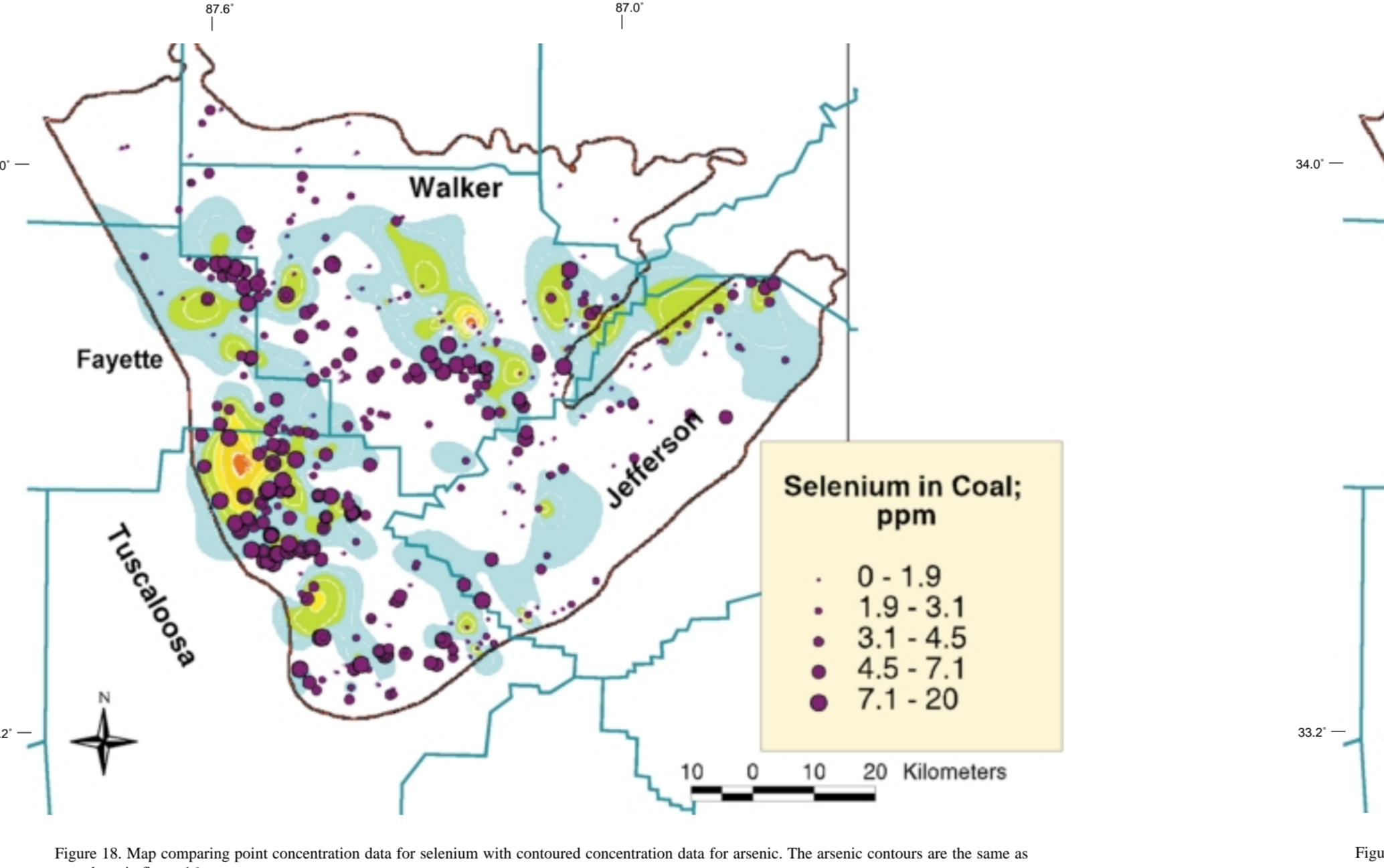
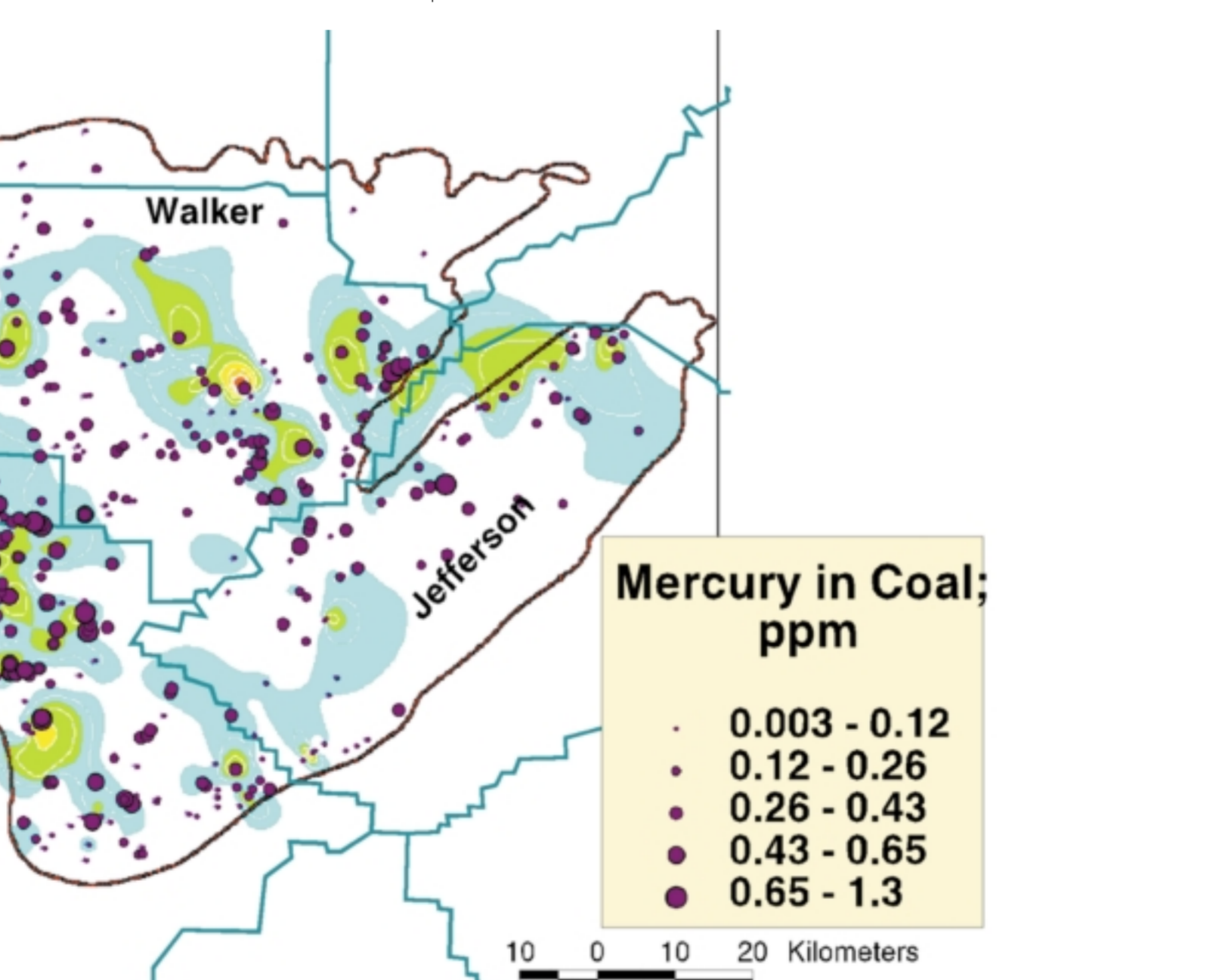
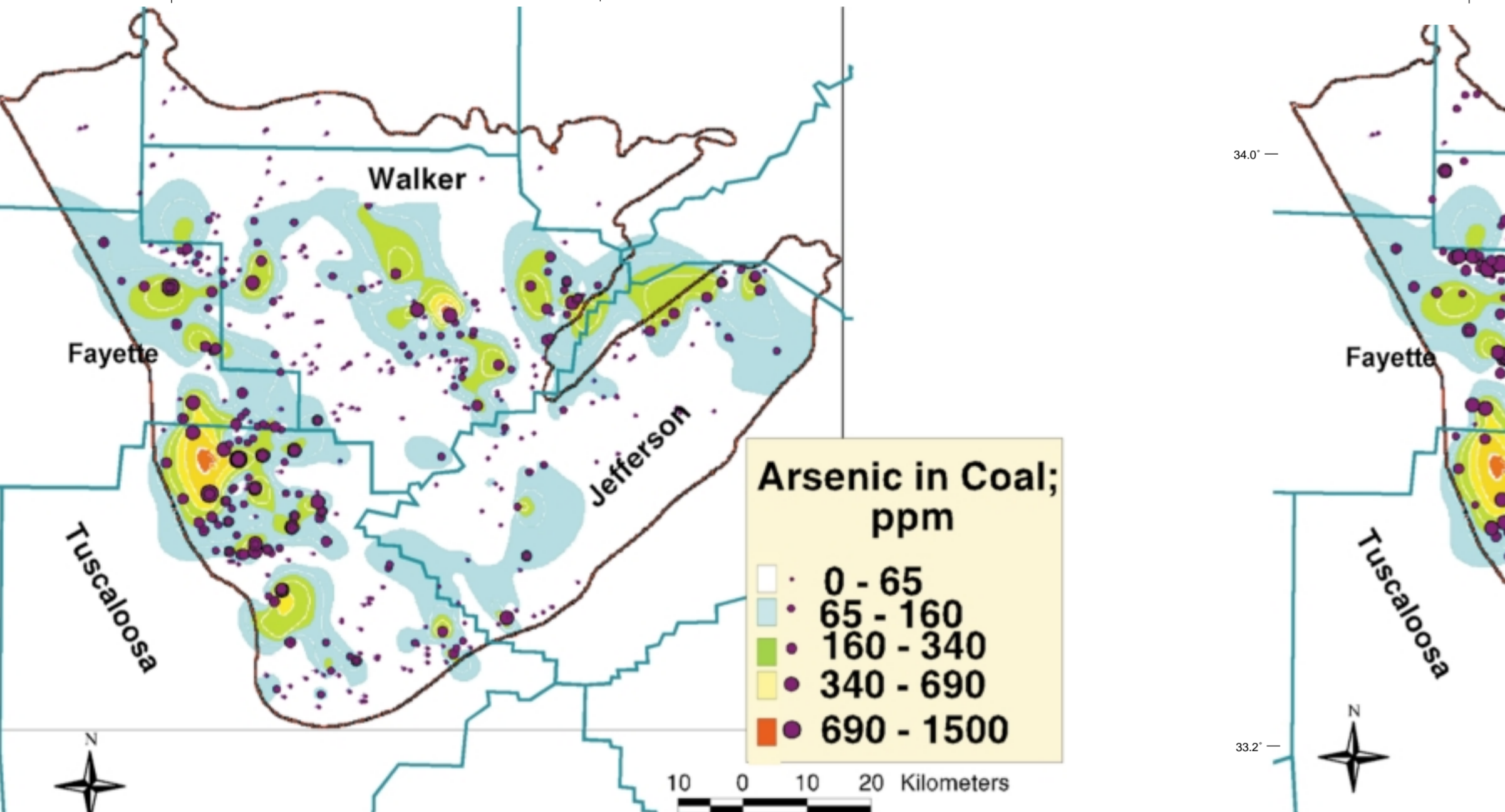


Figure 18. Map showing constrained and point concentration data for arsenic in the Warrior coal field. The arsenic concentrations are shown in the legend in this figure as the concentration ranges associated with the variability of arsenic.

Figure 19. Map showing constrained and point concentration data for mercury in the Warrior coal field. The arsenic concentrations are shown in the legend in this figure as the concentration ranges associated with the variability of mercury.

Figure 20. Map showing constrained and point concentration data for selenium in the Warrior coal field. The arsenic concentrations are shown in the legend in this figure as the concentration ranges associated with the variability of selenium.

Figure 21. Map showing constrained and point concentration data for molybdenum in the Warrior coal field. The arsenic concentrations are shown in the legend in this figure as the concentration ranges associated with the variability of molybdenum.

Figure 22. Map showing constrained and point concentration data for antimony in the Warrior coal field. The arsenic concentrations are shown in the legend in this figure as the concentration ranges associated with the variability of antimony.

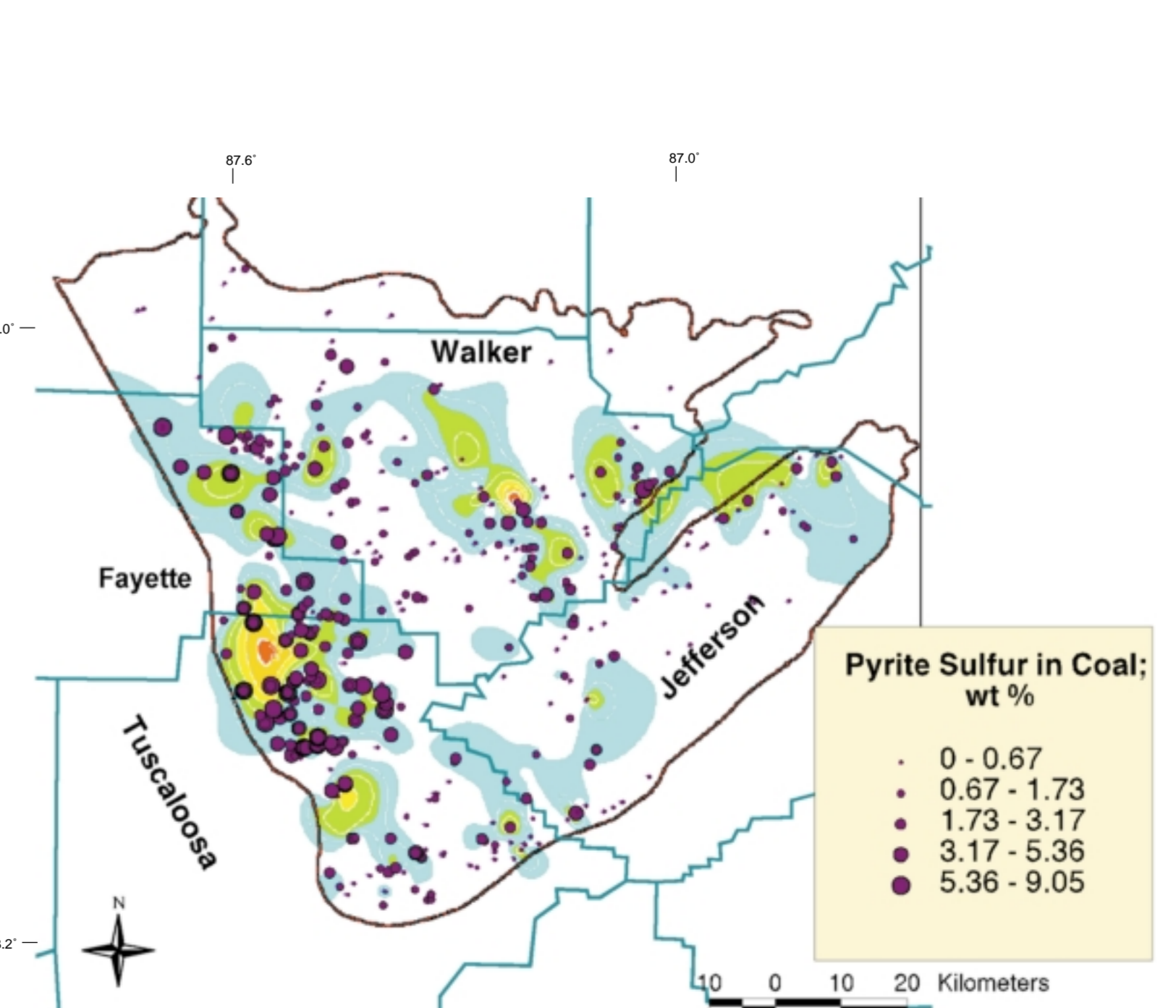
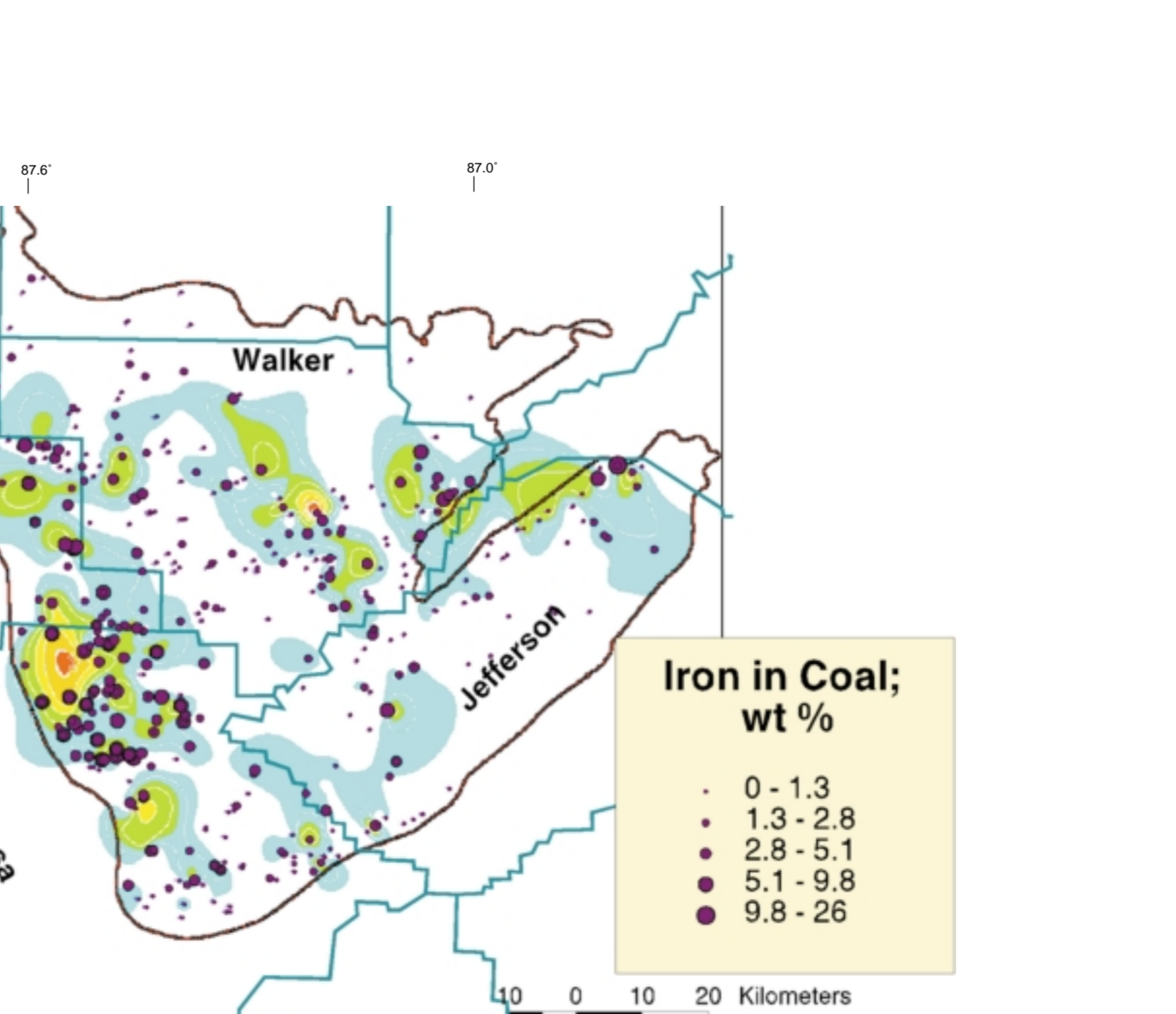
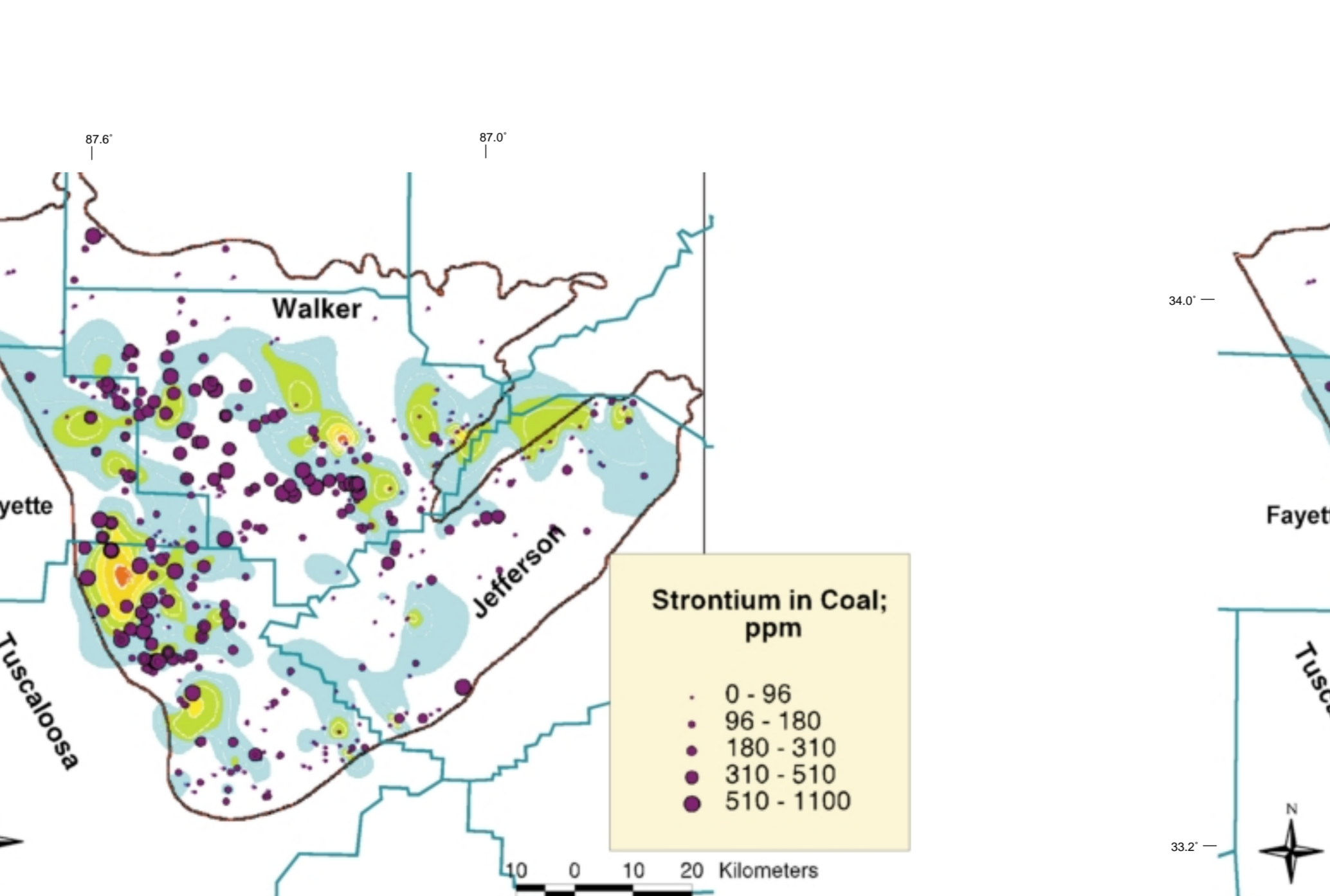
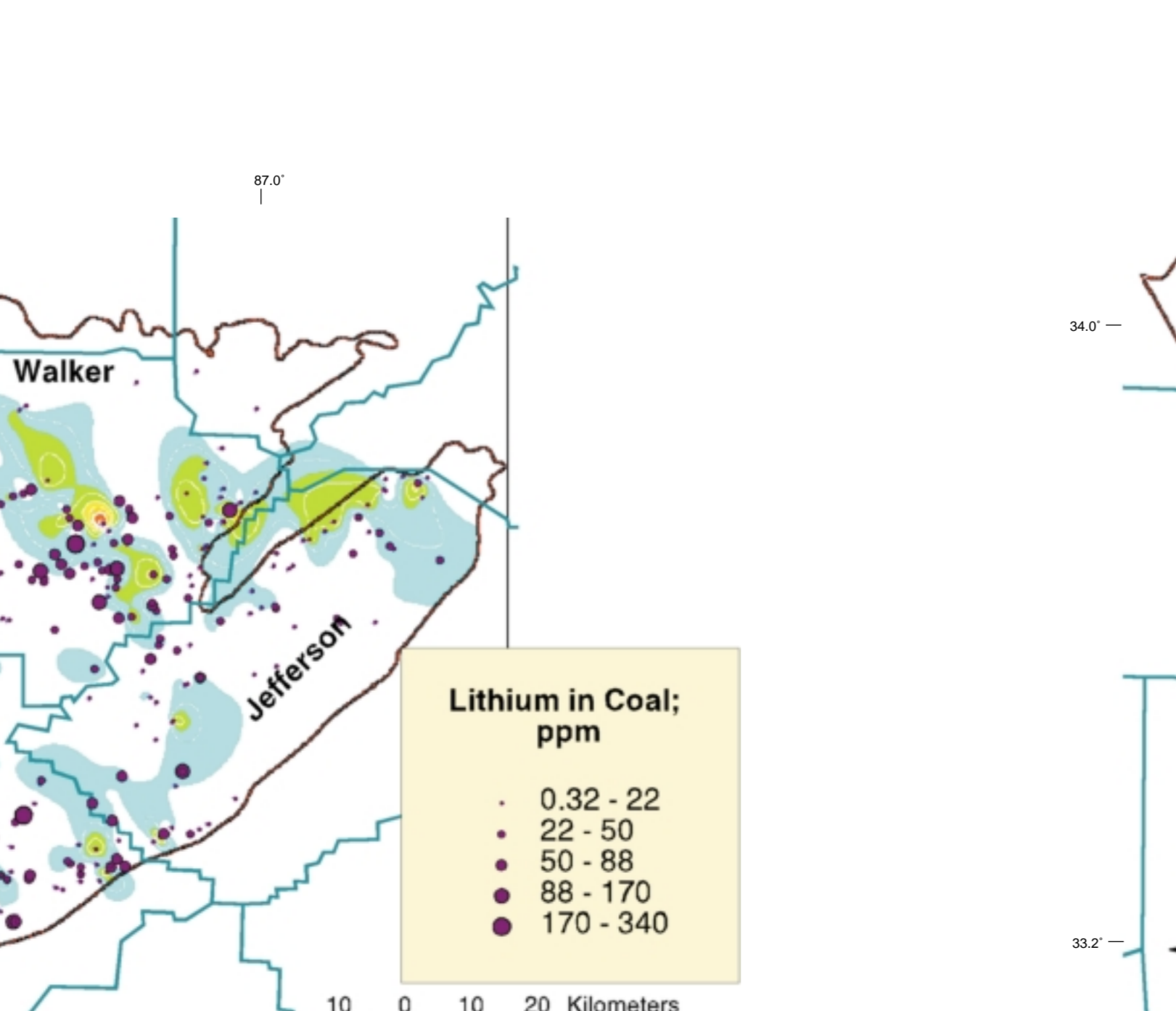
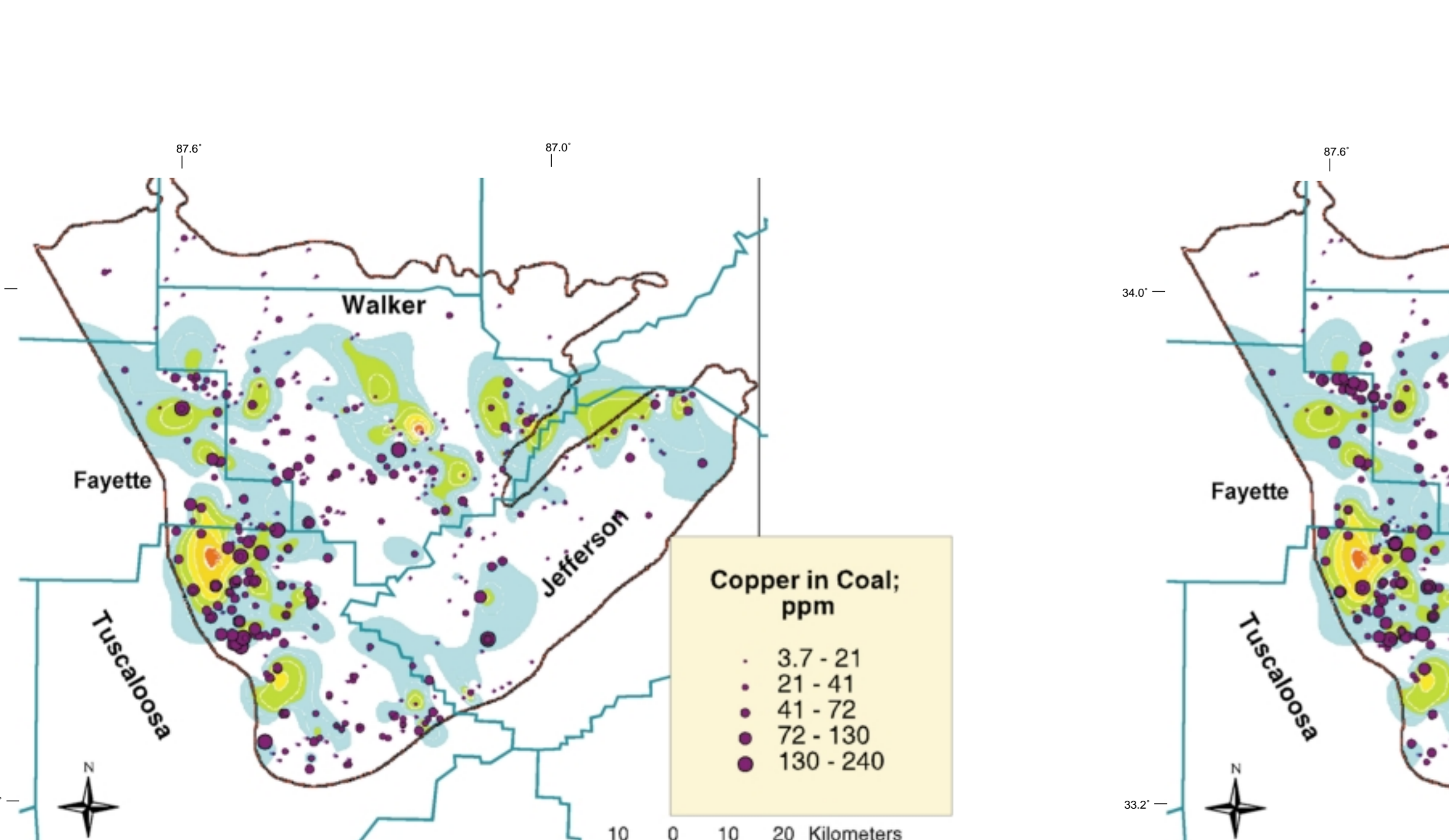


Figure 23. Map showing constrained and point concentration data for copper in the Warrior coal field. The arsenic concentrations are shown in the legend in this figure as the concentration ranges associated with the variability of copper.

Figure 24. Map showing constrained and point concentration data for lithium in the Warrior coal field. The arsenic concentrations are shown in the legend in this figure as the concentration ranges associated with the variability of lithium.

Figure 25. Map showing constrained and point concentration data for strontium in the Warrior coal field. The arsenic concentrations are shown in the legend in this figure as the concentration ranges associated with the variability of strontium.

Figure 26. Map showing constrained and point concentration data for iron in the Warrior coal field. The arsenic concentrations are shown in the legend in this figure as the concentration ranges associated with the variability of iron.

Figure 27. Map showing constrained and point concentration data for pyritic sulfur in the Warrior coal field. The arsenic concentrations are shown in the legend in this figure as the concentration ranges associated with the variability of pyritic sulfur.

DISTRIBUTION OF A SUITE OF ELEMENTS INCLUDING ARSENIC AND MERCURY IN ALABAMA COAL

By
M.B. Goldhaber, R.C. Bigelow, J.R. Hatch, and J.C. Pashin