The Third Nephi Disaster: A Geological View

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One of the most vivid descriptions of the utter destruction of cities and the death of hundreds of thousands of people is found in 3 Nephi 8 of the Book of Mormon. Earthquakes, volcanic eruptions, landslides, and storms of incredible proportions destroyed the largest part of the whole nation. At least five interesting questions are raised by this description.

1. In what kind of geological setting would one expect these events to have occurred?

2. If such a disastrous scene were possible, could it conceivably have taken place within three hours, as described in 3 Nephi 8:19?

3. Are there any likely locations in America where it might have occurred?

4. Are there any presently detectable evidences that such an event actually happened?

5. Could such a disaster discriminate between the wicked and the righteous?

As recorded in 3 Nephi 8, beginning with verse 5, the disaster was ushered in by "a great storm, such an one as never had been known in all the land." The storm was of such ferocity that thunder shook the ground and lightning started fires in the city of Zarahemla. The city of Moroni sank into the depths of the sea, and the earth buried the city of Moronihah. Many other cities were sunk, burned, or devastated. The ground surface suffered a general breakup: open fissures developed, and new hills and valleys formed (3 Ne. 5:8). These events took place in three hours and were followed by a foreboding darkness that the people could feel, a darkness so intense that fires could not be kindled and people were overcome and apparently suffocated (3 Ne. 10:13).

In summary, the disaster was characterized by a terrible storm, earthquakes, and a smothering darkness. Attending these events was fire sent down from heaven (3 Ne. 9:11).

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Every aspect of this dreadful occurrence, except for its selectivity, can be accommodated by modern earthquake models. Nibley, in *Since Cumorah*, does an admirable job of documenting events similar to those recounted in 3 Nephi in locales around the world (Nibley 1967, 262–65). However, it is possible, using modern models, to identify the west coasts of Central and South America as the geological setting where the events described in 3 Nephi could have occurred.

Geologists know that earthquakes generally occur in well-defined belts or zones on the earth. These belts mark the junctions of the earth's plates, or large segments — usually continent sized — of its brittle crust. As these plates move slowly over the surface of the earth, they collide with one another, pull away from one another, and in some cases slide over and beneath each other. The most geologically dramatic junction, called a subduction zone, occurs when one plate slides beneath another. A subduction zone is characterized by periodic, severe earthquakes, by volcanic activity, usually by a deep trench, and, where conditions permit, by large-scale change of ground elevation by means of faulting. (A fault is a fracture in the earth's crust along which opposing sides of the crust have moved.) Movement along some faults has been measured in thousands of feet. It is generally thought that such massive movement along a fault occurs in small increments over a long period of time; but under some conditions, a single earthquake can cause significant large-scale movement.

One of the more active subduction zones of the world is located along the western coast of South America and the western edge of Central America (Fig. 1). Several devastating earthquakes have occurred during historic times in this vicinity. One earthquake destroyed Antiqua, then the capital of Guatemala, on 11 September 1541. In October 1746 an earthquake struck Lima, Peru, killing at least 5,000 people. Locals still wear purple in memory of that event. On 31 May 1970 a severe earthquake, centered offshore from Chimbote, Peru, triggered massive land and mudslides. One massive mudslide moved at an estimated 250–300 miles per hour down from the mountains and along the valley. It completely buried the town of Yungay, killing more than 20,000 inhabitants. Was Moronihah "swallowed up" by a similar phenomenon? Subsequent subsurface drilling at and near the site of the Yungay disaster found ruins of two other cities buried by previous landslides.

The mountainous area of Central and South America abuts a long, linear ocean trench. This trench exceeds 20,000 feet in depth and is bordered along the shore by mountains more than 22,000 feet high. The elevation difference of more than 40,000 feet makes this a likely site for large-scale fault development, allowing blocks of earth to slip oceanward. Such a slippage could occur during a devastating earthquake and could explain the loss of the city of Moroni into the depths. High-altitude air photos of the Andean Mountains exhibited at a professional meeting I once attended reveal what may be disconnected segments of an ancient highway system, apparently separated by considerable vertical displacements. Could they be part of the highway system mentioned in 3 Nephi 6:8? If so, they could have been disrupted by the earth-

quakes described in 3 Nephi 8. Even if these are not the highways of 3 Nephi, their existence lends credence to the idea of a general topographic disruption as described in 3 Nephi.

All this earthquake activity, with the main violent quake followed by several aftershocks, could well have occurred within three hours. Several earthquakes in Guatemala had a main shock followed by periodic aftershocks for more than five weeks afterward.

Two devastating Guatemalan earthquakes (23 December 1586 and 29–30 September 1717) were accompanied by severe and violent eruptions of the volcano Fuego. The vapor of darkness could well have been, as Nibley suggests (1967, 267), the result of volcanic activity. However, it is also possible for an earthquake to be so violent that huge, dense clouds of dust rise into the air. The vapor of darkness could have been a combination of earthquake-caused dust and volcanic gas and smoke. Active volcanoes are common along the west coast of South America and, particularly, Central America.

It is common for areas that have frequent, severe earthquakes to have a high incidence of volcanic activity. A violent earthquake could have caused volcanic eruptions, which perhaps were the fires from heaven described in 3 Nephi. These eruptions would not only have made the atmosphere dark with dust and cinders but would have released carbon monoxide, carbon dioxide, and sulfurous gases into the atmosphere. Sufficiently concentrated, this mix of potentially lethal gases would not only have been suffocating but would have made fire kindling impossible. In several modern cases, gases have collected in low spots after an eruption, killing both animals and vegetation. In one 1947–49 volcanic eruption in Iceland, hundreds of sheep suffocated while the sheepherders, located on rims above the sheep, suffered no ill effect (Macdonald 1972, 257). Interestingly, the vapor of darkness described in 3 Nephi remained for three days, a duration not unlikely in cases of volcanic dust and gas emission.

The selectivity of such a disaster is more difficult to explain. Of course, because the majority of people living at that time were not righteous, most of those killed would, by chance, have been wicked. Another explanation is that because, even in the most destructive earthquakes, the disastrous effects seem to be localized and because people of similar beliefs tend to live together, the disaster that struck a particular city would be likely to kill people of a particular persuasion.

In summary, the disaster described in 3 Nephi was probably a gigantic earthquake with attendant storms and volcanic activity. The west coasts of South and Central America have the geological features that one would expect to find at the site of such a disaster. Modern geological models of plate motion confirm that this area could have produced the 3 Nephi events. The subduction zone of Central and South America shows evidences of earthquake and volcanic activity very similar to the activity described in the Book of Mormon. It is important to note that this subduction zone model and its implications had not been developed when Joseph Smith translated the Book of Mormon. Obviously, a great deal of work must precede a definitive answer, but it is at