Fractal pattern of different alteration zones in porphyry copper deposits of Reko Dik, Chagai belt, Pakitan.

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Fractal is a mathematical set that has a fractal dimension that usually exceeds its topological dimension and may fall between integers. They represent the idea of detailed self-similar repetition at same scale or they may nearly be the same at different scales. Fractals are geometrical objects with the fractal dimension (D). Their fractal geometry deals with the objects and spaces. They occupy space (x,y,z) of any dimension greater than or equal to the dimension of the objects.

In this study, hydrothermally altered zones of porphyry copper deposits of Reko-Dik, Chagai Belt, are taken into account to see whether alternation patterns follow any fractal law. Rowan et al. (2006) carried out detailed spectral analyses of different alteration zones nicely exposed around the Reko-Dik. We have used the same images as base map in our calculations for spatial analysis. A refined box-counting method is used, where the number of boxes (Nr) containing the alteration versus the box size (r) repeatedly tested. To start with, the scaling properties of box size (r) were taken at 0.5 km interval, following 0.5 km addition in each analysis ending at 5 km. The spatial distributions of hydrothermally altered zones show following fractal dimension values: (D) for argillic ($D = 1.0\pm0.05$), phyllic (muscovite + jarosite) ($D = 1.2\pm0.04$), phyllic (muscovite) ($D= 0.8\pm0.05$), propylitic ($D = 1.2\pm0.04$), and siliceous ($D = 0.8\pm0.07$). Further work is in progress to refine the D values using improved box-counting method (Roy et al., 2007).

References

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