

SUMMARY
Utah Quaternary Fault Parameters Working Group Meeting
Thursday, March 3, 2005
Utah Department of Natural Resources Building, Room 1060
1594 West North Temple, Salt Lake City

Welcome and Introduction

William Lund (Utah Geological Survey [UGS]) called the 2005 Utah Quaternary Fault Parameters Working Group Annual Meeting to order at 8:15 a.m. Following a welcome and introduction of the Working Group members and guests in attendance (see attached list), Bill provided a brief summary of the Working Group's activities to this point and outlined the purpose and goals of the Working Group for the future.

Purpose

UQFPWG is now one of four standing committees created to help set and coordinate the earthquake-hazard research agenda for the State of Utah

Goals

Review ongoing paleoseismic research in Utah

Provide advice/insight regarding technical issues related to fault behavior in Utah and the Basin and Range Province in general

Identify/prioritize future Utah Quaternary fault studies – NEHRP funded or otherwise

Technical Presentations

The remainder of the morning was devoted to summary presentations on ongoing and upcoming paleoseismic research in Utah, and a discussion of establishing a methodology for updating the soon to be published UQFPWG consensus vertical slip rate and recurrence interval database. Presentations included:

1. Extending the Paleoseismic Record of the Provo Segment of the Wasatch Fault: Preliminary Results from the Mapleton Megatrench – the Sequel *by Susan Olig, URS Corporation*
2. Surficial Geologic Map of the Fayette Segment of the Wasatch Fault *by Michael Hylland*
3. Sevier Fault Paleoseismic Reconnaissance *by William Lund*
4. 2004 Utah Quaternary Fault and Fold Database Update *by Christopher DuRoss*
5. Current and Suggested Future Paleoseismic Studies of the North and South Ends of the Wasatch Fault Zone Utah *by Michael Hylland*
6. 2005 NEHRP Trenching Along the Nephi Segment *by Christopher DuRoss*
7. Updating the UQFPWG Consensus Document – How Should It Be Done? *by William Lund.*

* *PowerPoint versions of these talks are available on CD-ROM upon request to the UGS.*

Regarding updating the UQFPWG consensus database, the Working Group directed the UGS to perform a detailed review of new paleoseismic-trenching data as it is published, and to provide a summary of that information to Working Group members in a manner similar that followed during the Working Group's previous review of existing trenching data. The Working Group will then meet as necessary (at least annually) to evaluate the new data and recommend consensus vertical-slip-rate and recurrence-interval values for inclusion in the database. A strong recommendation was also made for a formal field review of paleoseismic-trenching results prior to closing the trenches, so that any technical issues can be identified early and corrected prior to publication of final study results.

Technical Discussion Items

Following lunch, the Working Group considered two technical discussion items:

1. Basin and Range Province Earthquake Working Group, and the
2. Wasatch Fault Multi-Segment Rupture Model.

Basin and Range Province Earthquake Working Group

The Basin and Range Province Earthquake Working Group (BRPEWG) is an outgrowth of the Western States Seismic Policy Council (WSSPC) -sponsored Basin and Range Seismic Hazard Summit II (BRPSHSII) held in May 2004 in Sparks, Nevada. One result of BRPSHSII was a WSSPC policy statement recommending that a working group consisting of experts familiar with seismic hazards in the Basin and Range Province (BRP) be convened to consider a series of questions relevant to seismic hazards in the BRP and of importance to future updates of the National Seismic Hazard Maps (NSHMs). The questions identified by WSSPC are:

1. Use and relative weighting of time-dependent, Poisson, and clustering models to characterize BRP fault behavior.
2. Proper magnitude-frequency distributions (Gutenberg-Richter vs. characteristic earthquake models) for BRP faults.
3. Use of length vs. displacement relations to estimate earthquake magnitudes.
4. Probabilities and magnitudes of multi-segment ruptures on BRP faults.
5. Resolving discrepancies between horizontal geodetic extension rates and vertical geologic slip rates.
6. Appropriate attenuation relations, stress drops, and kappa in modeling ground motions, including evidence from precarious rock studies.

At the behest of WSSPC and with funding from the U.S. Geological Survey (USGS), the UGS has taken the lead in organizing BRPEWG. It was the UGS' intention at this meeting to solicit UQFPWG's input regarding (1) the seismic-hazard questions to be considered by BRPEWG, (2) who should be invited to serve on BRPEWG, and (3)

which subject-matter experts should be invited to present information to BRPEWG regarding the questions being considered.

Mark Petersen (USGS) informed the Working Group that the USGS intends to convene a two-day meeting in October 2005 to consider which attenuation relations to use in the next generation of NSHMs nationwide, and that issues relevant to ground shaking in the BRP will be considered in that meeting (question 6). Mark also indicated that the USGS has tentatively scheduled a meeting in March 2006, likely in Salt Lake City, to consider new technical information from the BRP relevant to the NSHMs. Mark recommended postponing BRPEWG until after the March 2006 meeting so that BRPEWG members have access to the most recent technical data available for the BRP. Also, USGS could move the March 2006 meeting up if needed.

Other suggestions included that we group the questions (perhaps 1,2, & 5 and 3 & 4) and consider several meetings to better target specific groups of professionals, and that we focus the questions as they apply to BRP issues, since most of the questions have national relevance. We decided the BRPEWG meeting need not be scheduled around the 2007 NSHM update, since these far-reaching questions will probably not be resolved in time to be incorporated into the 2007 NSHMs. Also, USGS will need time to prepare scenario maps for the BRPEWG meeting to show the effects of the various possible alternatives on the NSHMs. We did not discuss possible BRPEWG members.

Wasatch Fault Multi-Segment Rupture Model

Chris DuRoss (UGS) presented preliminary results regarding development of a multi-segment rupture model for the Wasatch fault (WF). The results consisted of a composite figure illustrating various aspects of fault zone complexity, along strike gravity data, long-term uplift rates, surface-faulting slip distribution, and surface-faulting timing. The Working Group's comments focused chiefly on how Chris had illustrated earthquake timing on the various WF segments. Chris' approach delineated the broadest possible window over which surface-faulting events on the segments may have occurred. The Working Group recommended that Chris instead use the most closely limiting timing data available (see McCalpin and Nishenko, 1996 and Lund, 2005) to depict the narrowest range over which surface faulting may have occurred. Once the earthquakes are limited to their smallest possible window of occurrence, it will be possible to see which events have the greatest likelihood of having ruptured more than one fault segment. We also should compare displacements to rupture lengths to see if displacements indicate multi-segment ruptures, and investigate applying the quantitative approach to earthquake dating used by Biasi et al. and Weldon et al. on the San Andreas fault to the WFZ trench data.

Paleoseismic Proposals/Partnerships for 2006

The Working Group reviewed their previous recommendations regarding faults requiring additional paleoseismic studying Utah (Lund, 2005) and concluded the following:

1. That the Weber segment is the WF segment with evidence for multiple Holocene surface-faulting earthquakes for which the chronology of surface faulting is most poorly understood, leading to questions about long-term fault behavior, timing of the most recent event, and possible multiple-segment or partial-segment ruptures.
2. That the West Valley fault zone has high relevance to seismic hazards in the Salt Lake Valley and that its relation to the Salt Lake City segment of the WF needs to be determined.
3. That the faults beneath Utah Lake remain a largely unevaluated hazard in Utah Valley and should be investigated to determine their relation to the Provo segment of the WF.
4. That urbanization is progressing rapidly along the East Cache fault zone for which conclusive data regarding surface-faulting activity is only available for one of four proposed fault sections.
5. That Utah's Quaternary faults should be classified (A through D) in a manner similar to the faults included on the USGS Quaternary Faults and Folds Database of the United States.
6. Studies be performed to resolve the seismogenic vs. nonseismogenic nature of certain faults.

Jim Pechmann stated the he and David Dinter of the University of Utah would likely submit a 2006 NEHRP proposal to investigate the faults beneath Utah Lake. The UGS will likewise submit a NEHRP proposal to better define the chronology of surface faulting on the Weber segment. No other proposals for 2006 NEHRP funding were identified.

Following the above discussion on paleoseismic-study priorities and NEHRP grant proposals, the Utah Quaternary Fault Parameters Working Group Meeting was adjourned at 4:30 p.m.

Meeting Attendees

Quaternary Fault Parameters Working Group

Bill Black, Western GeoLogic
Ronald Bruhn, University of Utah
Wu-Lung Chang, University of Utah
Gary Christenson, UGS
David Dinter, University of Utah
Chris DuRoss, UGS
Kathleen Haller, USGS
Ronald Harris, BYU
Michael Hylland, UGS
William Lund, UGS
James McCalpin, GEO-HAZ Consulting
Susan Olig, URS Corporation

Dean Ostenaar, U.S. Bureau of Reclamation
James Pechmann, University of Utah
Mark Peterson, USGS
David Schwartz, USGS
Ivan Wong, URS Corporation

Guests

David Simon, SBI-Simon and Bymaster, Inc.
Charles Payton, AMEC, Inc.