

FORWARD

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A devastating earthquake of magnitude Mw 7.7 rocked the Kachchh District, Gujarat State, India, on January 26, 2001. This earthquake was the most deadly in India's recorded history. As of March 20, about two months after the earthquake, official figures from the Government of India placed the death toll at 20,005 with 166,000 injured and 247 missing. The number of destroyed houses is estimated at 370,000 and damaged houses at 920,000 with 600,000 people left homeless. Because of the compressional stress resulting from India's northward collision with Asia, the Kachchh Peninsula has a long history of strong earthquakes.

With a Grant-in-Aid for Scientific Research from the Monbu-Kagaku-sho (Japanese Ministry of Education, Culture, Sports, Science and Technology), a research team was formed and dispatched to Gujarat for investigating seismological aspects of this earthquake and evaluating the earthquake damage. The team consisted of eighteen members including four Indian researchers. A list of the members is shown below. The research team set four main targets for the investigations, i.e., (1) search for surface faults associated with the earthquake, (2) aftershock observation for determining the configuration of the main-shock fault, (3) GPS monitoring of

Members of the Research Team

(1) Search for surface faults associated with the earthquake

Takashi Nakata	Hiroshima University, Japan
Hiroshi Sato	Earthquake Research Institute, University of Tokyo, Japan
Toshikazu Yoshioka	National Institute of Advanced Industrial Sci. and Technology, Japan
Javed N. Malik	JSPS Fellow at Hiroshima University, Japan

(2) Aftershock observation

Tamao Sato	Hirosaki University, Japan (Leader)
James J. Mori	Disaster Prevention Research Institute, Kyoto University, Japan
Hiroaki Negishi	National Research Inst. for Earth Sci. and Disaster Prevention, Japan
Ramesh P. Singh	Indian Institute of Technology Kanpur, India

(3) GPS monitoring of post-seismic deformation

Kaoru Miyashita	Ibaraki University, Japan
Teruyuki Kato	Earthquake Research Institute, University of Tokyo, Japan
Gurubax S. Lakhina	India Institute of Geomagnetism, India

(4) Evaluation of casualties and damage to buildings and lifelines

Hitomi Murakami	Yamaguchi University, Japan
Yoshiaki Hisada	Kougakuin University, Japan
Yasuhiro Hayashi	Disaster Prevention Research Institute, Kyoto University, Japan
Sumio Sawada	Disaster Prevention Research Institute, Kyoto University, Japan
Venkataramana Katta	Kagoshima University, Japan
Masanori Hamada	Waseda University, Japan
Dilip K. Paul	University of Roorkee, India

2. Seismological Aspects

post-seismic crustal deformation, and (4) evaluation of casualties and damage to buildings and lifelines. The field survey was carried out from 18 February to 13 March, about a month after the earthquake occurred.

Although the debris from collapsed houses and buildings along the crowded streets had already been removed in many places, we still saw numerous areas where there were piles of debris which had remained untouched along the narrow alleys in severely damaged areas. We witnessed many evacuees taking shelter in tents on the outskirts of towns and villages. Because of several damaging earthquakes in the past, the Kachchh District in Gujarat State had the highest rank in the seismic risk evaluations of India. Unfortunately, the awareness of the seismic risk did not facilitate implementation of earthquake-resistant design codes on the traditional buildings, which are quite vulnerable to strong ground shaking. It was fortunate that the earthquake took place in the dry season, otherwise the restoration following the devastating disaster would have been much harder.

This report mainly consists of contributions from the members of the research group supported by the Monbu-Kagaku-sho. But it also includes some papers written by researchers who closely collaborated with us from the start of this investigation. The addresses of all the authors who contributed to this report are listed in the appendix. We sincerely hope that the knowledge and insight gained during the present study will help in understanding the seismic hazard in this region and in reconstructing towns that are resilient in future large earthquakes.

In the literature, this earthquake of 26 January 2001 is called by different names, such as the Bhuj earthquake, Kachchh earthquake, Gujarat earthquake, and West

India earthquake. In this report this event is for the most part referred to as the Gujarat earthquake, but the readers may find the event being called by other names throughout the text.

Soon after we returned to Japan from the field survey in India, we started to post the latest information on the progress of our investigations on a webpage. The webpage contains many photos showing damage to buildings, sites of surface deformation and liquefaction, etc., which are not included in this report because of lack of space. For this information, the readers are referred to the following web site:

<http://kouzou.cc.kogakuin.ac.jp/mext/india>