

LETTER TO THE EDITOR

Applied stats examples are documented

Prof. Alastair Sinclair, whose letter appeared in your Nov. 4 issue, was present when I taught a short course on sampling precious metals deposits at the University of British Columbia in 1989.

He did not object when I applied analysis of variance to test whether the gold grades of an ordered set of rounds in a drift were randomly distributed within this sample space or displayed a significant degree of associative (spatial) dependence.

When I met him at his office in August 1992 to explain the difference between applied statistics and geostatistics, and to explore the potential of a centre for ore reserve estimation at UBC, Sinclair did not notice much of a difference and saw no merit in my suggestion.

In a previous letter to the editor (*T.N.M.*, Nov. 16/98), Sinclair claims "there is a substantial school of thought amongst geostatisticians that the concept of degrees of freedom breaks down in matters of spatial dependence."

When I asked him to explain his theory, he invited me once more to come to his office and discuss the matter, but I told him I would prefer a debate in the presence of students and staff at the Dept. of Earth and Ocean Sciences.

Regrettably, Prof. Robert Ellis, head of the department, in his response to a letter I wrote, stated "this issue is not of sufficiently widespread interest within the department for me to arrange a forum for its discussion," but added that Sinclair and others were completely free to arrange or participate in such a

discussion. Sinclair did not respond.

When Ellis replied to my request that geostatistics — the only-variant-of-probability theory without the requirement of functional independence, and the only-variant-of-applied-statistics theory without degrees of freedom — no longer be taught at UBC, he pontificated about academic freedom and fruitful avenues of inquiry. In a letter he said "I am not suggesting the issue is unimportant," but it was evidently not important enough to initiate further action at the university.

So what is the difference between applied statistics and geostatistics all about? In summary:

□ Applied statistics proved that Busang was a salting scam several months before Bre-X's management team was honoured, and Bre-X's shareholders saw their investments vanish.

□ Applied statistics could have proved that Busang was a salting scam on the basis of test results for 3-5 boreholes and for 20-30 duplicate 750-gram test portions of crushed and salted core samples.

□ Applied statistics gives unbiased confidence limits for metal contents and grades of ore deposits.

□ Geostatistical software converted a little placer gold into 40 million phantom ounces.

□ Geostatisticians are troubled by analysis of variance and degrees of freedom.

□ Geostatistics cannot possibly give unbiased confidence limits for metal contents and grades of ore deposits.

I submitted an abstract for "Applied Statistics and the Bre-X Fraud" to the 2000 Mining Millennium conference but received no response. By contrast, "Borehole Statistics with Spreadsheet Software," which was published in *SME Transactions* (Vol. V, no. 308, 2000), explains how confidence limits for contents and grades of ore deposits can be calculated in six stages. I applied this technique to more than 300 boreholes, proved spatial dependence between boreholes within lines and between lines in the gold deposit, and obtained a 95% confidence interval of close to 12% relative. My confidentiality agreement does not allow me to use this data set and show how to calculate 95% confidence intervals and ranges for contents and grades of gold deposits with only three types of spreadsheet templates.

While I was trying to implement scientifically sound statistical tests and techniques in mineral exploration and mining, Sinclair was one of the CIM reviewers who rejected my work and was allowed to teach a flawed variant of applied statistics in the name of academic freedom and fruitful avenues of inquiry. Peer review is the very reason why so few could do so much with so little in such a short time with blatant disregard for sustained criticism and scientific integrity. Sinclair, to his credit, was not the worst reviewer.

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