GeoMedicine Seminar Vienna - Baden, November 1999 – Berichte der Geologischen Bundesanstalt, ISSN 1017-8880, Band 50, Wien 2000

Jurian HOOGEWERFF, Iris BUXBAUM and Gerhard HEISS

First Attempts Towards Geochemical-Epidemiology in West Austria

Abstact

In a recent publication (1) spatial data for cancer morbidity and mortality in West Austria was presented. Intuitive observations of the published maps led to the hypothesis that the geology or geochemistry in western Austria might have an influence on the health of the inhabitants.

In recent years knowledge about the importance of trace elements in nutrition and health has motivated environmental geochemists to compare spatial geological data with spatial indicators of health (2). The Austrian Geochemical Stream Sediment Atlas (3) provides the most densely sampled indicator of the geological and anthropological "background" presently available in Austria.

In our study we compare the spatial distribution of different standardised cancer morbidity rates in the states of Vorarlberg, Tyrol and Salzburg with the those parts of the Geochemical Stream Sediment Atlas of Austria which have been completed until today (the "Central Zone") in that area. The completion of the coverage over the whole of Austria is in progress and expected to be ready in 2005

The major problem in comparing spatial epidemiological data presented in political areas with geochemical point data is finding a common format.

In a methodological pilot study we are testing two different approaches:

In the first method the data are transformed to a rectangular grid using a weighed inverse distance or kriging algorithm for the geochemical data and a simple rastering of the political boundaries to the same grid format. The two grids are then compared using a moving (3x3, 5x5 or 9x9) correlation window giving a correlation coefficient at the central cell. A problem is the determination of the optimum cell size for the epidemiological data. Small cell sizes produce large areas of constant values within large political districts which, when using parametric correlation, produce artificial correlation in these large districts (Figure 1). An alternative is the use of non parametric correlation.

In the second method the geochemical data are translated to the political areas using either the median, 95 percentile or maximum value of geochemical data within one political district. Although non spatial correlation analyses is now easy spatial correlation of non rectangular irregular areas is notoriously difficult. We hope to present the first results of non linear correlation analyses at the meeting.

References

(1)...OBERAIGNER, W, CONCIN, H, and HAUSMANINGER, H,: Krebsatlas Westösterreich (Salzburg,Tirol, Vorarlberg),Verein Arbeitsgemeinschaft regionaler Tumorregister Österreichs. Innsbruck (1998)

(2)...BØLVIKEN B., NILSEN R. and UKKELBERG A.: A new method for spatially movingcorrelationanalysis in geomedicine, Env. Geochem. Health: 19, 143-153 (1997)

(3)...THALMANN, F., SCHERMANN, O., SCHROLL, E., HAUSBERGER, G.: Geochemischer Atlas der Republik Österreich 1:1 Mio. - Geologische Bundesanstalt, Wien 1989

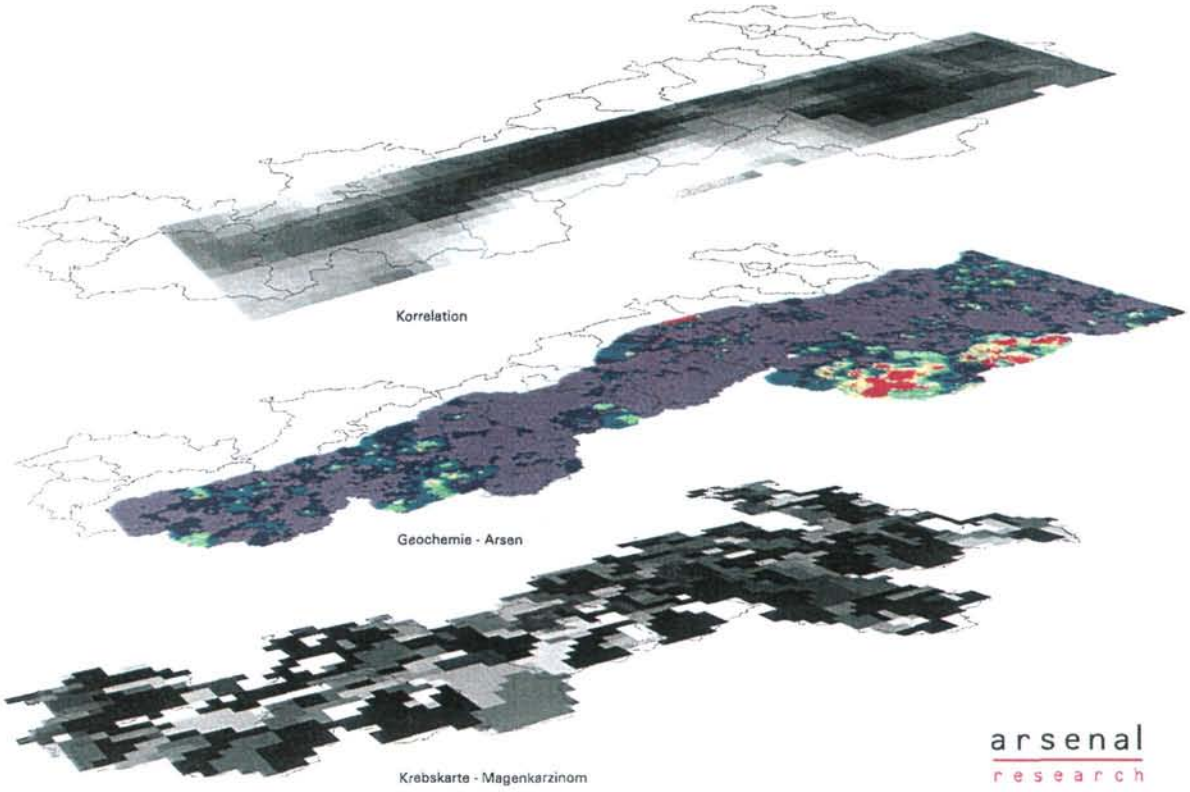

Fig 1. Example of the influence of large political districts (lower layer). In a parametric window correlation method between lower cancer rates layer and middle geochemical layer artificial correlation is produced (white cells in the upper layer) in these districts.