CHAPTER 6

CONSTRUCTION OF GEOCHEMICAL MAP BY MEAN OF MOVING AVERAGE METHOD

In geochemical exploration, in order to obtain a meaningful interpretation of geochemical data, it is primarily essential to remove or at least to minimize point deviation or noises due to sampling error or analytical error (Chand, 1980). This will facilitate the computation of regional trend or background values and, therefore, the residuals will be obtained. Point deviations are normally removed by smoothing the data by one of various techniques, for instance, Moving Average, Kriging (Chand, 1980). The moving average or rolling mean is considered to be the effective one. A moving average is a smoothing or filtering technique which facilitates the separation of a signal from the noise. Moving average using different cell sizes is useful in separating the various components of a geochemical landscape such as background, residual, and point deviations (Chand, 1980). This method was employed in the present investigation to define background trends in the element distribution of the provincial survey. The moving average or rolling mean analysis is regarded as the one dimensional smoothing technique applied to areally distributed data (Armour-Brown and Nicol, 1970).

6.1 Relation between Cell Size and Trend Components.

The technique described by Geoffroy, Wu, and Heins (1968) was applied to determine the suitable cell size that represent the regional trend component and combined areal and regional trend components. The full reports on this subject were presented by Sektheera (1972) and Yamniyom (1973). The selection of cell size can be determined as follows:

1. Select the sampling site with a relatively high concentration value and calculate mean values for different cell sizes, retaining the given sampling site as the mid-point of the cells

2. Plot these mean values against the cell sizes. The relation between the mean cell values and the cell sizes was obtained from graph. The results for Cr, Ni and Co relations are shown in Fig. 6.1, 6.2 and 6.3 respectively.

The graphs obtained are interpreted as follows:

1. Cell size of 7x7 km^2 for Co and 6x6 km^2 for Cr and Ni produce the regional component.

2. Cell size of 2x2 km^2 for Cr, Ni and Co produce the combined areal and regional components.

3. Cell size of 1x1 km^2 for Cr, Ni and Co produce the combined local, areal, and regional components.

6.2 Construction of Geochemical Surface by Moving Average Method

The geochemical surfaces for Cr, Ni and Co were constructed by using the suitable cell sizes. The cell sizes of 7x7 km^2 for Co and 6x6 km^2 for Cr and Ni were used for the construction of the regional geochemical surface and the cell size of 2x2 km^2 for Cr, Ni and Co were selected for the construction of areal geochemical surface. The mid cell values were calculated for all selected cell sizes and the cell was moved across the entire area from W to E and N to S. The cells have an overlap of 50 percents. These geochemical surfaces were produced by contouring the lines as interpolated from average mid cell values. A regional surface represents only regional component and

an areal surface represents the combined areal and regional components. Residual maps representing only the areal component are obtained by substracting the regional surface from positive and negative values. The area of high concentration of positive values may indicate possible mineralizations. The adventages of the moving average method are that regional and areal or local components can be recognized and computation is very simple and can be conducted easily with computer. For the disadvantage, the local trends and trend directions may be eliminated due to flattening of surface by average cell values.

6.3 Analysis of Geochemical Surfaces by Moving Average Method.

6.3.1 Regional Map

The regional maps based on the 6x6 km^2 moving average method are shown in Fig. 6.4 for Cr and Fig. 6.7 for Ni, and the 7x7 km^2 cell size for Co is shown in Fig 6.10. The regional map of Cr shows an area of high values locate within the ultramafic zone in direction of NW-SE and some of high values Cr extend to surrounded rocks. The regional maps of Ni and Co show certain similarities to Cr map which is clearly connected with ultramafic terrain.

6.3.2 Combined areal and regional component maps

These maps base on 2x2 km^2 cell sizes for Cr, Ni and Co are shown in Fig. 6.5, 6.8, and 6.11 respectively. The areas underlain by the ultramafic rocks show the high Cr, Ni and Co concentrations. These localities coincide with the high values of regional map but cover area less than the regional map. The low values of each element are located outside the exposed ultramafic rocks.

6.4 Analysis of Residual Maps

The residual maps represent the distribution of areal components obtained by substraction of the regional surface from the combined areal plus regional surface. Fig.6.6, 6.9 and 6.12 are residual map of Cr, Ni and Co respectively. The residual maps show area of positive and negative deviations. Cr residual map shows high positive values which located on the NW-SE trending serpentinized rocks. The negative values occure around the ultramafic zone. These significantly high positive values coincide with the anomalous localities on the discrete value map that is very important for indication of possible chromium mineralization. The residual maps of Ni and Co are very similar to that of Cr in the same localities. It is also clear from discrete value map that the high positive values show significant association with Cr distribution. The Ni and Co negative values, however, appear in the area outside ultramafic rocks, especially over chert and weathered sandstone.

Fig. 6.1 Variation of Mean Cr value with cell size. Based on sample density 2 samples per 1 km^2.

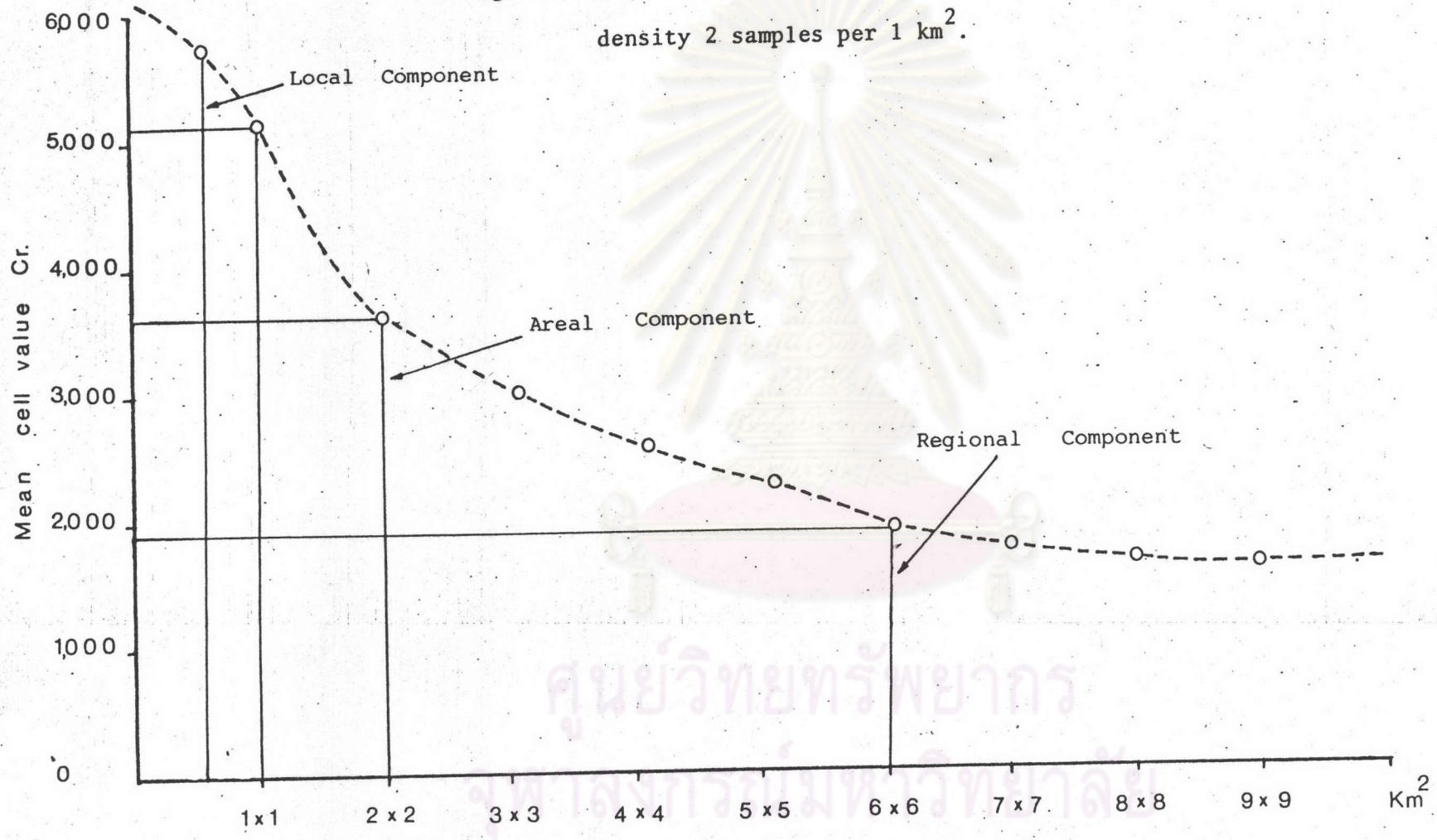


Fig. 6.2 Variation of Mean Ni value with cell size. Based on sample density 2 samples per 1 km^2.

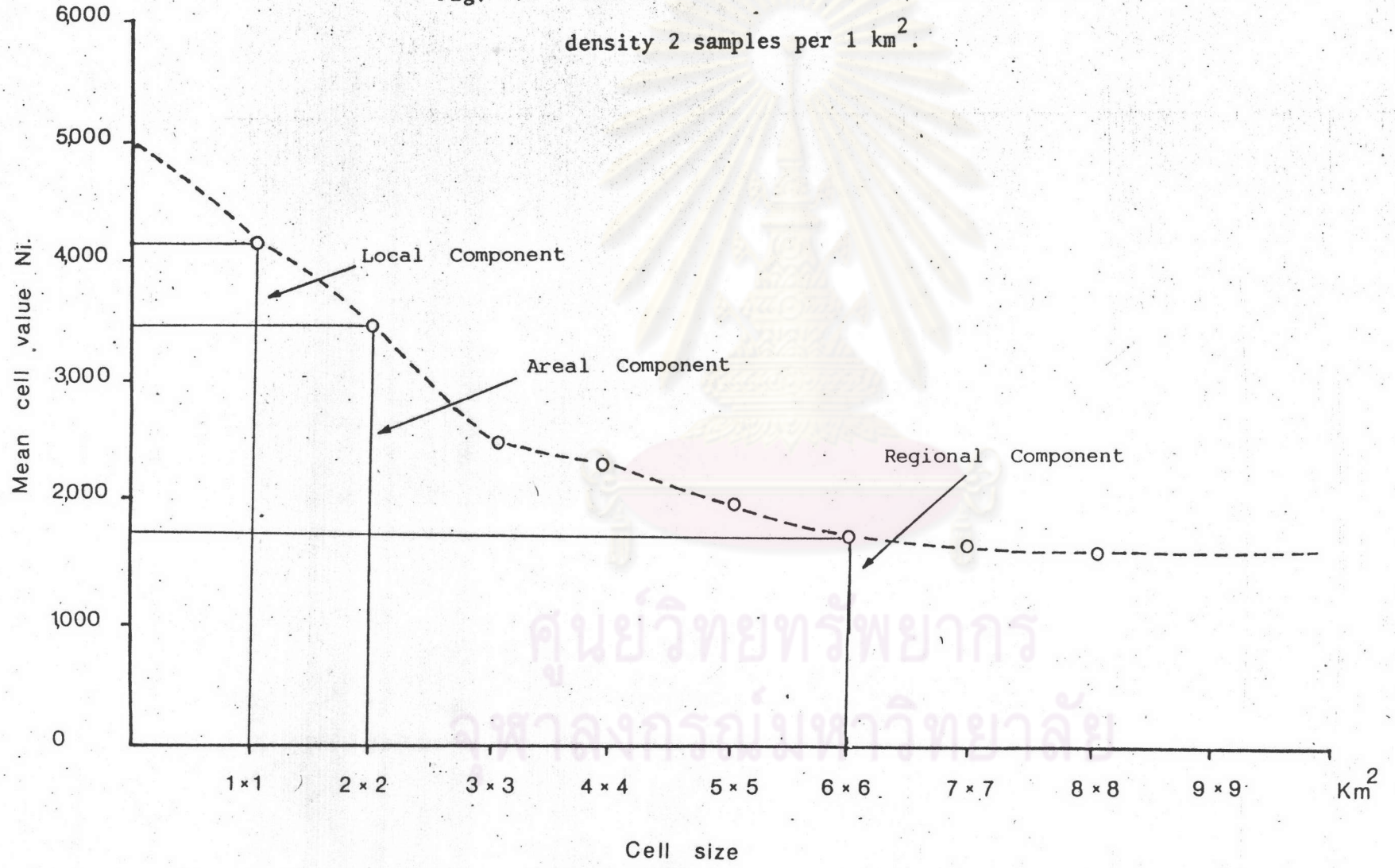
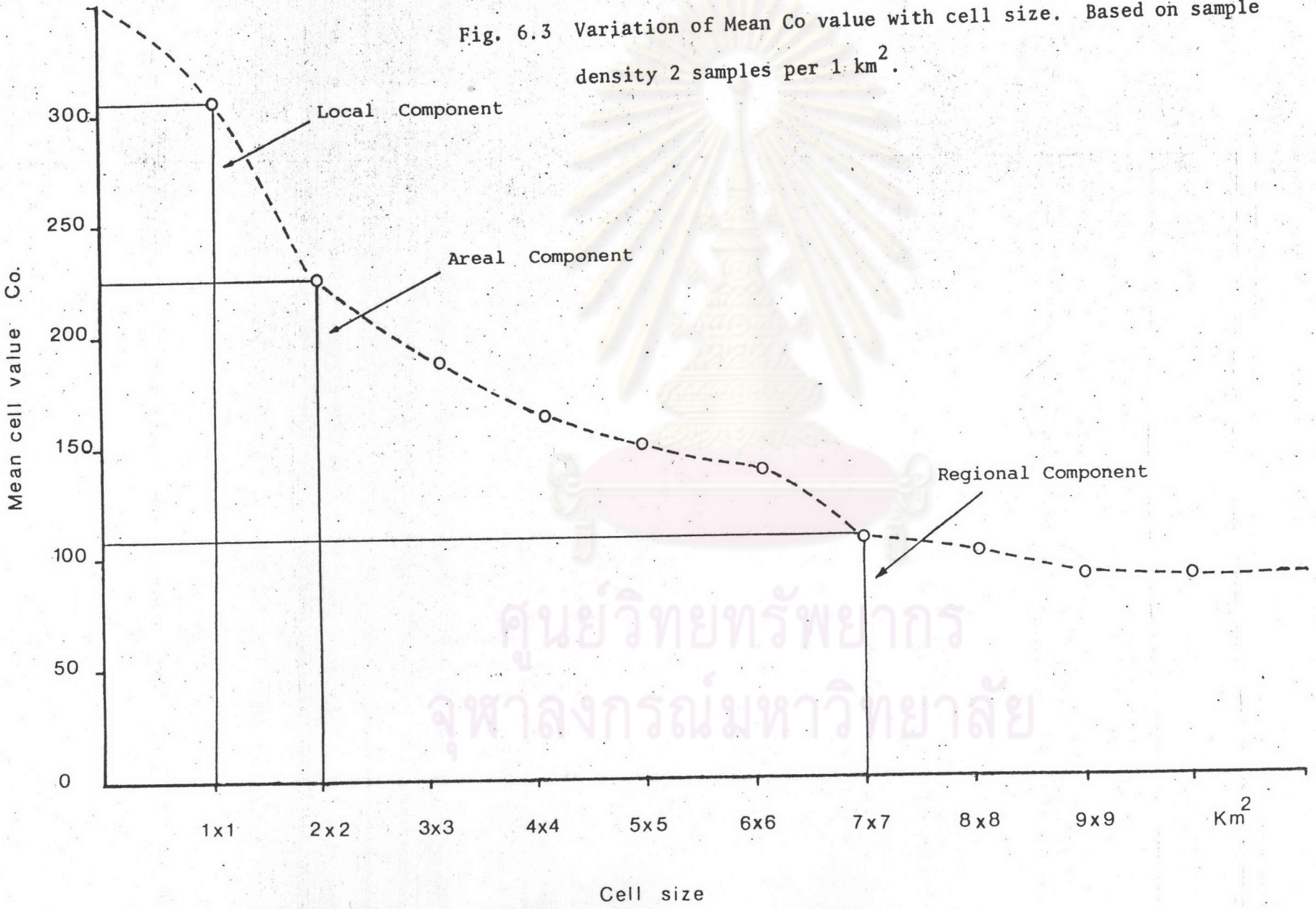


Fig. 6.3 Variation of Mean Co value with cell size. Based on sample density 2 samples per 1 km^2.



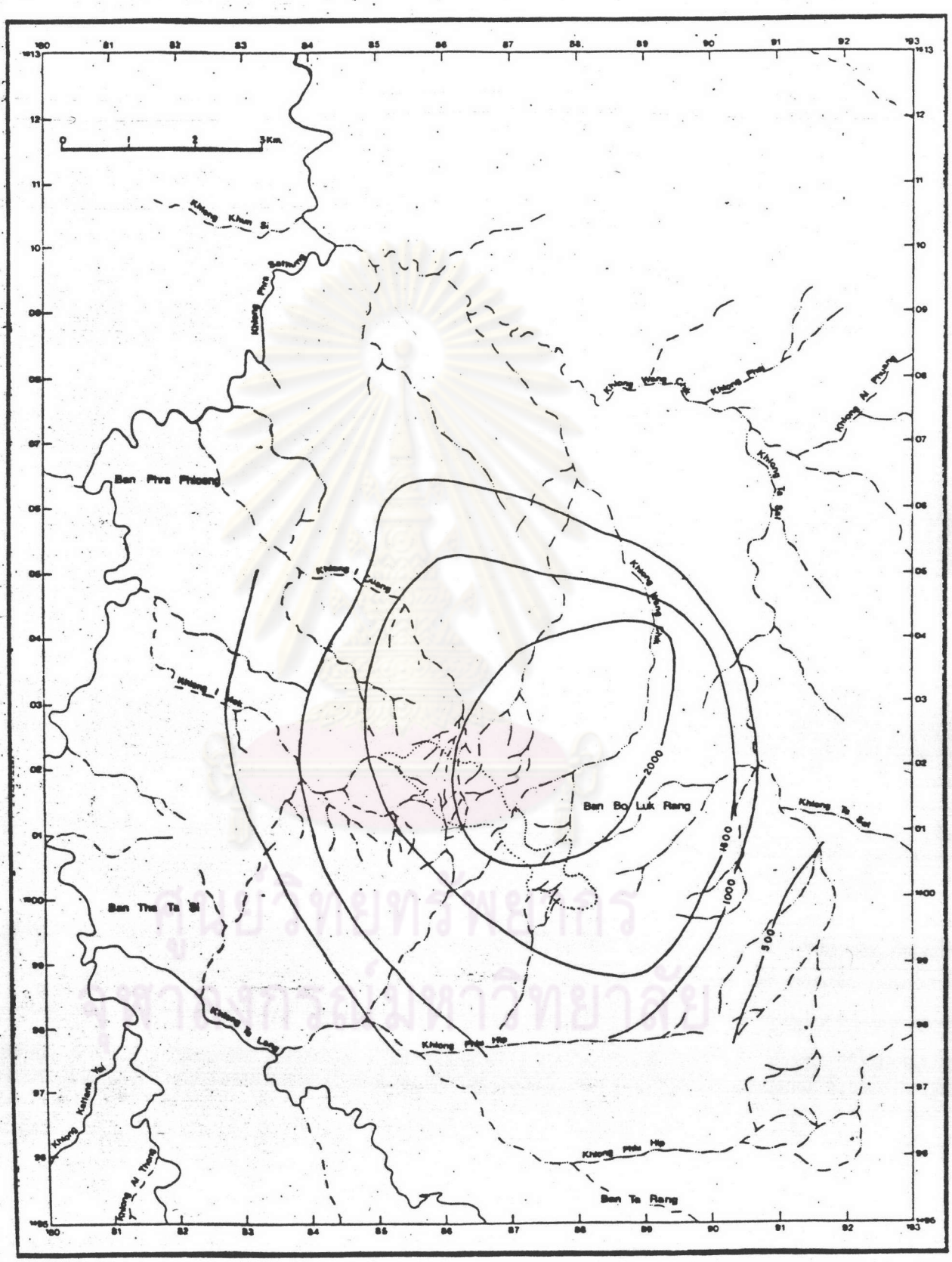


Fig. 6.4 Geochemical contour map for Cr (ppm) based on moving cell average of 6x6 km^2 cell size.

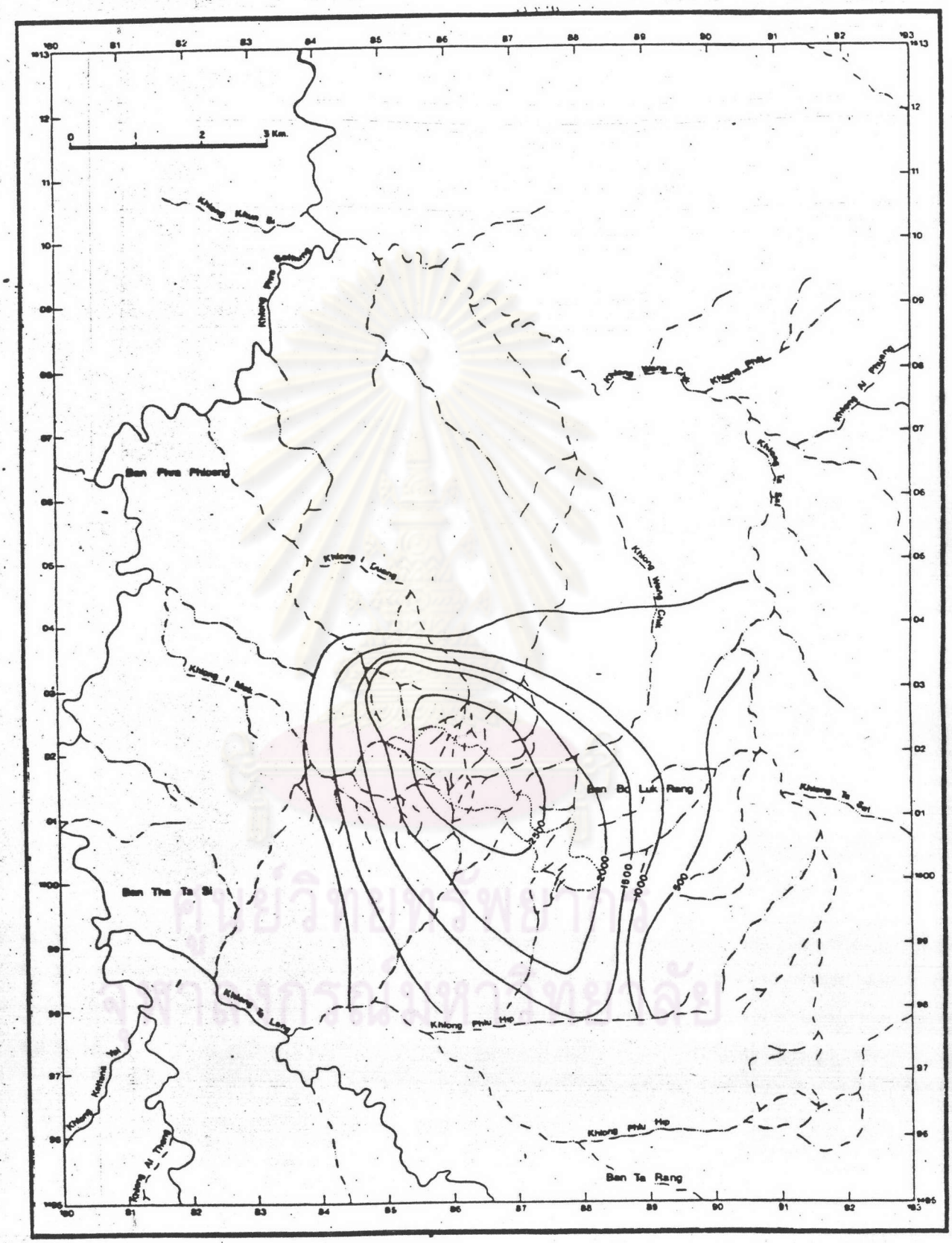


Fig.6.5 Geochemical contour map for Cr (ppm) based on moving cell average of 2x2 km^2 cell size.

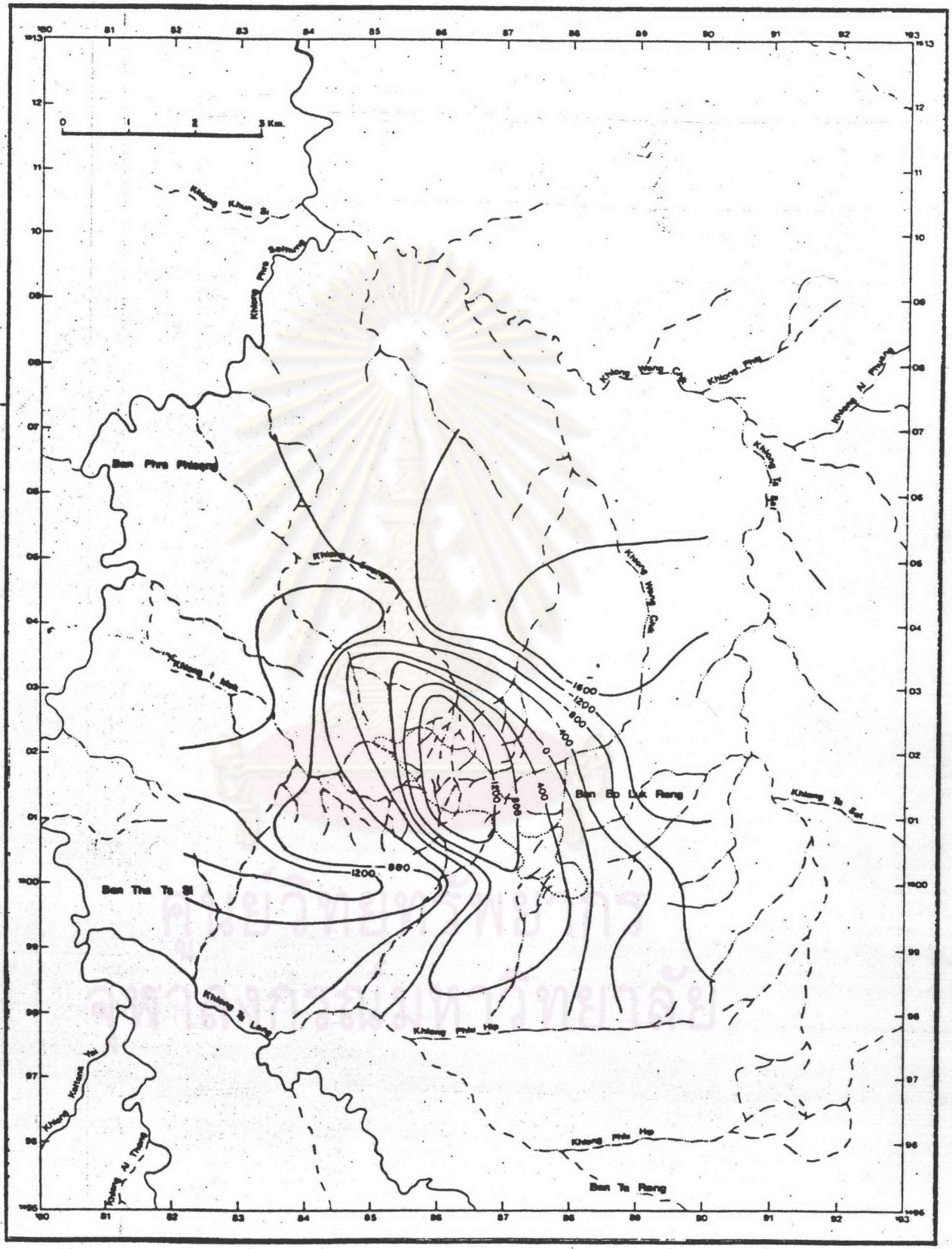


Fig.6.6 Residual map for Cr (ppm) based on moving cell average method.

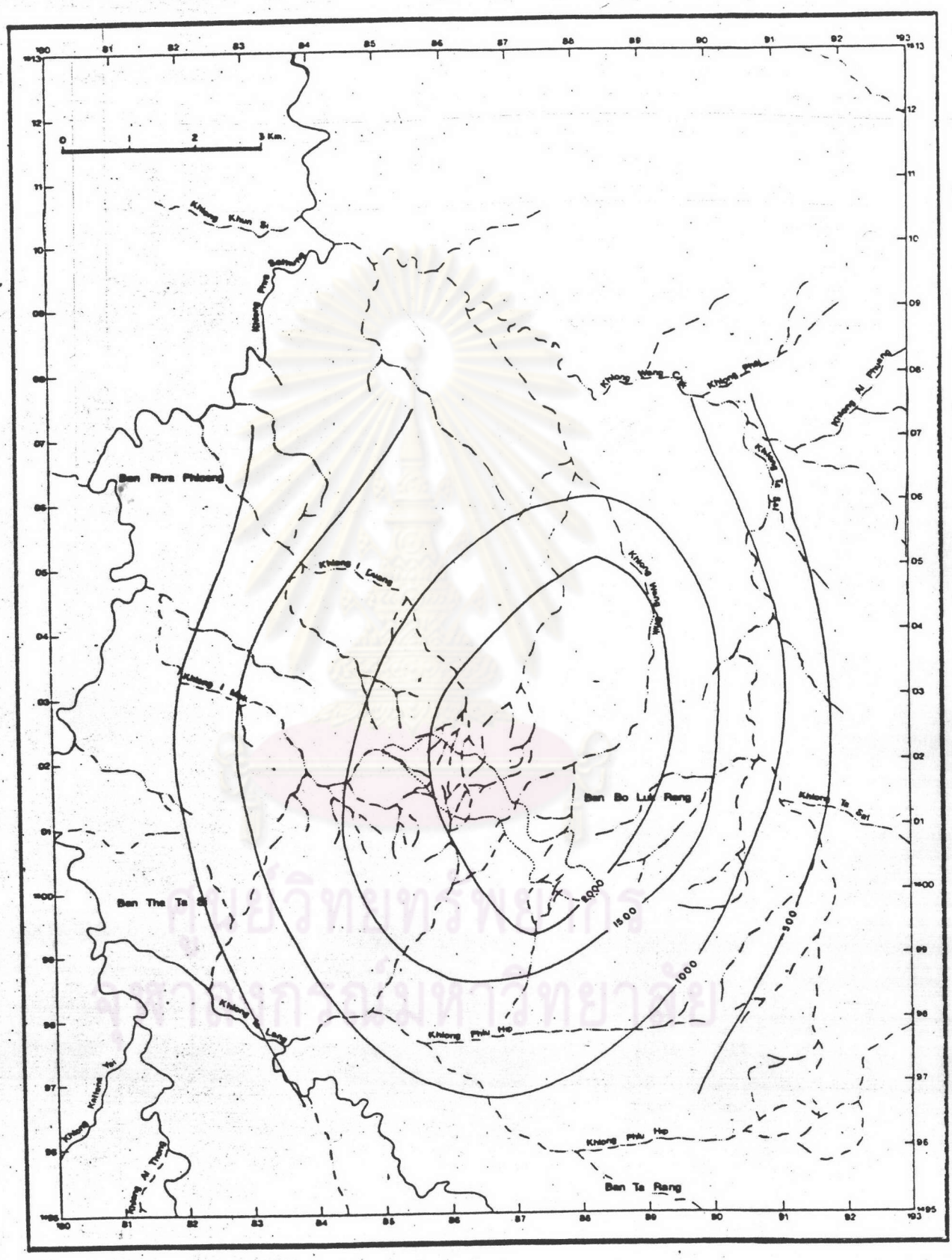


Fig.6.7 Geochemical contour map For Ni (ppm) based on moving cell average of 6x6 km^2 cell size.

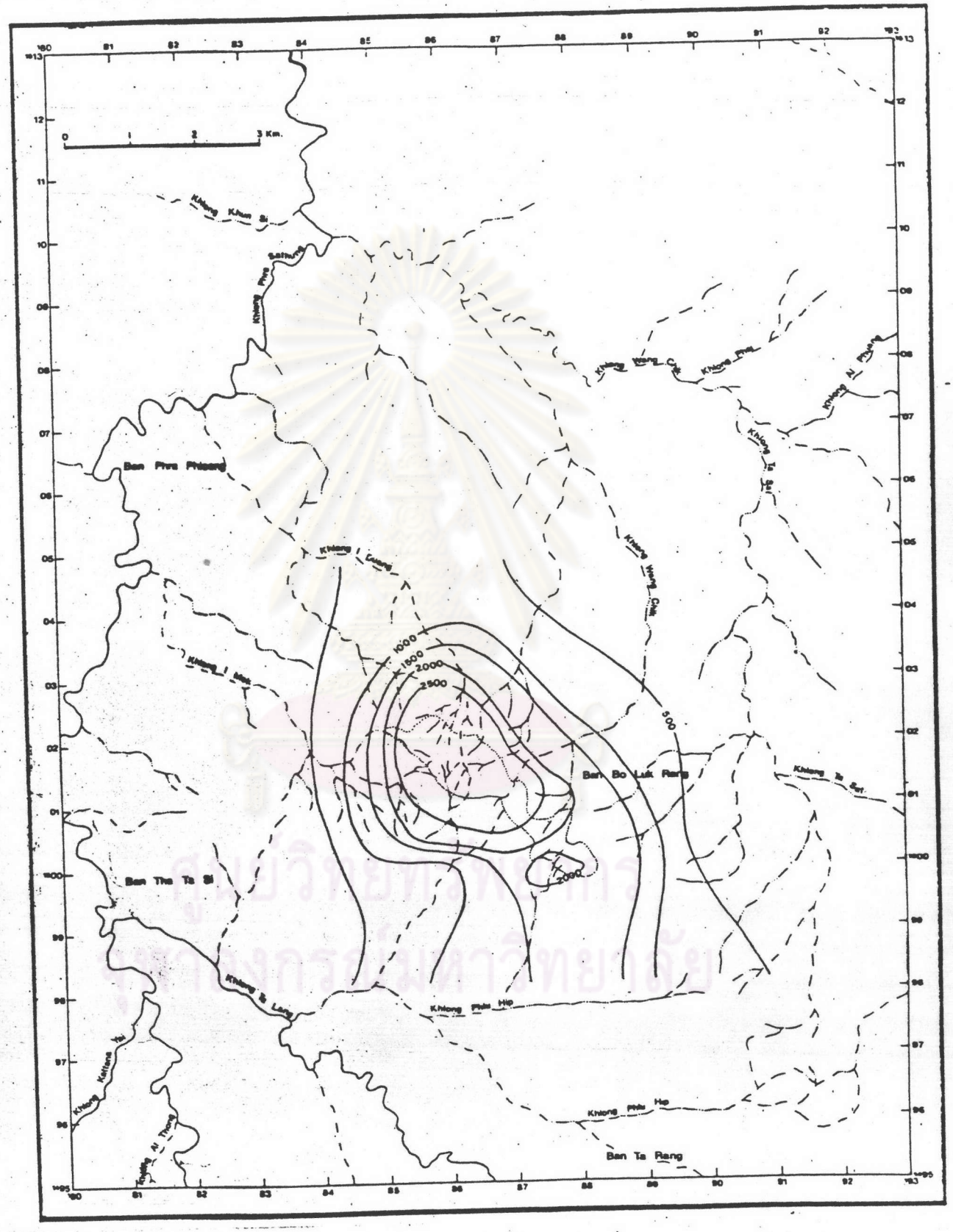


Fig.6.8 Geochemical contour map For Ni (ppm) based on moving cell average of 2x2 km^2 cell size.

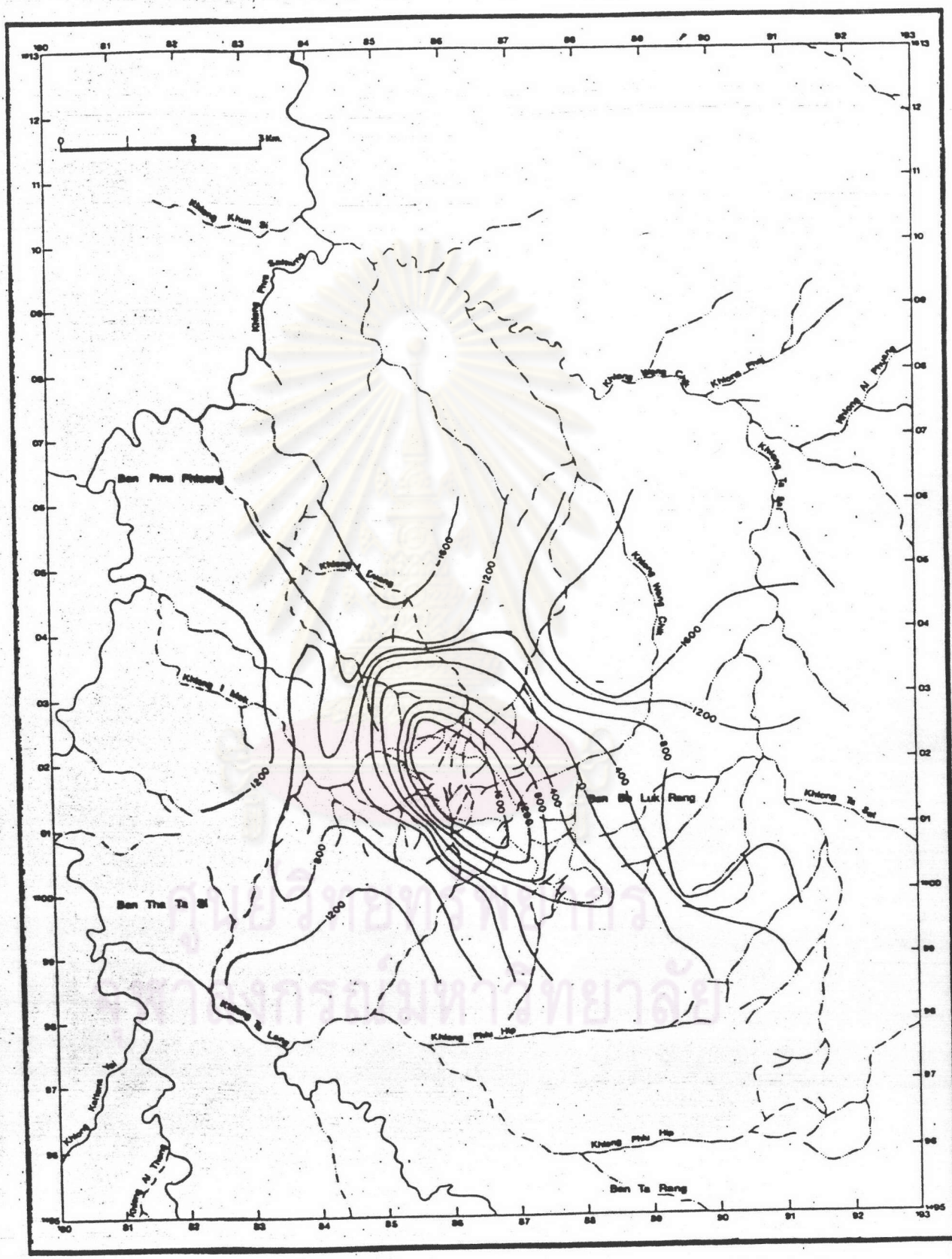


Fig.6.9 Residual map for Ni (ppm) based on moving cell average method.

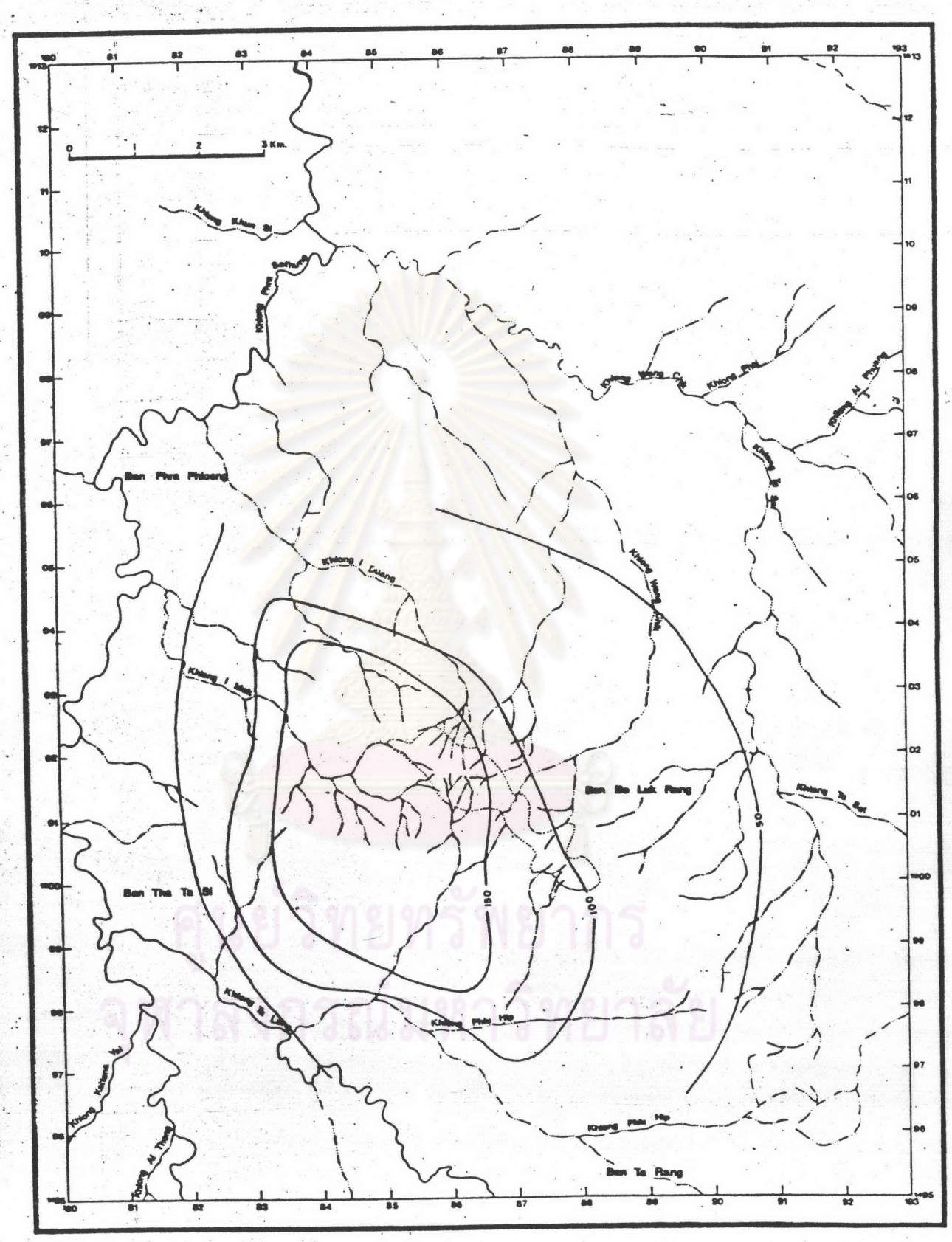


Fig.6.10 Geochemical contour map for Co (ppm) based on moving average of 7x7 km^2 cell size.

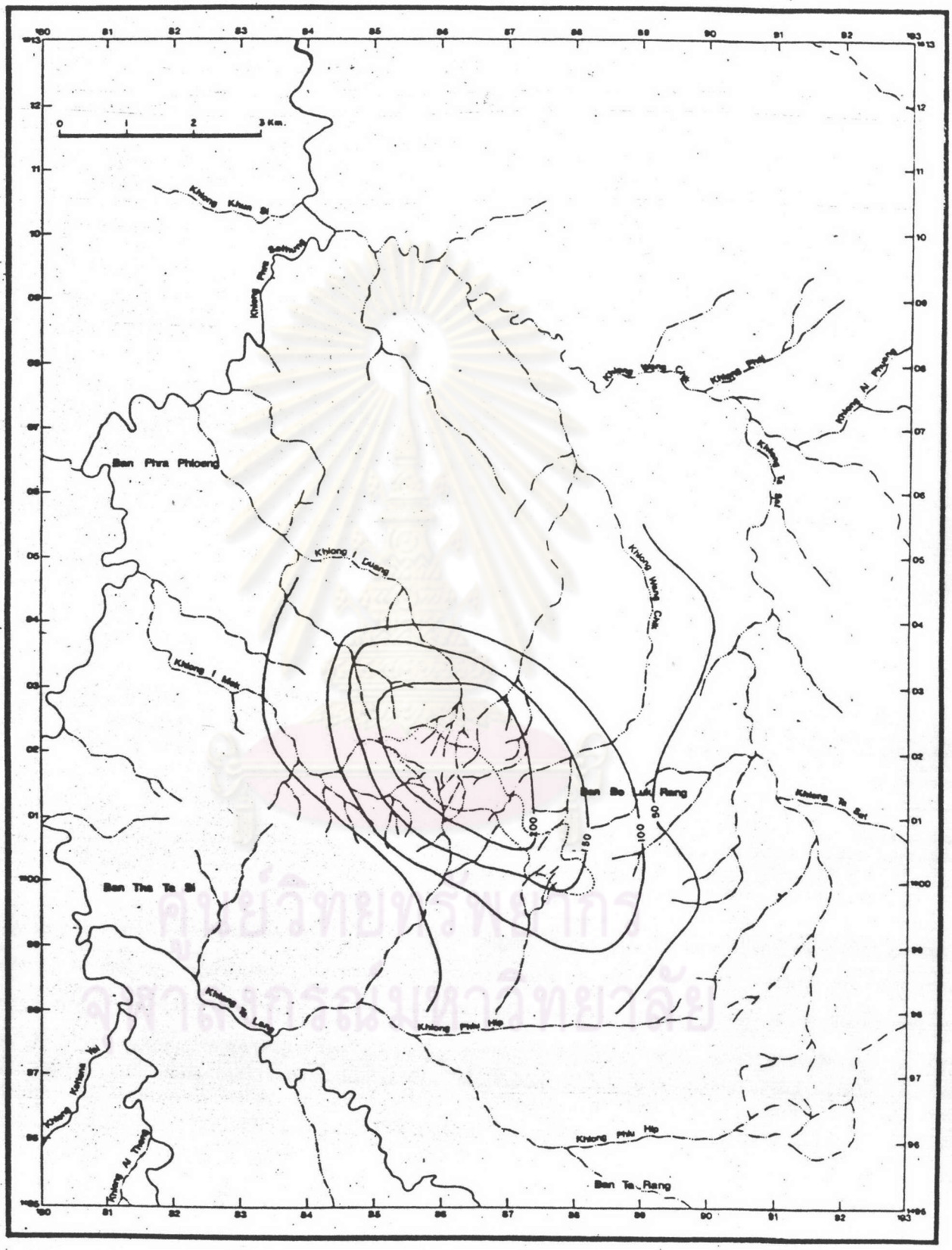


Fig.6.11 Geochemical contour map for Co (ppm) based on moving cell average of 2x2 km^2 cell size.

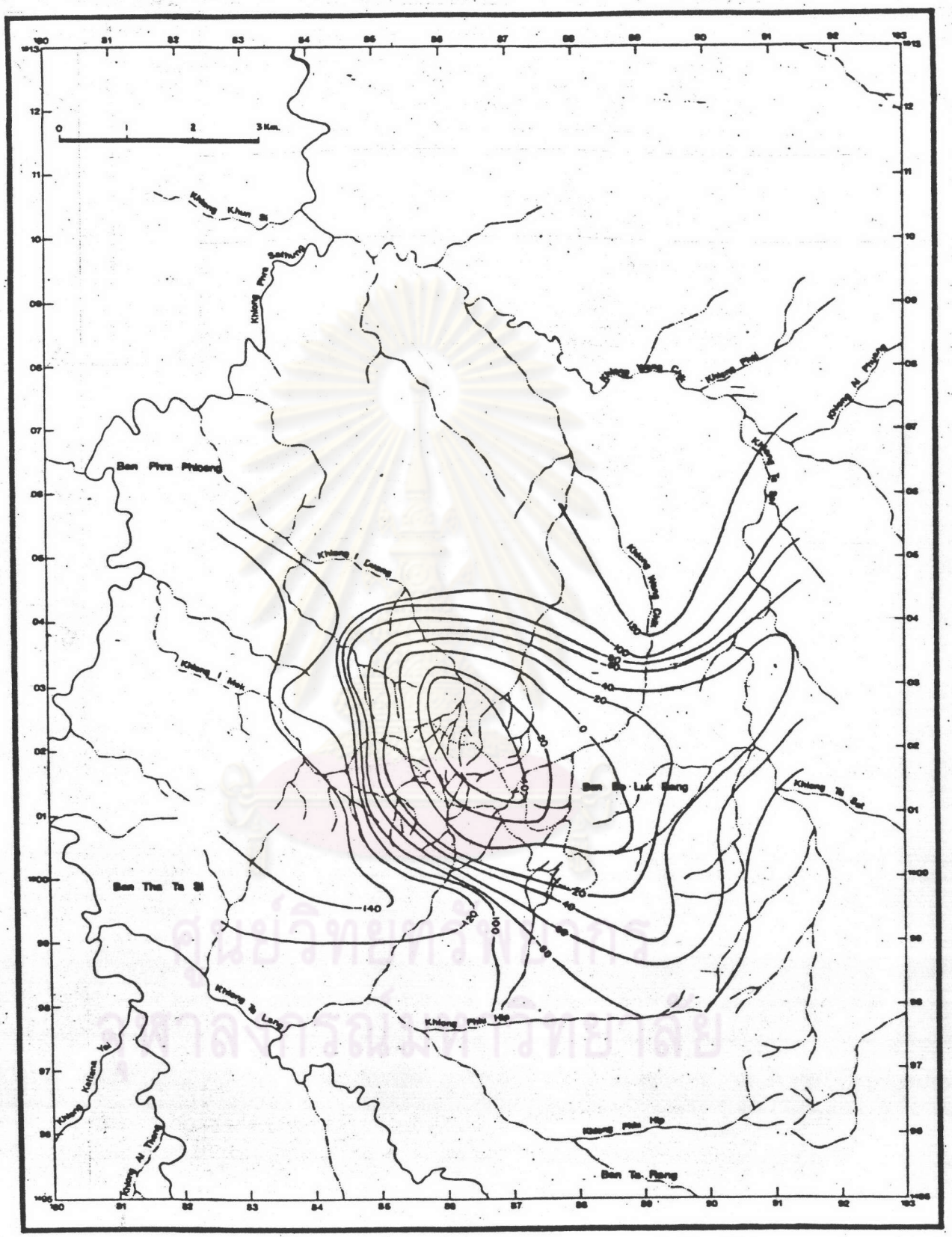


Fig.6.12 Residual map For Co (ppm) based on moving cell average method.