

Learning from Earthquakes

Eastern Turkey EQ Update

An M_w 7.1 (USGS) earthquake in the Van region of eastern Turkey on Sunday, 23 October 2011, at 1:41 p.m. local time, claimed 604 lives. The town of Ercis, population ~80,000 and located about 30 km NNW from the estimated epicenter, was hit hardest with 191 buildings subject to rescue and recovery operations. The main city of Van, population ~400,000 and located about 25 km SW from the estimated epicenter, was relatively spared with no more than six building collapses reported. While there have been numerous aftershocks in the primary faulting region, believed to be an oblique-thrust faulting zone, on 9 November 2011 an M_w 5.7 (USGS) earthquake occurred about 15 km south of the main city of Van. This latter event claimed 40 lives, caused further damage in Van, including 25 additional building collapses (22 of which were condemned following the quake

on October 23), and brought life in the city to a standstill.

EERI members Ricardo Hernandez (Degenkolb Engineers), Ayhan Irfanoglu (Purdue University), Rafael Alaluf (EQRM Int'l, Istanbul), and Cemalettin Donmez (Izmir Institute of Technology) traveled to the region 26 October-1 November. They joined reconnaissance teams from Middle East Technical University (Ankara) and Dicle University (Diyarbakir) to inspect buildings in Ercis and Van. The team found that the vast majority of buildings were made of reinforced concrete, and that many of the damaged buildings suffered from fundamental design errors, including inadequate lateral-

load-resisting systems, soft stories at ground level (open and tall ground stories for commercial use), floor torsion (Figure 1), mezzanine-level construction resulting in disproportionate loading of structural elements (Figure 2), flexible joist floors with infills, and captive columns. The team also found widespread substandard construction practices, including inappropriate reinforcing detailing and poor quality concrete, suggesting the absence of proper inspection and quality control during the construction process.

EERI members will be notified when a report by the team is posted on <http://www.eqclearinghouse.org/2011-10-23-eastern-turkey/>.



Figure 1. A heavily damaged six-story building in Ercis. The structural layout resulted in excessive floor torsion. The flexible joist floors with block infills had cracks around columns at every floor level. The columns failed at the base of the ground story (photo: A. Irfanoglu).



Figure 2. A newer building in Ercis with a typical tall ground story and mezzanine level for commercial use (photo: A. Irfanoglu).

Forensic Disaster Analysis at CEDIM

The Center for Disaster Management and Risk Reduction Technology (CEDIM, www.cedim.de) — an interdisciplinary research center founded by the German Research Centre for Geoscience (GFZ) and Karlsruhe Institute of Technology (KIT) — has embarked on a new style of disaster research known as Forensic Disaster Analysis (FDA). The notion has been coined by the Integrated Re-

search on Disaster Risk initiative (IRDR, www.irdrinternational.org) launched by the ICSU (International Council for Science) in 2010. This approach to studying natural disasters aims at uncovering their root causes through in-depth investigations that go beyond reconnaissance reports and case studies, in order to help build an understanding of how natural hazards do, or do not, become disasters.

In adopting this approach, CEDIM adds a real-time component to the

assessment and evaluation process. Most if not all relevant aspects of disasters are considered and jointly analysed. This includes the impact (human, economy, and infrastructure), comparisons with recent historic events, social vulnerability, reconstruction, and long-term impacts on livelihood. The FDA mode is thus best characterized as “event-based research” through systematic investigation of critical issues arising after a disaster across interrelated areas.

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