Preface

I live in South Carolina, the state that bore the brunt of the destructive 1886 Charleston earthquake. For those who live in South Carolina, the earthquake is a distant memory, but it also is a constant reminder of the devastating potential of intraplate earthquakes (IPE). Being a resident, this earthquake and IPE in general became a lifelong interest of mine. The destructive 1975 Haicheng and 1976 Tangshan earthquakes in China further fueled this interest.

In the past four decades, after the development of the plate tectonic theory, there has been considerable progress in understanding the nature of these rare earthquakes. In the United States, the first systematic attempt to place IPE in a global setting began in the late 1970s, together with a proliferation of seismic networks. In the 1980s, to assess the seismic hazard posed by future IPE, the United States nuclear industry sponsored a systematic study of the phenomenon in the Central/Eastern United States (CEUS). Simultaneously, another major forward step was the compilation of the global in situ stress data. The results of these studies led to the identification of various global, geologic and seismological aspects of IPE. After the discovery in the early 1980s of buried sand blows associated with the 1886 and prehistoric Charleston earthquakes, systematic paleoseismological investigations led to the discovery and dating of several prehistoric earthquakes in the CEUS.

In the 1990s, with the collection of increasingly better geological, seismological, paleoseismological and GPS data, several theoretical models were proposed to explain the IPE in the New Madrid seismic zone. Further breakthroughs occurred when aftershocks of moderate earthquakes in the eastern margin of the Sea of Japan and the destructive 2001 Bhuj earthquake in Western India were recorded on dense networks of seismic instruments. Tomographic inversions of these data led to an identification of the causative structures and to a better understanding of the seismogenesis of these earthquakes. Simultaneous to the developments in the United States and Eastern Canada, IPE were being studied in Australia, Brazil, eastern China, India and Western Europe. Following a special session on IPE at the American Geophysical Union meeting in Iguassu Falls, Brazil, in August 2010, it was thought that a global review of IPE would be of wide interest. This book was borne out of that proposition.

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