Effects of grid size in interpolating of geochemical data

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Grid size is one of important uncertainty sources in interpolating of geochemical data. We explore the grid size how to influence geochemical mapping using a case study located in the western Gangdese belt, Tibet (China). This study area measures about 19,375 km^2 and comprises of 921 stream sediment samples with a density 0.05 sample point per km^2 corresponds to the scale of about 1:500, 000. The selection of grid size is influenced by the density of samples or mapping scale(i.e., The denser the sample points, the larger the scale of mapping, and the smaller the grid size), and the structure of point patterns (i.e., distance between the sampled points, and the range of spatial dependence). Generally, the gird size should be smaller than a given size which makes >95% of the closest point pairs not fall into the same grid. The grid size is also larger than a given grid size because finer grid cell do not make sense as it will be hard to visualize or print them at this scale of work [1]. The resulting of neighbour nearest distance between point pairs shows that the average spacing between the closest point pairs is 2.18 km, and 5% probability smallest distance is 1.09 km, which makes >95% point not fall into the same grid. The original dataset is divided into two parts namely testing dataset and training dataset. The testing dataset contains randomly selected samples, which are 5% of the total number of samples, and the remaining 95% samples are used for interpolating data. Six grid sizes namely 1.1 km, 1.3 km, 1.5 km, 1.7 km, 1.9 km, 2.1 km are selected to interpolate Cu data using inverse distance weighted method (IDW) with the same parameters. The results indicate that 1.7 km is the optimal grid cell size in this study because the interpolating Cu map has the maximum value of standard deviation, and the difference between Cu true value and interpolated value has the lower mean and relative lower standard deviation.

[1] Hengl (2006), *Computers & Geosciences* **32**, 1283-1298.

Technical methods of barriers of near-surface disposal of very low level radioactive waste

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The caused environmental pollution problems by nuclear are very urgent, any country treats it with caution. Under existed technologies, geological disposal is recognized as the most effective method. For security and efficient, the very low level radioactive waste (VLLW) is separated from the medium-low-level radioactive waste, and the design of the repository could meet the environmental requirements without very strict geological condition, however, the barrier material of the VLLW repository still is key to radioactive waste disposal. A candidate site, which was for the disposal of VLLW in Southwestern China, was built in the terraces of alluvial valley. We focused on the multiple geological barrier system on the near-surface geological disposal. The multiple barrier technology is reflected at natural barriers (natural geological body) and engineering barriers (material). For the absorption of the barrier, batch tests and column experiments methods were applied for the influencing factors and mechanism of adsorption.

The disposal site was on a narrow but long river terraces at the interchange of two rivers, the groundwater table in the site was generally 5-6m. ^{90}Sr were selected as the typical nuclides. The barriers in the wall and bottom of repository (basin-shaped) were selected. The fine particle (d<1mm), which is from the site, was used for the barrier material in the wall, attapulgite mixed with gravel was used for the bottom barriers. The sorption characteristics and influencing fators of ^{90}Sr in the two barrier material were measured by batch tests, results show that the selected fine particle (d<1mm) for ^{90}Sr have a certain adsorption, the orders of distribution coefficient in the 10^2. And from the results, the K_d value of the fine particle and the attapulgite was 40-80 and 100-120, respectively, and there was a great influence of pH value, content of CO_3^{2-}, and initial concentration on sorption. In addition, modified (acid treated, sonicated and baked) attapulgite was researched for the sorption capacity, the concentration of hydrochloric acid at 1M, or ultrasonic time of 10min, or the temperature at 600°C, the adsorption of nuclear improved significantly.

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