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Calendar of Events

JANUARY 2007

12
USSC Meeting
CONSONUS, West Jordan
R.S.V.P Only

FEBRUARY 2007

22
City & County Directors Conf.
Salt Lake City, Utah

MAY 2007

8
Western States Geologists Conf.
St. George, Utah

10
USSC joint meeting w/Nevada
St. George, Utah

31
City & County Directors Conf.
Salt Lake City, Utah

AUGUST 2007

20-24 (Tentative Dates)
Public Officials Conference
Park City, Utah

UTAH “SHAKES” IN AUGUST

BY GARY E. CHRISTENSON

Utah hosted two unique urban seismic surveys in August this year. Both surveys were designed to give us a better understanding of geologic conditions deep in Wasatch Front basins that can amplify earthquake ground motions. The University of Texas at Austin (UTA) brought a specially designed shaker truck to measure conditions down to 1000 feet, and the U.S. Geological Survey (USGS) performed deeper surveys to discern conditions down nearly a mile.

These projects were performed in cooperation with Utah’s Ground Shaking Working Group, which is coordinating collection of data to develop a “community velocity model” (CVM) for the Wasatch Front. The CVM will characterize shear-wave velocity of basin-fill materials and depth to bedrock in the deep sediment-filled Wasatch Front basins beneath Ogden, Provo, and Salt Lake City. The CVM will use these data in a three-dimensional computer model to estimate how sites will respond when a large earthquake occurs. Presently, we lack shear-wave-velocity data from the 100- to 1000-foot depth interval, as well as data on the dip of the Wasatch fault and depth to bedrock. These new surveys will help fill these gaps.

One of the Network for Earthquake Engineering Simulation (NEES) sites funded by the National Science Foundation is at UTA, which has developed several large-scale mobile “shaker” trucks specifically designed for dynamic field testing. One of these shakers, informally known as the “Liquidator,” is designed to generate long-period (low-frequency) seismic waves that allow penetration deeper than other methods for direct shear-wave-velocity measurements. Under a UTA project funded by the USGS National Earthquake Hazards Reduction Program, which was also subsidized by NEES for equipment mobilization, the “Liquidator” came to Utah to perform about 10 deep soundings around Salt Lake Valley to determine shear-wave velocity of sediments to depths of 1000 feet. Ken Stokoe is director of the NEES program at UTA; Bradley Wilder, a graduate student at UTA, headed the Utah operation; and Jim Bay, Utah State University and UTA associate, provided technical oversight. The Utah Geological Survey and Utah Department of Transportation (UDOT) assisted in identifying sites; several local property owners graciously gave permission to perform surveys on their property.

UTAH “SHAKES” IN AUGUST CONTINUED

In addition, the USGS has been performing various seismic surveys using a smaller vibratory “shaker” truck in Utah since 2003 to contribute to developing Utah’s CVM for the Wasatch Front. This year, the USGS performed several long, deep primary-wave (P wave) seismic-reflection surveys in Utah Valley in the Mapleton and Provo areas using the “minivibe” shaker truck built to generate P waves. Rather than collecting a shear-wave-velocity profile at a point as the “Liquidator” does, the USGS surveys will provide cross-sectional images several miles long extending west from the mountain front on the east side of Utah Valley. From these images, we will be able to model the dip of the Wasatch fault and the depths to bedrock and other layers in the subsurface. Bill Stephenson and Rob Williams of the USGS Denver office headed the effort. The USGS worked with faculty from the University of Utah and Brigham Young University, Bill Keach and John McBride. UDOT provided rights-of-way to perform work along state highways.

The “Liquidator” surveys were run in late July-early August over a period of about 1½ weeks. Local seismologists, engineers, and geologists visited a site on August 3 to view the operation and experience the ground shaking. The USGS was in Utah for about a week in late August. The data from these surveys will be processed and provided to the researchers developing the CVM. Preliminary results will be presented at Utah’s Earthquake Working Group meetings in February or March 2007. This new work will allow for a much more accurate characterization of relatively deep geologic conditions, and should produce some exciting results.



Local scientists and engineers view “Liquidator” in action near the I-80/5600 W. intersection in Salt Lake City on August 3, 2006.



USGS minivibe working along Utah State Highway 147 between Spanish Fork and Mapleton.

EARTHQUAKE PROGRAM MANAGERS MEET IN SALT LAKE CITY

BY BOB CAREY

Earthquake program managers from across the county met in late June in Salt Lake for their annual program managers meeting. The annual meeting is designed to share program information from each of the states, to hear program updates from the National Earthquake Hazards Reduction Program (NEHRP) agencies and to receive training.

The meeting featured a field trip in the Salt Lake Valley to view the Wasatch fault and two retrofit projects. The managers received an overview of the State Capitol retrofit, toured the University of Utah Marriott Library retrofit project which is Utah's first Pre-Disaster Mitigation Competitive Grant project, and viewed Wasatch fault at the mouth of Little Cottonwood Canyon.

The meeting wrapped up with presentations on developing Clearinghouses, using HAZUS for catastrophic planning, and developing stronger tsunami programs. The 2007 National Program Managers Meeting will be held in Tennessee in late April.



Tour of the University of Utah Marriott Library retrofit.



View of the Wasatch Fault at the mouth of Little Cottonwood Canyon.

USSC VOTES IN A NEW CHAIR

Peter McDonough has been a natural gas distribution and pipeline engineer for 30 years. He has a BS in Civil and Environmental Engineering from Clarkson College of Technology, Potsdam N.Y. and MS in Civil Engineering from the Polytechnic Institute of New York. He is a Licensed Professional Engineer. Since 1979 he has been involved with earthquake engineering design in Utah. A member of the Earthquake Engineering Research Institute, he is also of the American Society of Civil Engineer's Technical Council on Lifeline Earthquake Engineering. With this being his second time as the Chair for the Commission, his vision for USSC is to build on successes of the various committees and to make the USSC better known among the larger community. Vice-Chair's were also elected at the July meeting. The Commission unanimously voted Kerry Baum and Roger Evans to that position.

UNIVERSITY OF UTAH QUARTERLY SEISMICITY SUMMARY

EARTHQUAKE ACTIVITY IN THE UTAH REGION

April 1 – June 30, 2006

by R. Burlacu, P. M. Roberson, and M. Kline
with contributions by W. J. Arabasz, J. C. Pechmann, and K. L. Pankow

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During the three-month period April 1 through June 30, 2006, the University of Utah Seismograph Stations (UUSS) located 653 earthquakes within the Utah region (Figure 1). The total includes one earthquake in the magnitude 4 range, two earthquakes in the magnitude 3 range, and 35 earthquakes in the magnitude 2 range. Earthquakes of magnitude 3.0 or larger (plotted as stars and specifically labeled on Figure 1) are listed below. Two earthquakes were reported felt during the report period (see Table 1, a cumulative tabulation of earthquakes during 2006 that were either felt in the Utah region or for which a ShakeMap was produced, or both). Additional information on earthquakes within the Utah region is available from the University of Utah Seismograph Stations.

Online Information

A complete copy of this report, including maps and the earthquake catalog, is available on the UUSS Web site at <http://www.seis.utah.edu/catalog/quarterly.shtml>. ShakeMaps—computer maps of the ground shaking produced by an earthquake—are automatically produced by UUSS for earthquakes of magnitude 3 and larger within the Wasatch Front urban area. On November 30, 2005, UUSS extended its capability for producing ShakeMaps to the entire Utah region for shocks of magnitude 4.0 or larger; in the greater Wasatch Front area, outside the urban corridor, the threshold is magnitude 3.5. The ShakeMaps are accessible on the UUSS Web page at <http://www.seis.utah.edu/shake>. Earthquakes during 2006 for which ShakeMaps are available are indicated in Table 1. For earthquakes of magnitude 3 and larger in the Utah region, the U. S. Geological Survey automatically posts a Community Internet Intensity Map (CIIM) on its "Did You Feel It?" Web page at <http://pasadena.wr.usgs.gov/shake/imw>. We urge anyone who feels an earthquake to report their observations on this interactive Web site; felt information is available by zip code on the CIIM site or can be obtained from UUSS directly.

Earthquakes of Magnitude 3.0 or Larger

ML 3.0 May 4 05:16 MDT 7 mi ENE of Helper, UT

ML 3.4 June 11 04:01 MDT 3 mi NE of Strawberry Reservoir, UT (felt, CIIM intensity map and ShakeMap available, see Table 1)

ML 4.3 June 30 10:55 MDT 11 mi WSW of Georgetown, ID (felt, CIIM intensity map and ShakeMap available, see Table 1)

Other Notable Seismicity

During the report period, there were four notable spatial clusters of natural earthquake activity (labeled A to D in Figure 1). For reporting purposes, we define a cluster as ten or more earthquakes occurring within a 10-km (6-mile) radius during the report period. Referring to the epicenter map (Figure 1), these include the following—from north to south (all dates below are UTC unless otherwise noted):

A. A cluster of 20 earthquakes ($1.0 \leq M \leq 4.3$) occurred about seven miles SW of Georgetown, ID (~50 miles NE of Logan). Nineteen events, including the magnitude 4.3 shock, occurred on June 30.

B. A cluster of 16 earthquakes ($0.5 \leq M \leq 2.5$) occurred about twenty four miles WNW of Garland, UT (~40 miles WNW of Logan). Ten events, including a magnitude 2.5 shock, occurred between June 19 and June 28.

C. A cluster of 11 earthquakes ($0.8 \leq M \leq 2.9$) occurred about thirty three miles W of Garland, UT (~50 miles W of Logan). Five events, including a magnitude 2.9 shock, occurred on May 20.

D. A cluster of 13 earthquakes ($0.1 \leq M \leq 1.8$) occurred about six miles ENE of Providence, UT (~6 miles E of Logan). All events, including a magnitude 1.8 shock, occurred between June 15 and June 17.

In Figure 1, the locally clustered seismic events within a radius of approximately 30 miles of Price, together with a localized cluster about 50 miles to its southwest, are associated with known areas of underground coal mining and are interpreted to be mining-related. These include a total of 472 located shocks ($0.6 \leq M \leq 3.0$) that occurred throughout the report period.

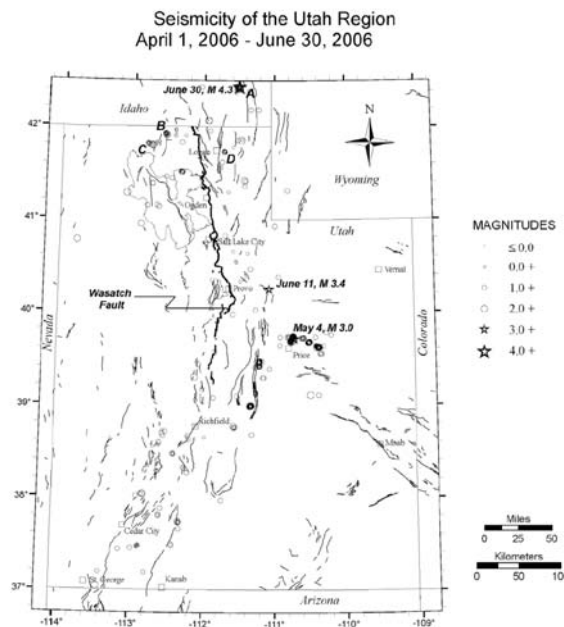


Figure 1. Earthquake epicenters, located by the University of Utah Seismograph Stations, superposed on a map of Quaternary (geologically young) faults compiled by the Utah Geological Survey. The Wasatch fault is shown in bold. Earthquakes of magnitude 3.0 and larger are labeled by local date and size. Earthquake clusters labeled A to D are discussed in the text.

UTAH SEISMIC SAFETY COMMISSION MEETING NOTES

JULY 2006 BY AMISHA LESTER

On July 28, 2006, a regularly scheduled quarterly meeting of the Utah Seismic Safety Commission was held in Room 5112 at the State Office Building, Salt Lake City, Utah.

Barry Welliver opened up nominations for Chair and Vice Chair for the USSC. Paper ballots were passed around for the Commission to vote on. After compiling the ballots, Pete McDonough was elected as Chair and both Kerry Baum and Roger Evans as Vice Chairs.

Julie Ott, ABS Consulting, gave a presentation to the Commission regarding the Jordan Valley Water Conservancy District Seismic Upgrade Program. The Commission discussed the program with Julie and asked for a possible tour of the facility for a future Commission meeting. For further information regarding the seismic upgrade, logon to www.absconsulting.com.

Renee Murphy, Utah Division of Homeland Security, gave a presentation on Business Continuity Planning in Utah. Renee asked to possibly have a representative from the Commission to sit on the Homeland Security Coordinating Council. All meetings are held on the second Friday of each month in the State Office Building Auditorium from 8:30 – 9:30 a.m. For further information about Renee's presentation, logon to www.BeReadyUtah.org.

Doug Bausch, FEMA Region VIII, gave a presentation and update on FEMA activities and HAZUS in Utah. His presentation gave the history of HAZUS and its beginnings to its present structure and workings. For more information on HAZUS and FEMA, logon to www.fema.gov/hazus.

Other meeting notes...

Bob Carey reported on the 2006 Pre-Disaster Mitigation (PDM) Grants. Utah received grants for four out of the five that were submitted. Activities in Utah include: Unified Fire Authority Station earthquake hardening, Ogden City Fire Station seismic retrofit and reconstruction, Jordan Valley water treatment plant filter gallery and chemical control buildings seismic retrofit, and Wasatch Front PDM Plan update.

Bob reported that the 2006 Earthquake Program Managers Meeting held here in Utah, was very well received. The meeting had several sessions on Clearinghouses and a session on Tsunamis that were very interesting.

Walter Arabasz gave a brief update on the "Putting Down Roots" brochure. An ad hoc committee that includes, Barry Welliver, Gary Christenson, Walter Arabasz, and Bob Carey are currently working on the brochure.

Barry also spoke on the URM initiative and informed the Commission that he will come prepared next meeting with Doug Bausch's assistance to discuss a possible inventory in the state.

The Commission discussed the possibility of a joint meeting with Nevada in Zion National Park for the October 2006 meeting. Due to time constraints and lack of conference rooms, the Commission has decided to possibly have the joint meeting 6-12 months out. Rick Allis mentioned the possibility of having the joint meeting during the Geological Society of America Rocky Mountain Section meeting, which will involve a meeting of state geologists, held in St. George in the spring 2007. The Commission will continue to work on the joint meeting.



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USSC DEVELOPS NEW BROCHURE

BY BOB CAREY

An ad-hoc committee from the Utah Seismic Safety Commission has been meeting over the past several months developing a new preparedness brochure. The brochure will replace the preparedness brochure, "EARTHQUAKES, What You Should Know When Living In Utah", published by the Utah Office of Emergency Services, now the Utah Division of Homeland Security. Commission members were approached by the US Geological Survey to develop a preparedness brochure similar to the Bay Area's brochure, "Putting Down Roots".

The brochure will contain information about the earthquake hazard that will impact Wasatch Front along with secondary hazards like landslides and liquefaction. The brochure will have sections on seismicity, engineering, and preparedness. There will be statistical data on building losses, casualties, and other damage estimates in the brochure provided by HAZUS-MH, a FEMA loss-estimation software. The brochure is estimated to be out early summer 2007.