

# UNIV. PROF. DR. SCOTT KIEFFER, P.E., C.E.G.

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## EDUCATION

1998 PH.D., CIVIL ENGINEERING (GEOTECHNICAL)  
UNIVERSITY OF CALIFORNIA AT BERKELEY

1995 M.S., CIVIL ENGINEERING (GEOTECHNICAL)  
UNIVERSITY OF CALIFORNIA AT BERKELEY

1989 B.A., EARTH SCIENCES (GEOLOGY)  
UNIVERSITY OF CALIFORNIA AT SANTA CRUZ

## PROFESSIONAL QUALIFICATIONS

PROFESSIONAL ENGINEER (CIVIL): #63196 CALIFORNIA

PROFESSIONAL ENGINEER (CIVIL): #39497 COLORADO

CERTIFIED ENGINEERING GEOLOGIST: #2156 CALIFORNIA

PROFESSIONAL GEOLOGIST: #6920 CALIFORNIA

BERATENDE INGENIEUR FÜR TECHNISCHE GEOLOGIE, ÖSTERREICH  
(CONSULTING ENGINEERING GEOLOGIST, AUSTRIA)

## ACADEMIC EXPERIENCE

7/2007 to Present

PROFESSOR OF ENGINEERING GEOLOGY

Faculty of Civil Engineering - Institute of Applied Geosciences

Graz University of Technology, Austria

9/2007 to 9/2009

ADJUNCT PROFESSOR

Department of Mining Engineering, Colorado School of Mines

6/2002 to 7/2007

ASSISTANT PROFESSOR

Department of Mining Engineering, Colorado School of Mines

1/2000 to 7/2000

LECTURER

Department of Geosciences, San Francisco State University

1/1994 to 5/1997

GRADUATE STUDENT INSTRUCTOR

Dept of Civil and Environ. Engineering, University of California at Berkeley

## CONSULTING EXPERIENCE

6/2002 to Present

INDEPENDENT GEOTECHNICAL CONSULTANT

Colorado, Austria

5/1998 to 5/2002

SENIOR - ASSOCIATE DESIGN ENGINEER

Jacobs Associates, San Francisco

1/1992 to 5/1994 & 6/1989 to 10/1991

STAFF GEOLOGIST

Harlan Tait Associates, San Francisco, USA

11/1991 to 11/1992

STAFF ENGINEERING GEOLOGIST

Dames & Moore, Honolulu, USA

8/1988 to 6/1989

STAFF GEOLOGIST

Rogers E. Johnson & Associates, Santa Cruz, USA

## **HONORS AND AWARDS**

2010 - KWANG-HUA VISITING PROFESSOR

2011 College of Civil Engineering  
Tongji University, Shanghai, China

2009 CHARLES PANKOW AWARD FOR INNOVATION  
COLLABORATOR: CLAREMONT TUNNEL SEISMIC UPGRADE PROJECT  
American Society of Civil Engineers

2000 PROGRAM OF THE YEAR AWARD  
Association of Engineering Geologists, San Francisco Section

1998 DOUGLAS R. PITEAU OUTSTANDING YOUNG MEMBER AWARD  
Association of Engineering Geologists (National Award)

1996 USCOLD GRADUATE RESEARCH SCHOLARSHIP  
United States Committee on Large Dams (National Award)

1994 JANE LEWIS GRADUATE RESEARCH FELLOWSHIP  
Department of Materials Science and Mineral Engineering, U.C. Berkeley

## **PROFESSIONAL AFFILIATIONS**

American Society of Civil Engineers – Member

American Rock Mechanics Association – Member

Austrian Society for Geomechanics - Member

International Society for Rock Mechanics - Member

## **PROFESSIONAL SERVICE**

ASCE GeoInstitute, Rock Mechanics Committee Member

ASCE GeoInstitute, Grouting Committee Member

ASCE Standards Committee, Compaction Grouting Consensus Guide, ASCE/GI 53-10

Editorial Board Member, Geomechanics and Tunnelling, Ernst. & Sohn

Organizer and Director of Continuing Education Course (3.5 CEUs): Grouting Fundamentals & Current Practice, Colorado School of Mines, Golden, CO (2004 - present).

## **ACADEMIC SERVICE**

### **University Courses Taught**

**Graz University of Technology**

GEO.201\_1 Field Methods in the Earth Sciences (3 sh)

GEO.310 Mechanics (1 sh)

GEO.821 Geologic Mapping (2.5 sh)

GEO 920\_1 Excursion Inland/Abroad (3 sh)  
 GEO.992 Mass Movements - landslides and slope stability (2sh)  
 GEO.993 Aerial Photograph Interpretation (1 sh)  
 GEO.994 Engineering Geology Excursion  
 NAT.201 Investigation and Ground Characterization (1 sh)  
 NAT.209 Ground Improvement (2 sh)  
 217.352 Geotechnical Fundamentals (1 sh)  
 221.606 Advanced Engineering Geology (2 sh)

#### **Colorado School of Mines**

DCGN 241 Statics (3 sh)  
 GOGN 504 Surface Structures in Earth Materials (3 sh)  
 MNGN 406 Design and Support of Underground Excavations (3 sh)  
 MNGN 506 Design and Support of Underground Excavations (3 sh)  
 MNGN 599 Applied Rock Engineering (1 sh)

#### **San Francisco State University**

GEOL 795 Problems in Engineering Geology (2 sh)

### **Research Supervision**

#### **Graz University of Technology**

##### **Ph.D. Dissertation Research**

Chronology, Structure, and Kinematics of the 20 km<sup>3</sup> Dangkhar Landslide, Himachal Pradesh, India, doctoral research topic of Markus Kaspar, ongoing research.

Accuracy and Limits of Using Terrestrial Laser Scanning for 3D Joint Roughness Characterization, doctoral research topic of Maja Bitenc, ongoing research.

The Creep Equilibrium Analysis Method - a Novel Approach for the Analysis of Creeping Slides in Soil and Rock, doctoral research topic of Daniela Engl (dissertation defense in June, 2013).

Deformation Mechanisms and Fluid-Rock Interactions in Carbonate Fault Rocks, doctoral research topic of Stefan Hausegger, 2013, co-advisor with W. Kurz.

Ingenieurgeologische und Geotechnische Untersuchungen von Massbewegungen im Gebiet des Bunzkoögeles bei Matrei in Osttirol (Engineering Geologic Evaluation of Landslides in the Bunzkoegel area, Matrei in East Tyrol), doctoral research topic of Johann Thomas Sausgruber, 2010, co-advised with R. Poisel.

##### **M.S. Thesis Research**

Impact of Livestock Grazing on Landslide Formation in Southern Styria, Austria, MS research topic of Ines Korbuly, ongoing research, co-advisor with R. Marte.

Unstable Slopes and Their Effects on Civil Infrastructure - Case Examples from Landeck, Tyrol, Austria, MS research topic of Sara Strobl, ongoing.

2D and 3D Risk Analysis for Potential Rock Fall Events at Anetwände and Tscheppaschlucht, Carinthia, Austria, MS research topic of Manuel Schaunigg, ongoing.

The Block Scour Spectrum as a Screening Criterion for Rock Mass Erosion, MS research topic of Stephanie Schmidl, ongoing.

Evaluation of Potential Failure Mechanisms and Rock Fall Impacts of the Hornbergl, Tyrol, Austria, MS research topic of Andreas Aschenbrenner, ongoing.

Role of Structural Discontinuities in Rock Mass Scour at Salza Dam, Upper Styria, Austria MS research topic of Elisabeth Macher, 2012, co-advised with Q. Liu.

Kolkbildung im Bereich Des Ottenstein Staudammes, Niederösterreich (Scour Development at Ottenstein Dam, Lower Austria), MS research topic of Christoph Steinbauer, 2012.

Geological Conditions Favoring Extreme Scour of an Unlined Spillway at Ricobayo Dam, Zamora, Spain, MS research topic of Markus Kaspar, 2012.

Response of Ricobayo Dam Spillway Walls to Extensive Rock Scour, MS research topic of Luiz Felipe Meirelles Coelho Rocha, 2012.

Failure Mechanism and Kinematics of the 1999 Huben Slope Failure, Ötztal, Austria, May 2009, MS research topic of Gudrun Pack, 2009, co-advised with W. Kurz and C. Zangerl.

Landslides in Adishu Area, Northern Ethiopia: Characterization and GIS-Based Susceptibility Mapping, MS research topic of Shishay Tadios Kidanu, 2008, co-advised with K. Klima.

#### **Visiting Scholars**

Stability Analysis of Cemented Soil for Large-Diameter Tunnel Breakthroughs, doctoral research topic of Yilei Liao, Tongji University, Shanghai, China (Feb. - June, 2012).

Face Stability Model for Large Span TBMs in Heterogeneous Soft Soils, doctoral research topic of Xinyu Hu, Tongji University, Shanghai, China (Oct. 2009 - June, 2010).

#### **Colorado School of Mines**

##### **Ph.D. Dissertation Research**

Further Understanding of Block-in-Matrix Ground in TBM Tunneling, doctoral research topic of Cheowchan Leeausukseree, 2006.

#### **University Administration**

##### **Graz University of Technology**

###### Departmental Service

Head of Institute of Applied Geosciences (2010-2011)

Deputy Head of Institute of Applied Geosciences (2007-2010 and 2012 -present)

###### University Service

Senate Election Commission. Member (2013)

University Senate - Substitute Member (2010 to present)

Faculty Search Committee - Professor of Soil Mechanics (2011)

Curricular Committee for Earth Sciences - Member (2007 - present)

Doctoral School of Civil Engineering - Member (2007 - present)

Doctoral School of Geosciences - Member (2007 - present)

##### **External University Service**

Imperial College, London - External Examiner, Department of Civil & Environmental Engineering, 2010-2013

## **Colorado School of Mines**

### Departmental Service

Faculty Search Committee (2004-2005)

Scholarship Committee (2004 – Present)

### University Service

Graduate Council (2004-2007)

Faculty Affairs Committee (2004-2007)

## **RESEARCH GRANTS AND EXTERNAL FUNDING**

### **Graz University of Technology**

InSAR Survey of the Ingelsberg in Bad Hofgastein, Salzburg, Austria, Markt Gemeinde Bad Hofgastein, €10,000 (\$13,000) in-kind support, 2013, PI.

NTG<sup>2</sup> - New Techniques in Geodesy and Geotechnical Engineering, Republic of Slovenia and European Union, €396,646 (\$515,640), 2011-2014, Co-PI.

InSAR Evaluation of Slow Moving Alpine Landslides, Austria Society for Geomechanics, €25,000 (\$32,500), 2012, PI.

Semmering-Basistunnel neu Geologisch-mineralogische Laboruntersuchungen Erkundung 2011 (Semmering Base Tunnel New Geological-Mineralogical Laboratory Investigations from 2011 Explorations), Austrian Federal Railway Authority (ÖBB), €156,613 (\$203,600), 2011-2012.

Rock Slope Stability Evaluation of the Hornbergl, Reutte, Tyrol, Austria, Austrian Service for Torrent and Avalanche Control, €5,000 (\$6,500), 2011-2012, PI.

Evaluation of Scour in Blocky Rock Masses, Austria Society for Geomechanics, €45,000 (\$58,500), 2010-2011, PI.

### **Colorado School of Mines**

Chemical Grout Sub-Slab Vapor Barriers for Mitigating Alkali Silica Reaction in Concrete Foundation Elements, de Neef Construction Chemicals, \$25,000, 2006-2007, PI

Integrated Geophysical Void Detection Demonstrations, Department of Labor, Mine Safety and Health Administration, \$380,781, 2004-2005, PI.

Subsurface Mechanical Engineering Design Services – Office of Civilian Radioactive Waste Management, Bechtel SAIC, \$544,683 funding from 2003-2004, Co-PI.

## **PUBLICATIONS**

### **Journals**

Hu, X.; Zhang, Z.; Kieffer, D.S., 2012, A real-life stability model for a large shield-driven tunnels in heterogeneous soft soils, *Frontiers of architecture and civil engineering in China* 6 (2012) 2, S. 176 - 187

Kieffer, D. S.; Goodman, R. E., 2012, Assessing scour potential of unlined rock spillways with the Block Scour Spectrum, *Geomechanics and Tunnelling* 5 (2012), 527 - 536, Taylor & Francis.

Zixin, Z.X., Hu, X., and Kieffer, D.S., 2011, A discrete numerical approach for modelling face stability in slurry shield tunnelling in soft soils, *Computers and Geotechnics* 38 (2011) 94-104, Elsevier.

Solomon, N.; Pischinger, G.; Klima, K.; Kieffer, D. S., 2008, Extensional Tectonics at Tendaho Dam and Irrigation Site. - in: Journal of alpine geology 49 (2008).

Kieffer, D. S.; Jibson, R.; Rathje, E.; Kelson, K. I., 2006, Landslides Triggered by the 2004 Niigata Ken Chuetsu, Japan, Earthquake. - in: Earthquake spectra 22 (2006) 47 – 73.

Kieffer, D. S., 2003, Rotational Instability of Hard Rock Slopes. - in: Felsbau 21 (2003) 2, 31 – 38.

Kieffer, D.S., McRae, M.T. and Chern, J.C., 2001, Chi-Chi, Taiwan, Earthquake of September 21, 1999, Performance of Underground Structures, p. 162-172. Earthquake Spectra, Supp. A to Vol. 17, Pub. No. 2001-02, J. Uzarski and C. Arnold, Eds.

Goodman, R.E., and Kieffer, D.S., 2000, Behavior of Rock in Slopes. Journal of Geotechnical and Geoenvironmental Engineering, Vol 126, No. 8, August, 2000.

Kelson, K. I., Kieffer D. S., Sitar, N., Wright, R., Wells, D., and Perkins, W., 2000, Fault-related Deformation Resulting from the Chi-Chi (Taiwan) Earthquake: Preliminary Conclusions of the NSF-PEER Reconnaissance Team. Proc. Seismological Society of America, 484-492.

### **Conference Proceedings and Specialty Publications**

Liu, Q.; Kieffer, D. S., 2012, Digital tunnel mapping using terrestrial LiDAR - a case study, International Society for Rock Mechanics, EUROCK 2012 Stockholm: Rock Engineering & Technology for Sustainable Underground Construction, S. 135 - 145

Liu, Q., and Kieffer, D.S., 2011, Virtual Outcrop Models for 3D Characterization of Engineering Rock Masses. Proceedings, American Society of Rock Mechanics, San Francisco, CA.

Engl, D.A., Zangerl, C., Fellin, W., Kieffer, D.S., 2010, A novel approach for assessing the deformation characteristics of rockslides. Proceedings of the 11<sup>th</sup> IAEG Congress, Auckland, New Zealand.

Liu, Q.; Kieffer, D. S.; Klima, K.; Brosch, F.-J., 2009, A Realistic Fracture System Model for Engineering Analysis of Underground Excavations - in: SINOROCK2009 "Rock Characterisation, Modelling and Engineering Design Methods".

Kieffer, D. S.; Leelasuksee, C.; Mustoe, G., 2008, Disc cutter performance in boulder laden ground. - in: North American Tunneling 2008 proceedings, 129 – 136.

Kieffer, D. S.; Blümel, M.; Hanna, K., 2008, Void detection demonstration: Cross hole seismic tomography. - in: Proceedings of the 42nd Rock Mechanics Symposium

Blümel, M.; Kieffer, D. S., 2008, Perspectives on Laboratory Rock Testing Procedures. - in: Proceedings of the 42nd US Rock Mechanics Symposium.

Kennedy, D.; Manley, T.; Mack, D.; Kieffer, D. S., 2008, Assessing potential rock fall impacts and foundation block movement, Iron Canyon fish ladder, Upper Bidwell Park, Chico, California. - in: Proceedings, 42nd US Rock Mechanics Symposium.

Kieffer, D. S., 2006, Influence of Cross Jointing in Block Slumping Failures. - in: Proc. 41st U.S. Rock Mechanics Symposium, Golden, CO.

Leelasuksee, C. L.; Kieffer, D. S.; Mustoe, G.G.W., 2006, Numerical Simulation of Disc Cutters in Heterogeneous Ground. - in: Proc. 41st U.S. Rock Mechanics Symposium, Golden, CO.

Kieffer, D.S., Caulfield, R.J., and Tsztoo, D., 2004, Seismic Retrofit of the Claremont Tunnel. - in: Rock Engineering, Theory and Practice, EUROCK 2004 and 53rd Geomechanics Colloquy, 333 – 338.

Badr, S., Ozbay, U., Kieffer, D.S., and Salamon, M., 2003, Three-Dimensional Strain Softening Modeling of Deep Longwall Mine Layouts. Proceedings of the 3rd International FLAC and FLAC3D Symposium on Numerical Modeling in Geomechanics, Sudbury, Ontario, Canada.

Rozgonyi, T.G., Kieffer, D.S., Maidl, U., and Balci, C., 2003, TBM Considerations for Soft Ground Tunnels. Proc. Int. Symp. On the Fusion Technology of Geosystems Engineering, Rock Engineering, and Geophysical Exploration, Seoul, S. Korea

Badr, S., Mendoza, R., Kieffer, D.S., Salamon, M.G.D., and Ozbay, U., 2003, Numerical Modeling of Longwalls in Deep Coal Mines. Proceedings of the 22nd International Conference on Ground Control in Mining, Morgantown, WV.

Gibbs, P.W., Lowrie, J., Kieffer, D.S., and McQueen, L., 2002, M5 East - Design of a Shallow Soft Ground Shotcrete Motorway Tunnel. Proc. Int. Tunneling Assoc., March 2 – 8, Sydney, Australia.

Kieffer, D.S., Caulfield, R.J., and Cain, W., 2001, Seismic Upgrade of the Claremont Tunnel, Northern California. Society For Mining, Metallurgy, and Exploration, Proc. 2001 Rapid Excavation and Tunneling Conference, June 11-13, San Diego, CA.

Kieffer, D.S., and Goodman, R.E., 1999, Analysis of the Safety and Performance of Scott Dam using FLAC. ASCE Waterpower '99 Conference, Las Vegas, NV.

Kieffer, D.S., and Goodman, R.E., 1999, FLAC Analysis of a Gravity Dam on a Soft Foundation. Proceedings of the International FLAC Symposium on Numerical Modeling in Geomechanics, Minneapolis, MN.

McRae, M.T., and Kieffer, D.S., 1999, Inelastic Rock Reinforcement Design for the Lake Mathews Outlet Facilities. Proceedings of the American Rock Mechanics Association, Vail, CO.

Dubnewych, S., McRae, M.T., Redd, R.R., and Kieffer, D.S., 1999, Design Methodology Used for the Lake Mathews Outlet Facilities Project. Society For Mining, Metallurgy, and Exploration, Proc. 1999 Rapid Excavation and Tunneling Conference, June 21-23, Orlando, FL.

## **Reports**

Semmering-Basistunnel neu Geologisch-mineralogische Laboruntersuchungen Erkundung 2011 (Semmering Base Tunnel New Geological-Mineralogical Laboratory Investigations from 2011 Explorations), March 2012, prepared for the Austrian Federal Railway Authority (ÖBB).

Subsurface Mechanical Engineering, Design Services Report, Exhibit D – Task 004: Shaft Design, December, 2004, submitted to Bechtel SAIC Company, LLC, for funded research on the Yucca Mountain Nuclear Waste Repository Project (co-authored with L. Ozdemir, T. Goodell and D. McMullin).

## **Other Publications**

Kieffer, D.S., and Kaspar, M., 2013, The Dangkhari landslide: a world class mega-event, European Geosciences Union, Abstract EGU2013-9793, Vienna, Austria.

Liu, Q.; Kieffer, D. S., 2012, Terrestrial laser scanning, digital photogrammetry and RTK-GPS surveying in engineering geology: data acquisition, processing and application examples. - in: PANGEO Austria 2012: Geowissenschaft plus Praxis, Abstract, p. 93 - 93, Pangeo Austria

Bandimere S., Bowers C., Byle M., Cadden A., Dimaggio J., Droof E., Fitzgerald C., Geraci J., Golder M., Gruner L., Johnson L., Kieffer D.S., Miluski M., Nichols S., Shuttle D., Vipulanandan C., Warner J., and Yen P., 2010, Compaction Grouting Consensus Guide, ASCE Standard ASCE/G-I-53. 79 pp.

Di Capua, G., Kayen, R.E., Kieffer, D. S., Button, E., Biscontin, G., Scasserra, G., Lanzo, G., Tommasi, P., Pagliaroli, A., Silvestri, F., d'Onofrio, A., Violanti, C., Simonelli, A.L., Puglia, R., Athanasopoulos, G., Mylonakis, G., and Stewart, J.P., 2009, Preliminary Report on the Seismological and Geotechnical Aspects of the April 6 2009 L'Aquila Earthquake in Central Italy. Report for Web Dissemination, Geotechnical Earthquake Engineering Reconnaissance, [http://www.geerassociation.org/Post\\_EQ\\_Reports.html](http://www.geerassociation.org/Post_EQ_Reports.html)

Kieffer, D. S.; Leelasukseree, C.; Mustoe, G., 2008, Discs and boulders. - in: Tunnels & tunnelling international Nov. (2008) , 43 – 46.

Kieffer, D. S., 2003, Slope Stability Issues for Converting Open Pit Mine to Residential Subdivision. - in: Association of Engineering Geologists, Abstracts with Programs, Vail, CO.

Kelson, K. I.; Kieffer, D. S.; Sitar, N.; Wright, R.; Wells, D.; Perkins, W., 2000, Fault-related Deformation Resulting from the Chi-Chi (Taiwan) Earthquake: Preliminary Conclusions of the NSF-PEER Reconnaissance Team. - in: Abstracts with Programs, Seismological Society of America, 2000.

Kieffer, D.S., 1999, Implications of Faulted Marine Terrace Deposits at Mussel Rock, Daly City, California. Geological Society of America, Abstracts with Programs, Berkeley, CA.

Kieffer, D.S., 1998, Rock Slumping: A Compound Failure Mode of Jointed Hard Rock Slopes. Ph.D. Dissertation, Department of Civil and Environmental Engineering, University of California at Berkeley, CA.

Kieffer, D.S., 1995, Surface Displacement Rate of a Deep-Seated Bedrock Topple. Association of Engineering Geologists, Abstracts with Programs, Sacramento, CA.

Kieffer, D.S., Lessin, E.E., Clahan, K.B., Fisher, G.R., Wright, R.H., and Wesling, J., 1994, Paleoseismicity of the Cordelia Fault Zone, Solano County, California. Geological Society of America, Abstracts with Programs, Seattle, WA.

## **PRESENTATIONS**

### **Conferences and Symposia**

The Dangkhari landslide: a world class mega-event, presented at the European Geosciences Union, Vienna, Austria, April 10, 2013.

Assessing scour potential of unlined rock spillways with the Block Scour Spectrum, Geomechanics Colloquium, Austria Society for Geomechanics, Salzburg, Austria, Oct. 11, 2012.

Geotechnical Perspectives on the Restoration of Dangkhari Monastery, Himachal Pradesh, India, 6th Colloquium, Rock Mechanics – Theory and Practice, Vienna, Austria, March 3, 2012.

Simulating mixed face stability conditions and ground deformations in slurry shield tunneling, 4th Austria-China Tunnel and Underground Engineering International Symposium, Graz University of Technology, Austria, Oct. 11, 2010.

The Problem with Sackung, 5th Colloquium, Rock Mechanics – Theory and Practice, Vienna, Austria, Nov. 26, 2009.

Assessing the behavior of rock in slopes, Innsbruck Geo-Colloquium, University of Innsbruck, Austria, May 8, 2008.

Behavior of disc cutters in boulder laden ground, North American Tunneling Conference, San Francisco, June 8, 2008.

Numerical simulation of landslide processes, SIMNET Days 2008, Leoben, Austria, Nov. 13, 2008.



Three-dimensional in situ block system identification using a discrete fracture network (DFN) approach, 3rd Austria-China Tunnel and Underground Engineering International Symposium, Tongji University, Shanghai, China, Dec. 8, 2008.

Simulating the behavior of TBM disc cutters in boulder laden ground, 3rd Austria-China Tunnel and Underground Engineering International Symposium, Tongji University, Shanghai, China, Dec. 8, 2008.

Design Considerations for Unprecedented Geotechnical Structures, 4th Colloquium, Rock Mechanics – Theory and Practice, Vienna, Austria, Nov. 29, 2011.

Influence of Cross Jointing in Block Slumping Failures, 41st U.S. Rock Mechanics Symposium, Golden, CO. June 17, 2006.

Seismic Retrofit of the Claremont Tunnel, EUROCK 2004 and 53rd Geomechanics Colloquy, Salzburg, Austria, Oct. 8, 2004.

Slope Stability Issues for Converting an Open Pit Mine to a Residential Subdivision, Association of Engineering Geologists 46th Annual Meeting, Vail, CO, Sept. 15, 2003.

Seismic Upgrade of the Claremont Tunnel, Northern California, Rapid Excavation and Tunneling Conference, San Diego, California, June 11, 2001.

Implications of Faulted Marine Terrace Deposits at Mussel Rock, Daly City, California, Geological Society of America, Cordilleran Section Meeting, Berkeley, CA, June 2, 1999.

Evaluating an Old Gravity Dam on a Soft Foundation Using FLAC, 1st International FLAC Symposium on Numerical Modeling in Geomechanics, Minneapolis, Sept. 1, 1999.

Inelastic Rock Reinforcement Design for the Lake Mathews Outlet Facilities, 37th U.S. Rock Mechanics Symposium, Vail, CO, June 6, 1999.

Block Slumping: A Compound Failure Mode of Jointed Hard Rock Slopes, 3rd North American Rock Mechanics Symposium, Cancun, Mexico, June 3, 1998.

### **Workshops and Short Courses**

Workshop on the Application of Photogrammetry to Engineering Characterization of Fractured Rock Masses, Chiang Mai University, Thailand, 2-day workshop presented with M. Kaspar, Dec. 6-7, 2012.

Engineering geologic considerations for grouting rock masses, 33rd Short Course, Grouting Fundamentals and Current Practice, Colorado School of Mines, Golden, CO, June 18, 2012 (also workshop organizer/director).

Scour in Blocky Rock Masses - in: Workshop on Engineering with Blocky Rock Masses, Graz University of Technology, Austria, April 1, 2011.

Engineering geologic considerations for grouting rock masses, 32nd Short Course, Grouting Fundamentals and Current Practice, Colorado School of Mines, Golden, CO, June 14, 2011 (also workshop organizer/director).

Engineering geologic considerations for grouting rock masses, 31st Short Course, Grouting Fundamentals and Current Practice, Colorado School of Mines, Golden, CO, June 7, 2010 (also workshop organizer/director).

Engineering geologic considerations for grouting rock masses, 30th Short Course, Grouting Fundamentals and Current Practice, Colorado School of Mines, Golden, CO, June 22, 2009 (also workshop organizer/director).

Design considerations for concrete segmental linings, Short Course on Soft Ground Tunneling Technologies, North American Tunneling Conference, San Francisco, June 8, 2008.

Engineering geologic considerations for grouting rock masses, 29th Short Course, Grouting Fundamentals and Current Practice, Colorado School of Mines, Golden, CO, June 2, 2008 (also workshop organizer/director).

Segmental Concrete Linings: Design and Construction Considerations, Rapid Excavation and Tunneling Conference, Short Course on Mechanized Tunneling, Seattle, WA, June 27, 2005.

Segmental Concrete Linings: Design and Construction Considerations, North American Tunneling Conference, Short Course on Mechanized Tunneling, Atlanta, April 17, 2004.

Rotational Instability of Hard Rock Slopes, Graz University of Technology, Short Course on Rock Slope Instability, Nov 29, 2002.

Landslide Case Histories from the Austrian Alps, Graz University of Technology, Short Course on Rock Slope Instability, Nov. 29, 2002.

Surface Displacement Rate of a Deep Seated Bedrock Topple, 35th Annual Meeting of the Association of Engineering Geologists, Sacramento, CA, Oct. 2, 1995.

Paleoseismic Investigation of the Cordelia Fault, Fairfield, California, Geological Society of America Annual Meeting, Seattle, WA, Oct. 24, 1994.

### **Invited Lectures**

Innovative Methods for Rock Mass Characterization and Deformation Monitoring, Mae Moh Lignite Mine, Lampang, Thailand, Dec. 14, 2011.

Scour of Blocky Rocks, Department of Mining Engineering, Chiang Mai University, Thailand, Dec. 13, 2011.

Hydraulic Erosion Processes in Fractured Rocks, Department of Mining Engineering, Chulakorn University, Bangkok, Thailand, Dec. 7, 2011

Evaluation of Spillway Scour in Blocky Rock Masses, Department of Civil Engineering, Nanjing University, China, Oct. 15, 2011.

Hydraulic Erosion of Fractured Rock, Kwang-Hu Visiting Professor Lecture, College of Civil Engineering, Tongji University, Shanghai, China, Oct. 24, 2011.

Geotechnical aspects of the 2009 L'aquila Earthquake in Central Italy, Lecture Series of the Faculty of Civil Engineering, Graz University of Technology, Austria, Nov. 18, 2010.

TBM disc cutter performance in boulder laden ground, 6th Tiroler Geotechnik und Tunnelbautag, Innsbruck, Austria, Nov. 14, 2008

Geotechnical Aspects of the Mw 6.6 Niigata Ken Chuetsu Earthquake, October 23, 2004, Japan, presented to the Colorado Association of Geotechnical Engineers, Denver, CO, Dec. 14, 2005.

Damage Evaluations of the Recent Mw 6.6 Niigata Ken Chuetsu Earthquake in Japan, presented to the Colorado Scientific Society, Golden, CO, Jan 25, 2005.

Assessment of Landslides Triggered by the Mw 6.6 Niigata Ken Chuetsu Earthquake in Japan, United States Geological Survey, Golden, CO, Feb. 16, 2005.

Rotational Instability of Hard Rock Slopes, presented to the Colorado Association of Geotechnical Engineers, Denver, CO, May 13, 2003.

Toward a Unified Stability Analysis Concept in Rock Mechanics, 17th United States Committee on Large Dams Annual Meeting and Conference (USCOLD scholarship presentation), San Diego, CA, April 7, 1997.

Surface Displacement Rate of a Deep-Seated Bedrock Topple, Association of Engineering Geologists, San Francisco Section, San Francisco, CA, Oct. 10, 1996.

Rock Slope Stability at the Pardee Dam Spillway, California, Technical University of Vienna, Institute of Applied Geosciences, Vienna, Austria, June 20, 1996.

## **Posters**

Kieffer, D. S.; Kaspar, M.; Steinbauer, C., 2012, Save Dangkar: Geotechnical Challenges to Cultural Restoration of an Ancient Buddhist Monastery, 61. Geomechanics Colloquium. Salzburg, Austria Society for Geomechanics.

Kieffer, D. S.; Liu, Q., 2010, Assessment of Scour in Discontinuous Rock Masses, Geomechanics Colloquium, Salzburg, Austria Society for Geomechanics.

Liu, Q.; Kieffer, D. S., Laser-Photogrammetric Data Acquisition in Generating Realistic Discrete Fracture Network Models, 58th Geomechanics Colloquium, Salzburg, Austria Society for Geomechanics.

Solomon, N.; Pischinger, G.; Klima, K.; Kieffer, D. S., 2008, Extensional Tectonics at Tendaho Dam and Irrigation Site, Pangeo, Vienna, Austria.

Kieffer, D. S.: Kieffer, D. S., 2008, Assessing the permanent stability of temporary slope, 6th Austrian Tunnel Day and 57th Geomechanics Colloquium, Salzburg, Austria Society for Geomechanics.

## **SIGNIFICANT CONSULTING PROJECTS**

### **UNDERGROUND STRUCTURES**

#### **CALDECOTT TUNNEL 4TH BORE, OAKLAND, CALIFORNIA**

*Independent Consultant*

*Client: Jacobs Associates*

Provided geotechnical consultation related to portal development alternatives for the Caldecott Tunnel 4th Bore highway tunnel project. Design alternatives evaluated include tied back excavations to heights of 35 m in clay shales, and early turn under using pipe umbrellas in conjunction with the Sequential Excavation Method.

#### **CLAREMONT TUNNEL SEISMIC UPGRADES, NORTHERN CALIFORNIA**

*Employer: Jacobs Associates*

*Client: East Bay Municipal Utility District*

Design engineer for the seismic retrofit of East Bay Municipal Utility District's 18,000-foot long, 9-foot diameter Claremont water supply tunnel. Responsible for developing design plans and specifications for a new bypass tunnel section crossing the active Hayward Fault Zone. Key performance criteria include maintaining operation of the new tunnel facility subsequent to 7.5 feet of fault slip associated with a major earthquake along the Hayward Fault. Utilized empirical methods together with beam-spring structural models, finite element models, and closed form wave propagation analyses to evaluate ground support requirements and expected tunnel performance. Directed geotechnical investigations and laboratory testing program, and developed specifications for tunnel instrumentation and monitoring. Formulated tunnel inspection techniques to evaluate methods (structural repairs, contact grouting) for rehabilitating the existing tunnel in situ.

CLAREMONT TUNNEL CONSTRUCTION PHASE SERVICES, BERKELEY, CALIFORNIA

*Independent Consultant*

*Client: Jacobs Associates*

Provided engineering geologic consultation during construction of the Hayward Fault crossing section of the Claremont Tunnel bypass tunnel. Evaluated ground conditions exposed in tunnel face to confirm stationing of a special structural tunnel section designed to remain operational following 7.5 feet of lateral fault slip.

WASHINGTON DULLES INTERNATIONAL AIRPORT – PEDESTRIAN WALKBACK TUNNEL COLLAPSE EVALUATION, VIRGINIA

*Employer: Jacobs Associates*

*Client: Kiewit Construction Company*

Lead forensic investigator regarding the collapse during construction of a shallow NATM Tunnel. Directed recovery operations and exploratory excavations, documented in detail ground conditions in the vicinity of the tunnel collapse, directed geotechnical laboratory testing program, and back-calculated geomechanical ground parameters based on as-built survey data. Developed three-dimensional physical models of failure site and investigated probable failure mechanisms based on beam-spring structural models, finite element analyses and block theory.

BLUE RIDGE DAM LOW LEVEL OUTLET STRUCTURE, BLUE RIDGE, GEORGIA

*Employer: Jacobs Associates*

*Client: Atkinson Construction Company*

Lead design engineer during tender phase and initial design phases for a major design-build lake tap project. Project elements include 1,000 feet of 9-foot diameter final steel lining, 14-foot diameter submerged inlet structure, and valve outlet house/energy dissipation structure for up to 2,000 cfs flow. Key geotechnical issues include design and construction of a 65-foot high sheet pile cofferdam, groundwater seepage cutoff around the inlet collar, and meeting schedule constraints imposed by lake operating levels. Directed project geotechnical investigations and prepared Geotechnical Design Summary Report

PRE-BID GEOTECHNICAL REPORTS/RISK ASSESSMENTS.

*Independent Consultant*

*Client: Kiewit Construction Co.*

Reviewed contract bid documents and provided independent interpretations regarding ground behavior and impacts of geologic conditions on construction means and methods. Projects include: Beacon Hill Tunnel (Seattle), Seymour Capilano Tunnel (Canada), Hoover Dam Bypass Bridge (Nevada-Arizona); Contract CQ 028 East Side Extension (New York City), Washington Dulles International Airport Contracts 3E, 3W, and West Utility baggage Tunnel (Virginia), U.S. Hwy 160 Windy Point Road Widening, Big Walnut Outfall Tunnel (Columbus, OH), Croton Water Treatment Plant (New York City).

MARKOVEC TUNNEL, KOPER, SLOVENIA

*Independent Consultant*

*Client: DARS/Alpine Bau*

Provided independent engineering geologic interpretation of ground conditions and ground behavior for a 2.2 km long double lane twin tube highway tunnel between Koper and Izola on Slovenian coastline, excavated according to the NATM.

M5 EAST MOTORWAY, SYDNEY, AUSTRALIA

*Employer: Jacobs Associates*

*Client: Hyder Consulting*

Senior design engineer for major highway project including 8 km of double tube tunnels, underground road intersections, substation caverns and shafts. Responsible for analysis, design and specification of excavation and support sequence, together with temporary and permanent ground support for hard-rock spans reaching 19 m and soft-ground spans reaching 12 m. Developed specifications for groundwater control measures and tunnel instrumentation and monitoring. Developed *FLAC* models to evaluate detailed multi-stage excavation and support sequences using shotcrete, lattice girders and grouted pipe umbrellas to limit ground settlements in critical urban areas resulting from shallow soft-ground tunneling.

#### LAKE MATHEWS OUTLET FACILITIES, RIVERSIDE, CALIFORNIA

*Employer: Jacobs Associates*

*Client: LA Metropolitan Water District*

Senior design engineer for a water resources seismic retrofit project that includes a new outlet tower, connector and distribution tunnels, a junction shaft and underwater approach channel. Performed block theory analyses to evaluate the stability of critical 30 m deep surface cuts adjacent to cofferdam sheet piling, and developed designs and specifications for permanent rock slope support. Prepared project Geotechnical Baseline Report and developed state-of-the-art approach for determining adequacy of rock reinforcement when subjected to extreme seismic loading conditions. Provided construction-phase engineering services and as-built rock reinforcement recommendations.

#### SWAN ISLAND PUMP STATION SHAFT, PORTLAND, OREGON

*Employer: Jacobs Associates*

*Client: Parsons Brinckerhoff*

Design engineer responsible for analysis of structural support and groundwater cutoff requirements for a 150-foot diameter, 140-foot deep shaft structure in permeable gravel/sand materials. Developed *FLAC* models to evaluate slurry wall structural requirements and performance requirements for a concentric freeze wall embedded to a depth of 220 feet.

### **DAMS AND ASSOCIATED FACILITIES**

#### KEREN WATER SUPPLY PROJECT, ERITREA, AFRICA

*Employer: Michael W. West & Assoc.*

*Client: Natural Resource Assoc.*

Characterized geomechanical properties of rock mass foundation to support design of 55 m high roller compacted dam embankment. Activities included layout of geotechnical drilling/testing program, supervision of scan line and window surveys, geologic mapping, and estimation of foundation deformability and shear strength properties.

#### NUMERICAL MODEL STUDY FOR THE SCOTT DAM FOUNDATION, MENDOCINO COUNTY, CALIFORNIA

*Employer: Richard. E. Goodman*

*Client: Pacific Gas & Electric Company*

Co-principal investigator for a numerical model study to estimate the static and pseudostatic safety reserve of Pacific Gas & Electric Company's Scott Dam using the *FLAC* finite difference computer code. Developed a novel method to calculate factor of safety values from numerical model output that incorporated non-linear deformation characteristics of the geologically complex mélange foundation.

#### GEOTECHNICAL INVESTIGATION, WATER SUPPLY IMPROVEMENTS, MATAGALPA AND JINOTEGA, NICARAGUA

*Employer: Geoconsult, Austria*

*Client: GKW Consult*

Principal investigator for the preliminary siting and geotechnical feasibility study for five dam sites, with planned heights up to 55 m. Researched, compiled and analyzed regional geologic and seismologic data, performed aerial photo analysis and geologic field mapping. Prepared geotechnical feasibility reports and established criteria for design-level geotechnical investigations.

#### SLOPE STABILITY EVALUATION, INNERFRAGANT HYDROPOWER FACILITY, CARINTHIA, AUSTRIA

*Independent Consultant*

*Client: KELAG, Austria*

Principal investigator for the evaluation of active landsliding into a hydropower reservoir in the Austrian Alps. Performed aerial photo analysis, geologic field mapping, and rock discontinuity surveys to characterize an area of approximately 5 km<sup>2</sup> that has been subjected to repeated slope failures. Reviewed laboratory test and slope instrumentation data, performed slope stability analysis, recommended slope monitoring program, and prepared final technical report.

#### MCKAYS POINT DAM ABUTMENT STABILITY EVALUATION, CALAVERAS COUNTY, CALIFORNIA

*Independent Consultant*

*Client: Northern California Power Agency*

Principal investigator for the stability analysis of existing 30 m deep abutment cuts in blocky granitic rock. Identified potentially unstable areas based on geologic mapping data and block theory analyses, and established rock support requirements. Prepared design plans and specifications for rock fall protection and rock bolt installations.

SUCCESS DAM EXPLORATION SHAFTS, PORTERVILLE, CALIFORNIA.

*Independent Consultant*

*Client: U.S. Army Corp of Engineers/URS Corp.*

Provided geotechnical consultation and prepared design plans/specifications and cost estimate for completing three downhole exploration shafts to depths of 30 m. Shafts are to evaluate in-situ characteristics of alluvial foundation soils for new 60 m high embankment dam. Developed design plans for shaft drilling using large diameter hydraulic casing rotators, groundwater dewatering, shaft geologic mapping, performing down hole plate load testing, and retrieving large diameter undisturbed soil samples.

LOS VAQUEROS DAM, LIVERMORE, CALIFORNIA

*Employer: Woodward-Clyde*

*Client: Contra Costa Water District*

Field engineer during construction of a 192-foot high,  $3 \times 10^6$  cubic yard zoned earth fill dam. Responsible for as-built geologic mapping of abutments, supervision of earthwork and dental grouting operations.

MAGALIA RESERVOIR DIVERSION DAM, PARADISE, CALIFORNIA

*Employer: Harlan Tait Associates*

*Client: Paradise Irrigation District*

Engineering geologist for design-level investigation to construct a 30-foot high roller compacted concrete diversion dam. Performed aerial photo analysis and geologic field mapping, directed the subsurface exploration program and characterized rock mass properties.

**LANDSLIDES AND SLOPE STABILITY**

ANGOSTURA GOLD MINE, COLUMBIA

*Independent Consultant*

*Client: iC Consulentes*

Provided expert consultation and targeted slope stability analyses in support of geotechnical feasibility assessment for planned open cut mine slope having maximum 1000 m height. Performed comprehensive audit of geotechnical design parameters slope stability calculations.

LA COLOSA GOLD MINE, COLUMBIA

*Independent Consultant*

*Client: iC Consulentes*

Provided expert consultation for the development of a 3D rock mass model for surface and underground mining options.

ELIOT QUARRY SLOPE STABILIZATION, LIVERMORE, CALIFORNIA

*Independent Consultant*

*Client: Cemex*

Provided geotechnical consultation for the investigation, analysis, and mitigation of a 200,000 m<sup>3</sup> and 40 m deep landslide induced by gravel pit mining adjacent to residential areas. Analyses conducted include 2D Static, 2D Dynamic, and 3D FLAC model studies. Mitigation measures investigated in detail include earth buttressing, jet grouting, structural shear pins, and groundwater dewatering.

GUADALUPE VALLEY QUARRY, BRISBANE, CALIFORNIA

*Employer: Jacobs Associates*

*Client: SummerHill Homes*

Chief engineer and manager for a project involving the evaluation of rock slope stability hazards associated with conversion of large aggregate quarry to a residential subdivision. The conversion plan requires extreme care to protect property and residents from rock falls and other failures that could develop along man made slopes reaching heights of 600 feet. Responsible for geologic

mapping of the quarry, supervision of field and computer based rock fall simulation studies, engineering analyses, and development of mitigation measures.

**MUSSEL ROCK LANDSLIDE STABILIZATION, DALY CITY, CALIFORNIA**

*Employer: Jacobs Associates*

*Client: City of Daly City*

Principal investigator for a project to stabilize a 500,000 m<sup>3</sup> coastal landslide complex involving a residential subdivision within the San Andreas fault zone. Responsible for slope stability analyses and development of stabilization schemes involving dewatering, mass grading and tied-back structural walls. Performed aerial photo analysis and detailed geologic field mapping. Directed subsurface explorations and installation of geotechnical instrumentation.

**AVALON CANYON SLOPE REPAIRS, DALY CITY, CALIFORNIA**

*Employer: Jacobs Associates*

*Client: City of Daly City*

Senior design engineer for a project to stabilize a coastal canyon headwall that was undermined during the 1998 El-Niño winter. Responsible for stability analyses of the 250,000 m<sup>3</sup> earthwork repair and development of design plans and specifications for sediment basins, spillway structures and subsurface drainage.

**MAYHEW RESERVOIR LANDSLIDE INVESTIGATION, FREMONT, CALIFORNIA**

*Employer: Harlan Tait Associates*

*Client: Alameda County Water District*

Engineering geologist for a design-level geotechnical investigation to stabilize a deep-seated landslide complex causing reservoir lining deformations. Performed aerial photo analysis, geologic mapping, and conducted downhole shaft explorations to depths of 100 feet.

**BROOKTRAILS TOWNSHIP SPECIFIC PLAN AND EIR, MENDOCINO COUNTY, CALIFORNIA**

*Employer: Harlan Tait Associates*

*Client: Brooktrails Township*

Engineering geologist for a project to evaluate geologic hazards for a 5,200 acre hillside township. Study area includes multiple landslides and is traversed by the active Maacama fault zone. Performed aerial photo analysis, geologic field mapping, and prepared geologic and interpretive hazard maps.

**SEISMIC HAZARDS**

**GEOTECHNICAL RECONNAISSANCE – 2009 L'AQUILLA EARTHQUAKE, CENTRAL ITALY**

*Employer: Graz University of Technology*

*Client: GEER/ NSF*

Member international geotechnical reconnaissance team sponsored by GEER and the U.S. National Science Foundation. Documented and evaluated ground deformation, landsliding, and liquefaction with deployment of terrestrial LiDAR surveys.

**GEOTECHNICAL RECONNAISSANCE – 2004 Niigata Ken Chuetsu, Earthquake, Japan**

*Employer: Colorado School of Mines*

*Client: U.S. National Science Foundation*

Member of the geotechnical reconnaissance team sponsored by the U.S. National Science Foundation. Evaluated the distribution and occurrence of landslides triggered by the 2004 Niigata Ken Chuetsu earthquake and their impact on civil infrastructure.

**GEOTECHNICAL RECONNAISSANCE – 1999 CHI CHI EARTHQUAKE, TAIWAN**

*Employer: Jacobs Associates*

*Client: U.S. National Science Foundation*

Member of the U.S./Taiwan geotechnical reconnaissance team sponsored by the U.S. National Science Foundation. Evaluated the performance of underground structures in the earthquake epicenter region, and performed detailed surveys and geologic characterization of fault ground ruptures and associated ground deformation.

**SEISMIC HAZARD INVESTIGATION, NORTH FAIRFIELD, CALIFORNIA**

*Employer: Harlan Tait Associates*

*Client: City of Fairfield, California*

Chief field geologist for a paleoseismic investigation of the Cordelia fault zone. Performed aerial photo analysis, and supervised detailed logging of exploratory trenches having a cumulative length of 2,600 feet. Collected samples for amino acid and radiocarbon age dating, and established the Holocene fault recurrence interval and slip rate.

PORTOLA VALLEY ESTATES GEOLOGIC AND SEISMIC STUDY, CALIFORNIA

*Employer: Harlan Tait Associates*

*Client: Blue Oaks Partners*

Engineering geologist for a study to evaluate slope stability and fault ground rupture hazards for a 272-acre hillside property proposed for custom residential development, located astride the San Andreas fault zone. Performed aerial photo analysis, detailed field mapping and logging of exploratory trenches to establish the location and subsurface character of deep-seated landslides and active fault strands.

**DEEP FOUNDATIONS**

FOUNDATION INVESTIGATION, MSSS TELESCOPE, HALEAKALA, MAUI, HAWAII

*Employer: Dames & Moore*

*Client: Rockwell International*

Engineering geologist and geotechnical engineer for the foundation investigation of a 4 m diameter telescope and supporting facilities. Directed geological and geophysical field investigations to establish foundation conditions. Evaluated foundation design alternatives for the vibration-sensitive telescope pedestal, developed preliminary geotechnical design criteria and prepared geotechnical report.

SOILS AND FOUNDATION INVESTIGATION, WPB FACILITY AND PIER, OAHU, HAWAII

*Employer: Dames & Moore*

*Client: U.S. Coast Guard*

Engineering geologist and geotechnical engineer for foundation investigation of 140-foot long U.S. Coast Guard pier and support building. Supervised on-and-offshore subsurface explorations and evaluated laboratory test data. Developed design criteria for driven pile foundations and prepared final geotechnical design report.

CALIFORNIA-OREGON TRANSMISSION PROJECT, N. CALIFORNIA TO S. OREGON

*Employer: Harlan Tait Associates*

*Client: Transmission Agency of N. CA*

Engineering geologist for a foundation investigation and geologic hazards study for a 150-mile long, 500 kV transmission line. Performed aerial photo analysis, geologic field mapping, and directed the subsurface exploration program. Provided engineering geologic input regarding route alternatives and during foundation construction in adverse terrain.