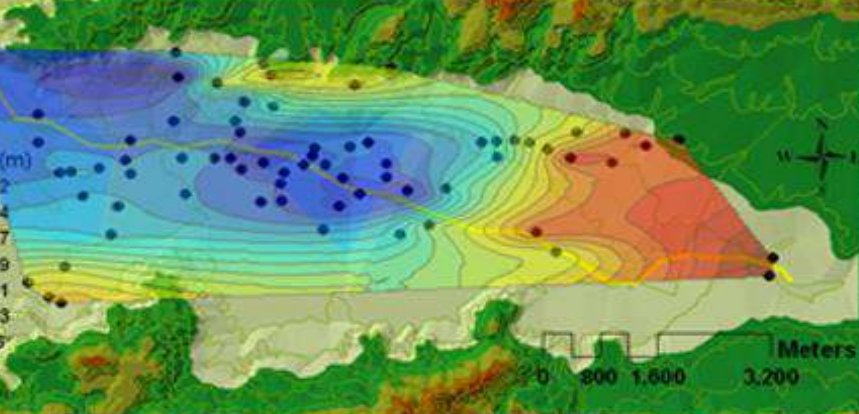




A World Class Training Provider



PRACTICAL GEOSTATISTICS & MINERAL RESOURCE ESTIMATION 5 DAY MASTERCLASS

20TH – 24TH NOVEMBER 2017 – OAKLANDS INN & CONFERENCE CENTRE

Comprehensive and up to date training course that will prepare and equip you with the necessary knowledge and techniques to accurately estimate and evaluate mineral resource based on practical methods that has been proven worldwide



Led by World Class Expert

Dr. Isobel Clark

Bsc Msc DIC PhD FSS FIMMM FSAIMM FAusIMM Ceng MMSA(QP)

Professional mining engineer with 40 years of experience
Author of Practical Geostatistics (1979) and (2000)
Director, Geostokos Limited, Scotland
Former Professor in Camborne School of Mines, University of Exeter, England
Former Professor, University of the Witwatersrand, Johannesburg
11 years of lecturing at Royal School of Mines, London

This 5-day course will consist of two parts.

Part 1 – Practical Geostatistics Workshop

The first 3 days of the course will cover the practical aspect of Geostatistics. It will bring the delegates to in-depth understanding of the mysteries of ordinary kriging and its variants. This is a classroom course and includes manual exercises to reinforce understanding of the techniques. This workshop composed of lectures augmented by practical PC/laptop-based exercises covering many different applications. Case studies ranging from coal through base metals and iron ore to precious metals such as gold and platinum will be covered. All case studies are drawn from Dr Clark's extensive worldwide experience. Practical Geostatistics is aimed at any professionals dealing with the estimation from or interpolation between samples collected on a spatial basis. A minimum of mathematics is necessary to explain the techniques - mainly simple algebra, up to understanding the concepts behind solving simple sets of simultaneous equations and differentiating x^2 . Questions and discussions are actively encouraged. Participants are advised to bring a laptop.

Part 2 – Mineral Resource Estimation Master Class

Participants in this Master Class are expected to be conversant with Geostatistics procedures or at least completed Practical Geostatistics Workshop. Participants are invited to contribute discussion and ideas from their own practical experiences and to bring their own data for preliminary analysis during and after the workshop. The workshop is aimed at professionals who are interested in discussing the real world application of resource estimation techniques. Using little or no mathematics, Isobel Clark discusses casestudies involving interpretation of everyday questions, such as:

- Is my data homogeneous enough for geostatistical mapping?
- Do I have trends in my data and (if so) what kind?
- How do I interpret semi-variograms which deviate from the ideal shapes?
- What Kriging method should I use (if any)?
- Should I be using Kriging results at all?

This course will be an interactive and participative workshop where participants will be encouraged to discuss their own practice and compare it to others and recognised best practice. Real projects and case studies will form an important part of the workshop and participants will be encouraged to discuss and reflect on their own organisations practices and ways to improve them.

BYO – BRING YOUR OWN SESSIONS!!

Get the trainer to address the concern you have in YOUR OWN projects!
YOU can BRING and ANALYSE YOUR own data using Practical Geostatistics 2000 teaching software under the supervision of Dr. Isobel Clark. Take away copies of all software and data sets!
You will be provided with a CD containing all relevant teaching materials.

Each delegate will receive a copy
Of the practical Geostatistics 2000 text book and CD containing (Digital version of text book and PG 2000 software, data sets and tutorials)

Master Class Format

This course will be an interactive and participative workshop where participants will be encouraged to discuss their own practice and compare it to others and recognised best practice. Real projects and case studies will form an important part of the workshop and participants will be encouraged to discuss and reflect on their own organisations practices and ways to improve them.

Pre-course Questionnaire

Dr. Isobel Clark would like to customize the class based on your specific needs. Pre-Course Questionnaire will be sent to you prior to the workshop to complete. Dr. Isobel Clark will analyse in advance and address the issues during the course.

Who Should Attend

But not limited to:

- Mining Geologists (Exploration, Production, Resource)
- Mining Engineers
- Mine Surveyors
- Geologist
- Geologist(Trainee)
- Mineral Resource Managers & MRM Practitioners
- Sampling Personnel
- Sampling Supervisors/Managers
- biologists
- Metallurgist(Trainee)
- Mineral Resource Managers
- Resource Analysts
- Mine Managers
- Mine Supervisors
- Geophysicists
- Geochemist
- Geometallurgist
- statisticians

All delegates will receive 5 CPD credits
Certificates will also indicate your CPD
Credits and serve towards your professional advancement

Just a few companies to mention that have attended our past mining Workshops

Anglo American Platinum Mine,, Worley Parsons, Cronimet Chrome Mining, Evander Gold Mine, Maptek, Northam Booyseendal Mine, Sabodala Gold Operations SA, Lonmin, Glencore, African Mining & Trust, African Rainbow Minerals Limited, Coal of Africa, Sasol Services,SRK Consulting Pty Ltd, United Manganese of Kalahari, Bafokeng Rasimone Platinum Mine, Discovery Metals Limited, Keaton Mining, Leeuw Mining & Exploration (Pty) Ltd, Metsana Group, Stefanutti Stocks Mining Services, Black Mountain Mining (Pty) Ltd, Exxaro Arnot Coal, Samancor Chrome Limited, Intertek Genalysis SA (Pty) Ltd, Mitra SK South Africa, Siza Coal Services CC, Assmang Chrome, Nkomati Mine,TRP, South Deep Gold Mine, Sibanye Gold, Anglo Gold Ashanti, Botswana Ash (Pty) Ltd, Idwala, Sasol, UNIVEN, AMIS...

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Practical Geostatistics & Mineral Resource Estimation

20th – 24th November 2017 – Oaklands Inn & Conference Centre

Course Content

Part 1 (20th -22nd November 2017) **Practical Geostatistics**

Session 1

- The basic assumptions of spatial estimation methods
- Inverse Distance interpolation methods
- Classical statistics: the Normal distribution

Session 2

Statistical Methods

- The lognormal distribution
- Confidence levels
- Standard errors
- Grade/tonnage curves

Session 3

Statistical Methods

- Construction and interpretation of semi-variograms
- Identification of trends
- Multi-component models
- Confirmation of basic assumptions
- Outliers

Session 4

Geostatistical Methods

- The experimental semi-variogram
- Modelling semi-variograms
- Trends
- Anisotropy
- Geological features

Session 5

Geostatistical Methods

- Variations on kriging
- Lognormal methods
- Indicator methods
- Non-linear geostatistics
- Regression problems (conditional bias)
- Simulation

Session 6

Case Studies and discussions on your own data (BYO)

Part 2 (23rd -24th November 2017) **Mineral Resource Estimation**

In Part 2 of this course YOU will be bringing YOUR own data. This will be a BYO session preliminary study of real data sets and open discussion guided by participants' interests and previous Q&A sessions.

on participants' interests we can go in depth to the following topics:

1. Basic assumptions and requirements for mineral resource estimation
2. Data validation, top-cuts and capping
3. Construction, interpretation and modelling of semi-variograms
4. Model validation and reconciliation with geological knowledge
5. Geostatistical resource estimation, 3D and block modelling and Kriging
6. Other Kriging techniques, such as MIK and Lognormal Kriging
7. Discussion covering the advantages/limitations of different estimation methods
8. Reserve estimation and possible classification definitions
9. Geostatistical Simulations and Risk Assessment
10. Grade control
11. Drill hole spacing analysis
12. Dynamic Anisotropy estimation

Session 7

Case Studies and BYO

- construction and interpretation of semi-variograms
- identification of trends
- confirmation of basic assumptions
- outliers

Session 8

Case Studies and BYO

- choice of appropriate kriging techniques
- **practical applications of kriging**

Session 9

Case Studies and BYO

- discussion of case studies from course participants
- general discussion of case studies

Session 10

Case Studies and BYO

- general discussion of case studies
- simulation techniques

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Contact Hamesh Ramparsad on 074 869 5047 or email hamesh@spectaculartc.co.za**

Facilitator Profile and Partial list of Consultancies and Projects in Africa

- Ad hoc advice on mineral sands applications, for Shell Minerals, **South Africa**
- Advice on sampling at Richards Bay Minerals, **South Africa**
- **American Mineral Fields Int. Ltd.**, supervision of feasibility study --- valuation and geology
- Assessment of Alexander Bay Diamond Mine, **South Africa**
- Audit of resources, tantalite deposit, **Mozambique**
- Evaluation of mining resources, Hartebeestfontein Mine, **South Africa**
- Fergusson Stewart, **Johannesburg**, evaluation of Joel Mine.
- Freda-Rebecca Mine, **Zimbabwe** for Cluff Minerals (and later Ashanti GoldFields)
- General Mining Union Corporation, **Johannesburg**
- Ghanaian Australian Goldfields, geostatistical modelling and advice on valuation
- Hartley Platinum, BHP **Zimbabwe**, peer review.
- Investigation of problems with Mine Call Factor for Libanon Mine, **South Africa**
- ISCOR Mining, audit of valuation for deposit in **Zaire**
- Johannesburg Consolidated Investment Limited, **Johannesburg**
- Lonrho **Zimbabwe**, advice on evaluation of small gold deposits
- MIMCO, **South Africa**, evaluation of gold mine.
- MineNet South Africa, evaluation of resources and reserves at Skorpion project, **Namibia**
- Mineral resource and reserve valuation for Skorpion Zinc project in **Namibia**
- Palabora Mine, underground development, RTZ Management Services, **Johannesburg**.
- Potgietersrus Platinum, JCI, benchmark evaluation.
- Public statement of remaining reserves at the Droogebult Mine, **South Africa**
- Resource evaluation studies for Lonrho Platinum, **South Africa**.
- Short training for **Nigerian Geological survey**
- Small scale consultation, AngloGold Ashanti Goldfields
- Study of sampling methods and calibrations for Namco Diamond Mining, **Cape Town**
- Tenke Fungurume project, **Congo** audit of computerized database
- Vaal Reefs Exploration & Mining Co. Ltd., audit of annual reserve statement
- Valuation advice for the Ayanfuri Project, **Ghana** for Cluff Minerals.

Your World Class Expert Course Presenter: Dr Isobel Clark



Dr. Isobel Clark provides consultancy through Geostokos Limited, almost exclusively in the field of mineral resource and reserve estimation, most often at feasibility or even pre-feasibility stage. She has a B.Sc. (1969) in Pure and Applied Mathematics from Strathclyde University, an M.Sc. (1970) in Biometrics from University of Reading, a Ph.D. (1979) in Engineering from University of London, and a Diploma in Educational Broadcasting (1980) from University of York. She is a Fellow of the Royal Statistical Society, a Member of the Biometrics Society, a Member of the Institution of Mining and Metallurgy, Member of the Society of Mining Engineers of AIME and of MMSA which carries accreditation as a QP, a Fellow of the Southern African Institution of Mining and Metallurgy, and a Fellow of the Australasian Institution of Mining and Metallurgy.

Dr. Clark has taught at the Royal School of Mines at Imperial College, the Department of Mining Engineering at University of the Witwatersrand, and Camborne School of Mines at the University of Exeter. She is the author of Practical Geostatistics (1979), co-author of the Practical Geostatistics 2000 series with William Harper, and author of numerous technical papers and short courses. Her major area of investigative study has been in the application of the "Theory of Regionalised Variables" in ore reserve estimation and other appropriate fields.



Practical Geostatistics & Mineral Resource Estimation

20th, 21st, 22nd, 23rd, 24th November 2017

Oaklands Inn & Conference Centre

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or email: marketing@spectaculartc.co.za

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excludes accommodation (B&B)

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Position:	

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- Spectacular Training and Conferences reserves the right to change speakers, program content date and venue, due to unforeseen circumstances.
- The signed registration form is a legally binding document.
- The conference / workshop fee includes conference / workshop material, Lunches and refreshments.
- Spectacular Training and Conferences will not be held liable for travel and accommodation.

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All cancellations must notify Spectacular Training and Conferences in writing and all cancellations will be subject to approval by Spectacular Training and Conferences management.

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Cancellations made within 30 days **which excludes weekends, holidays and public holidays** of date of the above mentioned event will be subject to a 100% cancellation fee.

There will be no refunds or credit vouchers.

Substitutions

Delegates of any substitutions must notify Spectacular Training and Conferences in writing.

There is no charge for substitutions. Spectacular Training and Conferences will not be held liable for incorrect delegate details on certificates, etc. in the event of substitutions been made on the day of the conference/ workshop.

Delegates will be issued with a credit voucher, which may be used at another of our events **should** Spectacular Training and Conferences cancel or postpone an event due to the state of affairs beyond our control.

Views expressed by speakers and facilitators are not necessarily those of Spectacular Training & Conferences

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