Ulrich Glawe

Geotechnical Engineer, Rock Engineer

German

Year of Birth: 1960

Languages: English, German (bilingual proficiency), Spanish (basics)

EDUCATION

1992	UNIVERSITY OF ERLANGEN-NUREMBERG, GERMANY PhD. Engineering Geology
1991	IMPERIAL COLLEGE, ROYAL SCHOOL OF MINES, LONDON, UK MSc. in Engineering Rock Mechanics; simultaneously with PhD.
1989	UNIVERSITY OF ERLANGEN-NUREMBERG, GERMANY MSc. Eng. Geol. (Dipl.-Geol.)

RESUME

Ulrich Glawe offers 29 years of experience, which he gained during all stages of development and implementation of hydropower and infrastructure projects. He is a "2 in 1" Engineering Geologist & Rock Engineer, specialized in surface and underground excavations.

His qualifications and experience demonstrate comprehensive capability in rock engineering throughout the project design, construction and operation phases: this includes site investigations, derivation of material parameters, selection of construction and support methods and measures, monitoring and decision making on necessary adjustments during construction, and following up of rock mass behavior during commissioning and operation.

He offers long lasting and continuous on-site supervision experience during project construction. His know-how is founded upon a robust education and an up-to-date theoretical background: he served for more than six years as University Lecturer at high-ranking institutes.

CAREER HISTORY

Aug. 2015 – today: Expert Geotechnical Engineer; contracted to Consortio SAM SpA (SKAVA-Amberg-Multiconsult), Santiago, Chile.

Oct. 2014 – July 2015:	Expert Geotechnical Engineer; contracted to SMEC Ltd., Melbourne, Australia. Simultaneously with the employment below.
May 2013 – July 2015:	Expert Geotechnical Engineer; contracted to Fichtner Consulting Ltd., Stuttgart, Germany
May 2010- May 2013:	Expert Geotechnical Engineer; contracted to SNC-Lavalin Power, Kuala Lumpur, Malaysia
March 2008 – April 2010	Chief Engineering Geologist, contracted to Lahmeyer International Ltd., Germany
Oct. 2007 - March 2008	Full Professor in Engineering Geology at Karlsruhe University (TH), Germany
Jan. 2002 - Oct. 2007	Associate Professor in Engineering Geology at the Asian Institute of Technology (AIT), Bangkok, Thailand
March 2000 – Jan. 2002	Senior Geotechnical Engineer, Taiwan High Speed Rail Cooperation, Taiwan
Jan. 1993 - March 2000	Senior Engineering Geologist, Electrowatt Engineering Ltd., Consulting Engineers, Zurich, Switzerland
Feb. 1992 - Jan. 1993	Engineering Geologist, CSD AG, Geoenvironmental Engineers, Berne, Switzerland

RELEVANT EXPERIENCE

2015-2018 **Consorcio SAM SpA**

Alto Maipo HEP (Chile)

This run-of-the-river project is located in the Andes, 50 km east of Santiago de Chile. It is almost fully located underground, with very few exceptions at intakes and at the outlet. The geology consists predominantly of a diversity of andesitic and tuff rock. The installed capacity will be 531 MW.

It comprises more than 50 km of feeder tunnels (5 m dia.), 10 km of tailrace tunnel (7 m dia.), and 8 km of access tunnels to caverns and adits for intermediate access (7 m dia.). The project includes two powerhouse complexes (power and transformer halls with associated structures) and two raise-bored steel-lined penstocks (300 m and 600 m deep). More than 60% of the tunnels are driven by TBMs; the other underground structures are excavated conventionally.

Due to the large area covered by the project, the variety of rock types (e.g. diversity in the tuff and andesite), the tectonic situation, the geotechnical challenges in this project are manifold and include, but are not limited to: high stresses/competent rock (= rock burst); deteriorated rock and high water pressure (= extensive grouting, cement and chemical, pre- and post-grouting) and swelling of rock (= adjustment of tunnel support).

Back analyses of various large tunnel collapses in the conventionally driven section of the VA4-Headrace Tunnel. Geotechnical risk analyses for all tunnels in the project.

Responsibilities: "Geo-leader" of the project, Area Manager at "Yeso/Volcan".

2014-2015 **Rasuwagadhi HEP (Nepal)**

The project is located at the Bhote Koshi River (Trisuli River) close to the border to Tibet (China). It is a typical run-of-the-river power station built in the Higher Himalaya and has an installed capacity of 111 MW. The head works consist of an intake weir and three large underground desander chambers with a length of 90 m and a span of 15 m, each. This is followed by a 4.5 km long, 6 m dia. headrace tunnel. The vertical penstock leads to the powerhouse complex with the power and transformer caverns. The water is discharged back into the river along a 500 m long tailrace tunnel. The project was subject to severe destruction (70 fatalities at site).during the 25.04.2015 Nepali Earthquake. Post-earthquake damage assessment, damage root cause analyses and hazard assessment for all surface and underground structures. Evaluation of potential rehabilitation measures.

Responsibilities: Engineering Geology / Rock Eng. Specialist.

2013-2015 **Lai Chau HEP (Vietnam)**

This project is located at the Black River in NW-Vietnam and comprises a 140 m high gravity dam (3.5 Mio. m3 RCC) with a crown length of 650 m, and has an installed capacity of 1200 MW. The spillway (six gates) and the chute are centrally incorporated in the dam. Three gated power intakes are also integrated in the dam. Three 10.6 m diameter steel penstocks are leading to the powerhouse with its three units of 400 MW, each, at the toe of the dam.

The works included the supervision of the excavation and preparation works for the dam foundation with steep rock excavations and comprehensive blasting operations.

Root cause analyses of multiple failures of the final cofferdams during their construction. Elaboration and implementation of appropriate construction methods. Despite extraordinarily difficult conditions during construction in the rainy season, the suggested construction methods eventually were leading to practically nil discharge of the dams.

Using modern grouting methods to ensure minimization of leakage of the grout curtain. This was achieved by fully introducing the state-of-the-art GIN-method in the construction procedures for the dam grout curtain. The works were conducted from galleries in the dam and from adits in the abutments as well as from surface. All components for successful curtain grouting were put in place step-by-step. After impounding to full supply level in July 2015, the total leakage of the dam was 25 l/s, only.

Responsibilities: Expert Geotechnical Engineer; Dam Foundation and Grout Curtain Specialist.

2010-2013 **Hulu Terengganu HEP (Malaysia)**

The project (250 MW installed capacity) consists of two schemes, the 75 m high earthfill embankment Puah Dam and the Tembat Concrete Gravity Dam (30 m high). The arrangement at the main dam includes a chute spillway and twin underground power conduits (headrace, shafts, power tunnels) leading to the power complex (transformer hall, powerhouse, surge chamber), and a 1.18 km long tailrace tunnel. The Tembat Scheme comprises the concrete dam and a 988 m long transfer tunnel to the main reservoir.

During these works he focused on construction supervision of the most difficult excavations: the 140 m high excavation for the power intake, the 400 m long and 70 m high excavation of the spillway chute as well as on the 800 m tailrace tunnel. This tunnel passed through an unpredicted 100 m wide fault, leading to squeezing and flowing ground. Root cause analyses for two major collapses of the tunnel due to inappropriate construction methods, implemented by the contractor. Elaboration and successful implementation of suitable construction methods.

Responsibilities: Expert Geotechnical Engineer

2009-2010 **Kenana and Rahad (II) Irrigation Projects (Sudan)**

Review of previous studies, design and supervision of site investigations and preparation of tender designs and documents for a project serving more than 9,000 km2 of potential new irrigation in connection with the ongoing raising of the Roseires Dam. The main components of the projects are two conveyor canals (q_{max} = 400 m3/s each) on both banks of the Blue Nile River; each of the canals exceeds 400 km in length. Most of the alignment is located in the “Black Cotton Soil”, highly problematic silty clay with varying properties (90% smectite minerals). Another major task in the projects is the proof of the availability and quality of required construction materials for aggregates and fills (rock sources).

Responsibilities: Chief Geotechnical Engineer; review and supervision of site investigations, assessment of geotechnical parameters for design purposes (tender design), assessment of construction materials, design of canal embankments and cuts, preparation of main geotechnical reports and tender drawings of the main conveyors.

Siah Bishe, Pumped Storage Scheme (Iran)

The scheme consists of two CFRDs, 85 m and 104 m in height. They are connected via two 2 km long headrace tunnels (dia. 5.7 m) and 500 m high and inclined steel-lined pressure shafts, each 5.0 m in dia.The powerhouse cavern is 130.0 m long, 22.0 m wide and 42.9 m high. Other large underground structures comprise the surge tank facilities, the 198 m long and 14.0 m wide transformer hall and the outlet tunnels. The turbine output is 1,040 MW. The project is located in a zone of high seismic risk and the underground structures are in rock that includes several large potentially active faults.

Responsibilities: Expert for the underground structures (penstocks), assessment of seismic impact at local active faults. Advice, expert opinion and responsibility for major decisions concerning engineering geological aspects in the project.

Mograt HEP (Sudan)

The Mograt Hydropower Project will be constructed at the Main Nile River adjacent to the Mograt Island 18 km downstream of Abu Hamad and 598 km downstream of Khartoum. Mograt HPP has an installed capacity of 312 MW, equipped with 6 Kaplan turbines. The spillway structure integrates 12 low-level spillway bays and 6 overflow spillway bays. The earth core rockfill dam, up to 22 m in height, is made up of three sections with a total length of 1024 m. The Mograt Southern Branch Regulating Dam will control the release of water from the Mograt Reservoir into a minor branch of the River Nile which borders Mograt Island in the south and bypasses Mograt HEP.

Responsibilities: Chief Engineering Geologist; supervision of site investigations, main geotechnical reports and derivation of design parameters (feasibility and tender design).

Dagash HEP (Sudan)

The Dagash Hydropower Project will be constructed between Mograt and Shereik HEPs at the River Nile, some 16 km upstream of Abu Hamad and 563 km downstream of Khartoum. Dagash HEP has an installed capacity of 312 MW and is equipped with 6 Kaplan turbines. The spillway structure integrates 10 low-level spillway bays and 6 overflow spillway bays. The earth core rockfill dam, up to 32 m in height, has a total length of 2656 m.

Responsibilities: Chief Engineering Geologist; supervision of site investigations, main geotechnical reports and derivation of design parameters (feasibility and tender design).

2008 **Sabaloka HEP (Sudan)**

The Sabaloka Hydropower Project will be constructed at the 6th cataract of the Nile River, 90 km downstream of Khartoum. Sabaloka HEP has an installed capacity of 168 MW, equipped with 6 Kaplan turbines. The spillway structure will integrate 14 gates to handle flood discharges of up to 15.500 m^3/s. A navigation lock will be constructed between spillway and dam. The earth core rockfill dam has a length of 520 m.

Responsibilities: Chief Engineering Geologist; geotechnical reports and derivation of design parameters (feasibility and tender design).

Kajbar HEP (Sudan)

This project is tendered and will be constructed on the 3rd Nile cataract and is part of the hydropower development scheme of the Main Nile River. The project has an installed capacity of 360 MW, equipped with six Kaplan turbines. A spillway structure integrates 4 bays of overflow spillways and 24 low-level sluices for handling of the flood discharges. The earth core rockfill dam is up to 31.0 m high and with a length of 2,240 m across the Nile River valley. Large powerhouse and spillway excavations of more than 30 m depth.

Responsibilities: Chief Engineering Geologist; guidance and supervision of site investigations, main geotechnical reports and derivation of design parameters (feasibility and tender design).

2007 **Karcham Wangtoo HEP, Himachal Pradesh (India)**

1,000 MW, 83 m high, 194 m long concrete gravity dam (founded 50 m in alluvium), 4 intake tunnels (1560 m long in total, 5 m dia.), 4 sedimentation chambers (1696 m long in total, 18.0 m wide, 30 m high), 10.5 m dia. 16.96 km long headrace tunnel, 27 m dia. 120 m high surge shaft., 4 pressure shafts 5.0 m dia., 187 m (L) x 23.0 m (W) x 52.0 m (H) machine hall, transformer hall and outlet tunnel.

The project is located in the central Himalaya in the geological Rampur Window, very close to active faults. The geology consists of gneiss with frequent and thick fault and shear zones.

Responsibilities: External Expert of the owner during construction. Review and modification of layout and design check of various large structures (dam abutment slopes, desilting chambers, surge shaft).

2005-2007 **Male Reef Stability Assessment (The Maldives)**

Stability assessment for several failed slopes around the Main Male Reef. Submarine engineering geological mapping and stability assessment. Extensive field works to a depth of 55 m were performed using scuba-dive equipment. Assessment of geotechnical strength parameters for the reef rock mass. Preliminary design of remediation works by cement grouting of the intact reef using special grouting techniques.

Responsibilities: Expert, preliminary design of various foundations of multiple-storey buildings upon extraordinary and weak rock on Main Male Reef.

2002-2007 **Nam San and Nam Man Mini HEPs (Thailand)**

In total 4200 m of low pressure tunnels with a cross-sectional area of 10 m2, each. Rock masses consist highly faulted shale, claystone, siltstone and sandstone. Strong potential of swelling and slaking. Mineralogical and mechanical tests and assessment of slake durability.

Responsibilities: Expert Geotechnical Engineer, review of inner liner design and quality assurance, expert reports.

2003-2005 **Landfill Sa Kaew for hazardous and municipal waste (Thailand)**

Consultant for the design of Thailand's largest landfill project. Total area of the landfill area 1 km2. 5 cells for hazardous industrial waste, 4 cells for municipal solid waste. Geological and engineering geological aspects.

Responsibilities: Expert, base liner design, leachate collection system design. Liner details and selection of construction methods.

2000 – 2002 **Taiwan High Speed Rail Cooperation (THSRC); (Taiwan)**

Lot C260 of the Taiwan High Speed Rail Project Taipei-Goachung.

The works at Lot 260 include 24.3 km of viaducts founded on 2 m dia. Bore-piles with a maximum depth of 60 m, 4 piles at each foundation every 30 m, in total more than 3000 piles. 9.3 km of tunnels including the 7.4 km long, conventional driven Paghuashan Tunnel and 2.9 km of cut & fill earthworks. All structures are located in an area of considerable recent tectonic activity (Chelongpu Fault; Chichi Earthquake; Sept. 21, 1999) and the alignment crosses various faults that are considered to be active. The geology consists of alluvium (25 km) and of consolidated soils, stiff soils and soft rocks (9 km). The alignment crosses the Paghuashan-anticline, where the tunnel works have a major impact on ground water, vice versa.

Responsibilities: Design review and modification for tunnels, earthworks and pile- and spread-foundations. Supervision and monitoring of construction.

1999 **Kusan-3 HEP, Kalimantan (Indonesia)**

100 m high, 563 m long RCC gravity dam including a surface powerhouse (130 MW) close to the toe of the dam. Surface and underground twin penstocks, each 3.8 m in diameter. The dam foundation rock consists of highly problematic fault materials (serpentinite and fractured pyroxenite). Extraordinarily difficult site conditions (access, remoteness, malaria). Detail and tender design stages. Position as Resident Engineering Geologist during a 5 months period of the site investigations. The activities included 1200 m of drillings, two exploratory adits in serpentinite, quarry trial blasts, and seismic investigations. Guidance and supervision of large-scale in situ tests (direct shear and plate load tests). 5 months as Senior Engineering Geologist at the Project Office in Jakarta. Responsibilities: Guidance and supervision of site investigations, investigation reports for the detail and tender design including derivation of the design parameters for the foundation rock. Finite Difference Stability Calculations for the dam. Geotechnical input to the tender documents for the underground and surface excavations (drawings and specifications).

1998-2000 **N7 National Highway, Girsberg Tunnel (Switzerland)**

1.8 km long twin tube tunnel with two lanes per tube. 1.4 km underground excavation including a TBM-driven pilot tunnel and head- and bench-excavated tunnel. 400 m constructed as cut-and-cover tunnel.

Responsibilities: External expert during construction.

1998 **Alborz Dam & HEP (Iran)**

82m high rockfill dam and power plant (175 MW), two 7.5 m diameter 375 m long Diversion Tunnels in marl. 120 m high slope cuts for the dam foundation in claystone. The rock mass exhibited a high swelling potential.

Responsibilities: Review and modification of the liner design of the diversion tunnels including Finite Difference Calculations.

Agh Chay Dam & HEP (Iran)

75 m high rockfill dam and power plant (125 MW) and irrigation scheme, two 8.0 m diameter and 750 m long diversion tunnels. Excavations in rock and rock fall material for the diversion tunnel outlet, exceeding 80 m in height.

Responsibilities: Review and modification of the liner design of the diversion tunnels. Review and modification of the excavation slopes at the tunnel outlet.

1997-1999 **Dhauliganga HEP (India)**

55 m high CFRD, 5 km long pressure tunnel, underground powerhouse (280 MW), large spillway excavation in rock (800 m long and 120 m in elevation). Slope stabilisation by means of more than 4500 passive rock bolts with lengths up to 20 m and by post-tensioned rock anchors.

Responsibilities: Responsible for input parameters for the design of surface (slopes) and underground excavations (caverns, tunnels, shafts) and for the design of the spillway slope cut.

1997 **Tagaytay Highlands Funicular Railway, Lake Taal (The Philippines)**

Problematic, extraordinarily varying volcanic rocks and soils. Funicular-type cable car exceeding a span of more than 600 m and 300 m in elevation.

Responsibilities: Geotechnical investigations and foundation design of 38 pylons and of the upper and lower stations (both tied back by pre-stressed anchors).

1996-1997 **Railway Link Macedonia-Bulgaria (FYR Macedonia)**

New 55 km long single-track railway link; part of the south-eastern European east-west corridor. 32 tunnels of total length 6,200 m, 60 bridges. Engineering geological investigations for 10.8 km of the alignment, including 10 tunnels (total 1,200 m) and 14 bridges (total 1,400 m). Follow-up and co-ordination of the field and laboratory investigations. Design of tunnels and slopes in rock and soil, including stabilization measures.

Responsibilities: Project Manager, responsible for all technical and administrative aspects in the project.

1996 **Kyongbu High-Speed Rail Project (Korea)**

Basic Design of the excavation and support of the Taegu Underground Station, a Triple-Tube Railway Tunnel with a span of 55 m: a complex excavation sequence in difficult geology, and in an urban area.

Responsibilities: Input parameters for the detail design of the excavations of the large station. Finite Difference Stability Calculations for the excavation.

1995-2000 **Nagra, National Cooperative for the storage of nuclear waste (Switzerland)**

Several engineering geological expert studies into a repository for highly active nuclear waste in Opalinus Claystone at a depth of 650 m at the Benken Site. Stability assessment of tunnels, underground caverns and storage galleries.

Responsibilities: Preliminary design of support and lining. Finite Difference calculations (2D, 3D).

1995-1996 **Railway Link Macedonia-Bulgaria (FYR Macedonia)**

New 55 km long single-track railway link; part of the south-eastern European east-west corridor. 32 tunnels of total length 6,200 m, 60 bridges. (see above). Feasibility study and cost estimates for tunnels and bridges.

Responsibilities: Project Manager, responsible for all technical and administrative aspects in the project.

1993-1998 **Nagra, National Cooperative for the storage of nuclear waste (Switzerland)**

Underground repository for low- and intermediate-level nuclear waste at the Wellenberg site in Central Switzerland. TBM-driven access adits of more than 10 km. Cavern system: shafts, galleries and very deep (800 m) storage caverns with a total cavern length exceeding 1 km and an average span of 16.0 m.

Responsibilities: Rock mechanics modelling and liner design of the caverns. Appraisal of laboratory test data and engineering geological borehole data of six very deep drillings (depth up to 1890 m) to assess rock engineering design parameters. 2D and 3D Finite Difference modelling to confirm the feasibility of the construction and the sealing of the access adits.

1993-1998 **Gotthard Base Tunnel (Switzerland)**

57 km twin tube TBM- and conventionally-driven railway tunnel through the Swiss Alps. Each tube 8.5 m in diameter, partly in extremely poor rock, with an overburden of up to 1800 m and very high water pressure. Basic and detail design stage.

Responsibilities and Project Contributions:

Evaluation of construction methods, in particular tunnel and cavern design for a 5 km long section through very poor fault rock materials with overburden of up to 900 m (Tavetscher Zwischenmassiv), including 3D-FD rock engineering calculations for the design of stabilization measures (shotcrete, anchors, rock bolts).

Tender design of a shaft a system of caverns at the base of a 900 m deep intermediate access shaft ("Shaft Sedrun") in the same problematic area of the tunnel.
Participation in several engineering studies for the "Piora Exploratory System". This system of adits and small caverns was constructed to explore the geological conditions within the "Piora Syncline", a fault zone, where water pressures of 130 bars and completely crushed dolomite were found at a depth of 1800 m below the surface.

1993 - 1996 **Road tunnel on the bypass west of Zurich, National Highway N20 (Switzerland)**

Three twin tube tunnels with two lanes per tube (0.5 km, 1.4 km, and 2.2 km in length), 3 ventilation plants, and four traffic interconnections.
Responsibilities and Project Contributions: Participation in the basic, detail and tender design of portal cuts and tunnels.

1993 - 1995 **Road tunnel on the bypass south of Sils National Highway N13c (Switzerland)**

1.3 km long double-lane road tunnel. Stability assessment and design of the portal cuts, using post-tensioned rock anchors.
Responsibilities and Project Contributions:
Participation in the detail design of portal constructions and follow-up of construction works. Evaluation of geology and derivation of construction methodsfor tunnel excavation methods for a location where the tunnel is very close (3.5 m) to an operating pressure tunnel.

1993-1995 **Berke Dam & HEP (Turkey)**

Concrete arch dam (201 m high) with 4 km of pressure tunnel and an underground hydroelectric power plant (513 MW).
Responsibilities and Project Contributions:
Several rock mechanics studies for surface and underground excavations. Design check and construction supervision for the powerhouse and pressure tunnel and for several very large surface excavations.

1992-93 **Axen Tunnel, Project Alptransit (Switzerland).**

12.3 km long railway tunnel. Study to develop a concept of the geological investigations, including a 600 m deep drilling site.

1992 **Wisenberg Tunnel (Switzerland).**

12.6 km long railway tunnel partly through swelling rock and an overburden of 300 m. Basic design of the lining, including coupled 2D rock engineering and hydraulic calculations to investigate the pore water pressure and inflow into the tunnel.

Koelliken Deposit (Switzerland).

Hazardous waste disposal facility (landfill), constructed and filled with chemical waste in the 1970s and 1980s. Sand- and claystone. Mollasse rock. Large contamination plume. Basic, detail and tender design of a 12,000 m² slurry cut as physical barrier.

Forêt de Châtel Quarry (Switzerland).

Open pit quarry. Evaluation of the stabilization of a large-scale landslide of 250,000 m³ above the quarry, assessment of stabilization measures, and design of a new 170 m high quarry slope.

Charuque Quarry, (Switzerland).

Stability analyses and design of a 150 m high quarry slope situated at the toe of a 300 m high steep slope in weak rock.

PROFESIONAL MEMBERSHIP

- International Society of Rock Mechanics (ISRM)
- International Association of Engineering Geology (IAEG)
- Several national professional Societies

INTERNATIONAL RECOGNITIONS

2015 Certificate of Merit; the Minister of Construction; Socialist Republic of Viet Nam

In recognition of valuable contributions to the construction of Lai Chau HEP (1200 MW) from 2013-2014. Fully responsible for the dam grout curtain; Lai Chau Dam (140 m high, RCC-gravity dam).

1992 Prof. Leopold Mueller Award; Austrian Geomechanics Society, Salzburg, Austria
In recognition of his outstanding doctoral thesis that dealt with an integral approach to geotechnical engineering in the sense of Leopold Mueller.

PUBLICATIONS

Glawe, U. & Moser M. (1989): Erste Untersuchungsergebnisse zur Kinematik der Bergzerreissung Tressdorfer Höhe (Karnische Alpen). Jb. Geol. B.-A., Bd. **132**, H.4, p. 629-644, Wien. In English: Results of monitoring of a large scale landslide (block-type slope movements) in Carinthia, Austria

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Glawe, U. & Bluemling, P. (1997): Rock Mechanics Data, In Situ Stresses and Results of Rock Mechanics Modelling concerning the Wellenberg Repository / Switzerland.- Felsbau (Rock and Soil Engineering), Vol. **15** , No. 6, p. 440-447, Essen.

Lotter, M., Moser, M., **Glawe, U.** & Zvelebil, J. (1998): Parameters and kinematic processes of spreading of mountain ridges.- Proc. Int. Congress IAEG, Vancouver, II, p. 1251-1257; Rotterdam (Balkema).

Hollmann, F.S., Kutter, H.K. & **Glawe, U.** (2001): Rock Mechanics and Micro-structural investigations on Serpentinite Cataclasites of SE-Kalimantan, Indonesia. (In German).- Proc. 13th Nat. Conf. Eng. Geol., Karlsruhe, Germany.

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Bergado, D.T., **Glawe, U.**, Sia A.H.I., Youwai, S., Voottipreux, P. (2004): Interface Shear Strength of Different Geosythetics in Landfill Liner System: The Case of the Sakaew Landfill, Thailand.- Proc. 3. Asian Reg. Conf. on Geosynthetics, p. 507-514, June 2004, Seoul, Korea.

Asavadorndeja, P. & **Glawe, U.** (2004): Preliminary Investigation into Electrokinetic Remediation Technologies in the Soft Bangkok Clay, Proc. 15th Southeast Asian Geotechnical Conf. (15th SEAGC), 653-658, Bangkok, Thailand.

Asavadorndeja, P., Roehl, K.E., **Glawe, U.** & Tuladhar, L. (2005): Electrokinetic Remediation of Zn(II) Contaminated Soft Bangkok Clay.- Lowland Technology International, Vol. **7**, No. 1, p. 89-97.

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