The Program

The objectives of the course are:

1. To impart a thorough knowledge of the relationship between geology and the more common useful geophysical techniques in gold, and more generally mineral exploration;
2. To understand the various survey geometries, and survey parameters used for mineral exploration, in the ground and air.
3. To understand what geophysical techniques cannot do in geological mapping and devise strategies to counter the knowledge gap;
4. To understand what the geological significance of the resolution, signal to noise trade off commonly made in the different surveys
5. To understand the expressions of different styles of mineralisation in geophysical data sets.
6. To be able to complete a first pass qualitative interpretation of airborne magnetometer survey (preferable that participants bring along their own data sets to work on, but data sets will be provided as well).

The teaching pattern on each day of the course will typically involve classroom presentations, data acquisition activities in the CF/TTG Office, computer analysis and modelling exercises, as well as some geophysical equipment demonstrations (IP, Resistivity, magnetometer).

Activities will commence at 8.30am each day and typically conclude at 5.30pm.

POTENTIAL ATTENDEES ARE INVITED TO IMMEDIATELY INDICATE WHICH IS THEIR PREFERRED DATES FOR THIS COURSE.

1. November 16th, start to November 21th ........................................

DAYS 1 AND 2 MONDAY and TUESDAY, November 16 AND November 17

Gravity and Magnetic Methods

- Basic gravity theory
- Converting Gravity into Geology – Density what are they, mineralogy, types of Rocks,
- Gravity survey methods, instrumentation and field procedures
- Surveying for geophysical surveys
- Gravity data processing
- Basic magnetic theory
- Converting Magnetics into Geology – Rock magnetisations, what are they, mineralogy, rock types
- Magnetic survey methods, instrumentation and field procedures
- Processing and enhancement of potential field data
- Qualitative interpretation of geophysical imagery
- Quantitative interpretation of potential field data –forward modelling and inversion
CASE STUDIES

Using Magnetics for Gold Exploration in West Africa – Regional examples
Using Gravity for Gold Exploration in West Africa – Regional examples
Using Magnetics for Gold Exploration in West Africa – Prospect Scale examples
Using Gravity for Gold Exploration in West Africa – Prospect Scale examples
Use of Magnetics and Gravity in Geological mapping in Archean and Proterozoic Terrains around the world
Use of Magnetics and Gravity in Mineral Exploration in Archean and Proterozoic Terrains around the world, for different commodities and ore types, including Porphyry Copper, VMS, IOCG.
A close inspection of the relative information of high resolution ground magnetics versus high resolution airborne magnetics in lateritic terrains

PRACTICAL EXERCISES

Processing airborne magnetic and gravity data in Burkina Faso to target gold camps.
Interpreting airborne magnetic and gravity data in Burkina Faso to target gold camps.

DAYS 3 AND 4 Wednesday 18, Thursday 19 November

Electrical,
The electrical properties of rocks
Galvanic methods – Resistivity and IP theory, field Procedures and logistics
Resistivity and IP data processing and interpretation

CASE STUDIES

Using Resistivity for Gold Exploration in West Africa – Regional examples
Using Resistivity for Gold Exploration in West Africa – Prospect Scale examples
Using IP for Gold Exploration in West Africa – Prospect Scale examples
Use of Resistivity and IP in Geological mapping in Archean and Proterozoic Terrains around the world
Use of Resistivity and IP in Mineral Exploration in Archean and Proterozoic Terrains around the world, for different commodities and ore types, including Porphyry Copper, VMS, IOCG.
A close inspection of the relative information of high resolution ground surveys, and understanding of survey design parameters

PRACTICAL EXERCISES

Processing of Resistivity and IP data in Burkina Faso to target gold mineralisation.
Interpreting Resistivity and IP data in Burkina Faso to target gold mineralisation

Electromagnetic and Borehole Methods

The EM method – basic EM theory, FEM, TEM, AEM, field procedures and logistics
Magnetometric resistivity (Fast sampling)
Magnetotelluric Surveying and Interpretation
Downhole electrical methods DHEM, DHMMR
EM data processing, display and interpretation
Ground penetrating radar
Borehole logging methods – basic theory – selection of tools etc.
Airborne Electromagnetics, Helicopter systems versus Fixed Wing Systems

CASE STUDIES

Magnetotelluric traverses across West Africa – what do they tell us, and what not.
Using Electromagnetics for Gold Exploration in West Africa – Regional examples
Using Electromagnetics Exploration in West Africa – Prospect Scale examples
Using Gravity for Gold Exploration in West Africa – Prospect Scale examples
Use of Electromagnetics in Geological mapping in Archean and Proterozoic Terrains around the world
Use of Electromagnetics in Mineral Exploration in Archean and Proterozoic Terrains around the world, for different commodities and ore types, including Porphyry Copper, VMS, IOCG. A close inspection of the relative information of high resolution ground Electromagnetics versus high resolution airborne Electromagnetics in lateritic terrains

PRACTICAL EXERCISES

Processing airborne and ground Electromagnetics data in Burkina Faso to target gold camps.
AEM design for bedrock conductor mapping in West Africa
Interpreting airborne Electromagnetics data in Burkina Faso to target gold camps

DAYS 5 AND 6 FRIDAY 20 November and SATURDAY 21 November

Seismic Methods

• Seismic wave propagation, wave types, elastic properties and seismic velocity
• Seismic sources and detectors
• Seismic refraction – theory and field procedures, data interpretation
• Seismic reflection – theory and field procedures
• Seismic reflection – data processing
• Seismic reflection – data interpretation

CASE STUDIES

Using Seismic for Gold Exploration in West Africa – Regional examples
Using Seismic for Exploration in Archean and Proterozoic Terrains around the world, for different commodities and ore types, including Porphyry Copper, VMS, IOCG

FIELD EXERCISES

Gravity Surveying and field processing
Magnetic Surveying and field processing
IP and Resistivity Surveying and field processing

AIRBORNE MAGNETICS IN FOCUS

• The geological basis for targeting from magnetics
• The basic principles simply explained and clearly illustrated
• Visualising the geology - processing for optimum geological effect
• Turning geophysics into predictive geological maps and cross-sections
• Some new tools for visualising, integrating and interpreting more effectively
• What should my target look like? Simple and effective magnetic modelling
Mr Peter Williams is co-founder of TTG. He has over a decade of invaluable experience in working in the mining sector in West Africa and in excess of 30 years in the international mining and exploration business. During his career he has held management and executive positions with a number of major resources groups including WMC Resources, Resolute Mining and the Independence Group. In WMC he held the positions of Chief Geophysicist and Manager of Geosciences Technology. He also has co-founded and played significant roles in the growth of several highly successful Exploration and Mining Companies.

Peter is a highly experienced geologist and geophysicist having graduated with First Class Honours from the University of South Australia and MSc in Geophysical Engineering from the Colorado School of Mines. He has been directly involved in the discovery of one gold mine in Western Australia, two copper gold mines in South Australia, a nickel sulphide mine in Western Australia and most recently two new gold provinces in southern Burkina Faso, now held by Gryphon Minerals and Centamin (formerly Ampella).

As importantly he has been involved in the development of successful new strategies and technologies for gold and base metal exploration. Peter was a prime strategist in the development of one of Australia’s most successful junior mining companies in recent years, Independence Group NL, where his roles included Chief Geophysicist and Executive Director of Exploration for Lightning Nickel (a wholly owned subsidiary of Independence Group). He was the co-founder of SanemaboreSarl, which was responsible for identifying the Banfora Project which is under active exploration by Gryphon Minerals, and introducing that company into Burkina Faso. He is a co-founder of the highly successful Gold Exploration Company, Ampella which is focused on discovering Gold in West Africa, and which has discovered a new gold province in southern Burkina Faso.

He is also a co-founder of HiSeis, which is a company focused on providing high definition 3d seismic surveying for the Mining, Energy, Engineering and Hydro-geological Industries, and which is a finalist in the West Australian Innovator of the Year Award in 2010. Peter was an invited Speaker at the Technical Sessions of International 10 yearly Exploration 1997 and 2007 Conferences, as well as at the Prospectors and Developers Association of Canada meetings in 2005 and 2010. He is a member of the Australian Society of Geophysicists Research Group, the Australian Institute of Geoscientists and the Australian Institute of Company Directors. He also holds the position of Adjunct Senior Research Fellow at the West Australian School of Mines and Adjunct Associate Professor at the Centre for Exploration Targeting, university of Western Australia.
Dr Morou Francois OUEDRAOGO

Holds a PhD in Metallogeny and structural Geology from university of Orleans (France); He is an exploration geologist with 25 years’ experience in the Birimian (Early Proterozoic) greenstone of West Africa. Dr Ouedraogo was the team leader of the United Nations Development Programme Project which was focused on the search for volcanogenic massive sulphide (VMS) mineralization in southern and central Burkina Faso. He is the co-author of “West African Gold Deposits in their Proterozoic Litho-structural Setting” and the “West African Mineral Map”.

He was also in charge of preparation of the Burkina Faso country wide geology mapping and airborne magnetic and radiometry coverage project funded by European Union SYSMIN facilities and he has been involved in four gold discoveries in Burkina Faso. Dr Ouedraogo has visited the majority of significant gold deposits in West Africa, East Africa and Western Australia. He has held numerous senior and executive roles with BUMIGEB (Bureau des Mines et de la Géologie du Burkina), United Nations Development Programme (Exploration Projects), WMIC (Africa) Ltd, Resolute (West Africa) Ltd, Goldbelt Resources (West Africa) Sarl as well as in Ampella Mining as Vice President of Exploration and more recently Senior Vice President Corporate Africa. He is a co-founder of ASX listed Ampella Mining, as well as co-founder of Sanembaore Sarl which has attracted several foreign investment in West Africa the last 5 years totalling over $250m Dollars for exploration. The most important being:

• Gryphon Minerals (Greenfields Discovery 3.6 M oz @2.1 g/t)
• Ampella Mining (Greenfields Discovery 3.2 Moz @2g/t)

Most interestingly, Dr Ouedraogo put together the team at Inata and implemented with Peter Williams techniques which took the project from 600,000 oz of resources to 1,400,000 oz in 18 months and completed pre-faisibility and feasibility study with Goldbelt resources.

Dr Ouedraogo put also the team which discovered Bati West Konkera deposit of Ampella Mining Ltd.

Mr Tibo YANOGO

Chief Geophysicist of TTG, Polytech of Montreal, 30 Years’ experience airborne & ground geophysical surveys including (Mag, EM, IP, Radiometry,…for Water and minerals. BUMIGEB, UNDP, various major and junior companies (BHP, Anglo, Randgold, Resolute, High River Gold, Orezone, Ampella, Volta Resources, Semafo)
across countries of West Africa. French & very good English

**Education**
- French BAC, C (mathematics, Physics and Chemistry option) mention fairly well;
- French DUES in Mathematics and Physics;
- French Degree in Mathematics
- North American BAC in Geophysics engineering

**Field Experience:**
Mr Yanogo has undertaken lot of surveys for minerals exploration projects as well as for ground water drilling both in sedimentary (West and North of Burkina Faso) and crystalline bedrock.
From September 1998 to February 2000 is was enrolled by AURENSA a Spanish geophysical survey company, as Technical Assistant assuming the daily quality control (QC) of airborne magnetic and radiometric survey performed by GEOTERREX on all west part of Burkina Faso.
From July 1989 to February 1998, Mr Yanogo was engaged in a United Nations (UNDP) project for Data interpretation acquire by an airborne magnetic and electromagnetic survey on the Boromo Greenstone Belt. Ground follow up of conductive EM anomalies for base metal exploration.
Mr Yanogo has long experience in exploration through the Bureau of Mines and Geology of Burkina for numerous exploration companies. He is a key asset to TTG for servicing companies in geophysics and geology.

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**Course Venue and Facilities**

All classroom activities will be conducted at TTG in Ouagadougou.

Data processing and interpretation exercises will be undertaken in TTG’s computer laboratories that are equipped with an extensive collection of commercial and publically available geophysical software.

Students are encouraged to bring their own laptops and will be provided with a USB/DVD containing public domain geophysical data analysis and display software, some of which will be used during the course.

TTG has a comprehensive range of geophysical equipment, and by arrangement with BUMIGEB, that will be utilised by participants for data acquisition exercises and for equipment demonstrations:

- Overhauser magnetometers
- Resistivity and induced polarisation systems
PRACTICAL APPLIED GEOPHYSICS FOR GEOLOGISTS

16 November to 21 November, 2015

REGISTRATION FORM

Please note there is a limit of 20 participants for this course, so please return the form as soon as possible.

Registrations close November 12, 2015.

PERSONAL DETAILS

Title – Please circle (Prof / Dr / Mr / Mrs / Ms / Miss)……………………………………………………………………….
First Name Last Name (surname/family name)………………………………………………………………………………………….
Preferred Name (for name tag)………………………………………………………………………………………………………….
Position Company/University………………………………………………………………………………………………………………
Address…………………………………………………………………………………………………………………………………………….
City State Postcode………………………………………………………………………………………………………………………………
Country……………………………………………………………………………………………………………………………………………
Email Mobile…………………………………………………………………………………………………………………………………….
Phone (home) Phone (work)
Fax………………………………………………………………………………………………………………………………………………….
Dietary requirements/allergies……………………………………………………………………………………………………………….

REGISTRATION FEE

The fee is US$1,800 and includes catering and one course dinner.

Participants are required to make their own travel and accommodation arrangements.

Please keep a copy of this form for your records and email, post or fax the original to:

Dr Morou Francois Ouedraogo
Email: mfo.ttf@gmail.com
Phone: +226 70 20 33 35 / +226 25 40 77 12

PAYMENTS

Full payment must be received prior to 12 November 2015.

AMOUNT DUE: US$1,800
Payment options

Cheque or Bank Draft

Please make cheques and bank drafts payable to “TTG”. Bank drafts must be made out in USD or CFA equivalent currency.

For electronic transfer, please contact us for SWIFT code and other details

Invoice

Invoices can be issued on request. Please specify name and address to whom the invoice is to be raised (or email this information to mfo.ttg@gmail.com).