

MEGE 2018

# PROGRAM

## THE 5TH INTERNATIONAL SYMPOSIUM ON MEGA EARTHQUAKE INDUCED GEO-DISASTERS AND LONG TERM EFFECTS

MAY 11-16, 2018 | CHENGDU, CHINA

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# ***MEGE 2018***

*The 5<sup>th</sup> International Symposium on  
Mega Earthquake Induced Geo-disasters and Long Term Effects*

<http://www.mege.net/>

*To mark the 10<sup>th</sup> anniversary of  
the 2008 Wenchuan Mega Earthquake*

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## *About MEGE 2018*

Ten years ago, a devastating earthquake occurred in Sichuan Province, China, causing the death of almost 90,000 people and widespread damage to urban and rural communities, deeply affecting the economy of the region. The earthquake triggered tens of thousands of landslides over a large area, and rainstorms in the years after the earthquake re-activated many of them, triggering debris flows from their deposits. Even though strategies for geo-hazards assessment and risk management have been implemented to reduce the long-term disaster-chain effects from the earthquake, 10 years on, the Wenchuan region is still threatened by various geo-hazards in the aftermath of the earthquake. Spatial and temporal trends in these threats raise international awareness and concerns about the issues of long-term disaster-chain effects in hazard and risk reduction.

Global trends of climate change, environmental destruction and explosive population growth are further increasing the frequency and impact of geo-hazards. There is an urgent international need for opportunities to exchange up-to-date knowledge on the nature of geo-hazards and on risk-reduction techniques, among researchers, engineers and decision makers at national, regional and local levels. Chengdu University of Technology, through the State Key Laboratory of Geo-hazard Prevention and Geo-environment Protection (SKLGP) has been pro-active in promoting such exchanges. We have hosted five successful international symposia to date in memory of the earthquake victims. These are the “Asian Regional Conference of IAEG” in 2009, “The International Symposium on Earthquake-induced Landslides and Disaster Mitigation at the 3rd Anniversary of the Wenchuan Earthquake” in 2011; “The International Symposium in Commemoration of the 5th Anniversary of the 2008 Wenchuan Earthquake: Long-term Geo-hazard and Risk Consequences of Areas Struck by High Magnitude Earthquakes” in 2013; and the “4th International Symposium on Mega-earthquake-induced Geo-disasters and Long-term Effects” in 2015. Building on these experiences and their social benefits and marking the occasion of the 10th anniversary of the 2008 Wenchuan mega-earthquake, Chengdu University of Technology through SKLGP will host “The 5th International Symposium on Mega-earthquake-induced Geo-disasters and Long-term Effects” in May 2018 in memory of the many victims. It will provide opportunity to present and exchange international knowledge and experience on the occurrence of geo-hazards in areas struck by mega-earthquakes and their long-term effects.

## *Main Topics*

The 2018 symposium will focus on building community resilience to dangerous earth-surface processes and geo-hazards in mega-earthquake areas, including:

1. Advances in research on the triggering and development of co-seismic landslides and debris flows
2. Long-term initiation and evolution of landslide and debris-flow hazards
3. Post-earthquake monitoring and analysis for hazard early warning and design of mitigation measures
4. Susceptibility, hazard, and risk assessment for rehabilitation and land-use planning in earthquake-struck areas
5. Resilience to earthquake-induced landslide risk
6. Geological disaster risk and engineering construction in meizoseismal area

## *Language*

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Official language of MEGE 2018 will be in English. All the presentations should be presented in English.

## *Hosted by*

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State Key Laboratory of Geo-hazard Prevention and Geo-environment Protection  
Chinese Society for Rock Mechanics and Engineering

## *Supported by*

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Chengdu University of Technology  
ENGEO IAEG China National Group  
International Consortium on Geo-disaster Reduction  
Collaborative Innovation Center of Geo-hazard Prevention  
International Research Association on Large Landslides  
Hong Kong Chemical, Biological & Environmental Engineering Society  
Young Education & Consultancy Co., Ltd.  
Feima Robotics Co. Ltd.  
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Rex Smart Technology Co., Ltd.  
China Academy of Safety Science and Technology  
Servotest Testing Systems Ltd.  
Shanghai Huace Navigation Technology Ltd.

## *Academic Committee:*

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### *Chairperson:*

Dr.Runqiu HUANG, Ministry of Ecology and Environment of the People's Republic of China, China; State Key Laboratory of Geohazard Prevention and Geoenvironment Protection (SKLGP) ,China

### *Members:*

Dr. Alexander STROM, Geodynamics Research Center, JSC "Hydroproject Institute", Moscow, Russia  
Dr. Cees van WESTEN University of Twente, ITC, the Netherlands  
Dr. Chunan TANG, Dalian University of Technology, China  
Dr. Dave PETLEY, University of Sheffield, UK

Dr. Faquan WU, Shaoxing University, China  
Dr. Giovanni B. CROSTA, University of Milano-Bicocca, Italy  
Dr. Hans-Balder HAVENITH, University of Liege, Belgium  
Dr. Huiming TANG, China University of Geosciences (Wuhan), China  
Dr. Janusz WASOWSKI, CNR-IRPI, Italy  
Dr. Jia-Jyun DONG, National Central University, Taiwan  
Dr. Jianbing PENG, Changan University, China  
Dr. Jordi COROMINAS, Technical University of Catalonia, Spain  
Dr. Leonardo CASCINI, The University of Salerno, Italy  
Dr. Oleg ZERKAL, Moscow State University, Russia  
Dr. Oliver KORUP, Potsdam University, Germany  
Dr. Peng CUI, Chinese Academy of Sciences, China  
Dr. Reginald HERMANN, Norwegian Geotechnical Institute, Norway  
Dr. Shenwu SONG, Power China, Chengdu Engineering Corporation Limited, China  
Dr. Steve G. EVANS, Waterloo University, Canada  
Dr. Thomas GLADE, University of Vienna, Austria  
Dr. Tim DAVIES, University of Canterbury, New Zealand  
Dr. Xingmin MENG, Lanzhou University, China  
Dr. Yongshuang ZHANG, Chinese Academy of Geological Sciences, China  
Dr. Yueping YIN, Geological Disaster Emergency Technical Guidance Center, Ministry of Natural Resources, China  
Mr. William SCHULZ, U.S. Geological Survey, USA

## *Organizing Committee*

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### *Chairperson:*

Dr. Qiang XU, Chengdu University of Technology, China

### *Members:*

Dr. Janusz WASOWSKI, National Research Council of Italy (CNR), Bari, Italy  
Dr. Gonghui WANG, Kyoto University, Japan  
Dr. Wei HU, Chengdu University of Technology, China  
Dr. Xuanmei FAN, Chengdu University of Technology, China  
Dr. Mauri McSaveney, GNS Science, New Zealand  
Dr. Niek RENGERS, International Institute for Geo-Information Science and Earth Observation (ITC), the Netherlands  
Dr. Jia-Jyun DONG, National Central University, Taiwan  
Dr. Theo van ASCH, Utrecht University, The Netherlands  
Dr. Chyi-Tyi LEE, National Central University, Taiwan  
Dr. Liming ZHANG, Hong Kong University of Science and Technology, China  
Dr. Tianbin LI, Chengdu University of Technology, China  
Dr. Chuan TANG, Chengdu University of Technology, China  
Dr. Xiangjun PEI, Chengdu University of Technology, China

Dr. Yunsheng WANG, Chengdu University of Technology, China

Dr. Yubin SHI, Society for Rock Mechanics and Engineering of Sichuan Province, China

Dr. Wei HU, Chinese Society for Rock Mechanics and Engineering, China

## *Keynote and Invited Speakers*



**Runqiu Huang**

Ministry of Ecology and Environment of the People's Republic of China, China  
State Key Laboratory of Geohazard Prevention and Geoenvironment Protection  
(SKLGP), China

*The Wenchuan Earthquake Chain of Geohazards: A Decade of Research  
and Challenges*



**Mauri McSaveney**

GNS Science, New Zealand

*An Update on the Hot Topic of Long-Runout Rock Avalanches*



**Peng Cui**

Institute of Mountain Hazards and Environment, CAS, China

*Initiation Mechanism and Risk Assessment of Flash Flood and Debris  
Flow Disaster*



**Micheal Jaboyedoff**

University Of Lausanne, Switzerland

*How to Assess Large Landslide Hazard and the Importance of Their  
Indirect Induced Hazard*



**Sijing Wang**

Institute of Geology and Geophysics, Chinese Academy of Sciences, China

*Self-Restoration of Nature after a Major Disaster or Human Disturbance*



**Toshi Shimamoto**

Shimamoto Earth & Environment Laboratory Ltd., Japan

*Chengdu Experimental System for Comprehensive Landslide Studies:  
Research Plans and Constitutions of Apparatuses*



**Giovanni Crosta**

Università degli Studi di Milano-Bicocca, Italy

*Analysis of Controlling Factors on Co-Seismic Landslide Size*



**Yueping Yin**

Geological Disaster Emergency Technical Guidance Center, Ministry of Natural Resources, China

*The June 2017 Maoxian Landslide: Geological Disaster in an Earthquake Area After the Wenchuan Ms 8.0 Earthquake*



**Steven G. Evans**

University of Waterloo, Canada

*Landslide Disasters caused by Earthquakes*



**Ikuo Towhata**

University of Tokyo, Japan

*Long-term Instability of Slopes along Major Seismic Faults*



**Joshua West**

University of Southern California, USA

*Towards Building a Landslide Sediment Budget for the Min Jiang Basin following the Wenchuan Earthquake: Grain Size and Reservoir Sedimentation Constraints*



**William Murphy**

University of Leeds, UK

*The Importance of Event Sequencing in Understanding Earthquake Triggered Landslides*



**Niels Hovius**

GFZ German Research Center for Geosciences, Germany

*Elevated Landslide Rates After Earthquakes: Coupling Geomorphological and Geophysical Data to Constrain Rock Damage and Healing*



**Cees van Westen**

ITC, University of Twente, the Netherlands

*Where to Build-Back-Better? Analyzing Changing Risk for Post-disaster Reconstruction Planning”*



**Masahiro Chigira**

Kyoto University, Japan

*Landslides Induced by the 2016 Kumamoto Earthquake and Its Application to Future Earthquake-Induced Landslides*



**David Frost**

Georgia Institute of Technology, USA

*Infrastructure Failure: Addressing Resilience and Sustainability during Reconstruction*



**Filippo Catani**

University of Firenze, Italy

*Susceptibility and Magnitude Assessment for Landslides Driving Factors and Scaling Issues in Different Environments*



**Oliver Korup**

University of Potsdam, Germany

*Ongoing River Response to Medieval Earthquakes, Central Nepal Himalaya*



**Theo van Asch**

Utrecht University, the Netherlands

*Pore Pressure Evolution in Bed Material by Overrunning Debris Flows; Experiments and Modelling*



**Hans-Balder Havenith**

University of Liège, Belgium

*Seismic VS. Climatic Origin of Large Rockslides*



**Vincenzo Del Gaudio**

The University of Bari, Italy

*Drawing Knowledge from Ambient Noise: Challenges for Ground Dynamic Response Investigations*



**Limin Zhang**

Hongkong University of Science and Technology, Hongkong, China

*10-Year Evolution of Geohazards in the Epicentral Area of the Wenchuan Earthquake*



**Chyi-Tyi Lee**

National Central University, Taiwan, China

*A Review and Perspectives on the Methodology of Landslide Hazard Analysis*



**Jia-jyun Dong**

National Central University, Taiwan, China

*Apparent Steady-State Friction Coefficient of Kaolin Clay under Different Slip Rates and Drainage Conditions*



**Gonghui Wang**

Kyoto University, Japan

*Estimation of Ground Motion for Slope Instability during Earthquake and Experimental Validation*



**Kerry McSaveney**

Wellington Region Emergency Management Office, New Zealand

*Beyond the Thin Blue Line – Community Input into Readiness and Response*



**Simon Cox**

GNS Science, New Zealand.

*Earthquake-induced Fluid Pressure Changes and the Hydrological Response in Landslides*



**Tristram Hales**

Cardiff University, UK

*How do We Develop Resilience to Post-Earthquake Landsliding?*



**Thomas Streil**

Sarad GmbH, Germany

*Gas Geochemical Precursors and Chance for the Forecast of Earthquakes and Volcanic Eruption*



**Alexander Strom**

Geodynamics Research Center, Russia

*Prehistoric Co-Seismic Rockslides: Criteria of Identification Illustrated by Central Asian Case Studies*



**Guangqi Chen**

Kyushu University, Japan

*Simulation of Earthquake Ground Motions*



**Chunan Tang**

Dalian University of Technology, China

*Spalling in Extreme Ground Motion and Evidence from the 2008 Wenchuan Earthquake*



**Xingmin Meng**

Lanzhou University, China

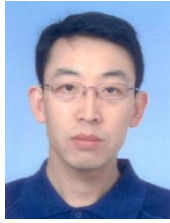
*Seismic Loess Landslides and Their Implications for Land Utilization in North-western China*



**Zhenming Shi**

Tongji University, China

*Stability Analysis and Evaluation of Landslide Dams*



**Shengwen Qi**

Institute of Geology and Geophysics, CAS,China

*Dynamic Behavior of Dip Bedded Rock Slopes with Large Shaking Table Tests*



**Chuan Tang**

State Key Laboratory of Geohazard Prevention and Geoenvironment Protection (SKLGP), China

*The Catastrophic Debris Flow Hazards and Mitigation in the Wenchuan Earthquake Area*



**Xuanmei Fan**

State Key Laboratory of Geohazard Prevention and Geoenvironment Protection (SKLGP), China

*Evolution of Geohazards and Consequent Risk after the 2008 Wenchuan Earthquake*

**Program Overview:**

May 11th, 2018	
10:00 - 18:00	Symposium Sign in
18:00 - 20:30	Ice-break Dinner
May 12th, 2018	
8:30 - 9:10	Opening Ceremony
9:10 - 9:30	Group photo
9:30 - 12:45	Keynote Lectures
12:50 - 13:50	Lunch
13:50 - 16:10	Invited Lectures
16:30 - 18:30	Subsession 1 Subsession 2 Subsession 3
18:50 - 20:30	Banquet
May 13th, 2018	
9:00 - 12:30	Keynote Lectures
12:30 - 13:30	Lunch Break

13:30 - 15:30	Invited Lectures
15:50 - 17:50	Subsession 4 Subsession 5 Subsession 6
18:30 - 20:00	Dinner
18:30 - 22:00	iRALL Meeting and dinner
May 14th, 2018	
9:00 - 12:30	Keynote Lectures
12:30 - 13:30	Lunch Break
13:30 - 16:00	Invited Lectures
16:20 - 17:50	Plenary Session Discussion
17:50 - 18:00	Closing Ceremony
18:30 - 19:30	Dinner
May 15th - 16th, 2018	
2 days	Field Excursions

## Detail Schedule

May 11, 2018				Venue
10:00 - 18:00	Symposium sign-in			Chengdu Eastar Hotel Lobby
18:00 - 20:30	Ice-break Dinner			Chengdu Eastar Hotel
May 12, 2018				Venue
8:00 - 18:00	Symposium sign-in			Auditorium of SKLGP
8:30 - 9:10	Opening Ceremony			Auditorium of SKLGP
9:10 - 9:30	Group photo			Outside of Auditorium of SKLGP
Keynote Presentations, Opening session Chairs: Niek Rengers, Niels Hovius				
Time	Name	Affiliation	Title	Venue
9:30 - 10:00	Runqiu Huang	Ministry of Environmental Protection of the PRC, China & SKLGP, China	The Wenchuan Earthquake Chain of Geohazards: A Decade of Research and Challenges	Auditorium of SKLGP
10:00- 10:30	Peng Cui	Institute of Mountain Hazards and Environment,CAS,China	Initiation Mechanism and Risk Assessment of Flash Flood and Debris Flow Disaster	Auditorium of SKLGP
10:30 - 11:00	Yueping Yin	Geological Disaster Emergency Technical Guidance Center, Ministry of Natural Resources, China	The June 2017 Maoxian Landslide: Geological Disaster in an Earthquake Area After the Wenchuan Ms 8.0 Earthquake	Auditorium of SKLGP
11:00-11:15	Coffee Break			Outside of Auditorium of SKLGP
Keynote Presentations: Factors controlling co-seismic and post-seismic landsliding Chairs: Mauri McSaveney, Qiang Xu				
Time	Name	Affiliation	Title	Venue
11:15 - 11:45	Niels Hovius	GFZ German Research Center for Geosciences, Germany	Elevated Landslide Rates After Earthquakes: Coupling Geomorphological and Geophysical Data to Constrain Rock Damage and Healing	Auditorium of SKLGP

11:45 - 12:15	Giovanni Crosta	Università degli Studi di Milano-Bicocca, Italy	Analysis of Controlling Factors on Co-Seismic Landslide Size	Auditorium of SKLGP
12:15 - 12:45	Masahiro Chigira	Kyoto University, Japan	Landslides Induced by the 2016 Kumamoto Earthquake and Its Application to Future Earthquake-Induced Landslides	Auditorium of SKLGP
12:50 - 13:50		Lunch		Xiangzhang Dinning Hall (3rd Floor)
Invited Presentations: Sedimentary process related to earthquake events Chairs: Oliver Korup, Yu Huang				
Time	Name	Affiliation	Title	Venue
13:50 - 14:10	Joshua West	University of Southern California, USA	Towards Building a Landslide Sediment Budget for the Min Jiang Basin following the Wenchuan Earthquake: Grain Size and Reservoir Sedimentation Constraints	Auditorium of SKLGP
14:10 - 14:30	Sijing Wang	Institute of Geology and Geophysics, CAS, China	Self-Restoration of Nature after a Major Disaster or Human Disturbance	Auditorium of SKLGP
14:30 - 14:50	Limin Zhang	Hongkong University of Science and Technology, Hongkong, China	10-Year Evolution of Geohazards in the Epicentral Area of the Wenchuan Earthquake	Auditorium of SKLGP
14:50 - 15:10	Chuan Tang	SKLGP, China	The Catastrophic Debris Flow Hazards and Mitigation in the Wenchuan Earthquake Area	Auditorium of SKLGP
15:10 - 15:30	Theo van Asch	Utrecht University, the Netherlands	Pore Pressure Evolution in Bed Material by Overrunning Debris Flows; Experiments and Modelling	Auditorium of SKLGP
15:30 - 15:50	Guangqi Chen	Kyushu University, Japan	Simulation of Earthquake Ground Motions	Auditorium of SKLGP

15:50 - 16:10	Simon Cox	GNS Science, New Zealand	Earthquake-Induced Fluid Pressure Changes and the Hydrological Response in Landslides	Auditorium of SKLGP
16:10 - 16:30		Coffee Break		Outside of Auditorium of SKLGP
16:30 - 18:30		Subsession 1 (Parallel) : Advances in research on triggering and development of co-seismic landslides and debris flows(Part I) Chairs: Van Asch Theo,Chaosheng Tang		Auditorium of SKLGP
Time	Name	Affiliation	Title	Venue
16:30 - 16:45	Huiling Xing	The University of Queensland, Australia	Fault Geometry Effect on Earthquakes	Auditorium of SKLGP
16:45 - 17:00	Yonggang Jia	Ocean University of China, China	Dynamic Response Characteristics and Penetration Depth of Seabed Sediments by Shoaling Internal Solitary Waves	Auditorium of SKLGP
17:00 - 17:15	Zerkal O.V.	Lomonosov Moscow State University, Russia	The Role of the Additional Seismic Stresses in the Formation of Abnormally Moving Rockslides and Rock Avalanches (According to the Results of Conceptual Modeling)	Auditorium of SKLGP
17:15 - 17:30	Oliver Francis	Cardiff University, UK	Large Earthquakes Build Mountain Ranges	Auditorium of SKLGP
17:30 - 17:45	Tao Zhao	Sichuan University, China	Discrete Element Analyses of the Co-seismic Tangjiashan Landslide	Auditorium of SKLGP
17:45 - 18:00	Wengang Zhang	Chongqing University, China	Characteristics Analys of Granular Landslide Using Shaking Table Model Test	Auditorium of SKLGP

18:00 - 18:15	Yufeng Wang	Southwest Jiaotong University, China	Velocity Dependent Frictional Weakening of Large Rock Avalanche Basal Facies	Auditorium of SKLGP
18:15 - 18:30	Christopher Gomez	Kobe University, Japan	Dome Evolution at Unzen Volcano between 2003 and 2015: Erosion and Destabilization	Auditorium of SKLGP
16:30 - 18:30		Subsession 2 (Parallel) : Long-term development of post-earthquake hazards in the area for landslides and debris flows Initiation and evolution mechanisms of geo-hazards. Chairs: Tianbin Li, Jia-jyun Dong		SKLGP Room 318
Time	Name	Affiliation	Title	Venue
16:30 - 16:45	Maxwell P. Dahlquist	University of Southern California, USA	Controls on Debris Flows Associated with the 2015 Gorkha Earthquake	SKLGP Room 318
16:45 - 17:00	Guillem Domènech	Chengdu University of Technology, China	Processes in co-seismic deposits influence the evolution of rainfall thresholds for debris flow	SKLGP Room 318
17:00 - 17:15	Alexander J. Horton	Cardiff University, UK	A Physically based Assessment of Post-seismic Debris Flow Hazards	SKLGP Room 318
17:15 - 17:30	Ming Wang	Beijing Normal University, China	Evolution Characteristics of the Landslides and Debris Flows Triggered by the Wenchuan Earthquake	SKLGP Room 318
17:30 - 17:45	Zili Dai	Shimane University, Japan	A Preliminary Report on Two Landslides Triggered by the 2016 Kumamoto Earthquake, Japan	SKLGP Room 318
17:45 - 18:00	Kang Liu	National Earthquake Response Support Service, China	Response to Landslides after the Mw7.8 Nepal Earthquake in 2015	SKLGP Room 318
18:00 - 18:15	Zainab Khalid	Lanzhou University, China	Attabad Lake, Pakistan: Formation, Mechanism and Aftereffects	SKLGP Room 318

18:15 - 18:30	Zhi Song	Chengdu Institute of Geology and Mineral Resources, China	Study on Debris Flow Numerical Analog and River-blocking Mode at Rainfall Conditions of Different Frequencies	SKLGP Room 318
16:30 - 18:30		Subsession 3 (Parallel) : Monitoring and analysis of post-earthquake areas for early warning and design of mitigation measures. Chairs: Tristram Hales, Qiangong Chen		SKLGP Room 211
Time	Name	Affiliation	Title	Venue
16:30 - 16:45	Chris Massey	Institute of Geological and Nuclear Science (GNS Science), New Zealand	A Prototype Earthquake-Induced Landslide Forecast Tool for New Zealand	SKLGP Room 211
16:45 - 17:00	Chaosheng Tang	Nanjing University, China	Soil Hydro-Mechanical Response to Climate Change	SKLGP Room 211
17:00 - 17:15	William Ries	University of Vienna, Austria	What didn't Move? – Some Challenges with Remotely Sensed Data Collected in Response to the 2016 Kaikōura Earthquake, New Zealand	SKLGP Room 211
17:15 - 17:30	Zhi Cui	Earth Products China Limited	History, development and innovation of the GDS test system	SKLGP Room 211
17:30 - 17:45	Lin Wang	Chuo Kaihatsu Corporation	An Early Warning Monitoring of Earthquake-induced Slope Failures based on Multi-Point Tilt Sensors	SKLGP Room 211
17:45 - 18:00	Chun Liu	Nanjing University, China	Three-dimensional Discrete Element Modeling of Large-scale Landslide and the Application	SKLGP Room 211
18:00 - 18:15	Kai Gu	Nanjing University, China	Full section monitoring of land subsidence borehole using distributed fiber optic sensing (DFOS) techniques	SKLGP Room 211
18:15 - 18:30	Shun Yang	Technical Center for Geological Hazard Prevention and Control, CGS, China	The Research on the Movable Solid Materials under Seepage Flow Effect in Debris Flow Source Area	SKLGP Room 211
18:50 - 20:30		Banquet		Easter Hotel

May 13, 2018				
Keynote Presentations: Large slope failure hazards Chairs: Gonghui Wang, Janusz Wasowski				
Time	Name	Affiliation	Title	Venue
9:00 - 9:30	Mauri McSaveney	GNS Science, New Zealand	An Update on the Hot Topic of Long-Runout Rock Avalanches	Auditorium of SKLGP
9:30 - 10:00	Micheal Jaboyedoff	University of Lausanne, Switzerland	How to Assess Large Landslide Hazard and the Importance of Their Indirect Induced Hazard	Auditorium of SKLGP
10:00 - 10:30	William Murphy	University of Leeds, UK	The Importance of Event Sequencing in Understanding Earthquake Triggered Landslides	Auditorium of SKLGP
10:30 - 11:00	Coffee Break			Outside of Auditorium of SKLGP
Keynote Presentations: Experimental systems Chairs: William Murphy, Yonggang Jia				
Time	Name	Affiliation	Title	Venue
11:00 - 11:30	Toshi Shimamoto	Shimamoto Earth & Environment Laboratory Ltd., Japan	Chengdu Experimental System for Comprehensive Landslide Studies: Research Plans and Constitutions of Apparatuses	Auditorium of SKLGP
11:30 - 12:00	Jia-jyun Dong	National Central University, Taiwan, China	Apparent Steady-State Friction Coefficient of Kaolin Clay under Different Slip Rates and Drainage Conditions	Auditorium of SKLGP
12:00 - 12:30	Gonghui Wang	Kyoto University, Japan	Estimation of Ground Motion for Slope Instability during Earthquake and Experimental Validation	Auditorium of SKLGP
12:30 - 14:00	Lunch			Xiangzhang Dinning Hall (3rd Floor)

Invited Presentations: From events to reponse Chairs: Cees van Westen, Chuan Tang				
Time	Name	Affiliation	Title	Venue
13:30 - 13:50	Alexander Strom	Geodynamics Research Center – branch of JSC "Hydroproject Institute", Russia	Prehistoric Co-Seismic Rockslides: Criteria of Identification Illustrated by Central Asian Case Studies	Auditorium of SKLGP
13:50 - 14:10	Xinming Meng	Lanzhou University, China	Seismic Loess landslides and their implications for land utilization in the north western China	Auditorium of SKLGP
14:10 - 14:30	Zhenming Shi	Tongji University, China	Stability analysis and evaluation of landslide dams	Auditorium of SKLGP
14:30 - 14:50	Chunan Tang	Dalian University of Technology, China	Spalling in extreme ground motion and evidence from the 2008 Wenchuan earthquake	Auditorium of SKLGP
14:50 - 15:10	Tristram Hales	Cardiff University, UK	How do We Develop Resilience to Post-Earthquake Landsliding?	Auditorium of SKLGP
15:10 - 15:30	Kerry McSaveney	Wellington Region Emergency Management Office, New Zealand	Beyond the Thin Blue Line: Community Input into Readiness and Response	Auditorium of SKLGP
15:30 - 15:50	Coffee Break			Outside of Auditorium of SKLGP
15:50 - 17:50	Subsession 4 (Parallel) :Susceptibility, hazard, and risk assessment for rehabilitation and land-use planning in earthquake struck areas. Chairs: Cees van Westen, Zhenming Shi			Auditorium of SKLGP
Time	Name	Affiliation	Title	Venue
15:50 - 16:05	Ming Chang	State Key Laboratory of GeoHazard Prevention and GeoEnvironment Protection, China	Spatial Distribution Characteristics of Landslides Induced by 2013-04-20 Lushan Earthquake and 2017-08-08 Jiuzhaigou Earthquake, Southwest China	Auditorium of SKLGP
16:05 - 16:20	Chenxiao Tang	University of Twente, the Netherlands	Multi-Temporal Landslide Volumetric Analysis and Suitability Evaluation of Multi-Sourced Dams	Auditorium of SKLGP

16:20 - 16:35	Chong Xu	China Earthquake Administration, China	A Database of Landslides Triggered by the 2017 Ms7.0 (Mw6.5) Jiuzhaigou (China) Earthquake Based on Geoeye-1 Satellite Imagery	Auditorium of SKLGP
16:35 - 16:50	Kaushal Raj Gnyawali	Shanghai Jiao Tong University, China	Intensity and Distribution Control of Co-Seismic Landslides in Large Earthquakes	Auditorium of SKLGP
16:50 - 17:05	Zhengguo Li	Xi'an Center of Geological Survey, China Geology Survey	Analysis of the Process and Mechanism of Landslide Destroying Loess Platform based on Remote Sensing Image and DEM	Auditorium of SKLGP
17:05 - 17:20	Yanchao Gao	ISPRA, Geological Survey of Italy, Italy	Comparison of Earthquake Environmental Effects and ESI Intensities for Recent Seismic Events in Different Tectonic Settings: Sichuan (SW China) and Central Apennines (Italy)	Auditorium of SKLGP
17:20 - 17:35	Xuwen Ding	Earthquake Administration of Shanxi Province, China	Study on Slope Seismic Stability of Dagoba in Mountain Scenic Area in Taiyuan	Auditorium of SKLGP
17:35 - 17:50	Muhammad Shafique	University of Peshawar, Pakistan	Spatial and Temporal Dynamics of the 2005 Kashmir Earthquake Induced Landslides, Northern Pakistan	Auditorium of SKLGP
15:50 - 17:50		Subsession 5 (Parallel) : Advances in research on triggering and development of co-seismic landslides and debris flows(Part II), Chairs: Xiaoqing Chen, Shengwen Qi		SKLGP Room 318
Time	Name	Affiliation	Title	Venue
15:50 - 16:05	Julian S. H. Kwan	Government of the Hong Kong Special Administrative Region, Hong Kong, China	Managing Risks of Earthquake-induced Geo-hazards:Recent Technical Development in Hong Kong	SKLGP Room 318
16:05 - 16:20	Wenjie Xu	Tsinghua University, China	Failure Process of Landslide under Earthquake: Take Hongshiyuan Landslide as an Example	SKLGP Room 318

16:20 - 16:35	Yanjun Shang	Institute of Geology and Geophysics, CAS, China	Observation of Craters and Test Results of Ejecta above the Rock Avalanches of the Wenchuan Earthquake in 2008	SKLGP Room 318
16:35 - 16:50	Jing Ran	Cardiff University, UK	Measurement of Social Vulnerability in Relation to Geo-Physical Hazards in Low and Middle Income Countries: A Systematic Review	SKLGP Room 318
16:50 - 17:05	Jiawen Zhou	Sichuan University, China	Numerical Simulation of Entrainment Effect during Mass Movement Process in High-Speed Debris Avalanches	SKLGP Room 318
17:05 - 17:20	Huayong Ni	Chengdu Center of China Geological Survey, China	Hourly Rainfall Pattern and Critical Hourly Rainfall Condition of Debris Flow Occurrence in Wenchuan Earthquake Extremely Stricken Areas	SKLGP Room 318
17:20 - 17:35	Wentao Yang	Beijing Forestry University, China	Landslides-Damaged Vegetation and its Recovery Process in the Wenchuan Earthquake Affected Region	SKLGP Room 318
17:35 - 17:50	Tao Xu	Northeastern University, China	Modeling of Time-Dependent Deformation and Fracturing of Heterogeneous Brittle Rocks	SKLGP Room 318
15:50 - 17:50		Subsession 6 (Parallel) : Geological disaster risk and engineering construction in meizoseismal area, Chair: Oliver Korup, Yunsheng Wang		SKLGP Room 211
Time	Name	Affiliation	Title	Venue
15:50 - 16:05	Stefano Utili	Newcastle University, U.K	Dimensionless Stability Charts for C-Phi Slopes with Tension Cracks Subject to Seismic Action	SKLGP Room 211
16:05 - 16:20	Kravchenko N.S.	Moscow State University, Russia	Stabilization of Slopes Seismic Induced Landslides and Rockfalls Using Polymer Compounds	SKLGP Room 211

16:20 - 16:35	Hua Ge	China Geological Survey - Chengdu Center, China	Regional Seismic Landslide Hazards Mapping: A Case Study Using Calibrated Newmark Model in the Yingxiu Area, Sichuan, China	SKLGP Room 211
16:35 - 16:50	Ni Zhang	Xi'an Jiaotong University, China	Erosion Process of Sliding Mud by the Entered External Flow	SKLGP Room 211
16:50 - 17:05	Andrey A. Ponomarev	Lomonosov Moscow State University, Russia	The Impact of Anthropogenic Factors on the Stability of Weathered Slopes and New Methods for Their Stabilization	SKLGP Room 211
17:05 - 17:20	Jun Liang	Sichuan Provincial Water Resources Department, China	Survey of Quake Lakes Caused by the "5.12 Wenchuan" Earthquake and Related Danger Elimination	SKLGP Room 211
17:20 - 17:35	Mohib Ur Rehman	Lanzhou University, China	Investigations of Mass Movements along the Karakorum Highway from Khunjarab to Islamabad	SKLGP Room 211
17:35 - 17:50	Qihua Chen	Powerchina Chengdu Engineering Corporation Limited, China	Post-Earthquake Inspection and Rehabilitation for Hydropower Stations after 2008 Wenchuan Mega Earthquake	SKLGP Room 211
18:00 - 19:30	Dinner			Xiangzhang Dinning Hall (3rd Floor)
18:30-22:00	iRALL Meeting and dinner(Coordinator: Runqiu Huang, Gonghui Wang, Mauri McSaveney, Xuanmei Fan, Wei Hu)			Easter Hotel
May 14, 2018				
Keynote Presentations:Long-term earthquake effects and ground dynamic response Chairs: Thomas Streil, Alexander Strom				
Time	Name	Affiliation	Title	Venue
9:00 - 9:30	Ikuo Towhata	University of Tokyo, Japan	Long-Term Instability of Slopes along Major Seismic Faults	Auditorium of SKLGP
9:30 - 10:00	Oliver Korup	University of Potsdam, Germany	Ongoing River Response to Medieval Earthquakes, Central Nepal Himalaya	Auditorium of SKLGP

10:00- 10:30	Vincenzo Del Gaudio	University of Bari, Italy	Drawing Knowledge from Ambient Noise: Challenges of Ground Dynamic Response Investigations	Auditorium of SKLGP
10:30 - 11:00		Coffee Break		Outside of Auditorium of SKLGP
Keynote Presentations : Hazard and risk. Chairs: Giovanni Crosta; Steven G. Evans				
Time	Name	Affiliation	Title	Venue
11:00- 11:30	Chyi-Tyi Lee	National Central University, Taiwan, China	A Review and Perspectives on the Methodology of Landslide Hazard Analysis	Auditorium of SKLGP
11:30 - 12:00	Xuanmei Fan	SKLGP, China	Evolution of Geohazards and Consequent Risk after the 2008 Wenchuan Earthquake	Auditorium of SKLGP
12:00 - 12:30	Cees van Westen	ITC, University of Twente, the Netherlands	Where to Build-Back-Better? Analyzing Changing Risk for Post-Disaster Reconstruction Planning	Auditorium of SKLGP
12:30 - 14:00		Lunch		Xiangzhang Dinning Hall (3rd Floor)
Invited Presentations:Geohazards in seismically active areas Chairs: Christopher Massey, Chyi-Tyi Lee				
Time	Name	Affiliation	Title	Venue
14:00 - 14:20	Steven G. Evans	University of Waterloo, Canada	Landslide Disasters caused by Earthquakes	Auditorium of SKLGP
14:20 - 14:40	Hans-Balder Havenith	University of Li ège, Belgium	Seismic vs. Climatic origin of Large Rockslides	Auditorium of SKLGP
14:40 - 15:00	David Frost	Georgia Institute of Technology, USA	Infrastructure Failure: Addressing Resilience and Sustainability during Reconstruction	Auditorium of SKLGP
15:00 - 15:20	Shengwen Qi	Institute of geology and geophysics,CAS, China	Dynamic Behaviour of Dip Bedded Rock Slopes with Large Shaking Table Tests	Auditorium of SKLGP

15:20 - 15:40	Filippo Catani	University of Firenze, Italy	Susceptibility and Magnitude Assessment for Landslides Driving Factors and Scaling Issues in Different Environments	Auditorium of SKLGP
15:40 - 16:00	Thomas Streil	Sarad GmbH, Germany	Gas Geochemical Precursors and Chance for the Forecast of Earthquakes and Volcanic Eruption	Auditorium of SKLGP
16:00 - 16:20	Coffee Break			Outside of Auditorium of SKLGP
16:20 - 17:50	<b>Plenary Session Discussion</b> <b>Moderators: Niels Hovius, Gonghui Wang</b>			Auditorium of SKLGP
17:50 - 18:00	Closing Ceremony			Auditorium of SKLGP
18:20 - 19:30	Dinner			Xiangzhang Dinning Hall (3rd Floor)
May 15, 2018				
8:00 - 17:00	Field excursion Group 1& Group 2 Day 1			Maoxian Wenchuan
May 16, 2018				
8:00 - 17:00	Field excursion Group 1& Group 2 Day 2			Maoxian Wenchuan

## *Presentation Guideline*

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### **Instructions for Presenters**

All presentations should be present in English. Speakers are requested to be in their respective session rooms at least 10 minutes prior to the commencement of each session.

The duration of a keynote presentation is 30 minutes. This includes 25 minutes for the presentation itself and 5 minutes for Q&A. The duration of an invited presentation is 20 minutes. This includes 15 minutes for the presentation itself and 5 minutes for Q&A. The duration of a regular presentation is 15 minutes. This includes 12 minutes for the presentation itself and 3 minutes for Q&A. We would appreciate if each presenter can adhere strictly to their time limit.

Presentation must be carried out using **Microsoft Power Point** or **PDF**. The screen ratio in the auditorium of SKLGP is 4:3. The screen ratio in the room 211 and room 318 can be adjusted between 4:3 and 16:9. Speakers should load their presentation materials in a USB driver and **upload the files at least 10 minutes before their session starts.**

### **Instructions for Session Chairs**

We kindly ask the session chairs to keep the program to time for your session. We provide a small bell in every session room. Please be aware of the presenting time given to different types of presentations, and ring the bell as follows:

Keynote talk: the first ring at 23 minutes, the second ring at 25 minutes

Invited talk: the first ring at 13 minutes, the second ring at 15 minutes

Regular talk: the first ring at 10 minutes, the first ring at 12 minutes

Please remind your speakers at the start of your session that you will ring this bell. Please leave the bell in the room for the next session chair.

### **Poster Sessions**

Poster sessions will be held. Presenters should bring their posters (single-side poster A1 size [594mm×841mm]) to the registration desk and ask the staff for instruction of poster presentation. At least one author should be present for each poster.

## Venue



### Auditorium of SKLGP in Chengdu University of Technology (CDUT), Chengdu, China

CDUT main campus is located in eastern Chengdu at No.1 Erxianqiao East Rd. The distance from Chengdu International Airport to the campus is 35 km and from Chengdu North Railway Station is 5 km. If you go by taxi, it will cost you about 90RMB from Chengdu International Airport and 15RMB from Chengdu North Railway Station.

On the May 11<sup>th</sup>, the registration desk will be in Eastar hotel.

From May 12<sup>th</sup> to 14<sup>th</sup>, the registration desk will be outside of the Auditorium of SKLGP.

The main conference room is Auditorium of SKLGP while some subsessions will be held in room 211 (2<sup>nd</sup> Floor) and room 318 (3<sup>rd</sup> Floor) in SKLGP New Building.

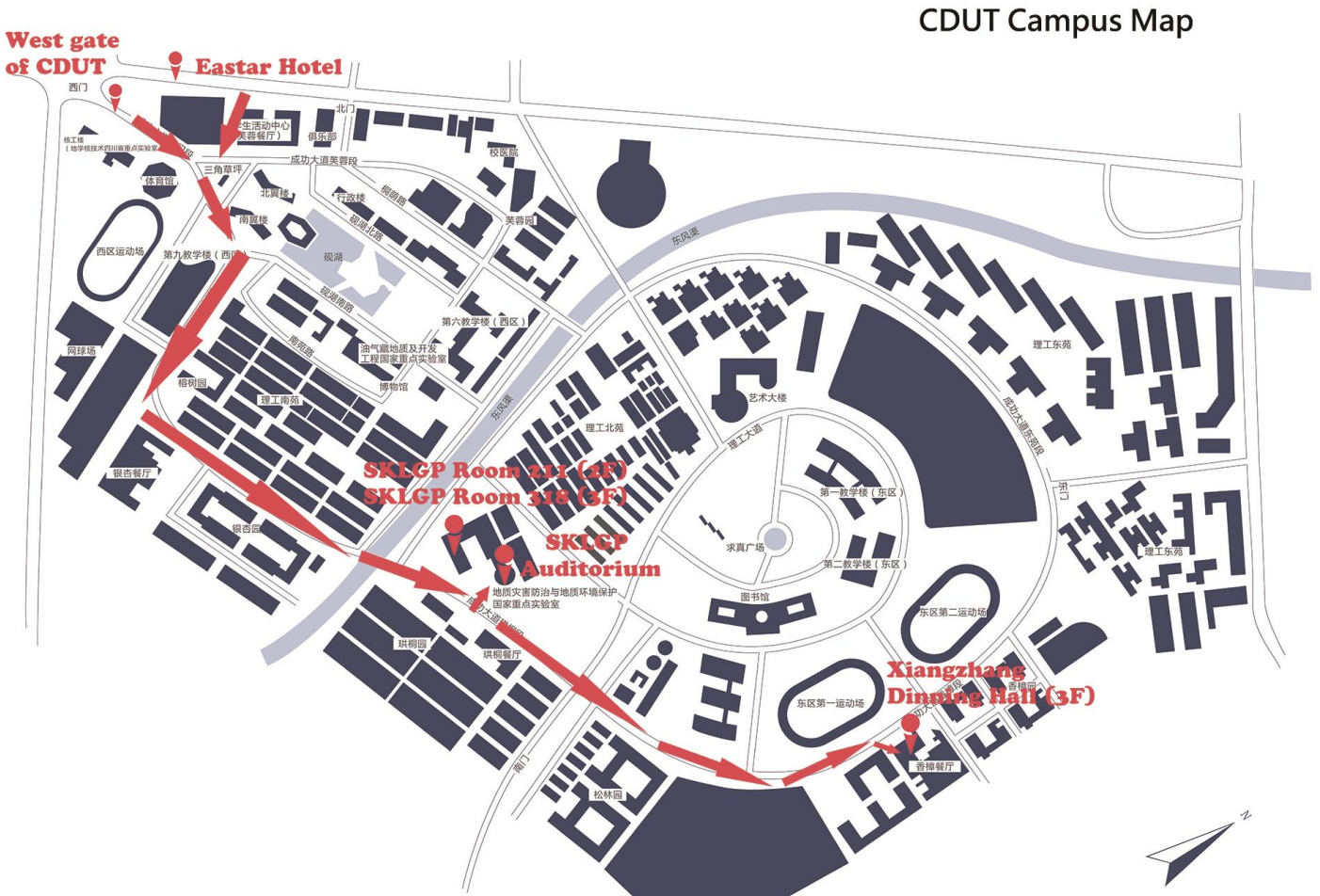
### Symposium Volunteers

Volunteers wearing the red vest will be in the airport, train station, subway station and campus to guide you to the venue. If you need any help, you can turn to these warm and friendly volunteers.



## Campus Map:

The distance from the West gate of CDUT and the Eastar Hotel to Conference venue is 1.6km. It takes 15-20 mins by walk or you can take the campus cart to get there (cost 1 CNY). Please get off at "Gongtong Yuan". Shared bikes like OfO or Mobike can take you there as well.



## Local Weather:

The weather of Chengdu in May will mostly be hot and sunny. The average temperature will be around 27°C to 30°C. There may be rain days. It is recommended to wear T-shirts, shorts and bring umbrella with you. The weather forecast is shown below:

DAY	DESCRIPTION	HIGH / LOW	PRECIP	WIND	HUMIDITY
FRI MAY 11	AM Showers	24/18°	40%	SSE 12 km/h	74%
SAT MAY 12	Partly Cloudy	31/18°	10%	SSW 11 km/h	51%
SUN MAY 13	Mostly Sunny	32/20°	0%	SSE 11 km/h	49%
MON MAY 14	Mostly Sunny	34/22°	0%	ESE 6 km/h	48%
TUE MAY 15	Partly Cloudy	34/23°	10%	SSE 8 km/h	51%
WED MAY 16	Partly Cloudy	33/23°	10%	E 7 km/h	54%

## *Transportation*

The Symposium organizers are not responsible for airport or train-station pick up. The attendees should manage the transportation to the venue by themselves.

### **1. From Shuangliu International Airport to Eastar Hotel or Huadu Hotel**

- (1) It is about 25 km from the Shuangliu International Airport to Eastar Hotel or Huadu Hotel. If you take a taxi, it takes around 40 minutes and cost is approximately CNY 90 (USD 14)
- (2) Subway (recommended): Metro Line 10 ---> Metro Line 7 (1hr05mins,CNY 7 (USD 1))

Take Metro Line 10 (Direction: Taipingyuan 太平园方向) at Terminal 1 or Terminal 2 ---> After 4 stops, get off at Taipingyuan (太平园) ---> Walk to Metro Line 7 ---> Take Metro Line 7 (Outer ring , Direction: North Railway Station 火车北站方向) ---> After 14 stops, get off at Chengdu University of Technology (理工大学) ---> Walk out the station from Exit B2 and walk to Eastar Hotel or Huadu Hotel (600m).

### **2. From East Railway Station to Eastar Hotel or Huadu Hotel**

- (1) It is about 10 km from the East Railway Station to Eastar Hotel or Huadu Hotel. If you take a taxi, it takes around 15 minutes and cost is approximately CNY 26 (USD 4).
- (2) Subway (29mins, CNY 3 (USD 0.5)): Take Metro Line 7 (Outer ring , Direction: North Railway Station 火车北站方向) at the railway station ---> After 5 stops, get off at Chengdu University of Technology (理工大学) ---> Walk out the station from Exit B2 and walk to Eastar Hotel or Huadu Hotel (600m).

### **3. From North Railway Station to Eastar Hotel or Huadu Hotel**

- (1) It is about 9 km from the North Railway Station to Eastar Hotel or Huadu Hotel. If you take a taxi, it takes around 23 minutes and cost is approximately CNY 22 (USD 3.5).
- (2) Subway (23mins, CNY 3 (USD 0.5)): Take Metro Line 7 (Inner ring , Direction: East Railway Station 火车东站方向) at the railway station ---> After 5 stops, get off at Chengdu University of Technology (理工大学) ---> Walk out the station from Exit B2 and walk to Eastar Hotel or Huadu Hotel (600m).

Transportation map overview:



The map showing Terminal 1 and Terminal 2 of Shuangliu International Airport:



The direction from subway Exit B2 to the Easter Hotel or Huadu Hotel is shown below:



The Easter Hotel, exterior view

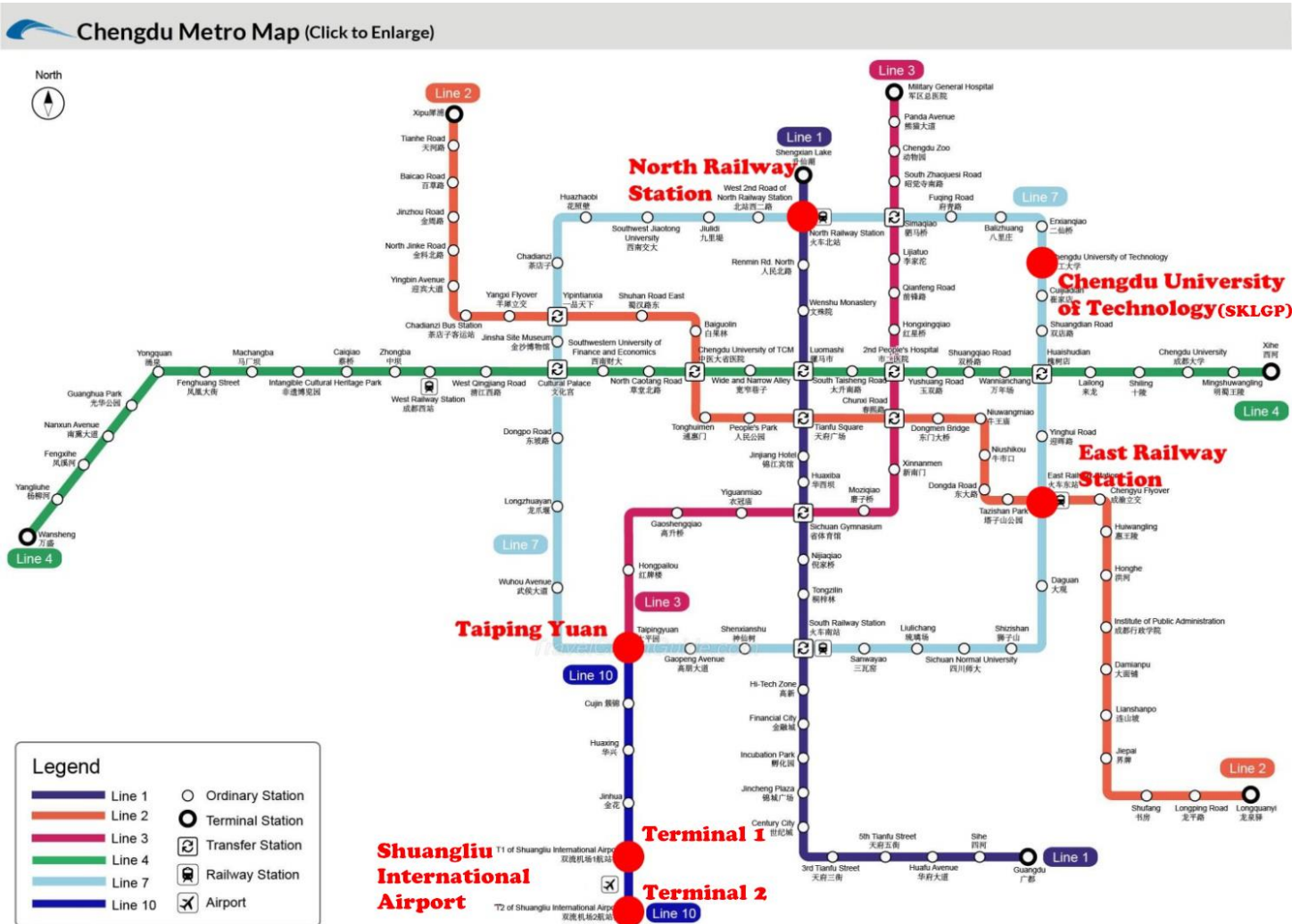


The Huadu Hotel, exterior view

The schedule of the stops is shown as below:

Stop	First train	Last train	Remarks
Airport Terminal 2	06:05	23:05	Line 10, Taipingyuan direction
Airport Terminal 1	06:08	23:08	Line 10, Taipingyuan direction
Taipingyuan	06:19	23:33	Transfer to Line 7, outer ring
East railway station	06:15	23:54	Line 7, outer ring, North Railway Station direction
Chengdu university of Technology	06:17	22:57	Line 7, outer ring, North Railway Station direction
North railway station	06:18	23:49	Line 7, inner ring, East Railway Station direction

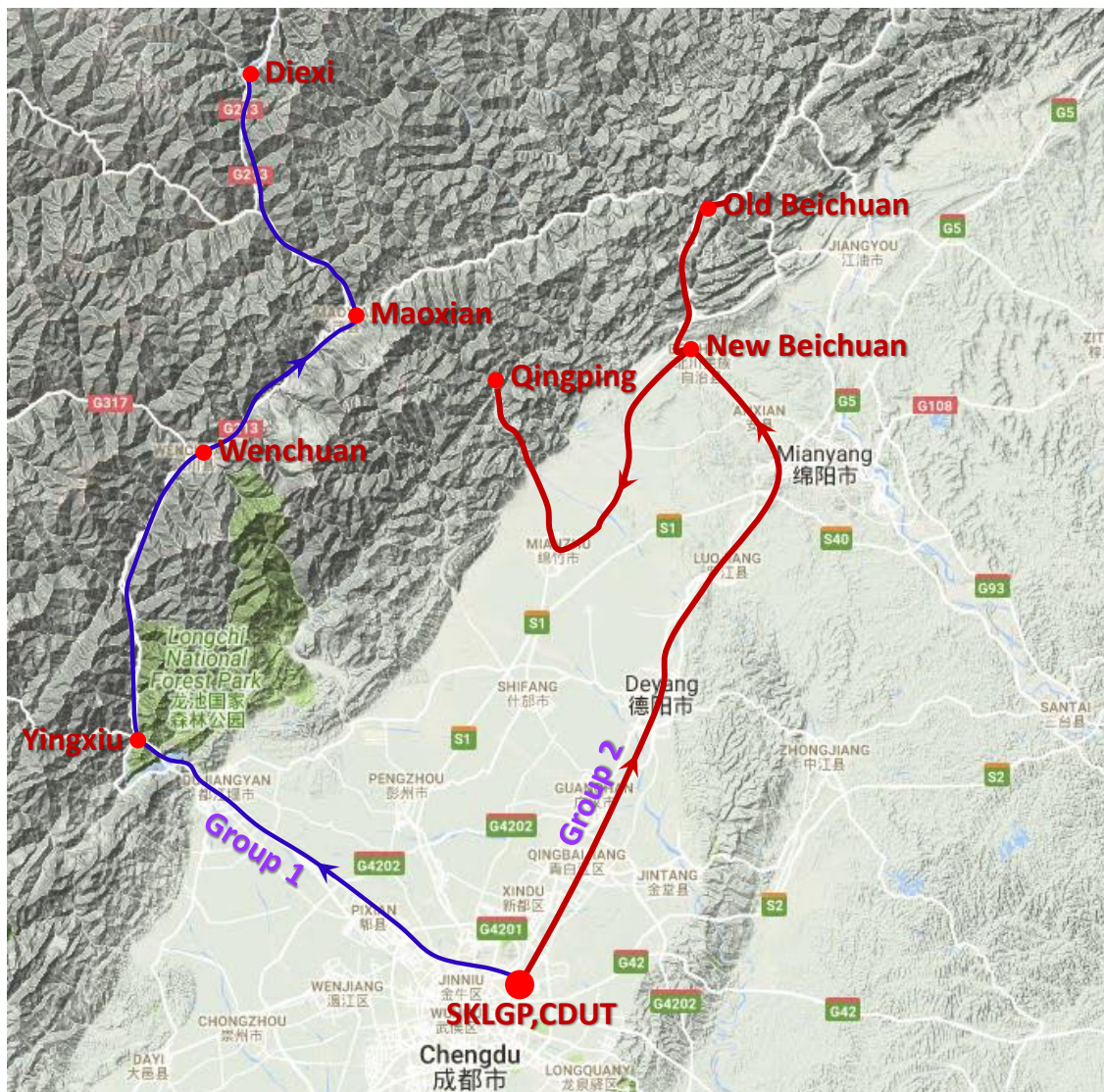
The Chengdu metro system map is shown as below:



## Filed Trip

The field trip will be divided into two groups. The participants can choose either group to join at the registration desk. Please be prepared with outdoor gear (i.e.: walking boots, waterproof jackets, hat and etc.).

- **Group one: Chengdu---Maoxian---Wenchuan---Chengdu (Organized by Chengdu University of Technology, SKLGP)**
- **Group two: Chengdu---Beichuan---Mianzhu---Chengdu (Organized by Society for Rock Mechanics and Engineering of Sichuan Province)**

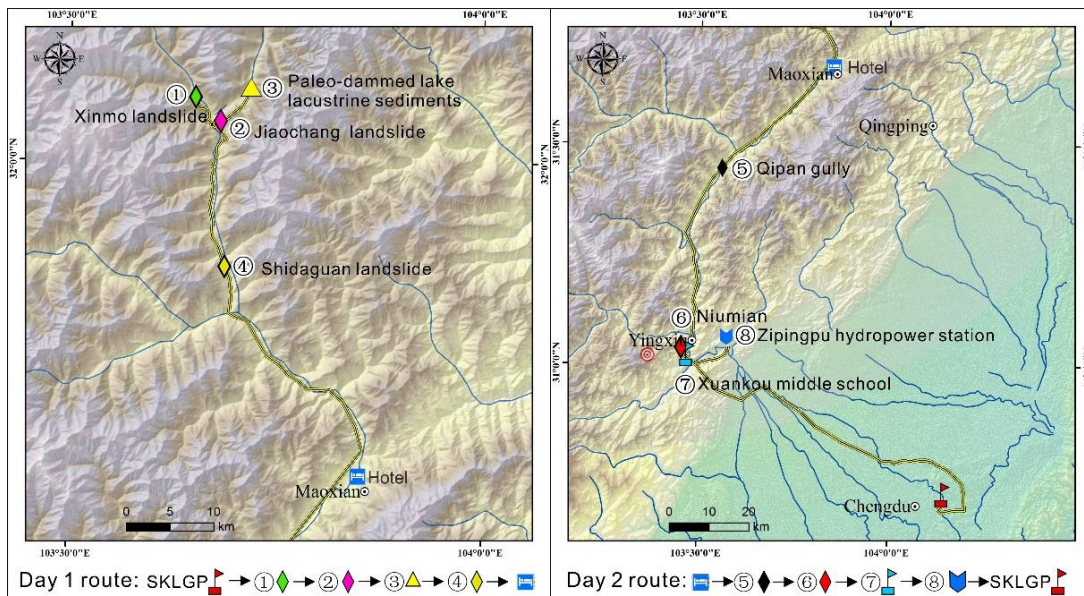


The route map of Group one and Group two

## Introduction of group one

- **Day 1 (May 15, 2018): Xinmo landslide→Old landslides, barrier lakes and paleo-dammed lake lacustrine sediments near the Diexi town→the Shidaguan landslide**
- **Day 2 (May 16, 2018): Qipan debris flow gully→Niumian debris flow→Xuankou middle school→ Zipingpu hydropower station**

Due to the continuous uplifting of Qinghai-Tibet Plateau, the south-western China is characterised by extremely high and steep alpine terrain, and is prone to large earthquakes. In the past 100 years, several large magnitude earthquakes have occurred in this region, such as the 1933 Diexi earthquake (Ms 7.5), the 1976 Songpan-Pingwu earthquake (Ms 7.2), the 2008 Wenchuan earthquake (Ms 8.0), the 2013 Lushan earthquake (Ms 7.0), the 2017 Jiuzhaigou earthquake (Ms 7.0). These earthquakes triggered many landslides, particularly because of the steep terrain and the fragile geological environment. We will visit an area severely affected by both the 1933 Diexi earthquake and the 2008 Wenchuan earthquake. You will see many old landslides, even paleo-landslides as well as relative new landslides triggered by the Wenchuan earthquake and post-earthquake rainfalls, such as the Xinmo landslide and the Shidaguan landslide. Some of the landslides triggered by the Diexi earthquake dammed the Minjiang river, forming barrier lakes that still exist today, such as the Daihaizi, Xiaohaizi and Diexi. You will also observe the destructive landslides triggered by the Wenchuan earthquake and post-earthquake debris flows induced by heavy rainfall, such as the Niumian debris flow and Qipan debris flow gully, as well as the Xuankou middle school earthquake relic, some reconstruction sites, well-designed highways, the magnificent mitigation projects of the large-scale debris flows, and a hydropower station, Zipingpu near the epicenter of the Wenchuan earthquake.



**Route map of Day 1 and Day 2 of Group One**

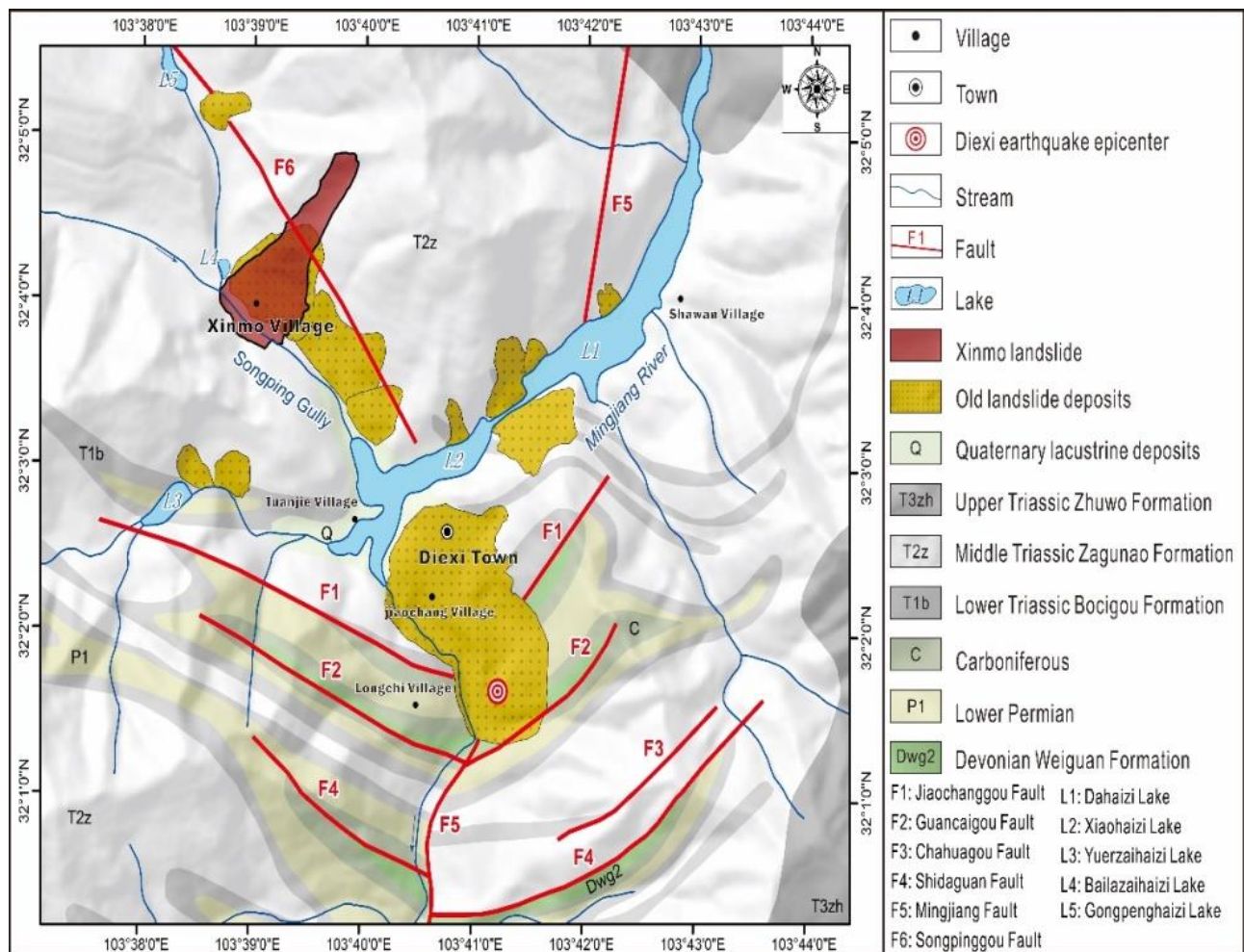
**Day 1 (May 15, 2018):** ① Xinmo landslide→② Old landslides, barrier lakes→③ paleo-dammed lake lacustrine sediments near the Diexi town→④ the Shidaguan landslide

**Day 2 (May 16, 2018):** ⑤ Qipan debris flow gully→⑥ Niumian debris flow→⑦ Xuankou middle school→ ⑧ Zipingpu hydropower station

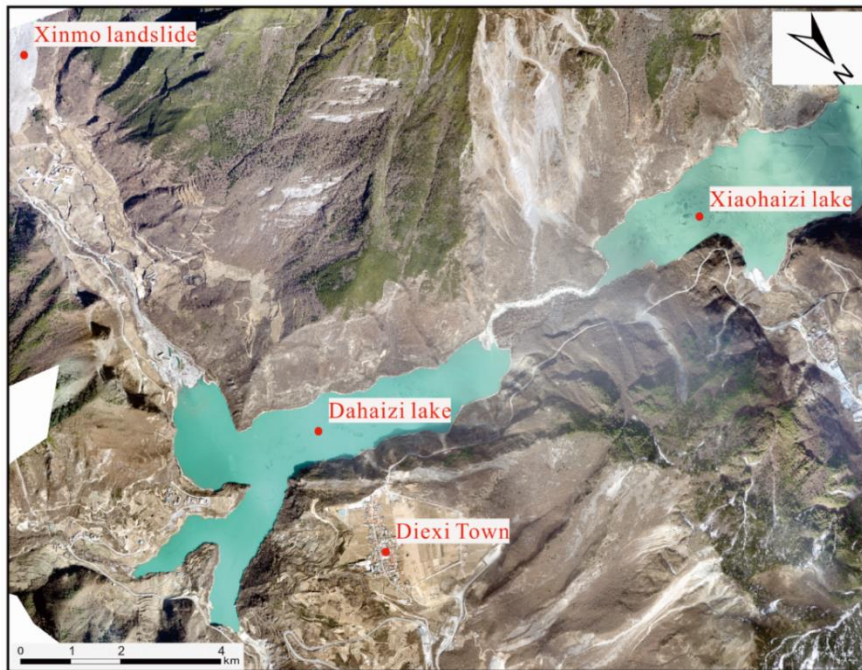
**Day 1 (May 15, 2018)**

**Xinmo landslide→Old landslides, barrier lakes and paleo-dammed lake lacustrine sediments near the Diexi town→the Shidaguan landslide**

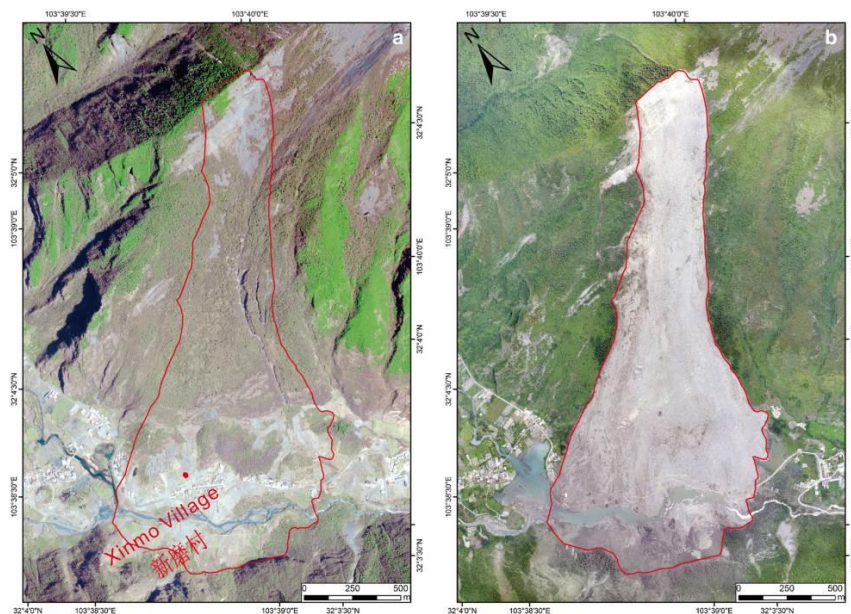
During the first day, participants will observe the 2017 Xinmo landslide, the Shidaguan landslide, the 1933 Jiaochang landslide and ancient lacustrine sediments near Diexi Town. At about 5:38 am local time on Saturday, 24th June, 2017, a massive rock avalanche destroyed the village of Xinmo in Maoxian County (N 32° 04' 47", E 103° 39' 46", Fig. 6). The landslide buried 64 houses and killed 10 people. A further 73 people are reported missing. The sliding mass blocked 1.0 km of river and damaged 1.5 km of road. It was one of the most catastrophic landslide events in recent years in China.



**Geological map of the Diexi region indicating the location of the Xinmo landslide, old landslide deposits, barrier lakes and active faults (from Fan et al., 2017a)**



UAV image of the area near the Diexi town, showing Dahaizi and Xiaohaizi dammed lakes

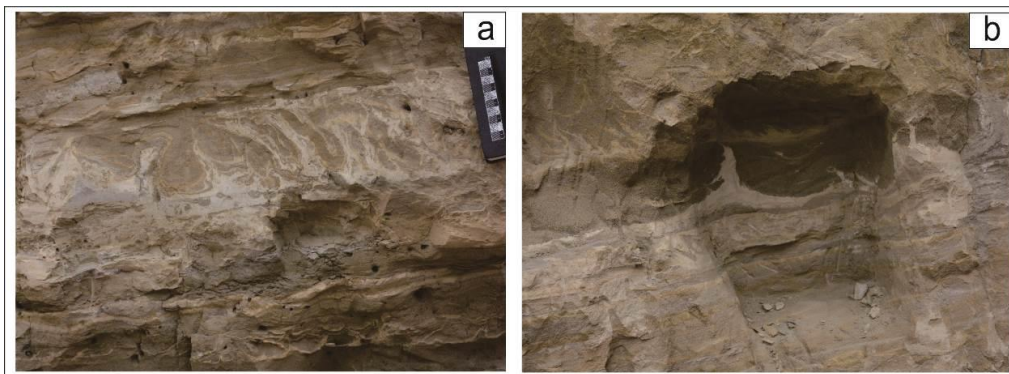


Pre-sliding image on April 8th, 2017 (a) and post-sliding image on June 26th, 2017 (b) (from Fan et al., 2017a)

This trip, will give you an impressive view of lacustrine sediments formed in the paleo-dammed lake. Besides the direct flooding disasters caused by the breach of the paleo-dam, the impact of landslide dams and dammed lakes is extremely important for its long-term environmental effects on the sediment content of rivers, the changes of riverbed morphology, and the evolution of landforms and geohazards. This effect can last up to tens of thousands of years depending on the formation and survival time of landslide dams and their paleo-lakes. Prof. Lansheng Wang, discovered the lacustrine sediments in the paleo-dammed lake in the Diexi area in 1999. These sediments were deposited 30 thousand years ago.

Ten climatic periods have been identified for the Diexi barrier lake area within the time span from

30,000 to 15,000 years BP, based on examination of climatic indicators in the sediments, such as spore-pollen, organic matter, carbon and oxygen isotopes, calcium carbonate and particle size. Ten earthquake-induced disturbance layers in the lake sediments were identified through examination of a drill core. This indicates that from 30 000 to 15 000 years BP, there were at least 10 strong earthquakes in the Dixi area. The sedimentary sections disturbed by earthquakes show good coincidence with the climate changes, indicating that the geologic evolution and the climatic and environmental changes are associated (Wang et al., 2014).



**The lake lacustrine sediments: a. the wave structure; b. the flame structure**

You will visit the 2017 Shidaguan landslide, located in Shidaguan Town, Maoxian County, on the right bank of Minjiang river. It is a large-scale toppling landslide, with a height drop of 450m and a volume of 14 million m<sup>3</sup>. The movement of the landslide started at the middle part of the slope in 2013, where cracks were developed in the terrain surface and in the buildings. In September 2014, the front and middle part of the landslide started to collapse and move into the Minjiang river, causing blockage of the river. Meanwhile, deformation also started to develop at the backside of the landslide. In August 2015, the deformation became extensive, and by July 2017 the front and rear part of the landslide had slid down for more than 10 m. Rock falls and collapse continues to occur from the front part of the landslide, covering the toe of the sliding surface.

## **Day 2 (May 16, 2018)**

**Qipan debris flow gully → Niumian debris flow → Xuankou middle school → Zipingpu hydropower station**

During the second day, you will observe large coseismic landslides and debris flows along the Minjiang River, such as the Qipan and Niumian debris-flow gullies, the Xuankou middle school earthquake relic, and the Dujiangyan-Wenchuan highway. On the way back to Chengdu, we will stop in Dujiangyan to see the Zipingpu hydropower station.



The remote-sensing imagery of Qipan Gully



Destroyed houses near the outlet



Reconstruction site was affected



Xuankou middle school memorial square



Ruins of the Xuankou Middle School

**Zipingpu hydropower station:** the concrete-faced, rock-fill, 125 m high embankment dam of the Zipingpu river management project is located in Maxi along the Minjiang River, about 60 km northwest of Chengdu. The project is 9 km from Dujiangyan City and downstream of it is located the world-famous Dujiangyan Diversion Canal Project. The Zipingpu project is a water management project, with the functions of power generation, flood control, environmental protection, and tourism. It is also one of the Key projects of infrastructure construction during the "fifteenth" national development period and a landmark project of the development of Western China. In 2001, the construction was formally approved by the government, and in September 2005, water storage was started. In May 2006, all 4 power generation units were producing electricity. It has been running now safely for 12 years, which is the first high concrete faced rock-fill dam, to withstand an Intensity IX (Wenchuan 2008) earthquake in the world.



**Zipingpu dam and hydro-power station**

## Introduction of group two

- **Group two: Chengdu --- Beichuan---- Mianzhu ---- Chengdu (It is organized by Society for Rock Mechanics and Engineering of Sichuan Province)**

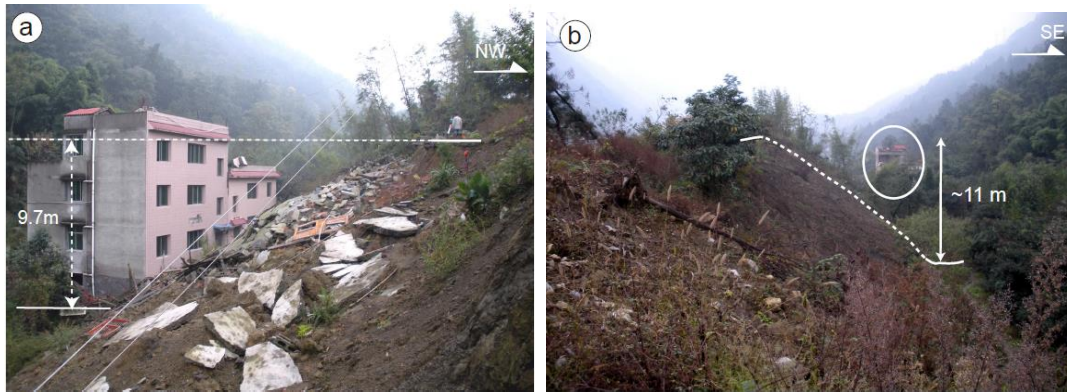
Day 1 (May 15, 2018): The fault rupture with the largest vertical displacement→Beichuan earthquake ruins→5 12 Wenchuan Earthquake Memorial Museum→New Beichuan city, live in the New Beichuan hotel



The detail route map of group two Day 1 (① The fault rupture with the largest vertical displacement; ② Beichuan earthquake ruins and landslides; ③5 12 Wenchuan Earthquake Memorial Museum; ④ new Beichuan city)

### 1. The fault rupture with the largest vertical displacement

The Wenchuan Earthquake ruptured two large thrust faults along the Longmen Mountain thrust and generated 240 km long surface rupture zone along the Yingxiu-Beichuan fault and 72 km long surface rupture zone along the Pengzhou-Guanxian fault. The largest surface slip with ~11.0 m vertical and 4.5 m right-lateral displacement was found near old Beichuan.

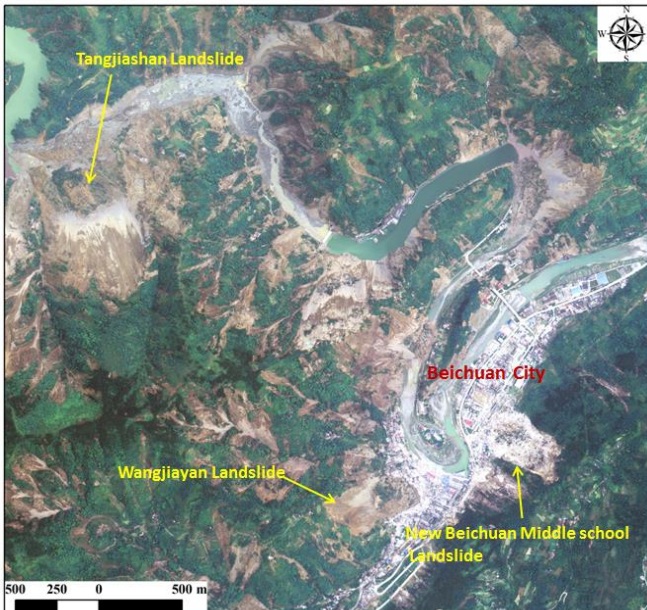


**Photos showing fault rupture with the largest vertical displacement, a few kilometers northeast of old Beichuan (Liu-Zeng et al.,2009)**

## **2. Beichuan earthquake ruins and 5 • 12 Wenchuan Earthquake Memorial Museum**

Old Beichuan is located in the middle part of the Yingxiu-Beichuan fault, where the fault mechanism changes from thrusting to strike-slip. It was at the center of one of two zones where seismic intensity was the highest (at XI) during the Wenchuan Earthquake. The earthquake caused devastating damage, where 80% of the buildings in the town collapsed and almost all of the remaining buildings were severely damaged. Approximately 15,645 people in the county lost their lives (9.8% of the county population) and 4,412 people were reported missing. Inside Beichuan town, the death toll was 8,600 (40% of the town population). The ruins in Beichuan have been conserved, as they have significant scientific value from a seismological and structural engineering point of view. The 5.12 Wenchuan Earthquake Memorial Museum was built in Renjiaping near old Beichuan,

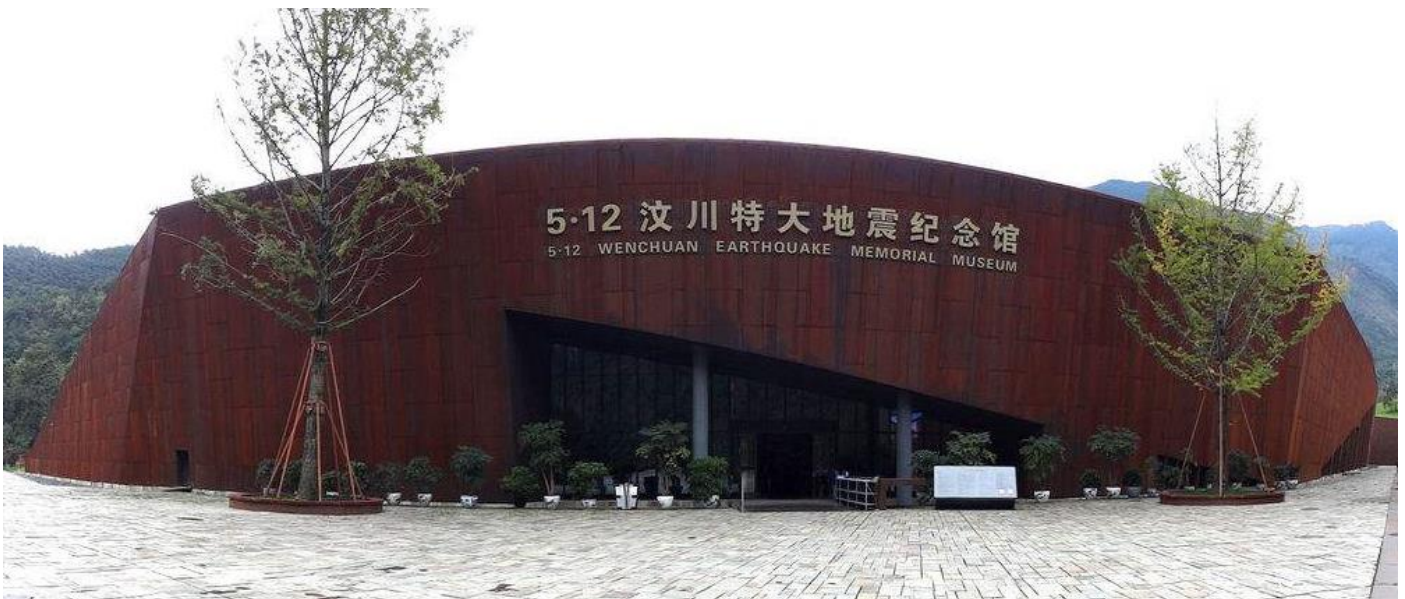
Three large landslides caused severe damage in old Beichuan: the Wangjiayan landslide, the new Beichuan middle school landslide and the Tangjiashan landslide. A large part of the old town of Beichuan was destroyed by the Wangjiayan landslide which killed over 1,600 people and had an estimated volume of 10 million m<sup>3</sup>. The New Beichuan Middle School landslide buried at least 700 students and teachers. The Tangjiashan landslide dam impounded the largest lake in the earthquake affected area. A heavy rainstorm occurred in the early morning on 24 September 2008 with a daily rainfall of 370 mm at the rainstorm center. This rainstorm triggered numerous debris flows in the central part of Beichuan. A large debris flow almost completely buried the remains of the old town with a thickness between 5 and 8 m.



**Aerial photo of the Beichuan town taken  
on May 23rd, 2008**



**Beichuan town after the debris flows that  
occurred in September 2008**



**The 5 · 12 Wenchuan Earthquake Memorial Museum**

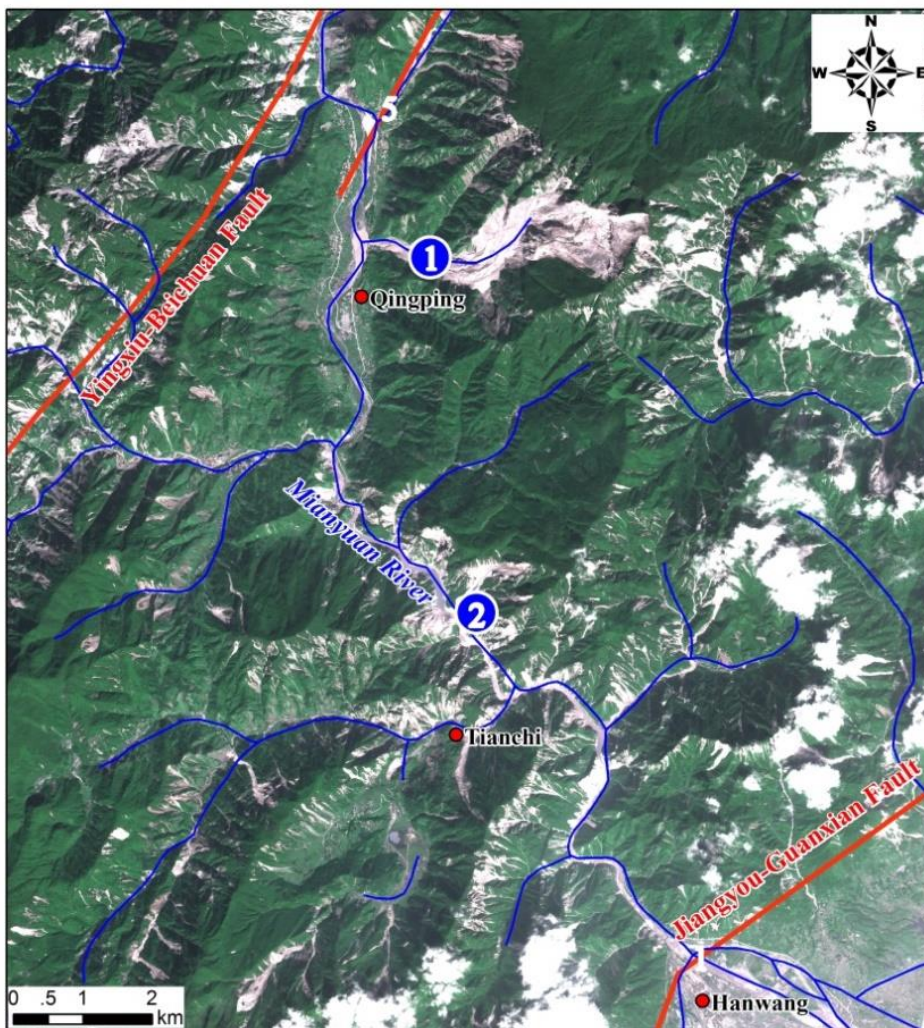
### **3. New Beichuan City**

Because the geological environment is very fragile and prone to geo-hazards, and a fault goes through the old city, it was evaluated to have very high risk for people to live there. Therefore, a new town was constructed 23 km away from the old town. New Beichuan City comprises a central district, an industrial park in the south, a leisure district in the hilly north and an area reserved for future development in the west. Reconstruction projects are clustered in the east bank of the Anchang River, encompassing five square kilometers of construction land for short-term resettlement of 35,000 people (including survivors from the old county town) with a long-term plan of settling 50,000 people.



New Beichuan City

Day 2 (May 16, 2018): Wenjiagou debris flow → Xiaogangjian debris flow



The detail route map of Group two Day 2 (① Wenjiagou debris flow; ② Xiaogangjian debris flow)

#### 4. Wenjiagou Debris Flow Remediation and the Town Reconstruction in Qingping Town- the Biggest Debris Flow Disaster Point after the Wenchuan earthquake

Wenjiagou is located in the north of Qingpingchang Town in the northwestern part of Mianzhu City, Sichuan Province. After the devastating 5·12 Wenchuan Earthquake in 2008, many debris flows took place in the earthquake-affected areas, and the debris flow in Wenjiagou, Qingping town, was the most significant. Wenjiagou was not originally a debris flow gully, but the huge landslide-debris accumulation caused by the Wenchuan earthquake has changed Wenjiagou into a debris flow gully. In the following three rainy seasons, Wenjiagou produced five large debris-flow disasters (2008.9.24, 2010.7.31, 2010.8.13, 2010.8.19, and 2010.9.18), of which, the “8·13” debris flow in Wenjia Gully was the largest and most harmful.



**Xiaogangjian debris flow**

After the "8·13" debris flow comprehensive remediation work was carried out and completed in 2011. In flood seasons, it has stood the test. Now, a debris-flow management and training base and a national geological park have been set up in Wenjiagou.



**Xiaogangjian debris flow**

## *Contact*

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