

EARTHQUAKES

The seismicity of South Carolina from June 1886 until 1914 is considered the most active period in the earthquake history for the state. Close to 200 recorded earthquakes occurred during this time period including the catastrophic earthquake of August 31, 1886. The Charleston earthquake of 1886 is considered to be one of the largest historical earthquakes in eastern North America, as well as the largest earthquake in the southeastern United States.

At 9:50 PM on August 31, 1886, the major Charleston earthquake occurred and lasted less than one minute near Charleston. It caused approximately sixty deaths and extensive damage to the areas surrounding its epicenter. This earthquake was preceded by several light tremors and two earthquakes on August 27 and 28, 1886. During the three months ensuing August 1886, following the rapid release of seismic energy, numerous aftershocks occurred with two large earthquakes on October 22 and November 5, 1886. Over the next 12 months, the seismicity decreased although it continued to produce noticeable tremors until 1888. Sporadic earthquakes continued in the Charleston-Summerville area until 1914 (Visvanathan, 1980).



William E. Wilson (South Caroliniana Library Archives)

1, Figures 1 and 2). The estimated body wave magnitude of 6.6-6.9 was calculated from intensity data reported after the earthquake (Nuttli and others, 1979).

The widespread effects of the earthquake were evident in structural damage reported as far away as central Ohio, as well as places such as eastern Kentucky, southern Virginia, and western West Virginia. Long-period effects were noted more than a thousand kilometers away from the epicenter. The vast majority of damage, however, was focused in an elliptical area approximately 35 by 45 kilometers trending northeast between the Charleston and Jedburg areas (left). Notable damage included more than 1,300 square kilometers of extensive cratering and fissuring. Approximately 80 kilometers of railroad track were damaged. Damage included lateral and vertical displacement of tracks and formations of S-shaped curves (See photo above).

The close proximity of the earthquake's epicenter to Charleston resulted in it being the most physically destructive earthquake in the 19th century in the United States, causing an estimated \$5-\$6 million in property damage (approximately \$100 million in today's economy). It also was the only earthquake to occur east of the Rocky Mountains that was reported to have caused the loss of human life. Low-level seismic activity continues in the Charleston area.

Within the past few years, several hypotheses of the 1886 Charleston earthquake have been developed to help explain the cause of the seismicity. Data have been collected from seismic reflection and refraction surveys, gravity surveys, aeromagnetic surveys, a variety of geologic and geodetic data, current seismicity and the compilation of historical seismicity. With further study, scientists hope to explain the cause of the Summerville-Charleston area seismicity and better prepare the population for another large-scale earthquake, minimizing damage and loss of life.

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Because proper seismological instrumentation had not yet been implemented, C.E. Dutton, in a report published by the US Geological Survey in 1889, could only estimate the location and size of the earthquake. A modified Mercalli intensity of X (Bollinger, 1977) was assigned to this earthquake as a result of the severity of the damage (Table

Figure 1. Isoseismal map showing the state of South Carolina for the 1886 Charleston earthquake. Intensity observations are indicated by Arabic numerals, and the contoured levels are shown by Roman numerals – revised (modified from Bollinger, 1977).

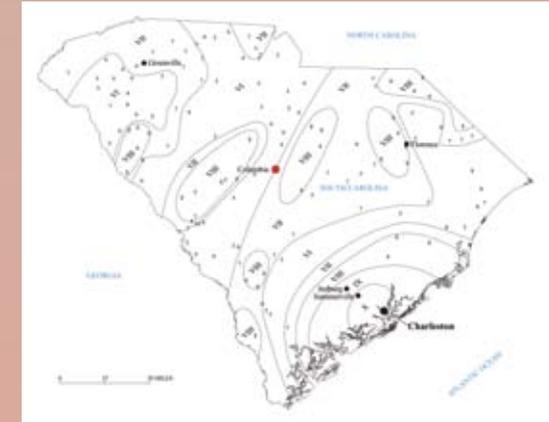
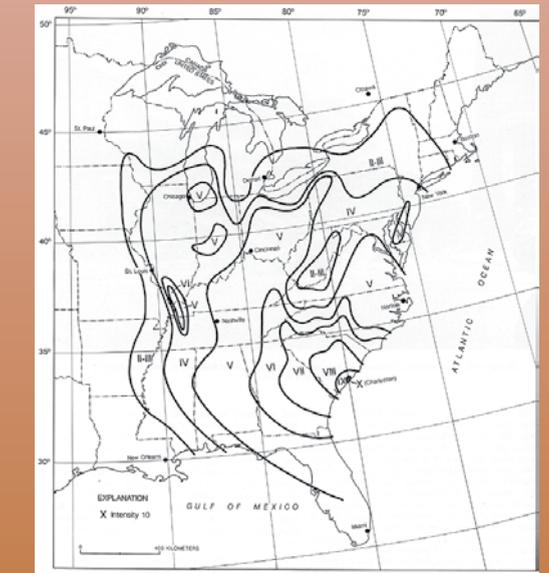


Figure 2. Isoseismal map for the 1886 Charleston earthquake. Intensity is indicated by Roman numerals (Stover et al., 1993).



References cited:

- Bollinger, G.A., 1977, Reinterpretation of the intensity data for the 1886 Charleston, South Carolina, earthquake, in Rankin, D.W., ed., Studies related to the Charleston, South Carolina, earthquake of 1886 – A preliminary report: U.S. Geological Survey Professional Paper 1028, p. 17-32.
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- Nuttli, O.W., Bollinger, G.A., and Griffiths, D.W., 1979, On the relation between Modified Mercalli intensity and body-wave magnitude: Seismological Society of America Bulletin, v. 69, p. 893-909.
- Stover, Carl W., and Coffman, Jerry L., 1993, Abridged from Seismicity of the United States, 1568-1989 (Revised), U.S. Geological Survey Professional Paper 1527, United States Government Printing Office, Washington.
- Visvanathan, T.R., 1980, Earthquakes in South Carolina 1698-1975, South Carolina Geological Survey Bulletin 40, 61 p.

INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+
SHAKING	Not felt	Weak	Light	Moderate	Strong	Very Strong	Severe	Violent	Extreme
DAMAGE	none	none	none	Very light	Light	Moderate	Moderate/Heavy	Heavy	Very Heavy

Table 1. Modified Mercalli Intensity Scale