

## INTENSIVE TRAINING COURSE ON Sediment-hosted and Unconformity-related Mineral Deposits from aluminum to zirconium with special reference to sequence stratigraphy and environment analysis

The **International School for Geoscience Resources** of KIGAM presents an intensive training course on Sediment-hosted and Unconformity-related Mineral Deposits. The course will take place at the Ara room of International School for Geoscience Resources of KIGAM in Daejeon (Korea) in May 16<sup>th</sup> through June 1<sup>st</sup>, 2011 and will include the following modules.

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Module	Duration	Leading Instructor
<b>Introduction and Mineral Deposits</b>	5.16	
<b>Module 1.</b> Sediment-hosted and Unconformity-related Mineral Deposits (Metallic)	5.17 ~ 5.21	Prof. Dr. Harald G. Dill
<b>Module 2.</b> Sediment-hosted and Unconformity-related Mineral Deposits (Non-metallic)	5.23 ~ 5.27	Prof. Dr. Harald G. Dill

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## Agenda

- This course will provide an introduction to sediment-hosted and unconformity-related mineral deposits from aluminum to zirconium, as such it is designed to bring together course participants whose interests touch upon different commodities
- The course is intended particularly for newly joined and newly qualified staff of geological surveys and governmental agencies dealing with mineral resources or granting licenses to or supervising companies involved in mineral exploration
- Who should attend this course? Geologists, mineralogist and geophysicists who have a basic knowledge and limited experience in economic geology but want to broaden their knowledge especially in the field of sedimentary / sediment-hosted mineral deposits and shallow vein-type and vein-like deposits
- Vice versa, sedimentologists and stratigraphers who have not worked yet in economic geology but want to learn what kind of processes caused the concentration of metallic and non-metallic raw materials and in which environment of deposition these commodities may be found
- Geographers and (civil) engineers in land management who have a good background in minerals and geology and work at the interface between extractive and environment geology (E & E issues)

## Course Covered

- Introduction into methods and techniques to provide a solution to the E & E issue
- Basic information is distributed on and how to identify heavy minerals
- Mineralogy and geology of sediment-hosted (including pyroclastic depositional environments) mineral deposits
- Mineralogy and geology of unconformity-related vein-type and vein-like deposits
- Basics in sequence stratigraphy so as to enable exploration geologist to understand its value for mineral exploration
- Basics in environment analysis to assist field geologist interpret depositional environments in relation to mineralizing processes and create predictive models
- Sedimentary process (from weathering through diagnosis)
- Classification schemes of sedimentary rocks suitable to be handled in the field by geologists from the camps of extractive and environment geology

## Course Requirements

- Basics in general geology and mineralogy
- Experience with optical methods in mineral identification
- Understanding of fundamental processes in geodynamics and economic geology
- For those who lack one or the other skills raised above individual tuition at the end of each day is designed to help them to catch up with the running program

- **Summary of module content and learning objectives**
- You will
  - get an overview of methods and techniques in the field and in the
  - get an idea of the E & E issue (“Conflict of use”)
  - learn how to use heavy minerals during routine optical microscopy
- **Content of Introduction**
  - **Intro. Introduction and Mineral Deposits**
    - Capturing digital data in sedimentary lithologies-a solution to the E & E issue (economic geology vs. environmental geology) - Overview
    - Introduction into the “Chessboard” classification scheme of mineral deposits – geology from aluminum to zirconium) - Overview
    - Heavy mineral analysis and placer deposits I
    - Heavy mineral analysis and placer deposits II
    - Heavy minerals under the petrographic microscope
    - Individual tuition (optional - subject matter selected by participants–  
Lecture course & Discussion

Further reading:

DILL, H.G. (1998) A review of heavy minerals in clastic sediments with case studies from the alluvial fan through the near-shore marine environments.- Earth Science Review, 45: 103-132.

DILL, H.G. (2003) PIMA –supported exploration of industrial minerals in Mongolia and Thailand.- Erzmetall, 56: 20-28.

DILL H.G., LUDWIG R.-R., KATHEWERA A. and MWENELUPEMBE J. (2005) A lithofacies terrain model for the Blantyre Region: Implications for the interpretation of palaeosavanna depositional systems and for environmental geology and economic geology in southern Malawi.- Journal of African Earth Sciences, 41: 341-393

DILL, H.G. (2010) From heavy mineral analysis to placer exploitation.- SciTopics (Internet)

**Module 1. Sediment-hosted and Unconformity-related Mineral Deposits –  
Metallic, May 17 – 21 by Prof. Dr. habil. HARALD G. DILL**

- **Summary of module content and learning objectives**
- You will
  - get an overview of minerals and commodities
  - get an insight into the depositional environments
  - learn where and how certain elements were concentrated
- **Content of module**
  - **Day 1. Cr-Ni-Co-PGE, Ti-V & Fe-Mn Deposits**
    - Sedimentary and unconformity-related Cr-Ni-Co-PGE deposits–  
Advanced
    - Sedimentary and unconformity-related Ti-V deposits & Sedimentary  
and unconformity-related Fe-Mn deposits I – Advanced
    - Sedimentary and unconformity-related Fe-Mn deposits II
    - Sequence stratigraphic principles for mineral exploration I–  
Introduction
    - Environment analysis- Alluvial-fluvial deposits I
    - Individual tuition (optional - subject matter selected by participants) –  
Lecture course, exercise & discussion
  - **Day 2. Cu-Se-Te & Mo-Sn-W Deposits**
    - Sedimentary and unconformity-related Cu-Se-Te deposits
    - Sedimentary and unconformity-related Mo-Sn-W deposits
    - Sequence stratigraphic principles for exploration II
    - Environment analysis- Alluvial-fluvial deposits II
    - Environment analysis- Deltas
    - Individual tuition (optional - subject matter selected by participants) –  
Lecture course, exercise & discussion
  - **Day 3. Be-Li-Cs & Pb-Zn-Ge-In-Cd Deposits**
    - Sedimentary and unconformity-related Be-Li-Cs deposits
    - Sedimentary and unconformity-related Pb-Zn-Ge-In-Cd deposits I
    - Sedimentary and unconformity-related Pb-Zn-Ge-In-Cd deposits II
    - Environment analysis- Lakes I
    - Environment analysis- Lakes II
    - Individual tuition (optional - subject matter selected by participants) –  
Lecture course, exercise & discussion
  - **Day 4. Au, Sb-As-Tl & Hg-REE Deposits**
    - Sedimentary and unconformity-related Au deposits
    - Sedimentary and unconformity-related Sb-As-Tl deposits

- Sedimentary and unconformity-related Hg-REE deposits
- Environment analysis- Glacial deposits
- Diagenesis of siliceous rocks
- Individual tuition (optional - subject matter selected by participants) –  
Lecture course, exercise & discussion

○ **Day 5. Th-U & U Deposits**

- Sedimentary and unconformity-related Th-U deposits I
- Sedimentary and unconformity-related U deposits II
- Sedimentary and unconformity-related U deposits III
- Environment analysis-Linear terrigenous shoreline I
- Environment analysis-Linear terrigenous shoreline II
- Individual tuition (optional - subject matter selected by participants) –  
Lecture course, exercise & discussion
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**Module 2. Sediment-hosted and Unconformity-related Mineral Deposits –  
Non-metallic, May 23 – 27 by Prof. Dr. habil. HARALD G. DILL**

• **Summary of module content and learning objectives**

• You will

- get an overview of minerals and commodities
- get an insight into the depositional processes
- learn where and how certain elements were concentrated

• **Content of module**

○ **Day 1. Al-Ga & Ca-Mg Deposits**

- Sedimentary and unconformity-related Al-Ga deposits
- Sedimentary and unconformity-related Ca-Mg deposits I
- Sedimentary and unconformity-related Ca-Mg deposits II
- Classification and Terminology of Sedimentary Calcareous Rocks  
(Supplement)
- Diagenesis-epigenesis of calcareous rocks
- Individual tuition (optional - subject matter selected by participants) –  
Lecture course, exercise & discussion

○ **Day 2. B-Sr& S Deposits**

- Sedimentary and unconformity-related B-Sr deposits
- Sedimentary and unconformity-related S deposit
- Environment analysis-Marine calcareous environment
- Environment analysis-Continental calcareous environment
- Environment analysis- Aeolian deposits

- Individual tuition (optional - subject matter selected by participants) –  
Lecture course, exercise & discussion
  
- **Day 3. S, F-Ba, Na-K-Br-Cl-I-N&P-Zr-Hf Deposits**
  - Sedimentary and unconformity-related S deposits
  - Sedimentary and unconformity-related F-Ba deposits
  - Sedimentary and unconformity-related Na-K-Br-Cl-I-N deposits
  - Sedimentary and unconformity-related P –Zr-Hf deposits
  - Environment analysis-Reefal-slope and shelf deposits
  - Individual tuition (optional - subject matter selected by participants) –  
Lecture course, exercise & discussion
  
- **Day 4. Other Deposits**
  - Sedimentary and unconformity-related silica deposits I
  - Sedimentary and unconformity-related silica deposits II
  - Sedimentary and unconformity-related garnet-epidote-sillimanite  
group deposits
  - Sedimentary and unconformity-related diamond-corundum-spinel  
deposits
  - Sedimentary and unconformity-related graphite-pyroxene-olivine-  
amber-jet deposits
  - Individual tuition (optional - subject matter selected by participants) -  
Lecture course, exercise & discussion
  
- **Day 5. Clay Deposits**
  - Mudstones and claystones – basics of phyllosilicates
  - Sedimentary and unconformity-related clay deposits I
  - Sedimentary and unconformity-related clay deposits II
  - Advanced level studies of clay minerals I
  - Advanced level studies of clay minerals II
  - Individual tuition (optional - subject matter selected by participants) -  
Lecture course, exercise & discussion

Further reading:

DILL, H.G. (2010) The “chessboard” classification scheme of mineral deposits:  
Mineralogy and geology from aluminum to zirconium.- Earth Science Reviews, 100:  
1-420

DILL, H.G. (2010) Economic geology in space and time - Structure- and sequence  
stratigraphic-related subdivision of mineral resources in Central Europe.- SciTopics  
(Internet)

About the presenter-*Prof. Dr. habil. HARALD G. DILL*



After 2 years active service in an armored artillery battalion with the German Army he began studying geology in 1971 at Würzburg University (minor: geography, mineralogy) followed by economic geology at the Technical University at Aachen. He received his M.Sc. degree in geology in 1975 after having submitted his master thesis on stratigraphy and paleoenvironmental studies. In 1978 he was graduated from Erlangen University with a PhD thesis on pyritiferous Pb-Cu-Zn deposits in Italy, submitted to the Dept. of Mineralogy.

Subsequently, he entered upon a one-year research work at the Dept. of Soil Sciences and Soil Geography of Bayreuth University, where he was mainly engaged in shallow geophysical sounding and the study of duricrusts. Since 1979 he has been with the Federal Institute for Geosciences and Natural Resources (BGR), Hannover-Dept. of Geophysics/Radiometric age dating. He was mainly involved in the study of uranium concentration processes, a joint research projects carried out in close cooperation with international agencies and exploration companies in France, Italy and Australia. From 1986 through 1991 he was a staff member of the project management group of the "Continental Deep Drilling Program of the F.R. Germany, being responsible for economic geology, mineralogy and geochemistry.

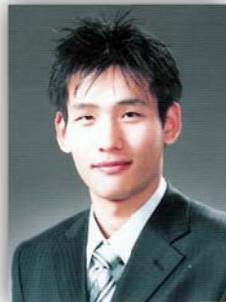
In 1982 he became lecturer for applied geology at Mainz University, where he obtained his Dr. habil. degree in 1985 after submission of his thesis entitled "Ore Mineralization at the Western Edge of the Bohemian Massif" (Assist. Prof.). In 1991 he was appointed Associated Professor at Hannover University, in 2008 honorary Professor at Mainz University and in 2010 profesor invitado de la Universidad Nacional del Sur - Bahia Blanca, Argentine

He gives lectures in economic geology (metallic and non-metallic deposits), applied sedimentology and lecture courses in petrographic microscopy and is mentoring young colleagues (Ms. students) during more than 30 years. Aside of his regular teaching posts he was/is involved in teaching at universities in Bangkok (Thailand), Cottbus (Germany), Doha (Qatar), Vilnius (Lithuania), Ulan Bataar (Mongolia), Zomba, Malawi, Tashkent (Uzbekistan), Riga (Latvia), Muscat (Oman), Amman (Jordan), Tunis (Tunisia), Hanoi (Vietnam), Athens (Greece), Bahia Blanca (Argentina) and Iasi (Romania). In BGR he is senior research scientist in "Geophysical exploration and technical mineralogy". His main interest lies in the field of chemistry and mineralogy of ancient and modern depositional systems and related fossil fuel, metallic and non-metallic deposits. His work on this subject matter has led to more than 260 publications, more than 80 abstracts and several open file reports (for more details visit: [www.hgeodill.de](http://www.hgeodill.de)). His scientific work led also to the discovery of a smectite-bearing clay deposit at the edge of the Gobi Desert, Mongolia, helped delineating a gypsum-celestite deposit in the desert on the Qatar Peninsula, and contributed to the finds of oil in the Permo-Carboniferous basins in SE Germany. Furthermore he

conducts studies in the field of archeometallurgy, mining history and only recently he wrote a book on the history of aviation.

## COURSE INFORMATION

- **STARTING/END DATE AND LOCATION**
  - ✓ May 16 - May 27 (Two weeks) at KIGAM in Daejeon, Korea (If you take fully all training courses composed of 2 modules)
- **LANGUAGE OF STUDY**
  - ✓ The language of instruction is English and all courseware is in English.
- **ASSESSMENT AND CERTIFICATION**
  - ✓ Participants will receive certificates upon completion of the course.
- **APPLICATION**
  - ✓ Participants should fill the application form and send to E-mail below no later than **May 9, 2011**.
- **CONTACT**



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