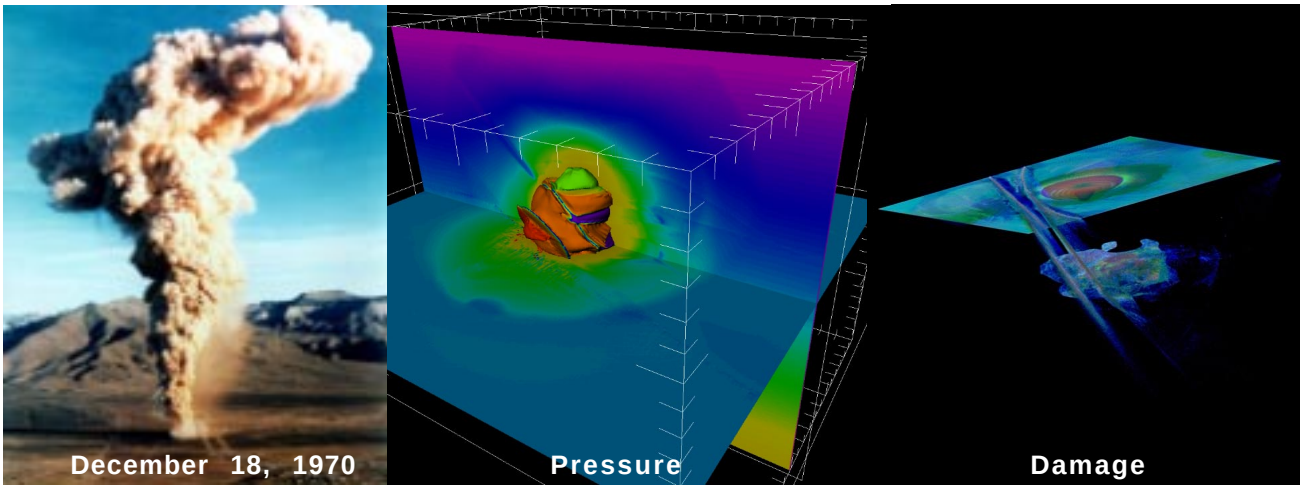

3D GEODYN simulations provide a better understanding of the Baneberry underground test containment failure. High-fidelity representations of complex geologic features are important to containment.

Three-dimensional Simulation of the Baneberry Nuclear Event

Baneberry, a 10-kiloton nuclear event, was detonated at a depth of 278 m at the Nevada Test Site on December 18, 1970. Shortly after detonation, radioactive gases emanating from the cavity were released into the atmosphere through a shock-induced fissure near surface ground zero. Extensive geophysical investigations, coupled with a series of 1D and 2D computational studies were used to reconstruct the sequence of events that led to the catastrophic failure.

However, the geological profile of the Baneberry site is complex and inherently three-dimensional, which meant that some geological features had to be simplified or ignored in the 2D simulations. This left open the possibility that features unaccounted for in the 2D simulations could have had an important influence on the eventual containment failure of the Baneberry event. To address this issue, a new study was undertaken that encompassed 3D high-fidelity Baneberry simulations based on the most accurate geologic and geophysical data available.

The computational model used included about 40 million zones and the simulation required approximately 40,000 CPU hours to complete, thus making it the largest simulation of its kind. The simulation helped establish a new capability to perform underground test containment simulations in 3D, thus making it possible—for the first time—to accurately represent complex geologic features in the simulation. Comparison of the results of the study with available data and with the results of the previous 2D computational studies provided new insight into the cause of the Baneberry containment failure.

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