

Indonesia, Pakistan and Turkey face Seismic Threats

Indonesia, Pakistan, Turkey and Japan were hit by series of earthquakes but no large scale destruction has been reported so far. The detail of these seismic threats are as under:

Indonesia: Indonesia has been under continuous seismic threat for some period of time, number of earthquake have been reported so far. A major earthquake occurred 130 km (80 miles) WNW of Ternate, Moluccas 165 km (100 miles) E of Manado, Sulawesi, Indonesia at 5:27 AM MDT, Jan 21, 2007. One person died of a heart attack, 3 others killed, 4 others injured and minor damage to some buildings at Mandano, Sulawesi, Indonesia. Earthquake was felt (VI) on Ternate; (VI) at Bitung and Tondano, (V) at Kotamobagu, (IV) at Gorontalo, Sulawesi; (IV) in southern Halmahera, Indonesia. Its magnitude was 7.1 (major) at a location of 1.222°N, 126.395°E and depth of 22 km (13.7 miles). Another earthquake of magnitude 5.0 hit the same region of Indonesia on Monday, February 12, 2007 at 11:44:10 AM local time with epicenter at distances of 185 km (115 miles) W of Sibolga, Sumatra, Indonesia, 280 km (175 miles) SW of Medan, Sumatra, Indonesia, 540 km (335 miles) WSW of KUALA LUMPUR, Malaysia, 1365 km (850 miles) NW of JAKARTA, Java, Indonesia. Its location was 1.54N 97.12E at a depth of 30.0 Km. On Wednesday 14th Feb again earthquakes of magnitude 5.4 and 5.7 were reported in the Nias region. One more quake of magnitude 5.5 was observed on 1st March at 9:01am local time in the same region. However no damages were reported so far

Pakistan An earthquake of magnitude 4.9 occurred in Pakistan at 130 km (80 miles) NE of Chitral Pakistan, 155 km (95 miles) NW of Gilgit Kashmir, 155 km (95 miles) SE of Khorugh Tajikistan, 340 km (210 miles) N of ISLAMABAD, Pakistan on Sunday 11th Feb, 2007 at 4:39:18. Another, mild intensity earthquake measuring 4 on Richter scale was observed at 175 km (110 miles) WNW of Deraj Ghazi Khan, Pakistan, 180 km (110 miles) E of Quetta, Pakistan, 235 km (145 miles) N of Jacobabad, Pakistan, 545 km (340 miles) SW of ISLAMABAD, Pakistan, on Monday, January 22, 2007 at 17:04:41.

Turkey:

Eastern Turkey: An earthquake of 3.4 magnitude struck on Saturday, February 10, 2007 at 05:01:58 PM local time at epicenter at 25 km (15 miles) SW of Karakose (Agri), Turkey, 115 km (70 miles) SSW of Kars, Turkey, 130 km (80 miles) NNW of Van, Turkey, 855 km (530 miles) E of ANKARA, Turkey. Its location was observed to be 39.59N 42.79E at a shallow depth of 5.0 Km.

Just an hour before that earthquake a minor earthquake of magnitude 2.8 was also recorded at 04:09:19 PM local time with epicenter at a distances of 35 km (20 miles) S of Elazig, Turkey, 75 km (50 miles) E of Malatya, Turkey, 105 km (65 miles) NE of Adiyaman, Turkey, 575 km (355 miles) ESE of ANKARA, Turkey. Its location was 38.37N 39.18E and it was too at depth of just 6.0 Km.

Western Turkey:

Just before the earthquakes in Eastern Turkey on Feb 10, 2007 an earthquake of 2.8 magnitude was also recorded in the west part on 2:55:51 PM local time with epicenter at distances of 70 km (45 miles) SW of Istanbul, Turkey, 75 km (45 miles) NW of Bursa, Turkey, 85 km (50 miles) ESE of Tekirdag, Turkey, 390 km (240 miles) WNW of ANKARA, Turkey. Its location was 40.57N 28.35E and it was at a much greater depth of 17.0 Km. Another earthquake of a greater magnitude of 4.1 struck on Wednesday, February 07, 2007 07:25:14 AM local time having epicenter, at 75 km (45 miles) WSW of Antalya, Turkey, 140 km (90 miles) SSW of Isparta, Turkey, 155 km (95 miles) SSE of Denizli, Turkey, 450 km (280 miles) SW of ANKARA, Turkey. Its location was 36.57N 29.95E at a depth of 28.1 Km. However no casualties were reported so far in both areas.

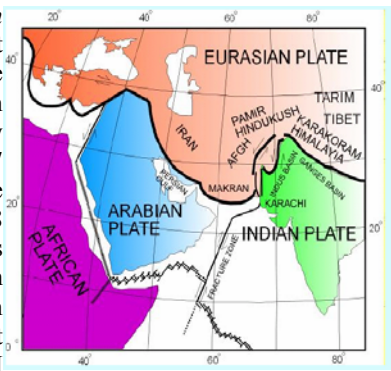


Fig: World Plate Tectonic

Source: www.usgs.gov

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EDITORIAL

The first issue of Volume 7 of CESNED Newsletter in hand is a reflection of the consistent policy of disseminating related knowledge. CESNED has always taken a lead in developing working relationships with known centers of leading universities and professional bodies and its aspiring to serve community through its outreach activities. CESNED in continuation of its endeavors

organized seminars and workshops which were addressed by leading experts

CESNED is striving hard for its cause and hope that the Newsletter would receive your personal attention and patronage, keeping in mind that every effort, how modest it may be, needs at least a moral support.

Editor

A MINERALOGICAL TECHNIQUE TO STUDY FAULT MOVEMENT

A generic relationship exists between the fault movement and clay mineral formation. Pronounced changes in clay mineral assemblages are preserved along the faults. The study of fault related changes in clay mineralogy is being used as an effective tool to establish the age of the fault activity. Clay minerals formation on the fault plane helps in the detection of displacement along faults or finding evidence of reactivated structures. The authigenic clay mineral phases usually called as fault gouge forms thin film coatings on the fault plane surfaces and can be recognized in hand specimen by the occurrence of well polished surfaces. The mineralogical and isotopic analysis of this gouge material helps not only to establish the age of any fault activity but are also used for determining the evolution of the faults. The mineralogical studies of fault gouge include the identification of detrital and authigenic clays and identification of fault related changes in the clay mineral assemblages. The authigenic clays are the result of hydrothermal fluids and include minerals mainly illite, smectite and discrete illite/mixed-layer illite-smectite. The interseismic, coseismic or postseismic periods can also be interpreted on the basis of formation of these authigenic clays. The Modeling of fluid behavior along faults in terms of formation of gouge material present can be done to interpretate the fault activities.

Studies of clay minerals in fault zones also have implications for fault mechanics. Clay growth in fault zone & the influence of clay on the permeability structure of fault zone are responsible for weak faults. The fabric of clay minerals is used to understand the controls on the fluid movements along the fault plains. Timing of mineralization of faults is usually determined by $^{40}\text{Ar}/^{39}\text{Ar}$ or K/Ar dating of authigenic clay content of fault gouge. The methods include Ar dating of illite-smectite or illite as well as new approach that uses illite polytype (1Md). This technique of absolute dating is considered useful in characterizing latest activity on major faults.

The Mega city Karachi with an estimated population of over 14 million is surrounded by several active faults and has a recorded history of earthquakes. Though the present level of seismicity is low as compared to rest of the country especially the northern parts, some large magnitude of earthquake have occurred along the fault system occurring around the region in the past. Although there is limited geophysical

data available, the history of the fault system still cannot be reconstructed, furthermore no mineralogical study on the fault gouges in these fault systems has been undertaken, despite the potential of such studies to understand the evolution of these fault systems.

The identification and establishment of movements along these faults are indispensable for the development of earthquake friendly infrastructure in this city. For the purpose it is high time to consider the study of these potential fault systems by utilizing the mineralogical technique in addition to other geophysical and geological methods.

Source: CESNED by Dr Abid Murtaza

World Wide Earthquake 2000-2007								
Magnitude	2000	2001	2002	2003	2004	2005	2006	2007
8.0 to 9.9	1	1	0	1	2	1	1	2
7.0 to 7.9	14	15	13	14	14	10	10	2
6.0 to 6.9	158	126	130	140	141	142	132	447
5.0 to 5.9	1345	1243	1218	1203	1515	1694	1483	2453
4.0 to 4.9	8045	8084	8584	8462	10888	13920	13069	1554
3.0 to 3.9	4784	6151	7005	7624	7932	9185	9953	655
2.0 to 2.9	3758	4162	6419	7727	6316	4636	4016	613
1.0 to 1.9	1026	944	1137	2506	1344	26	19	5
0.1 to 0.9	5	1	10	134	103	0	2	0
No Magnitude	3120	2938	2937	3608	2939	865	849	453
Total	22256	23534	27454	31419	31194	30479	29534	5575
Estimated Deaths	231	21357	1685	33819	284010	89354	6605	4

Source: www.usgs.gov

CESNED ACTIVITIES

Seminar on “Seismic Hazards With Special Reference To Karachi ,Pakistan.

On Saturday 27th January 2007, a one-day seminar titled: “**Seismic Hazards with special References to Karachi, Pakistan**” was held by the Department of Civil Engineering Participants from various professional bodies, organizations, government agencies and NGO’s from different parts of the country along with students of NED University attended the seminar. The seminar focused on the realities and facts regarding seismic hazards in Pakistan with special reference to Karachi. Technical sessions included two presentations first one presented by Prof .Dr.Roger Bilham, Geological Sciences ,University of Colorado ,USA. And second presentation was given by Dr.Susan Elizabeth Hough, Seismologist ,United States Geological Survey respectively. All the participants lauded the efforts of the department of Civil Engineering, NED university of Engg and Technology in organizing a very informative and valuable seminar. In the end Prof Dr Rafeeqi distributed souvenirs to the respected speakers and thanked all participants and the organizing committee of the seminar in his closing remarks.Fig1



Fig 1 Dr.Roger Bilham presenting

Two Day Workshop on “Seismic Hazards Assessment ”

A workshop on “**Seismic Hazards Assessments** “ was organized by Department of Civil Engineering from 23rd January to 24th January. Renowned earthquake experts Prof .Dr.Roger Bilham of University of Colorado, Dr.Susan Elizabeth Hough of United States Geological Survey and Prof. Dr.S.H.Lodi of Department NED University were the main speakers for the workshop. Faculty members and large number of students participated in the two day interactive workshop. Fig2



Fig2: Speakers with faculty members

Lecture on “Politics of New Humanitarian Aid and The Earthquake Disaster in Pakistan”

The Department of Civil Engineering in continuation of its endeavors organized a lecture on 20th December 2006 on “**Politics of New Humanitarian Aid and The Earthquake Disaster in Pakistan**” given by Dr.Naem Khalid an associate advisor to the British Council’s Chevening and member of panel of experts of the One World Trust’s Global accountability project, British Parliament. A large number of leading consultants, engineers, architects, academicians and students attended the lecture. Fig 3



Fig 3: Dr.Naem Kalid delivering his speech.

Series of Lectures by Dr.Tanvir Wasti

Series of lectures were organized by Department of Civil Engineering on 1st ,2nd and 21st March 2007. Renowned earthquake engineering expert Dr. Tanvir Wasti of Middle East Technical University, Turkey was the main speaker. First lecture which was on the topic “**Ramdom thoughts in Engineering**” which was attended by large number of undergraduate students. Second was for M.engg students on “**Earthquake: where is the fault?**” last one was on “**University Industry Interaction**” which was attended by large number of faculty members.



Fig 4: Dr.Tanvir Wasti delivering lecturer

CCEE holds 3 day course on “Latest Developments in Earthquake Engineering”

A 3 day course “**Latest Developments in Earthquake Engineering**” was organized by Centre for Continuing Engineering Education NED University in association with CESNED from 19th March to 21st March 2007. Renowned earthquake engineering expert Dr. Tanvir Wasti of Middle East Technical University, Turkey and Prof. Dr.SFA Rafeeqi, Dean (CEA) NED University were the main speakers for the course. A large number of leading consultants, engineers, architects, academicians and students participated in the 3 day interactive course.

“Building Pakistan’s Capacity for Instruction, Research, and Practice in Earthquake Engineering and Seismic Retrofit”

“Building Pakistan’s Capacity for Instruction, Research, and Practice in Earthquake Engineering and Seismic Retrofit” is Pakistan–US Joint earthquake related research project under cooperative program. **Dr. Sahibzada F.A. Rafeeqi ,Professor and Dean, Faculty Civil Engineering and Architecture,NED University of Engineering and Technology, Karachi** is the Principal Investigator from **Pakistan side** and **Dr. Brian E. Tucker,President ,GeoHazards International** is the Principal Investigator from **US side**.The other partner Institutions from **US side are Earthquake Engineering Research Center, University of California, Berkeley,John Blume Earthquake Engrg. Center, Stanford University,Pacific Earthquake Engineering Research Center Computers & Structures, Inc.** Several Engineering Universities, Building Control Authorities, Professional Bodies of Architects and Engineering and Civic Agencies are partners from Pakistan side.

The project summary is as follow

The project would build the capacity of Pakistan’s leading universities to teach and conduct research in earthquake engineering, and transfer the knowledge needed to seismically retrofit essential structures to both new graduates and practicing engineers, thus improving the country’s technical capacity for dealing with its earthquake risk. The approach integrates formal instruction in theory combined with practice using a case study of a group of existing buildings typical of the local building stock. It recognizes that earthquake engineering exists in a broader societal context that requires balancing safety and certainty with competing demands and values by employing multi-disciplinary earthquake risk management decision-making processes.

The project would build sustainable academic interest in earthquake engineering research by encouraging cooperative research and professional relationships with American researchers through an academic exchange element and a study tour in California, consultation on specific research topics with direct impact on seismic safety in Pakistan, and finally creation of a Pakistan Earthquake Engineering Research Agenda.The project would begin with an assessment by a team of Pakistani and American faculty members of current earthquake engineering curricula and the technology and knowledge transfer needed for developing the case study and training courses for practicing building professionals and students. Based on this assessment, the team would identify participants and teach state-of-the-art earthquake engineering concepts and seismic retrofit techniques to junior faculty and graduate students from NED University and other educational institutions.

A small group of ten key participants would visit California for education in and first-hand observation of seismic retrofit techniques, plus academic exchange with American researchers with the intent of encouraging future research collaboration. Throughout this process, participants would apply the concepts learned in the creation of a case study of a group of existing buildings that would then, along with theory, form the basis for courses in seismic assessment and retrofit, comprising both practical training courses for practicing professionals and academic courses integrated with the current curriculum. American faculty members would work with Pakistani participants to develop teach, evaluate, and revise these courses, which would be piloted in workshops for practicing professionals and as regular courses at NED University. After assessment and revision, the courses for practitioners would be taught at six workshops with twenty participants each in Islamabad, Muzaffarabad, and the four provincial headquarters, and four workshops would be held to train up to eighty additional instructors for both practical and academic courses.After three years, the project would result in: a) a cadre of university educators in Pakistan who are versed in earthquake engineering, the analysis of existing buildings, and the design of seismic retrofits; b) several case study buildings that have been evaluated and have had retrofit solutions designed; (c) academic exchanges between Pakistani and American researchers;d) courses in earthquake engineering and practical seismic retrofit that have been developed and taught to students of structural engineering and practicing structural engineers, respectively. The project would create a virtual center of excellence in earthquake engineering, a critical mass of knowledgeable faculty members from Pakistani and American institutions, and administrators with ties to American counterparts having common interests.

Inaugural Ceremony of Pakistan Chapter, American Concrete Institute

Pakistan Chapter, American Concrete Institute (ACI) has been reorganized at the Department of Civil Engineering, NED University of Engineering & Technology, Karachi. Formation of ACI Chapter will not only help in bringing together the various individuals and groups in Pakistan who are interested in learning as much as they can about concrete, it will also provide a platform for the development of standards for design and construction incorporating concrete and related materials in line with international standard practice.

Formal inaugural ceremony of the Chapter will be held on **Wednesday 23rd May, 2007 at 6:00 p.m.** at the Auditorium of NED University of Engineering and Technology, Karachi.

RESOURCE PERSONS:

- Prof. Dr. S. F. A. Rafeeqi
- Prof. S. H. Lodi

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Information, news items, short notes on research findings are invited from across the globe.